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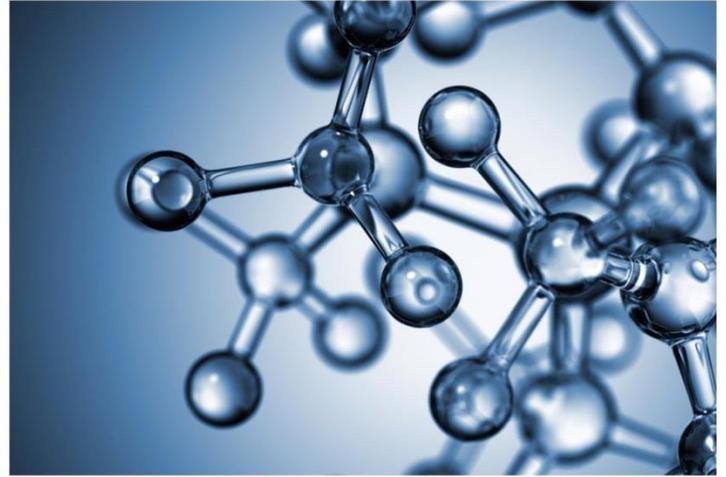
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Chemical Engineering

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- ✓ Fuels and Combustion
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- ✓ Materials and Construction
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- ✓ Polymer Technology
- ✓ Process Control and Instrumentation
- ✓ Process Equipment and Plant Design
- ✓ Refractory Technology
- ✓ Stoichiometry
- ✓ Thermodynamics

CHEMICAL ENGINEERING MCQS

A gas at 0°C is cooled at constant pressure until its volume becomes half the original volume. The temperature of the gas at this state will be _____?

- A. -136.5°C
- B. - 136.5°K
- C. -273°C
- D. 0°K

Unit of furnace loading is _____?

- A. Ton stock/hr/m² hearth area
- B. Ton stock/hr
- C. Ton stock/m² hearth area
- D. Both B. and C.

Which of the following is a commonly used manometric liquid for low pressure range ?

- A. Ethyl alcohol
- B. **Carbon tetrachloride**
- C. Glycerol
- D. Ethylene glycol

_____ pump is the most suitable device for discharging a liquid against a pressure of ≥ 1500 kgf/cm²?

- A. Centrifugal
- B. Piston
- C. **Plunger**
- D. Vane

Othmer chart is useful in estimating the heat of _____?

- A. Mixing

- B. Wetting
- C. Adsorption**
- D. None of these

Yellow glycerine is made into white, using_____?

- A. Activated carbon**
- B. Diatomaceous earth
- C. Bauxite
- D. Bentonite

The material is crushed in a gyratory crusher by the action of_____?

- A. Impact
- B. Compression**
- C. Attrition
- D. Cutting

_____ paint has the minimum absorption co-efficient?

- A. Black
- B. White lead**
- C. Grey
- D. Light cream

Very small pressure difference (< 5 mm water column) can be most conveniently measured by a/an _____ manometer?

- A. U-tube water
- B. U-tube mercury
- C. Inclined tube mercury
- D. Inclined tube water**

Coating provided on the electrodes used in the arc welding is not expected to_____?

- A. Add alloying elements

B. Prevent electrode from contamination

C. Stabilise the arc

D. Provide protective atmosphere to weld

Platinum resistance thermometer is the international standard for temperature measurement between _____?

A. Triple point of hydrogen and freezing point of antimony

B. 13.81°K to 903.9°K

C. Both A. and B.

D. Neither A. nor B.

At a given temperature, the volume of a gas dissolved in a solvent _____ with increase in pressure?

A. Increases

B. Decreases

C. Remains unchanged

D. May increase or decrease; depends on the gas

Higher percentage of ash in coal meant for the production of metallurgical grade coke _____?

A. Decreases the hardness of coke

B. Decreases the abrasion resistance of coke

C. Causes brittleness in steel

D. None of these

Alcohol percentage in molasses may be around _____?

A. 10

B. 40

C. 70

D. 85

In a heat exchanger, floating head is provided to _____?

A. Facilitate cleaning of the exchanger

- B. Increase the heat transfer area
- C. Relieve stresses caused by thermal expansion**
- D. Increase log mean temperature gradient

Catalyst used in the manufacture of sulphuric acid by chamber & contact processes are respectively ?

- A. V₂O₅ & Cr₂O₃.
- B. Oxides of nitrogen & Cr₂O₃
- C. V₂O₅ on a porous carrier & oxides of nitrogen
- D. Oxides of nitrogen & V₂O₅ on a porous carrier**

Which of the following is a moderating material used in nuclear reactor ?

- A. Graphite**
- B. Cadmium
- C. Zircaloy (an alloy of zirconium and aluminium)
- D. Stainless steel

'Age hardening' of duralumin is due to _____ ?

- A. Copper
- B. Magnesium
- C. Both A. & B.**
- D. Neither A. nor B.

A chemical reaction occurs when the energy of the reacting molecules is _____ the activation energy of the reaction?

- A. Less than
- B. Equal to
- C. More than
- D. Equal to or more than**

Corresponding to Prandtl number in heat transfer, the dimensionless group in mass transfer is the _____ number?

- A. Schmidt**

- B. Sherwood
- C. Peclet
- D. Stanton

The dimension of surface tension is _____?

- A. ML-2
- B. MT-2**
- C. MLT-2
- D. ML-2T

Tray spacing in a distillation column of dia 10-12 ft. used in petroleum refinery may be around _____ inches?

- A. 5
- B. 30**
- C. 60
- D. 100

Ultrafine grinders operate principally by _____?

- A. Slow compression
- B. Impact
- C. Attrition**
- D. Cutting action

The main use of HCl is in the _____?

- A. Drilling of petroleum wells and pickling of steel sheets**
- B. Manufacture of cationic detergent
- C. Treatment of spent fuel of nuclear reactor
- D. None of these

Which of the following reactions occurring during coal gasification is called the Neumann reversal reaction ?

- A. $2\text{CO} \leftrightarrow \text{C} + \text{CO}_2$**
- B. $\text{CO} + \text{H}_2\text{O} \leftrightarrow \text{CO}_2 + \text{H}_2$

- C. $C + H_2O \leftrightarrow CO + H_2$
- D. $C + 2H_2O \leftrightarrow CO_2 + 2H_2$

Limestone addition in the blast furnace is done to flux _____ present in the raw materials?

- A. SiO_2**
- B. Al_2O_3
- C. MnO_2
- D. P

For an irreversible process involving only pressure-volume work _____?

- A. $(dF)_T, p < 0$**
- B. $(dF)_T, p = 0$
- C. $(dF)_T, p > 0$
- D. $(dA)_T, v > 0$

Specific conductance is defined as the reciprocal of resistance in ohms of 1c.c. of liquid at a specified temperature. Its value for distilled water is about _____ micro mho/cm³?

- A. 50
- B. 100
- C. 10
- D. 1**

Pine oil used in froth floatation technique acts as a/an _____?

- A. Collector
- B. Modifier
- C. Frother**
- D. Activator

Domestic refrigerator usually works on the _____ refrigeration cycle?

- A. Carnot
- B. Air
- C. Absorption**
- D. vapour-ejection

Oxyacetylene reducing flame is used while carrying out welding on _____?

- A. Alloy steel
- B. Grey cast iron
- C. Mild steel**
- D. High carbon steel

Infective bacteria in water is killed by the _____ process?

- A. Sterilisation**
- B. Aeration
- C. Disinfection
- D. None of these

Ostwald charts are meant for _____?

- A. Computing the excess/deficiency of combustion air**
- B. Calculation of flue gas temperature
- C. Computation of flue gas analysis
- D. None of these

The most common filter aid is _____?

- A. Diatomaceous earth**
- B. Calcium silicate
- C. Sodium carbonate
- D. Silica gel

Fourier's law of heat conduction applies to _____ surfaces?

- A. Isothermal

- B. Non-isothermal
- C. Both A. and B.**
- D. Neither A. and B.

Capacity of a rotary dryer depends on its _____?

- A. rpm
- B. Inclination with ground surface
- C. Both A. and B.**
- D. Neither A. nor B.

pH value of soil is maintained at _____ by the addition of fertiliser for optimum growth and health of the plant?

- A. 4-5
- B. 7-8**
- C. 9-10
- D. 12-13

Raw materials for nitric acid manufacture are _____?

- A. Hydrogen peroxide, air and water
- B. Anhydrous ammonia and air
- C. Anhydrous ammonia, air and water**
- D. Wet ammonia, air and water

Nominal size of a pipe is an indication of its _____ diameter?

- A. Inner
- B. Outer
- C. Approximate**
- D. None of these

For one dimensional flow of an incompressible fluid in unsteady state in x-direction, the continuity equation is given by _____?

- A. $\partial u / \partial x = 0$**
- B. $\partial(\rho u) / \partial x = 0$

- C. $(\partial u/\partial x) = -(\partial \rho/\partial t)$
D. $\partial \rho/\partial t = 0$

Coating thickness in case of galvanising of steel sheet generally corresponds to the deposition of _____ gms of zinc per m² of steel strip ?

- A. 5-10
B. 1000-1500
C. 120-500
D. 1500-3000

Thermal diffusivity of a refractory brick is high, when its _____ is high?

- A. Density
B. Specific heat
C. Thermal conductivity
D. None of these

Atoms with same number of neutrons, but different number of nucleons are called _____?

- A. Isotones**
B. Isobars
C. Isotopes
D. Isostere

A centrifugal pump loses prime after starting. The reason of this trouble may be _____?

- A. Incomplete priming
B. Too high a suction lift
C. Low available NPSH and air leaks in the suction pipe
D. All A., B., and C.

An alloy of Fe – 0.4 % C is _____?

- A. Cast iron
B. Hypo-eutectoid steel

- C. Hyper-eutectoid steel
- D. Eutectoid steel

Silicone rubber is not resistant to the corrosive action of _____?

- A. Sulphuric acid (10%)
- B. Sulphuric acid (95%)
- C. Ether
- D. Both B. and C.**

The combustion equations of carbon and carbon monoxide are as follows: $C + O_2 = CO_2$, $\Delta H = -394 \text{ kJ/kg. mole}$ $CO + \frac{1}{2} O_2 = CO_2$, $\Delta H = -284.5 \text{ kJ/kg. mole}$. The heat of formation of CO is _____ kJ/kg. mole?

- A. -109.5**
- B. +109.5
- C. +180
- D. +100

Nylon-6 as compared to nylon 66 has lower ?

- A. Abrasion resistance**
- B. Thermal stability
- C. Adhesion to rubber
- D. Hardness

Bacterial aerobic oxidation of polluted water in biological oxidation ponds is done to purify it. Presence of bacteria helps in _____?

- A. Coagulation and flocculation of colloids
- B. Oxidation of carbonaceous matter to CO_2
- C. Nitrification or oxidation of ammonia derived from breakdown of nitrogenous organic matter to the nitrite and eventually to the nitrate
- D. All A., B. and C.**

In a binary liquid system, the composition expressed as _____ is independent of the temperature & pressure?

- A. Kg of solute/kg of solvent
- B. Kg-mole of solute/kg-mole of solvent
- C. Kg-mole of solute/1000 kg of solvent
- D. All A., B. & C.**

Which of the following is insensitive to changes in pressure ?

- A. Heat of vaporisation
- B. Melting point
- C. Heat of fusion
- D. Both B. and C.**

The inverse Laplace transform of the function $f(S) = 1/S (1 + S)$ is _____?

- A. $1 + et$
- B. $1 - et$
- C. $1 + e-t$
- D. $1 - e-t$**

The bank of tubes located at the back of the domestic refrigerators are the _____ tubes?

- A. Refrigerant cooling
- B. Evaporator
- C. Condenser**
- D. Throttling

For separating small pieces of metal from engine oil of a car, the best separating technique is the _____ ?

- A. Chromatography
- B. Evaporation
- C. Filtration**

D. Fractional distillation

The ratio of existing moles of vapor per mole of vapor free gas to the moles of vapor that would be present per mole of vapor free gas, if the mixture were saturated at the existing temperature & pressure, is termed as the _____?

- A. Relative humidity
- B. Relative saturation
- C. Percentage saturation**
- D. None of these

In a mixer, the quantity, $(v \cdot L/D)$ is termed as _____ number (where, v = longitudinal velocity of material, L = length of the mixer, D = diffusivity in axial mixing) ?

- A. Weber
- B. Peclet**
- C. Brinkman
- D. Schmidt

Which of the following is a desirable characteristic of an instrument ?

- A. High drift
- B. High fidelity**
- C. High measuring lag
- D. Poor reproducibility

Density in the solid state is slightly less than that in its liquid state, in case of _____?

- A. Carbon dioxide
- B. Water**
- C. Mercury
- D. None of these

Solvent extracted oil _____?

- A. Has low free fatty acid content
- B. Is odourless
- C. Has more of unsaturates
- D. None of these**

Soft & non-abrasive materials can be made into fines by _____?

- A. Attrition**
- B. Compression
- C. Cutting
- D. None of these

For a distillation column operating at minimum reflux, the _____?

- A. Concentration of liquid and vapour leaving a plate will be same
- B. Reflux ratio will be maximum
- C. Number of plates required will be maximum**
- D. None of these

Plastics are _____?

- A. Used in very high temperature applications
- B. Non-biodegradable**
- C. Not suitable for drainage pipe manufacture
- D. All A., B. & C.

Which one gives the monochromatic emissive power for black body radiation ?

- A. Planck's law**
- B. Kirchhoff's law
- C. Wien's law
- D. Stefan-Boltzmann law

A binary mixture of benzene and cyclohexane is separated

by _____ ?

- A. Flash vaporisation
- B. Extractive distillation**
- C. Solvent extraction
- D. Ordinary distillation

Most important property of steels for use in automobile bodies is the _____ ?

- A. Formability**
- B. Yield strength
- C. Toughness
- D. Resilience

In contact process, SO_3 is absorbed in 97% H_2SO_4 and not in water, because _____ ?

- A. SO_3 gas is sparingly soluble in water
- B. Water forms an acid mist, which is difficult to absorb**
- C. The purity of acid is affected
- D. Scale formation in the absorber is to be avoided

Which of the following is a Newtonian fluid ?

- A. Rubber latex
- B. Sewage sludge
- C. Quicksand
- D. Non-colloidal solution**

The pressure and power requirement of a gas fan at constant speed & capacity varies _____ the gas density?

- A. Directly as**
- B. Inversely as square root of
- C. Inversely as
- D. As square of

Unsaturated oils compared to saturated oils have _____?

- A. Lower melting point & higher reactivity to oxygen
- B. Higher melting point & higher reactivity to oxygen
- C. Lower melting point & lower reactivity to oxygen
- D. Higher melting point & lower reactivity to oxygen

For a zero order reaction, the concentration of product increases with the _____?

- A. Increase of reaction time
- B. Increase in initial concentration
- C. Total pressure
- D. Decrease in total pressure

Use of flux during soldering is done to _____?

- A. Increase fluidity of solder by lowering its melting temperature
- B. Prevent oxide formation
- C. Wash away surplus solder
- D. Full up the joint gap

Which of the following fine dust removal equipments is the most efficient?

- A. Bag filter
- B. Scrubber
- C. Electrostatic precipitator
- D. Cyclone separator

Which of the following mixtures does not form an azeotrope at atmospheric pressure?

- A. Water-alcohol
- B. Methyl alcohol-acetone
- C. Butyl acetate-water
- D. None of these

Pure aniline is evaporating through a stagnant air film of 1 mm thickness at 300

K and a total pressure of 100 KPa. The vapor pressure of aniline at 300 K is 0.1 KPa. The total molar concentration under these conditions is 40.1 mole/m³. The diffusivity of aniline in air is 0.74×10^{-5} m²/s. The numerical value of mass transfer co-efficient is 7.4×10^{-3} . Its units are _____?

- A. m/s
- B. cm/s
- C. mole/m².s.Pa**
- D. k.mole/m².s.Pa

Theoretical volume of oxygen required for complete combustion of 1Nm³ of acetylene, in oxy-acetylene welding is _____ Nm³ ?

- A. 0.5
- B. 1
- C. 1/3
- D. 2.5**

With increase in temperature, the equilibrium constant at constant pressure (K_p) for oxidation of sulphur dioxide _____?

- A. Increases
- B. Increases linearly
- C. Decreases**
- D. Decreases linearly

The calibration data of a thermocouple with its cold junction at 0°C are given below. The hot junction of the thermocouple is placed in a bath at 80°C, while its cold junction is at 20°C. What is the emf of thermocouple ?

- A. 3.26 mv
- B. 0.80 mv
- C. 2.46 mv**
- D. 2.43 mv

Which of the following metals reacts violently with water ?

- A. Mercury
- B. Sodium**
- C. Calcium
- D. Magnesium

Brass is an alloy of _____?

- A. Nickel and tin
- B. Copper and zinc**
- C. Tin and lead
- D. Copper, nickel and zinc

Reference points i.e., ice point and steam point in Reaumer temperature scale are respectively _____?

- A. -273° & 80°
- B. 0° & 80°**
- C. 32° & 460°
- D. 32° & 80°

Dimension of surface tension is (where, F = force, L = length) ?

- A. FL-1**
- B. F-1. L
- C. F.L-2
- D. F-2. L

Separation of the isotopes of helium for scientific investigations is done by _____?

- A. Reverse osmosis
- B. Thermal diffusion**
- C. Leaching
- D. Solvent extraction

Which of the following is not a continuous waste heat recovery equipment from the flue gases going out of furnace ?

- A. Economiser
- B. Regenerator**
- C. Ceramic recuperator
- D. Waste heat boiler

Bituminous coal _____ ?

- A. Ignites less easily than anthracite
- B. Is generally coking
- C. Burns with smoky yellow flame
- D. Both B. and C.**

High temperature carbonisation of coal produces _____ ?

- A. Inferior coke compared to low temperature carbonisation
- B. Less of gases compared to liquid products
- C. Large quantity of tar compared to low temperature carbonisation
- D. None of these**

Which is not concerned directly with mass transfer ?

- A. Schmidt number
- B. Sherwood number
- C. Lewis relationship
- D. Froude number**

Molecular diffusion is caused by the _____ ?

- A. Transfer of molecules from low concentration to high concentration region
- B. Thermal energy of the molecules**
- C. Activation energy of the molecules
- D. Potential energy of the molecules

_____ wire is never used for making the heating element ?

- A. Nichrome
- B. Kanthal
- C. Invar**

D. None of these

Main constituent of the gas produced from a gobar gas plant is _____?

- A. CO₂
- B. CH₄**
- C. H₂
- D. CO

Rise of liquid in a capillary tube is due to _____?

- A. Cohesion
- B. Adhesion
- C. Both A. & B.**
- D. Neither A. nor B.

In which of the electric power generation system, the operating cost is minimum ?

- A. Thermal
- B. Nuclear
- C. Hydroelectric**
- D. Fast breeder reactor

Magnetic flowmeters are generally not used for the velocity/flow measurement of hydrocarbons due to their ?

- A. Low thermal conductivity
- B. Low electrical conductivity**
- C. High viscosity index
- D. Low flash point

In turbulent flow, the _____?

- A. Fluid particles move in an orderly manner
- B. Momentum transfer is on molecular scale only
- C. Shear stress is caused more effectively by cohesion than momentum transfer

D. Shear stresses are generally larger than in a similar laminar flow

Which of the following is a bleaching agent added in the detergents to facilitate removal of stains caused due to blood, tea etc ?

- A. Sodium silicate
- B. Sodium borate**
- C. Sodium tripolyphosphate (STPP)
- D. Caustic soda

Correct use of 'factor of safety' is very important in equipment design. It is defined as the ratio of the _____?

- A. Ultimate stress to breaking stress
- B. Ultimate stress to working stress**
- C. Working stress to ultimate stress
- D. None of these

There are five concentric layers within the atmosphere which is differentiated on the basis of temperature. The atmospheric layer which lies close to the earth's surface in which human being along with other organisms live is called troposphere. The rate at which air temperature in the troposphere gradually decreases with height is about _____ °C/km?

- A. 0.05
- B. 1
- C. 6.5**
- D. 15

Advantage of continuous drying over batch drying is that the _____?

- A. Drying cost per unit weight of dried product is less
- B. Product with more uniform moisture content is produced
- C. Equipment size required is smaller
- D. All A , B. & C.**

Direct conversion of thermal energy to electrical energy is facilitated by the _____?

- A. Fuel cells
- B. Photo voltaic cell
- C. Magneto hydrodynamic generator**
- D. None of these

Mercaptans are _____?

- A. Low boiling sulphur compounds
- B. Added in LPG cylinders to detect gas leakage by its smell
- C. Undesirable in petrol, as they reduce its octane number
- D. All A., B. and C.**

An oxidation process is accompanied with decrease in the _____?

- A. Number of electrons**
- B. Oxidation number
- C. Number of ions
- D. All A , B. & C.

Secondary hardening in steels arises out of the _____?

- A. Precipitation of fine alloy carbides at high temperatures
- B. Refinement of ferrite grain size by working
- C. Decomposition of retained austenite upon heat treatment**
- D. Precipitation of complex inter-metallic upon heat treatment

What is the force required (in Newtons) to hold a spherical balloon stationary in water at a depth of H from the air-water interface? The balloon is of radius 0.1 m and is filled with air ?

- A. $4\pi g/3$**
- B. $0.01 \pi gH/4$

- C. $0.01 \pi \text{gH}/8$
- D. $0.04 \pi \text{gH}/3$

High ash coals _____?

- A. Are soft & friable (poor strength and size stability)
- B. Require longer time of carbonisation as ash offers resistance to heat transfer**
- C. Produce larger quantity of coke oven gas
- D. None of these

Main source of _____ is monazite sand?

- A. Uranium
- B. Polonium
- C. Hafnium
- D. Thorium**

Angle of nip of the crushing rolls does not depend upon the _____?

- A. Diameter of the rolls
- B. Speed of the rolls**
- C. Product size
- D. Feed size

Tabular bowl centrifuges as compared to disk bowl centrifuges _____?

- A. Operate at higher speed**
- B. Employ bowl of larger diameter
- C. Can't be operated under pressure/vacuum
- D. Can't be used for separation of fine suspended solids from a liquid

Plutonium _____?

- A. Is recovered from spent fuel from thermal nuclear reactor
- B. Has much lower melting point (640°C) compared to thorium (1690°C)
- C. Both A. and B.**
- D. Neither A. nor B.

'Fat coals' are those coals which have very high _____?

- A. **Caking capacity**
- B. Volatile matter content
- C. Fusion point of its ash
- D. Inherent moisture content

Refrigerants commonly used for domestic refrigerators are _____?

- A. **Ethyl chloride or methyl chloride**
- B. Freon-12
- C. Propane
- D. NH₃ or CO₂

It is not preferable to use superheated steam in evaporators, because of its very _____?

- A. High temperature
- B. High pressure
- C. **Low film co-efficient**
- D. None of these

Biological shield is provided in a nuclear power reactor to protect the _____ from radiation damage?

- A. Fuel elements
- B. **Operating personnels**
- C. Walls of the reactor

Pick out the wrong statement ?

- A. Lead can creep under its own weight at room temperature
- B. The electrical conductivity of gold is considerably reduced by alloying additions due to the decrease in electron movement
- C. **Recrystallisation temperature decreases with decrease in strain in a cold worked metal**

D. With increase in temperature, the electrical conductivity of intrinsic semi-conductor will

Which of the following is not a composition measuring instrument ?

- A. Thermal conductivity cell
- B. Mass spectrometer
- C. Polarograph
- D. Hot wire anemometer**

For preparation of porous bearings by powder metallurgy, preferred particle shape is _____ ?

- A. Spherical**
- B. Nodular
- C. Irregular
- D. No preferred shape

Which of the following is not a product of coal tar distillation ?

- A. Anthracene
- B. Creosote oil
- C. Carbolic oil
- D. None of these**

The laminar boundary layer thickness in zero pressure gradient flow over a flat plate along the x-direction varies as $x^{0.5}$ while the thickness of turbulent boundary layer varies as (where, x = distance from the leading edge) ?

- A. $x^{1.5}$
- B. $x^{0.8}$**
- C. $x^{-1.5}$
- D. $x^{-0.8}$

Furnace pressure is normally controlled by regulating the _____ ?

- A. Air pressure
- B. Fuel gas pressure
- C. Speed of I.D. fan

D. Damper

Plaster of Paris is _____?

- A. $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$
- B. Used for setting of broken bones
- C. Both A. and B.**
- D. Same as gypsum

When a catalyst increases the rate of chemical reaction, the rate constant _____?

- A. Decreases
- B. Increases**
- C. Remain constant
- D. Become infinite

Which of the following fastening devices has its both ends threaded ?

- A. Bolt
- B. Stud**
- C. Set screw
- D. Split nut

Presence of nickel in steel improves its _____?

- A. Corrosion resistance**
- B. Cutting ability
- C. Wear resistance
- D. All A., B. and C.

With the increase in depth, the hydrostatic pressure in an un-accelerated incompressible fluid (in a constant gravitational field) ?

- A. Decreases
- B. Increases linearly**
- C. Increases exponentially
- D. Remain constant

Acrlan fibres used for making cloth, carpet & blankets, which is a hard, horny & high melting polymeric material is nothing but _____?

- A. **Polyacrylonitrile**
- B. Polyamide
- C. Saturated polyester
- D. Alkyd resin

Extraction of penicillin employs a _____ extraction column?

- A. **Centrifugal**
- B. Packed
- C. Plate
- D. None of these

Convective heat transfer, in which heat is transferred by movement of warmed matter is described by _____?

- A. Fourier's law
- B. **Newton's law of cooling**
- C. Fick's law
- D. None of these

When the damping co-efficient (ξ) is unity, the system is _____?

- A. Overdamped
- B. **Critically damped**
- C. Underdamped
- D. Highly fluctuating

In case of absorption with exothermic reaction, for fluids having _____?

- A. $Pr = Sc$; percentage change in heat and mass transfer flux will be the same for a given change in the degree of turbulence
- B. $Pr = Sc = 1$; total mass, momentum and thermal diffusivity will be the same

C. Both A. and B.

D. $Pr = Sc$; there won't be any change in heat and mass transfer flux with changes in degree of turbulence

For the same heat load and mass flow rate in the tube side of a shell and tube heat exchanger, one may use multipass on the tube side, because it _____?

- A. Decreases the pressure drop
- B. Decreases the outlet temperature of cooling medium
- C. Increases the overall heat transfer coefficient**
- D. None of these

Latent heat absorbed by 1 lb of water at 212°F, when it is changed to steam at 212°F, may be around _____ BTU?

- A. 180**
- B. 970
- C. 3.97
- D. None of these

During combustion of coal on grate, clinker formation is increased by the _____?

- A. Use of thick fire bed
- B. Low fusion point of ash ($< 1100^\circ \text{C}$)
- C. Use of preheated primary air
- D. All A., B. & C.**

A CSTR is to be designed in which an exothermic liquid phase first order reaction of the type, $A \rightarrow R$, is taking place. The reactor is to be provided with a jacket in which coolant is flowing. Following data is given: $CA_0 = 5 \text{ kmole/m}^3$; $X_A = 0.5$; Feed temperature = reactor temperature = 40°C . Rate constant at $40^\circ \text{C} = 1 \text{ min}^{-1}$; $(\Delta H) = -40 \text{ kJ/mole}$; $\rho = 1000 \text{ kg/m}^3$ $CP = 4 \text{ J/gm.}^\circ \text{C}$; $q = 10^{-3} \text{ m}^3/\text{min}$ (ρ and

CP are same for the reactant and product streams). The amount of heat to be removed is _____?

- A. 2/3 kW
- B. 1 kW
- C. 5/3 kW**
- D. 4 kW

Eutectoid composition of carbon steel at room temperature is _____?

- A. Cementite
- B. Pearlite**
- C. Martensite
- D. Ferrite

Which of the following flow measuring devices is an area meter ?

- A. Venturimeter
- B. Orificemeter
- C. Anemometer
- D. Rotameter**

Hardened steel is softened by _____?

- A. Normalising
- B. Tempering**
- C. Annealing
- D. Carburising

Assuming that CO₂ obeys perfect gas law, calculate the density of CO₂ (in kg/m³) at 263°C and 2 atm ?

- A. 1
- B. 2**
- C. 3
- D. 4

Purchased cost of equipments for a chemical process plant ranges from _____ percent of the fixed capital investment?

- A. 10 to 20
- B. 20 to 40**
- C. 45 to 60
- D. 65 to 75

Maximum allowable vapour velocity in a bubble cap tower is determined by the _____?

- A. Entrainment considerations**
- B. Vapour density
- C. Diameter of the column
- D. None of these

The melting point of paraffin wax (which contracts on solidification) _____ with pressure rise?

- A. Increases**
- B. Decreases
- C. Remains unchanged
- D. Decreases linearly

The ends of a cylindrical vessel can be closed by a head, which can be one of the four shapes. For the same thickness, choose the one which can withstand the highest pressure ?

- A. Flat plate
- B. Hemispherical
- C. Torispherical
- D. Ellipsoidal**

Reciprocating pumps compared to centrifugal pumps _____?

- A. Deliver liquid at uniform pressure
- B. Can handle slurries more efficiently

C. Are not subject to air binding

D. Can be operated with delivery valve closed

A copolymer is formed by the combination of two or more monomer molecules _____?

A. In a chain without the elimination of water

B. With the elimination of small amount of water

C. Of the same monomer by elimination of small molecules of water

D. None of these

The interfacial area per unit volume of dispersion, in a gas-liquid contactor, for fractional hold up of gas = 0.1 and gas bubble diameter = 0.5 mm is given by (in m^2/m^3) _____?

A. 500

B. 1200

C. 900

D. 800

The thickness of heat transfer plates used in the plate type heat exchanger ranges from _____ mm, pressed in a single piece provided with grooves & corrugations?

A. 0.3 to 0.8

B. 1.25 to 3.125

C. 3.5 to 7.0

D. 8 to 12

A batch adiabatic reactor at an initial temperature of $373^\circ K$ is being used for the reaction, $A \rightarrow B$. Assume the heat of reaction is $-1 kJ/mole$ at $373^\circ K$ and heat capacity of both A and B to be constant and equal to $50 J/mole.K$. The temperature rise after a conversion of 0.5 will be _____?

A. $5^\circ C$

B. $10^\circ C$

- C. 20°C
- D. 100°C

Reaction rate of a first order reaction, which is half completed in 23 minutes will be _____?

- A. 0.03 sec⁻¹
- B. 0.03 min⁻¹**
- C. 0.03 hr⁻¹
- D. 0.05 min⁻¹

The ratio of neutrons to protons of an element having a mass number and atomic number of 80 and 40 respectively is _____?

- A. 1**
- B. 0.5
- C. 2
- D. 4

A space time of 3 hours for a flow reactor means that _____?

A. The time required to process one reactor volume of feed (measured at specified conditions) is

3 hours

- B. Three reactor volumes of feed can be processed every hour
- C. It takes three hours to dump the entire volume of the reactor with feed
- D. Conversion is cent per cent after three hours

In a heat exchanger, the rate of heat transfer from the hot fluid to the cold fluid _____?

A. Varies directly as the area and the LMTD

- B. Directly proportional to LMTD and inversely proportional to the area
- C. Varies as square of the area
- D. None of these

Materials having resistivity ranging from 1 to 100 ohm. cm is termed

as _____?

- A. Conductor
- B. Insulator
- C. Semi-conductor**
- D. None of these

Venturimeter and orificemeter measures the _____ of the fluid?

- A. Pressure
- B. Maximum velocity
- C. Average velocity**
- D. Point velocity

Hydrometer measures the specific gravity of liquids based on the principles of buoyancy. Pycnometer is used to measure the specific gravity of _____?

- A. Powder & granular solids
- B. Liquids
- C. Low melting point semi-solids
- D. All A, B & C**

Purpose of relief valve in a reciprocating pump is to _____?

- A. Protect the pump against developing excessive pressure**
- B. Facilitate unidirectional flow of liquid
- C. Reduce the discharge pressure
- D. Control the rate of discharge

Heat of reaction at constant volume is identified with _____ change?

- A. Enthalpy
- B. Internal energy**
- C. Either A. or B
- D. Neither A. nor B

Petrolatum is _____?

- A. Same as petroleum ether
- B. Petroleum coke
- C. A mixture of microcrystalline wax in viscous hydrocarbon liquids**
- D. None of these

The atomic heat capacities of all solid elements _____ with decrease in temperature?

- A. Increases
- B. Decreases**
- C. Remains unchanged
- D. Approach zero at 0°C

Styrene (a monomer for the production of polystyrene) is commercially produced by _____?

- A. Catalytic dehydrogenation of ethyl benzene**
- B. Dehydration of ethyl alcohol followed by hydrogenation
- C. Reacting ethylene oxide with acetaldehyde
- D. Fermentation of starch

For a first order isothermal chemical reaction in a porous catalyst, the effectiveness factor is 0.3. The effectiveness factor will increase if the _____?

- A. Catalyst size is reduced or the catalyst diffusivity is reduced
- B. Catalyst size is reduced or the catalyst diffusivity is increased**
- C. Catalyst size is increased or the catalyst diffusivity is reduced
- D. Catalyst size is increased or the catalyst diffusivity is increased

In a liquid-liquid heat exchanger, for the same process temperature, the ratio of the LMTD in parallel flow to the LMTD in counter flow is always _____?

- A. < 1**
- B. > 1

- C. 1
- D. ∞

Very high pressure boilers are usually _____ boilers?

- A. Fire tube
- B. Water tube
- C. Waste heat
- D. Natural circulation**

If the molar heat capacities (C_p or C_v) of the reactants and products of a chemical reaction are identical, then, with the increase in temperature, the heat of reaction will _____?

- A. Increase
- B. Decrease
- C. Remain unaltered**
- D. Increase or decrease; depends on the particular reaction

Pick out the wrong statement?

- A. Metal/alloys having hexagonal crystal lattice structure are less malleable than those having cubic crystal lattice structure
- B. Metal/alloys having body centred cubic (bcc) crystal lattice structure is stronger & less ductile than those having face centred cubic (fcc) crystal lattice structure
- C. Tungsten has a body centred cubic (bcc) crystal lattice structure**
- D. Both ferritic & austenitic stainless steel has a face centred cubic (fcc) crystal structure

'Utilities' in a chemical process plant includes compressed air, steam, water, electrical power, oxygen, acetylene, fuel gases etc. Utility costs for ordinary chemical process plants ranges roughly from _____ percent of the total product cost?

- A. 1 to 5

B. 10 to 20

C. 25 to 35

D. 35 to 45

In a second order under damped system, the _____?

A. Time required for the response of first reach its ultimate value is called the response time

B. Overshoot (which is a measure of how much the response exceeds the ultimate value) increase

with the decrease of damping co-efficient

C. Decay ratio (which is the ratio of the sizes of successive peaks) is equal to the reciprocal of

overshoot

D. None of these

“Critical mass” is the minimum mass of nuclear fissile material required for the _____?

A. Sustainment of chain reaction

B. Power generation on commercial scale

C. Economic power generation

D. None of these

_____ is never shipped in glass carboys?

A. Ammonia

B. Acetic acid

C. Phenol

D. Formaldehyde

Most of the atmospheric air pollutants are present in large quantity in _____?

A. Stratosphere

B. Thermosphere

C. Troposphere

D. Mesosphere

Which of the following is not a wet classifier ?

- A. Sharpies super-centrifuge
- B. Hydrocyclones
- C. Dorr Oliver rake classifier
- D. None of these**

Which of the following is not a current asset of a chemical company ?

- A. Inventories
- B. Marketable securities
- C. Chemical equipments**
- D. None of these

Fouling factor _____ ?

- A. Is a dimensionless quantity
- B. Does not provide a safety factor for design
- C. Accounts for additional resistances to heat flow**
- D. None of these

The colour of gasoline is an indication of its _____ ?

- A. Octane number
- B. Lead susceptibility
- C. Gum forming tendency & thoroughness of refining**
- D. None of these

In a grinding operation, the limiting particle size is the size of the _____ particle in the sample?

- A. Smallest
- B. Largest
- C. Either A. or B.
- D. Neither A. nor B.**

Can a cooling tower cool water below the wet bulb temperature of inlet air ?

- A. Yes
- B. No**
- C. Yes; but height of cooling tower will be prohibitively high
- D. Yes; but the air flow rate should be excessively high

Which of the following has sodium bicarbonate as its main constituent ?

- A. Baking soda
- B. Baking powder**
- C. Washing soda
- D. None of these

Nickel is a constituent of _____ ?

- A. Bronze
- B. Solder
- C. Duralumin
- D. Monel metal**

Though increased pressure has a retarding effect on cracking reaction, yet in actual process, a positive pressure of 10-15 kgf/cm² is maintained during cracking mainly to _____ ?

- A. Increase the yield of light distillates
- B. Suppress coke formation**
- C. Enhance the octane number of gasoline
- D. Reduce gum content in gasoline

To get high tray efficiency _____ ?

- A. Interfacial surface between liquid and gas phase should be large**
- B. Time of contact between the two phases should be less
- C. Gas velocity should be very low
- D. Liquid entrainment should be severe

The addition of antimony in tin-based alloys improves its _____ ?

- A. Rupture strength and hot hardness
- B. Impact strength and bonding strength
- C. Deformation resistance**
- D. Wear resistance

The percentage ratio of the partial pressure of the vapor to the vapor pressure of the liquid at the existing temperature is _____?

- A. Termed as relative saturation**
- B. Not a function of the composition of gas mixture
- C. Called percentage saturation
- D. Not a function of the nature of vapor

Apron conveyors are used for _____?

- A. Heavy loads & short runs**
- B. Small loads & long runs
- C. Heavy loads & long runs
- D. None of these

A pipe of I.D. 4 m is bifurcated into two pipes of I.D. 2 m each. If the average velocity of water flowing through the main pipe is 5 m/sec, the average velocity through the bifurcated pipes is _____?

- A. 20 m/sec
- B. 10 m/sec**
- C. $5\sqrt{2}$ m/sec
- D. 5 m/sec

Oils are partially hydrogenated (not fully) to manufacture Vanaspati, because fully saturated solidified oils?

- A. Cause cholesterol build up and blood clotting**
- B. Are prone to rancid oxidation
- C. Always contain some amount of nickel (as their complete removal is very difficult)
- D. Have affinity to retain harmful sulphur compounds

If x_D = overhead product molal composition and R_D = reflux ratio, then slope and intercept of the operating line for rectifying section are respectively ?

- A. $[x_D/(R_D + 1)]$, $[R_D/(R_D + 1)]$
- B. $[R_D/(R_D + 1)]$, $[x_D/(x_D + 1)]$**
- C. $[x_D/(R_D + 1)]$, $[(R_D + 1)/R_D]$
- D. None of these

A mono pump is a _____ pump ?

- A. Centrifugal
- B. Piston
- C. Positive acting rotary**
- D. A group of vacuum

Which of the following has the highest compressive strength ?

- A. Wrought iron
- B. Cast iron
- C. Mild steel
- D. High carbon steel**

Fat splitting catalyst is _____ ?

- A. CaCO_3
- B. ZnO**
- C. Al_2O_3
- D. Fe

Volume change for unimolecular type first order reaction as shown in the bellow figure, increases _____ with time?

- A. Linearly
- B. Exponentially**
- C. Parabolically
- D. Logarithmically

A material is called 'ductile', if it can be _____ ?

- A. Drawn into wires
- B. Hammered to a thin sheet
- C. Fractured without deformation
- D. Made lustrous by heating it

Assume that benzene is insoluble in water. The normal boiling points of benzene and water are 80.1 and 100°C respectively. At a pressure of 1 atm, the boiling point of a mixture of benzene and water is _____?

- A. 80.1°C
- B. Less than 80.1°C
- C. 100°C
- D. Greater than 80.1°C but less than 100°C**

Mass transfer rate between two fluid phases does not necessarily depend on the _____ of the two phases?

- A. Chemical properties**
- B. Physical properties
- C. Degree of turbulence
- D. Interfacial area

Polymorphism is not exhibited by _____?

- A. Carbon
- B. Iron
- C. Phosphorous
- D. None of these**

CFC (chloro fluoro carbon) is very highly reactive in causing depletion of ozone layer in the atmosphere. Each atom of chlorine liberated from CFC is capable of decomposing _____ molecules of ozone?

- A. 102
- B. 105**
- C. 109

D. 1015

Calorific value of tar is about _____ Kcal/kg?

A. 8800

B. 12000

C. 14000

D. 16000

Strain gage uses an electrical conductor wire, which when elastically stretched increases in length and reduces in diameter. Both these dimensional changes result in _____ in the electrical resistance of the wire ?

A. No change

B. Decrease

C. Increase

D. Exponential decrease

Atomic _____ of an element is a whole number ?

A. Weight

B. Number

C. Volume

D. Radius

Graetz number is given by _____ ?

A. mC_p/kL

B. kL/mC_p

C. $mC_p/k\mu$

D. $k\mu/mC_p$

What is the value of co-efficient of discharge for square edged circular orifice (for $\beta = 0.3$ to 0.5) ?

A. 0.61 – 0.63

B. 0.5 – 0.75

C. 0.75 – 0.90

D. 0.35 – 0.55

Spray dryer for evaporating milk to produce milk powder is made of _____?

- A. Lead lined steel
- B. Stainless steel**
- C. Aluminium
- D. Cast iron

The equipment frequently used for adiabatic humidification-cooling operation with recirculating liquid is _____?

- A. Natural draft cooling tower
- B. Induced draft cooling tower
- C. Spray chamber**
- D. None of these

With increase in the molecular weight of aromatic present in kerosene, its smoking tendency ?

- A. Increases**
- B. Decreases
- C. Remain same
- D. Is unpredictable

Spalling resistance of a refractory cannot be increased by _____?

- A. Increasing its porosity
- B. Using a coarser grog during its manufacture
- C. Decreasing its thermal co-efficient of expansion
- D. Making it denser**

One horsepower is equal to _____?

- A. 550 lbf.ft/second**

- B. 550 kgf.m/second
- C. Both A. and B.
- D. 550 lbf.ft./hr

The starting of a car takes time in winter, because the _____?

- A. Octane number of fuel is decreased
- B. Fuel supply for ignition is not sufficient
- C. Vaporisation of the fuel is decreased**
- D. Pour point of fuel decreases

In the laminar boundary layer flow over a flat plate, the ratio (δ/x) varies as: (where, ' δ ' is the boundary layer thickness and ' x ' is the distance from the leading edge in the direction of flow)?

- A. Re
- B. \sqrt{Re}
- C. $1/Re$
- D. $Re^{-1/2}$**

The terminal velocity of a particle moving through a fluid varies as dp^n . The value of n is equal to _____ in Stoke's law regime?

- A. 1
- B. 0.5
- C. 2**
- D. 1.5

For high pressure process equipments/vessels, the connected nozzle should be _____?

- A. Welded
- B. Screwed
- C. Flanged**
- D. Brazed

Nominal and effective interest rates are equal, when the interest is compounded _____?

- A. Quarterly
- B. Semi-annually
- C. Annually**
- D. In no case, they are equal

Polycaprolactam is also known as _____?

- A. Nylon-66
- B. Nylon-6**
- C. Teflon
- D. SBR

Percentage of the heavy water in ordinary water is around _____?

- A. 0.015**
- B. 7.54
- C. 0.71
- D. 32.97

Gross and net calorific value of a fuel will be the same _____?

- A. If its ash content is zero
- B. If its carbon content is very low
- C. If its hydrogen/hydrogen compound content is zero**
- D. Under no circumstances

If in a flow field, between any two points, then the flow must be _____?

- A. Steady, incompressible, irrotational**
- B. Steady, compressible, irrotational
- C. Steady, compressible and along a streamline
- D. Unsteady, incompressible, irrotational

For the laminar flow of a fluid in a circular pipe of radius R , the Hagen-Poiseuille equation predicts the volumetric flow rate to be proportional to _____?

- A. R
- B. R^2
- C. R^4**
- D. $R^{0.5}$

Pick out the wrong statement?

- A. System (of partially miscible liquid pairs), in which the mutual solubility increases with rise in temperature, are said to possess an upper consolute temperature
- B. Systems, in which the mutual solubility increases with decrease in temperature, are said to possess lower consolute temperature
- C. Nicotine-water system shows both an upper as well as a lower consolute temperature, implying that they are partially miscible between these two limiting temperatures
- D. None of these**

Mean residence time is equal to the space time, when _____?

- A. The feed rate is measured at temperature and pressure in the reactor
- B. The temperature, pressure and the density of reaction mixture remains constant throughout the reactor
- C. There is no change in number of moles in gaseous reaction
- D. All A., B. and C.**

An equipotential line is _____ to the velocity vector at every point?

- A. Normal**
- B. Parallel
- C. Tangential
- D. None of these

In hydrostatic testing of welded pipe (for leakage, strength etc.) the ratio of minimum hydrostatic test pressure to internal design pressure is around _____?

- A. 0.5
- B. 1.5**
- C. 2.5
- D. 3.5

Hydrochloric acid absorber is made of _____?

- A. Cast iron
- B. Mild steel
- C. Carbide**
- D. Stainless steel

Pick out the first order system from among the following ?

- A. Damped vibrator
- B. Mercury in glass thermometer kept in boiling water**
- C. Interacting system of two tanks in series
- D. Non-interacting system of two tanks in series

Fireclay bricks are used in the _____?

- A. Furnaces allowed to cool frequently
- B. Flues
- C. Chimney linings
- D. All A., B. and C.**

Degree of freedom of the system ice-water-vapour will be _____?

- A. 0**
- B. 1
- C. 2
- D. 3

High noise level in a chemical plant can be controlled by

the _____?

- A. Suppression of noise at the source itself
- B. Path control of noise
- C. Protection of operating personnel
- D. All A., B. & C.**

Mineral oils (e.g. petroleum oils) are preferred over fatty oils (e.g. mustard oil, ghee, tallow, palm oil, olive oil etc.) as a lubricant due to its _____?

- A. Poor oxidation stability and high gum forming tendency
- B. Greater tendency of decomposition at elevated temperature
- C. Hydrolysis tendency in presence of water
- D. All A, B. and C**

Osmotic pressure exerted by a solution prepared by dissolving one gram mole of a solute in 22.4 litres of a solvent at 0°C will be _____ atmosphere?

- A. 0.5
- B. 1**
- C. 1.5
- D. 2

Drying of a solid involves _____ transfer ?

- A. Only heat
- B. Only mass
- C. Both heat and mass**
- D. None of these

The enzyme which converts starch into the disaccharides maltose is _____?

- A. Diastase**
- B. Maltase
- C. Yeast
- D. None of these

Dielectric _____?

- A. Is an electrical insulating material
- B. Of low resistivity is preferred
- C. Should have high thermal conductivity
- D. Need not defy the corrosive action of chemicals

Penetration theory states that the mass transfer co-efficient is equal to (where, D_e is diffusivity and 't' is time) ?

- A. $(D_e \cdot t)^{1/2}$
- B. $(D_e/t)^{1/2}$
- C. $(4D_e/\pi t)^{1/2}$
- D. $(4D_e/t)$

Which of the following natural bio polymers are formed as a result of polymerisation of amino-acids ?

- A. Starch
- B. Cellulose
- C. **Proteins**
- D. Nucleic acids

When an isolated thermodynamic system executes a process _____?

- A. Work is done
- B. Heat transfer takes place
- C. Mass flow occurs across the boundary of the system
- D. **No chemical reaction takes place within the system**

In case of a continuous distillation column, increase in reflux ratio may result in the _____?

- A. Lower fixed charges for the column
- B. Greater cost for the reboiler heat supply
- C. Greater cost for the condenser coolant

D. All A., B. and C.

Langmuir equation is associated with _____?

A. Leaching

B. Adsorption

C. Steam distillation

D. Multi-component absorption

Size reduction does not occur due to compression in case of _____?

A. Rod mills

B. Gyratory crushers

C. Jaw crushers

D. Smooth roll crushers

A fluid is termed as the Newtonian fluid, when the shear stress is _____ the velocity gradient ?

A. Independent of

B. Inversely proportional to

C. Directly proportional to

D. None of these

Evaporation of 1kg of water from a solution in a single effect evaporator requires about _____ kg of steam?

A. 0.4 – 0.6

B. 1-1.3

C. 1.8-2

D. 2 – 2.4

During the manufacture of sulphuric acid, the temperature of molten sulphur is not increased beyond 160°C, as _____?

A. It is very corrosive at elevated temperature

- B. Its viscosity is not reduced on further heating (hence pressure drop on pumping it, cannot be further reduced)**
- C. It decomposes on further increasing the temperature
- D. None of these

Regeneration of molecular sieve requires it to be heated to a temperature of about _____ °C?

- A. 80-120
- B. 200-300
- C. 600-800
- D. 1000-1100**

The energy loss in flow through Venturimeter is less than that through flow nozzle, because in case of a flow nozzle, the ?

- A. Length is shorter
- B. Throat diameter is more
- C. Sudden expansion of flow in the downstream occurs**
- D. Distance between the throat and the inlet is more

Thermal shield used in high powered nuclear reactor to protect the walls of the reactor from radiation damage is made of _____?

- A. Concrete
- B. Steel**
- C. Zircaloy
- D. Graphite

Recycling in a chemical process facilitates _____?

- A. Increased yield
- B. Enrichment of product
- C. Heat conservation
- D. All A., B. & C.**

Validity of the relationship, inputs = outputs, holds good for the system at steady state _____?

- A. With chemical reaction
- B. Without chemical reaction
- C. Without chemical reaction & losses**
- D. None of these

Which of the following has the lowest overall heat transfer co-efficient ?

- A. Dowtherm
- B. Molten sodium
- C. Water
- D. Air**

Wave length of X-rays is about 1 angstrom; however it cannot pass through a sheet of _____?

- A. Paper
- B. Cloth
- C. Lead**
- D. Aluminium

Transition state theory relates the above quantities as _____?

- A. $k \propto e^{-E/RT}$
- B. $k \propto T \cdot e^{E/RT}$**
- C. $k \propto \sqrt{T}$
- D. $k \propto T^{1.5}$

Which of the following low melting alloy containing bismuth and lead is used for electric fuse ?

- A. Wood's metal**
- B. Babbitt metal
- C. Monel metal
- D. Duralumin

Pick out the wrong statement pertaining to the roll crushers?

- A. Maximum feed size determines the required roll diameter
- B. For hard material's crushing, the reduction ratio should not exceed 4
- C. Both the rolls run necessarily at the same speed**
- D. Reduction ratio and differential roll speed affect production rate & energy consumed per unit of surface produced

Inconel is an alloy of _____?

- A. Tin, zinc and nickel
- B. Iron, nickel and chromium**
- C. Copper and nickel
- D. Copper and tin

_____ mills are termed as impactors?

- A. Hammer**
- B. Cage
- C. Rolling-compression
- D. None of these

Corrosion resisting properties of cast iron are significantly improved by the addition of 12 – 15% of _____?

- A. Tungsten
- B. Vanadium
- C. Silicon**
- D. All A., B. & C.

Pressure differential maintained across a continuous rotary vacuum filter is in the range of _____ mm Hg column?

- A. 50 to 100
- B. 100 to 150
- C. 250 to 500**
- D. 600 to 700

In a continuous distillation column, the optimum reflux ratio ranges from _____ times the minimum reflux ratio?

- A. **1.1 to 1.5**
- B. 1.6 to 2
- C. 2.2 to 2.6
- D. 2.7 to 3

Nitrile rubber is produced by the polymerisation of _____?

- A. **Acrylonitrile & butadiene**
- B. Acrylonitrile & styrene
- C. Isobutylene & isoprene
- D. None of these

Heat flux through several resistances in series is analogous to the current flowing through several _____?

- A. Resistances in parallel
- B. Capacitors in series
- C. **Resistances in series**
- D. None of these

For condensation of pure vapors, if the heat transfer co-efficients in filmwise and drop-wise condensation are respectively h_f and h_d , then _____?

- A. $h_f = h_d$
- B. $h_f > h_d$
- C. **$h_f < h_d$**
- D. h_f could be greater or smaller than h_d

Coal containing large quantity of _____ are difficult to wash?

- A. Ash
- B. **Inherent mineral matter**

- C. Free impurities
- D. Volatile matter

Visco-elastic behaviour exhibited by plastics is a _____ like behaviour?

- A. Solid
- B. Liquid
- C. Combination of solid & liquid**
- D. Neither solid nor liquid

Water filtration rate in a rapid sand filter ranges from _____ kilolitres/m²/hr?

- A. 0.1 to 1
- B. 3 to 6**
- C. 10 to 15
- D. 15 to 20

The amount of water evaporated in kg per kg of fuel burnt in a boiler is called the _____ of a boiler ?

- A. Evaporative capacity**
- B. Evaporation efficiency
- C. Thermal efficiency
- D. Steam load

_____ moderator is used in a fast breeder reactor?

- A. Graphite
- B. Heavy water
- C. Beryllium
- D. No**

Mass transfer co-efficient is directly proportional to $DAB^{0.5}$, according to _____ theory ?

A. Penetration

- B. Surface renewal
- C. Film
- D. None of these

The excess air required for the combustion of pulverized coal is of the order of about _____ percent ?

- A. 5
- B. 15**
- C. 30
- D. 45

Blowdown in a cooling tower _____ ?

A. Means discarding a small fraction of circulating water to prevent and limit the concentration

of salt and impurities

- B. Increases the scale forming tendencies of water
- C. Is undesirable
- D. All A., B. & C.

Pick out the wrong statement ?

- A. The mole fraction of solute is directly proportional to the molality of a 'dilute' solution
- B. For a non-reacting binary mixture of ideal gases, the partial pressure distribution of both components is nonlinear in the case of steady state unimolal unidirectional diffusion

C. Azeotropes obey Raoult's law at all temperature

- D. The relative volatility of a binary mixture at the Azeotropic composition is 1

If the path of liquid across the plate is very long as in case of large diameter tower, Murphree efficiency can be _____ percent?

- A. 100
- B. > 100**
- C. < 100
- D. None of these

An air-water vapour mixture has a dry bulb temperature of 60°C and a dew point temperature of 40°C . The total pressure is 101.3 kPa and the vapour pressure of water at 40°C and 60°C are 7.30 kPa and 19.91 kPa respectively. The humidity of air sample expressed as kg of water vapour/kg of dry air is _____?

- A. 0.048
- B. 0.079
- C. 0.122
- D. 0.152**

The rate of emission of radiation by a body does not depend upon the _____?

- A. Wavelength of radiation
- B. Surface temperature of the body
- C. Nature of the surface
- D. Shape and porosity of the body**

Diffusion is that property by virtue of which a perfume bottle when opened up in a room, makes the whole room fragrant with its smell. If a perfume 'X' diffuses twice as fast as another perfume 'Y'; what is the molecular weight of 'Y', if the vapor density of gas 'X' is 2? Molecular weight of gas 'X' is to be assumed to be 2 ?

- A. 2
- B. 4
- C. 8
- D. 16**

Ponchon Savarit method is based on the use of enthalpy concentration diagram, which contains the bubble point curve (saturated liquid curve), dew point curve (saturated vapour curve) and equilibrium tie lines. As compared to McCabe-

Thiele's method, this method _____?

- A. is more accurate in finding the number of equilibrium stages
- B. accounts for the enthalpy changes in the process
- C. Facilitates direct calculation of heat load on reboiler & condenser from, the diagram used in this method
- D. All A, B. & C.**

Which of the following does not have a sharp melting point ?

- A. Thoria
- B. Glass**
- C. Ice
- D. Pig iron

In ammonia synthesis ($N_2 + 3H_2 = 2NH_3$), there is a decrease in total volume, hence to get high equilibrium conversion, the reaction should be carried out at _____?

- A. Low pressure
- B. High pressure**
- C. Very high temperature
- D. Atmospheric pressure; as the pressure has no effect on conversion

Fugacity and pressure are numerically not equal for the gases _____?

- A. At low temperature and high pressure
- B. At standard state
- C. Both A. and B**
- D. In ideal state

RIH stands for _____?

- A. Run in hole**
- B. Rip in hole
- C. Rest in hole

D. None of these

If Thiele modulus is _____, then the pore diffusion resistance in a catalyst may be considered as negligible?

- A. 0
- B. ∞
- C. < 0.5**
- D. > 0.5

In a reversible reaction, a catalyst increases the rate of forward reaction _____?

- A. Only
- B. To a greater extent than that of the backward reaction
- C. And decreases that of the backward reaction
- D. And the backward reaction equally**

Experimental determination of _____ is done by wetted wall column method?

- A. Diffusion co-efficient
- B. Mass transfer co-efficient**
- C. NTU
- D. None of these

_____ forces do not act in case of fluid flow ?

- A. Elastic
- B. Tensile**
- C. Vibratory
- D. Centrifugal

In the design of a bag filter, the gas temperature is an important consideration, as it affects the _____?

- A. Gas density

- B. Gas viscosity
- C. Fibre selection
- D. All A., B. & C.**

For annular flow of a fluid, the ratio of the equivalent diameter for pressure drop calculation to the equivalent diameter for heat transfer calculation is _____?

- A. $d_1/(d_1 + d_2)$**
- B. $d_2/(d_1 + d_2)$
- C. $(d_1 + d_2)/d_1$
- D. $(d_1 + d_2)/d_2$

For the same heat transfer area and the terminal conditions, the ratio of the capacities of a single effect evaporator to a triple effect evaporator is _____?

- A. 3
- B. 0.33
- C. 1**
- D. 1.33

Which of the following is not categorised as the ore agglomeration process?

- A. Nodulising
- B. Pelletising
- C. Balling**
- D. Briquetting

A fertile material is the one, which can be _____?

- A. Converted into fissile material on absorption of neutron**
- B. Fissioned by slow (thermal) neutrons
- C. Fissioned by fast neutrons
- D. Fissioned by either slow or fast neutrons

Which is the most suitable dye for synthetic fibres ?

- A. Acid dye**
- B. Azoic dye
- C. Pigment dye
- D. Mordant dye

Which of the following is not a continuous drier ?

- A. Drum drier
- B. Spray drier
- C. Tunnel drier
- D. Tray drier**

The discharge through a Venturimeter depends upon _____ ?

- A. Pressure drop only**
- B. Its orientation
- C. Co-efficient of contraction only
- D. None of these

Knudsen diffusion is directly proportional to _____ ?

- A. T
- B. \sqrt{T}**
- C. $1/\sqrt{T}$
- D. T^2

A domestic refrigerator has a/an _____ cooled condenser?

- A. Water
- B. Air**
- C. Evaporative
- D. Gas

For a multipass shell and tube heat exchanger, the LMTD correction factor is always _____ ?

- A. 1

- B. > 1
- C. < 1
- D. Between 1 & 2

Separation of solid suspended in liquid into a supernatant clear liquid and a denser slurry employs a process termed as the _____?

- A. Coagulation
- B. Flocculation
- C. **Sedimentation**
- D. Clarification

The most convenient way of expressing solution concentration is in terms of _____?

- A. Mole fraction
- B. Normality
- C. Molality
- D. **Molarity**

Pick out the material having minimum Rittinger's number?

- A. Calcite
- B. Pyrite
- C. **Quartz**
- D. Galena

Molten sodium (as a coolant in fast breeder reactor) ?

- A. Can't attain high temperature at normal pressure
- B. Is not at all corrosive, even at a higher temperature
- C. **Is highly radioactive at elevated temperatures and can cause explosion, when it comes in contact with air or water**
- D. None of these

Glycerine is a by-product of the _____ industry ?

- A. Soap**
- B. Detergent
- C. Oil hydrogenation
- D. Paint

Basic open hearth furnace (BOF) is not used for producing _____ steel?

- A. Killed
- B. Rimming
- C. High alloy**
- D. None of these

Roasting of metallurgical ores is done mainly to _____?

- A. Dehydrate it
- B. Sinter the ore
- C. Remove CO₂ & H₂O
- D. Remove arsenic & sulphur**

When the concentration of SO₂ in air is greater than _____ ppm, it gives a pungent smell?

- A. 0.01
- B. 0.1
- C. 1
- D. 4**

Thermocouple is suitable for measuring _____?

- A. Liquid temperatures only
- B. Very high temperatures only
- C. Very low temperatures only
- D. Both high and low temperatures**

The unity of Planck's constant 'h' in the equation, $E = hv$ is _____?

- A. J/s
- B. J.S**
- C. J/kmol
- D. kmol/J

Absorption factor, for a fixed degree of absorption from a fixed amount of gas should be _____?

- A. 1
- B. > 1**
- C. < 1
- D. ≤ 1

Which of the following identities can be most easily used to verify steam table data for superheated steam ?

- A. $(\partial T/\partial V)_S = (\partial p/\partial S)_V$
- B. $(\partial T/\partial P)_S = (\partial V/\partial S)_P$
- C. $(\partial P/\partial T)_V = (\partial S/\partial V)_T$
- D. $(\partial V/\partial T)_P = -(\partial S/\partial P)_T$**

The second law of thermodynamics states that _____?

- A. The energy change of a system undergoing any reversible process is zero
- B. It is not possible to transfer heat from a lower temperature to a higher temperature
- C. The total energy of system and surrounding remains the same
- D. None of the above**

With increase in pressure, the relative volatility for a binary system _____?

- A. Increases
- B. Decreases**
- C. Remains same
- D. Either A. or B., depends on the system

For the preliminary breaking of hard rock, we use a _____?

A. Gyrotory crusher

B. Ball mill

C. Tube mill

D. Squirrel-cage disintegrator

Vulcanisation of rubber _____ ?

A. Decreases its tensile strength

B. Increases its ozone & oxygen reactivity

C. Increases its oil & solvent resistance

D. Converts its plasticity into elasticity

Cost of instrumentation in a modern chemical plant ranges from _____ percent of the total plant cost?

A. 5 to 10

B. 20 to 30

C. 40 to 50

D. 60 to 70

The minimum liquid rate to be used in an absorber corresponds to an operating line _____ ?

A. Of slope = 1

B. Of slope = 0.1

C. Tangential to the equilibrium curve

D. None of these

Diesel index (an alternative index for expressing the quality of diesel) is _____ ?

A. Determined by using a test engine

B. Not related to aniline point

C. Equal to cetane number plus 3

D. All A., B. & C.

White smoke coming out of the chimney of a furnace indicates the use

of _____?

- A. Low excess air
- B. Very high excess air**
- C. Gaseous fuel in the furnace
- D. Liquid fuel in the furnace

For which pair of the fuel gases, calorific value (C.V.) of one fuel is almost double that of the other on volume basis (i.e., kcal/Nm³) while the C.V. is same on weight basis (i.e., kcal/kg)?

- A. Propane and acetylene
- B. Propane and LPG
- C. Sewage gas and gobar gas
- D. B.F gas and coke oven gas**

Mass velocity in case of steady flow and through a constant cross-section conduit is independent of the _____?

- A. Temperature
- B. Pressure
- C. Both A. & B.**
- D. Neither A. nor B.

An imbalanced chemical reaction equation is against the law of _____?

- A. Multiple proportion
- B. Conservation of mass**
- C. Constant proportion
- D. None of these

If air (a non-condensing gas) is present in a condensing vapor stream, it will _____ the condensation rate of vapor?

- A. Increase
- B. Decrease**

- C. Not affect
- D. Increase the condensing film co-efficient as well as

Thin spherical shells subjected to internal pressure, develop _____ stresses?

- A. Radial**
- B. Circumferential
- C. Both A. & B.
- D. Neither A. nor B.

Boiler feed water pump is usually a _____ pump?

- A. Reciprocating
- B. Gear
- C. Multistage centrifugal**
- D. Diaphragm

Polythene (low or high density) containers are not corroded by _____?

- A. Sulphuric acid (10%) at room temperature**
- B. Nitric acid (95%) at room temperature
- C. Sulphur trioxide at 60°C
- D. Any of these

A material being tested for endurance strength is subjected to the _____ load?

- A. Impact
- B. Completely reversed**
- C. Dynamic
- D. Static & dynamic

Reynolds number is the ratio of _____?

- A. Viscous forces to gravity forces
- B. Inertial forces to viscous forces**

- C. Viscous forces to inertial forces
- D. Inertial forces to gravity forces

A compound was found having nitrogen and oxygen in the ratio 28 gm and 80 gm respectively. The formula of the compound is _____?

- A. N₂O₄
- B. N₂O₅**
- C. N₂O₃
- D. None of these

A material no longer behaves elastically beyond _____?

- A. Plastic limit
- B. Limiting load
- C. Elastic limit**
- D. Breaking load

The boiling points for pure water and pure toluene are 100°C and 110.6°C respectively. Toluene and water are completely immiscible in each other. A well agitated equimolar mixture of toluene and water are prepared. The temperature at which the above mixture will exert a pressure of one standard atm. is _____?

- A. Less than 100°C
- B. 100°C
- C. Between 100 and 110°C**
- D. 110.6°C

The thermal efficiency of an air/fuel gas preheating recuperator may be as high as _____ percent?

- A. 50
- B. 65
- C. 85**
- D. 99

Most suitable material for high pressure vessel operating at 500 atm. and 500° C is _____?

- A. **Molybdenum stainless steel**
- B. 18/8 stainless steel
- C. Mild steel
- D. High silicon iron (14% Si)

Which of the following fertilisers is needed for promoting the development of leaves and stems during early stages of plant growth ?

- A. **Nitrogenous fertiliser**
- B. Potassic fertiliser
- C. Phosphatic fertiliser
- D. None of these

Which of the following is the most important deterrents to an extended use of pulverised coal in boiler firing ?

- A. **Ash disposal problem**
- B. Excessive fly-ash discharge from the stack
- C. High power consumption in its transportation
- D. Erosion of induced draft fan blades

The difference of wet bulb temperature and adiabatic saturation temperature of unsaturated mixture of any system is _____?

- A. **+ve**
- B. -ve
- C. Zero
- D. None of these

What is the normal range of exit cone angle of a Venturimeter ?

- A. 2 to 5
- B. **7 to 15**

- C. 15 to 25
- D. >25

Which of the following is the easiest to bend ?

- A. Steel
- B. Stainless steel
- C. Cast iron
- D. Wrought iron**

Pressure drop in packed bed for turbulent flow is given by the _____ equation?

- A. Kozeny-Carman
- B. Blake-Plummer**
- C. Leva's
- D. Hagen-Poiseuille's

Flooding in a column results due to _____ ?

- A. High pressure drop**
- B. Low pressure drop
- C. Low velocity of the liquid
- D. High temperature

Which of the following sources is responsible for maximum air pollution ?

- A. Industrial chimney exhaust
- B. Forest fire
- C. Automobiles exhaust**
- D. Photochemical oxidation of organic matter

Pyrometric cone equivalent (PCE) value (Segar cone) of 'Superduty refractories' is more than 33 which corresponds to a temperature of _____ °C?

- A. 1520
- B. 1630
- C. 1670

D. 1730

High acid value of an oil or fat is an indication of _____?

- A. Storage under improper conditions
- B. Absence of unsaturation
- C. Its smaller molecular weight
- D. None of these

Out of the following, maximum temperature drop for a given heat flow & for the same thickness will be in the case of _____?

- A. Steel
- B. Glass wood
- C. Copper
- D. Fireclay bricks

Pick out the wrong statement ?

- A. For a pressure vessel to be classified as 'thin vessel', the ratio of wall thickness to mean radius is less than 0.1
- B. For calculating forces and efficiency of riveted joint, either rivet diameter or rivet hole diameter is used in case of pressure vessel and in structural work
- C. Longitudinal joint is normally made butt joint to maintain the circularity of the vessel
- D. Maximum diameter of the opening provided in a pressure vessel, which does not require any compensation is 200 mm

BHC (Benzene hexachloride) is made by the chlorination of benzene _____?

- A. Which is an addition reaction
- B. Which is a substitution reaction
- C. In absolute dark
- D. In presence of sunlight

Austenitic manganese steel used for making jaws of crushing machines contains about _____ percent manganese?

- A. 1.5-2
- B. 3.5-4.5
- C. 7-9
- D. 12-14**

Half life period of a chemical reaction is proportional to CA_0^{-1} , if the reaction is of _____ order?

- A. First
- B. Zero
- C. Second**
- D. Third

Which of the following is not a manufactured fuel ?

- A. Coke breeze**
- B. Soft coke
- C. Colloidal fuels
- D. Charcoal

Feedstock for polymerisation is _____?

- A. Naphtha
- B. Cracked gases rich in C₂ & C₄ olefins**
- C. Low boiling aromatics
- D. None of these

Pick out the wrong statement ?

- A. Theoretical flame temperature is the temperature attained by the products of combustion, when the fuel is burned without loss or gain of heat
- B. Burning the fuel with theoretically required amount of pure oxygen results in attainment of maximum adiabatic flame temperature
- C. Burning the fuel with excess pure oxygen results in maximum theoretical flame temperature**

D. Adiabatic flame temperatures of actual combustions are always less than the maximum values

Value of Peclet number = 0, is the representative of _____?

- A. Laminar flow
- B. Complete back mixing**
- C. Plug flow
- D. Eddy diffusivity = 0

The length of the tube necessary for the boundary layer to reach the centre of the tube and for fully developed flow to be established is called the _____ length?

- A. Equivalent
- B. Transition**
- C. Prandtl mixing
- D. None of these

A Bingham fluid of viscosity $\mu = 10 \text{ Pa}\cdot\text{s}$ and yield stress, $\eta_0 = 10 \text{ KPa}$, is shared between flat parallel plates separated by a distance of 10^{-3} m . The top plate is moving with a velocity of 1 m/s . The shear stress on the plate is _____?

- A. 10 KPa
- B. 20 KPa**
- C. 30 KPa
- D. 40 KPa

Which of the following comes in the category of primary crusher for hard and tough stone ?

- A. Jaw crusher**
- B. Cone crusher
- C. Gyratory crusher
- D. None of these

Holes of a sieve tray are arranged in triangular pitch of _____ times the hole diameter?

- A. 1.5 to 2
- B. 2.5 to 5**
- C. 5 to 10
- D. 10 to 15

Which of the following gaseous fuels has the highest net calorific value (kcal/Nm³) ?

- A. Producer gas
- B. Carburetted water gas
- C. Natural gas
- D. Liquefied petroleum gas**

Which of the following equipments is not used for liquid dispersion ?

- A. Wetted wall towers
- B. Packed towers
- C. Venturi scrubbers
- D. Agitated vessels**

Which of the following has the highest viscosity of all (at a given temperature) ?

- A. Naphtha
- B. Fuel oil**
- C. Light diesel oil
- D. Petrol

Which of the following is the largest quantum of pressure ?

- A. 1 kg/cm²
- B. 1 bar
- C. 1 atmosphere**
- D. 1 kilo Pascal

Molecularity of a reaction _____?

- A. Is always equal to the overall order of reaction
- B. May not be equal to the order of reaction
- C. Can't have a fractional value
- D. Both B. and C.**

With increase in the alumina content in firebricks, its fusion point (refractoriness) ?

- A. Decreases linearly
- B. Remains unchanged
- C. Increases**
- D. Decreases

For the transfer of solution of thick slurry, the pump used is a _____ pump?

- A. Reciprocating
- B. Gear
- C. Diaphragm**
- D. Centrifugal

Dryness factor of steam is defined as the ratio of the mass of vapor in the mixture to the mass of the mixture. Dryness factor of steam is measured by a _____ calorimeter ?

- A. Bomb
- B. Throttling**
- C. Junker's
- D. Boy's

Ordinary glass is not a/an _____?

- A. Amorphous isotropic material
- B. Supercooled liquid
- C. Material with sharp definite melting point**

D. Electrical insulator

For the reversible exothermic reaction, $N_2 + 3H_2 \rightleftharpoons 2NH_3$, increase of pressure would _____?

- A. Shift the equilibrium towards right
- B. Give higher yield of NH_3
- C. Both B. and C**
- D. Neither A. nor B

Octane number of 2, 2, 4 – trimethyl pentane is _____?

- A. 0
- B. 100**
- C. In between 0 and 100
- D. More than 100

DDT is shipped in _____?

- A. Stainless steel containers
- B. Paper bags
- C. Fibre drums
- D. Either B. or C.**

Boiling point of a solution according to Duhring's rule is a linear function of the _____ of water?

- A. Boiling point (at the same pressure)**
- B. Viscosity
- C. Density
- D. Thermal conductivity

With increase in gas flow rate to fabric surface area ratio ($Nm^3/hr/m^2$ fabric surface area), the size & the cost of a bag filter _____?

- A. Increases
- B. Decreases**
- C. Remain unaffected

D. None of these

For any reaction, we may write conversion as a function of _____?

- A. Time
- B. Temperature
- C. Concentration
- D. All A., B. & C.**

Except _____, all other refractories are bad conductors of electricity (i.e, have low electrical conductivity)?

- A. Fireclay
- B. Carborundum
- C. Graphite**
- D. Chromite

A 'rupture disc' is provided in chemical equipments as an accessory meant for _____?

- A. Relieving excess pressure**
- B. Creating turbulence
- C. Enhancing mixing rate
- D. Avoiding vortex formation

Quantity of coke oven gas produced by high temperature carbonisation of one ton of dry coal may be around _____ Nm³?

- A. 30
- B. 300**
- C. 3,000
- D. 30,000

Which of the following is an exothermic reaction ?

- A. Conversion of graphite to diamond

- B. Decomposition of water
- C. Dehydrogenation of ethane to ethylene
- D. None of these**

For laminar flow of a shear thinning liquid in a pipe, if the volumetric flow rate is doubled, the pressure gradient will increase by a factor of _____?

- A. 2**
- B. 2
- D. 1/2

For storing water and acid free benzol, use a _____ vessel?

- A. Steel**
- B. Karbate
- C. Stainless steel
- D. None of these

The maximum thickness of the metal which can be welded using ultrasonic welding is _____ mm ?

- A. 0.5
- B. 3**
- C. 10
- D. 25

Which of the following is not a component of the working capital for a chemical process plant ?

- A. Product inventory
- B. In-process inventory
- C. Minimum cash reserve
- D. Storage facilities**

One ton of refrigeration is defined as the heat rate corresponding to melting of one ton of ice in one _____?

- A. Hour
- B. Day**
- C. Minute
- D. Second

The most suitable flow measuring device for the fluid flow measurement in a very large diameter pipeline is a _____?

- A. Weir
- B. Pitot tube**
- C. Kennison nozzle
- D. V-notch

In polytropic process ($PV^n = \text{constant}$), if $n = 1$; it means a/an _____ process?

- A. Adiabatic
- B. Reversible
- C. Isothermal**
- D. None of these

Phenol formaldehyde is produced by condensation polymerisation. It is also known as _____?

- A. Teflon
- B. Bakelite**
- C. Polyester
- D. Nylon-66

Deaeration of water in its treatment is necessary, as it _____?

- A. Minimises its turbidity
- B. Helps in controlling its taste and odour
- C. Minimises its corrosiveness**
- D. None of these

_____ gas is normally employed in B.E.T. method of finding out the

surface area of catalyst?

- A. N₂
- B. H₂
- C. CO₂
- D. He

One 'Therm' is equivalent to _____?

- A. 105 BTU
- B. 105 kcal
- C. 109 BTU
- D. 109 kcal

The molecular velocity of a real gas is proportional to (where, T = absolute temperature of the gas)?

- A. \sqrt{T}
- B. T
- C. T²
- D. $1/\sqrt{T}$

CO₂ present in reformed gas (obtained by steam reforming of naphtha) is removed by absorbing in _____?

- A. Mono-ethanolamine (MEA)
- B. Slaked lime
- C. Ammoniacal liquor
- D. Methyl-Ethyl Ketone (MEK)

Cracking is _____?

- A. An exothermic reaction
- B. An endothermic reaction
- C. Favoured at very low temperature
- D. None of these

The function of manholes provided in the shell of a distillation column is to

_____?

- A. Keep a check on the liquid gradient over the plate by direct visual observation
- B. Give access to the individual trays for cleaning, maintenance and installation**
- C. Guard against foaming & entrainment by dumping antifoaming agent through it
- D. All A., B. and C.

Air/fuel ratio on molar (volume) basis for combustion of methane with theoretical quantity of air will be _____?

- A. 9.5 : 1**
- B. 12.5 : 1
- C. 15.5 : 1
- D. 18.5 : 1

Given, $3\text{H}_2 + \text{CO} = \text{CH}_4 + \text{H}_2\text{O}$, $K_p = 101.84$ and, $4\text{H}_2 + \text{CO}_2 = \text{CH}_4 + 2\text{H}_2\text{O}$, $K_p = 101.17$ the K_p for the reaction $\text{CO} + \text{H}_2\text{O} = \text{CO}_2 + \text{H}_2$ is _____?

- A. 103.01
- B. 10-0.67
- C. 10-3.01
- D. 100.67**

High temperature carbonisation of coal takes place at _____ °C?

- A. 2000
- B. 700
- C. 1100**
- D. < 500

In Lurgi coal gasifier _____?

- A. Coking coals cannot be used
- B. Low carbon conversion efficiency is achieved
- C. Entrainment of solids is higher
- D. Larger quantity of coal can be processed**

1 bar is almost equal to _____ atmosphere?

- A. 1
- B. 10
- C. 100
- D. 1000

The expression for entropy change given by, $\Delta S = -nR \ln (P_2/P_1)$, holds good for _____?

- A. Expansion of a real gas
- B. Reversible isothermal volume change**
- C. Heating of an ideal gas
- D. Cooling of a real gas

For a heterogeneous catalytic reaction, $A + B \rightarrow C$, with equimole feed of A and B, the initial rate $-r_{A0}$ is invariant with total pressure. The rate controlling step is _____?

- A. Surface $K_c/(1 + TS)$ reaction between absorbed A and B in the gas phase
- B. Surface reaction between absorbed A and absorbed B
- C. Surface reaction between A in the gas phase and absorbed B
- D. Desorption of C**

Foaming and priming in boiler operation can be reduced by reduction in _____ in feed water?

- A. Turbidity
- B. Color (Hazen)
- C. Total solids
- D. All A., B. & C.**

Waxes present in petroleum products _____?

- A. Can be separated out by distillation
- B. Are not soluble in them
- C. Crystallise out at low temperature**
- D. Decrease their viscosity

Emf developed by a thermocouple while measuring a temperature of 400°C is 22 mV. The type of thermocouple used is _____?

- A. Chromel-alumel
- B. Iron-constantan**
- C. Platinum-rhodium
- D. Platinum-platinum + rhodium

Higher furnace temperature cannot be achieved by use of a lean fuel gas in the furnace by _____?

- A. Increasing the draft in the furnace**
- B. Preheating the fuel gas
- C. Oxygen enrichment of combustion air
- D. Preheating the combustion air

Catalyst used in the 'catalytic converter' employed in automobile exhaust line for complete combustion/oxidation of carbon monoxide, nitrogen oxides and hydrocarbons is _____?

- A. Alumina
- B. Platinum**
- C. Vanadium pentoxide
- D. Iron oxide

Which of the following accessories is provided in the vapor line of an evaporator for removing the entrained liquid ?

- A. Bleed point
- B. Vent
- C. Catchall**
- D. Baffle

For water-ethanol system, the minimum reflux ratio _____?

- A. Is computed from the slope of the upper operating line that is tangent to the equilibrium curve**

- B. Is computed from the intercept of the operating line
- C. Cannot be computed
- D. Is the optimum reflux ratio

Which of the following is an unsaturated fatty acid ?

- A. Lauric acid
- B. Palmitic acid
- C. Stearic acid
- D. Oleic acid**

Heat requirement for decomposition of a compound into its elements is _____ that is evolved during the formation of that compound from its elements?

- A. The same**
- B. Less than
- C. Greater than
- D. Different than

The fluid property which matters for falling rain drops to acquire spherical shape is its _____?

- A. Pressure
- B. Height of descend
- C. Viscosity
- D. Surface tension**

Out of the following fuels, the difference between the net and gross calorific value is maximum in case of _____?

- A. Pitch
- B. Fuel oil**
- C. Blast furnace gas
- D. Bituminous coal

At 100% relative humidity, the dew point temperature of moist air is _____?

- A. Less than the wet bulb temperature
- B. More than the wet bulb temperature**
- C. Equal to the wet bulb temperature
- D. Equal to the ambient temperature

Consideration of the creep is the most important in case of the _____?

- A. Blades of gas turbine**
- B. Piston of an I. C. engine
- C. Flywheel of steam engine
- D. Cycle chain

Critical humidity of a solid salt means the humidity _____?

- A. Above which it will always become damp
- B. Below which it will always stay dry
- C. Both A. and B.**
- D. Above Which it will always become dry and below which it will always stay damp

Signal normally used to study non-ideal flow by stimulus response technique is _____ input?

- A. Pulse
- B. Step
- C. Both A. & B.**
- D. Neither A. nor B.

$(\partial E/\partial T)_V$ is the mathematical expression for _____?

- A. CV
- B. Enthalpy change
- C. Free energy change
- D. None of these**

Earing is a defect found in steels after the following metal working operation ?

- A. Extrusion
- B. Rolling
- C. Deep drawing**
- D. Wire drawing

Nusselt number is the ratio of the temperature gradient at the wall to _____?

- A. Temperature difference
- B. Heat flux
- C. That across the entire pipe**
- D. None of these

Bromine content in sea water may be around _____ ppm?

- A. 70**
- B. 640
- C. 1875
- D. 2500

Which of the following clay mixing devices is vacuum operated for deairation of clay ?

- A. Banbury mixer
- B. Pug mill**
- C. Muller-mixer
- D. None of these

_____ is the trade name assigned to a non-ferrous cast alloy composed of cobalt, chromium & tungsten ?

- A. Stellite**
- B. High speed steel
- C. Cermet
- D. Alnico

Friction factor for fluid flow in pipe does not depend upon the _____?

- A. Pipe length
- B. Pipe roughness
- C. Fluid density & viscosity
- D. Mass flow rate of fluid

In an ammonia plant, the purge off is essential to _____?

- A. Maintain inert gas concentration within a limit
- B. Remove excess poisonous gases
- C. **Maintain H₂ : N₂ ratio at 3 :1**
- D. Remove uncondensed ammonia vapour

Raw materials for urea production are _____?

- A. CO₂ and N₂
- B. **CO₂, H₂ and N₂**
- C. NH₃ and CO
- D. HNO₃ and CaCO₃

Fusel oil is a/an _____?

- A. Essential oil
- B. Extract from medicinal herbs
- C. **Mixture of higher molecular weight alcohols (a by-product obtained during production of alcohol from molasses)**
- D. None of these

Time constant is the _____?

- A. **Time taken by the controlled variable to reach 63.2% of its full change**
- B. Same as transportation lag
- C. Same as dead time
- D. Time required by the measured variable to reach 63.2% of its ultimate change

Which of the following pollutants is absent in the emissions from a fertiliser plant ?

- A. SO₂ & SO₃
- B. NO₂
- C. NH₃
- D. CO**

The Nusselt number for fully developed (both thermally and hydrodynamically) laminar flow through a circular pipe, where the wall heat flux is constant, is _____?

- A. 2.36
- B. 4.36**
- C. 120.36
- D. Dependent on NRe only

Which of the following is not required in the manufacture of soda ash by Solvay process ?

- A. Ammonia
- B. Limestone
- C. Nitric acid**
- D. None of these

'GASOHOL' widely used in Brazil as a motor fuel is a mixture of alcohol and _____?

- A. Petrol**
- B. LPG
- C. Light hydrocarbon gases (e.g. butane or propane)
- D. None of these

With increase in temperature, the solubility of gases in liquids, at fixed pressure _____?

- A. Increases

B. Decreases

C. Remain same

D. Either A. or B., depends on the system

The operating pressure drop range in a bag filter is about _____ mm water gauge?

A. 50-150

B. 5-10

C. 500-1500

D. 1500-2500

_____ is required more for leafy crops?

A. Nitrogen

B. Phosphorous

C. Potassium

D. Carbon

In rectifying section of a continuous distillation column, the _____?

A. Vapour is enriched with low boilers

B. Vapour is enriched with high boilers

C. Liquid is stripped of high boilers

D. None of these

_____ is an addition polymer ?

A. Nylon

B. Bakelite

C. Polythene

D. None of these

Which of the following is the most severe air pollutant ?

A. Hydrocarbons

B. NO_x

- C. SO₂
- D. CO

Near their critical temperatures, all gases occupy volumes _____ that of the ideal gas?

- A. Less than**
- B. Same as
- C. More than
- D. Half

For turbulent mass transfer in pipes, the Sherwood number depends on the Reynolds number as _____?

- A. $Re^{0.33}$
- B. $Re^{0.53}$
- C. $Re^{0.83}$**
- D. Re

1.2 to 3.8 cms is the value of the _____?

- A. Downcomer liquid seal in case of a balanced tray design
- B. Static submergence in case of a bubble cap tray for column operating under pressure (≥ 1 atm)
- C. Skirt clearance for bubble caps
- D. All A., B. and C.**

The most commonly used moderator in nuclear power plants is _____?

- A. Graphite**
- B. Light water
- C. Heavy water
- D. Beryllium

The viscosity of water at room temperature may be around one

_____ ?

- A. Centipoise
- B. Poise
- C. Stoke
- D. Both B. & C.

A magnetic flowmeter is _____ ?

- A. Based on the principle of Faraday's law
- B. Capable of measuring the flow rate of slurries and electrolytes
- C. Based on the linear relationship between the fluid flow rate and the induced voltage
- D. All A., B. and C.

A good metallurgical coke _____ ?

- A. Should have high porosity
- B. Should be brittle
- C. Must contain moderate quantities of ash, moisture, sulphur and volatile matters
- D. Should have low fusion point of its ash

Older crude petroleum _____ ?

- A. Is light and better
- B. Gives more distillates
- C. Gives less tar
- D. All A., B. and C.

Which one shows the diagrammatic heat balance in a furnace ?

- A. Sankey diagram
- B. Cox chart
- C. Ostwald chart
- D. None of these

The velocity profile for turbulent flow through a closed conduit is _____ ?

- A. Logarithmic

- B. Parabolic
- C. Hyperbolic
- D. Linear

Which of the following gasoline (unleaded) has the least octane number ?

- A. Catalytically cracked gasoline
- B. Straight run gasoline**
- C. Catalytically reformed gasoline
- D. Polymer gasoline

Action of phosphoric acid on rock phosphate produces _____ ?

- A. Superphosphate
- B. Triple superphosphate**
- C. Nitrophosphate
- D. Diammonium phosphate

Mass transfer co-efficient varies as $DAB^{0.5}$, according to the _____ theory?

- A. Film
- B. Surface renewal**
- C. Penetration
- D. None of these

For the reversible reaction $A \rightleftharpoons 2B$, if the equilibrium constant K is 0.05 mole/litre; starting from initially 2 moles of A and zero moles of B , how many moles will be formed at equilibrium ?

- A. 0.253
- B. 0.338**
- C. 0.152
- D. 0.637

Specific gravity of a liquid cannot be measured by a/an _____ ?

- A. Anemometer**

- B. Specific gravity bottle
- C. Pycnometer
- D. Hydrometer

TLV of ozone (O₃) and phosgene (COCl₂) in air is _____ ppm?

- A. 0.1**
- B. 25
- C. 100
- D. 1000

The value of Lewis number ($Le = Sc/Pr$) for air-water vapour system is around _____?

- A. 1**
- B. 0.24
- C. 3.97
- D. 600

Poly Vinyl chloride (PVC) is a _____ material?

- A. Thermoplastic**
- B. Thermosetting
- C. Fibrous
- D. Chemically active

Consider the 'n' th order irreversible liquid phase reaction $A \rightarrow B$. Which one of the following plots involving half life of the reaction ($t_{1/2}$) and the initial reactant concentration (CA_0) gives a straight line plot ?

- A. CA_0 Vs $t_{1/2}$
- B. $\ln CA_0$ Vs $t_{1/2}$
- C. CA_0 Vs $\ln t_{1/2}$**
- D. $\ln CA_0$ Vs $\ln t_{1/2}$

The same volume of all gases is representative of

their _____?

- A. Specific gravities
- B. Densities
- C. Gas characteristic constants
- D. Molecular weights**

If the partial pressure of the solvent in the vapor phase is equal to the vapor pressure of the solvent at that temperature, then the system is said to be at its _____?

- A. Bubble point
- B. Saturation temperature
- C. Dew point
- D. Both B. and C.**

A fluid is a substance, that _____?

- A. Has to be kept in a closed container
- B. Is almost incompressible
- C. Has zero shear stress
- D. Flows when even a small shear is applied to it**

Which of the following is the most active zone of atmosphere in which weathering events like rain, storm & lightning occur ?

- A. Thermosphere
- B. Troposphere**
- C. Stratosphere
- D. None of these

Extraction of uranium from its ore is done using _____ methods?

- A. Electrometallurgical
- B. Pyrometallurgical
- C. Chemical**
- D. Physical beneficiation

In a _____ riveted joint, the number of rivets decreases from the innermost row to the outermost row?

- A. Chain
- B. Diamond**
- C. Zig-zag
- D. None of these

Fluidised beds are formed, when the _____?

- A. Fluid friction is zero
- B. Gravity force is less than the fluid friction**
- C. Pressure forces equal gravity forces
- D. Sum of the fluid friction and pressure forces is equal and opposite to gravity forces

Which of the following factors affect the pressure drop in a co-current gas-liquid absorption packed tower ?

- A. Size, shape, orientation and surface of the packing particles
- B. Density and viscosity of fluids
- C. Fluid flow rates
- D. All A., B. and C.**

Pick out the wrong statement ?

- A. The X-rays cannot be deflected by electric field unlike cathode rays
- B. The intensity of X-rays can be measured by ionisation current produced due to the ionisation of gas by X-rays
- C. The quality of X-rays can be controlled by varying the anode-cathode voltage**
- D. Crystal structure of a material can be studied by an electron microscope

Liquid flow rate in an open channel cannot be measured by a/an _____?

- A. Orifice meter**
- B. Cipolletti weir
- C. Rectangular weir

D. V-notch

Bakelite is _____?

- A. Same as Polytetrafluoroethylene (PTFE)
- B. An inorganic polymer
- C. Same as thermosetting phenol-formaldehyde**
- D. Not a polymer

In salt bath furnace, heat is transferred to the charge mainly by _____?

- A. Conduction**
- B. Convection
- C. Radiation
- D. None of these

Venturimeters, orificemeters and nozzles are used to measure the fluid discharge from a pipeline. The average fluid velocity in a pipeline can be measured by a/an _____?

- A. Weir
- B. Hot wire anemometer**
- C. Cup and vane anemometer
- D. None of these

A liquid phase reaction is to be carried out under isothermal conditions. The reaction rate as a function of conversion has been determined experimentally and is shown in the figure given below. What choice of reactor or combination of reactors will require the minimum overall reactor volume, if a conversion of 0.9 is desired ?

- A. CSTR followed by a PFR
- B. PFR followed by a CSTR
- C. CSTR followed by a PFR followed by a CSTR
- D. PFR followed by a CSTR followed by a PFR**

The reaction rate constants at two different temperatures T_1 and T_2 are related by _____?

- A. $\ln (k_2/k_1) = (E/R) (1/T_2 - 1/T_1)$
- B. $\ln (k_2/k_1) = (E/R) (1/T_1 - 1/T_2)$**
- C. $\exp (k_2/k_1) = (E/R) (1/T_2 - 1/T_1)$
- D. $\exp (k_2/k_1) = (E/R) (1/T_1 - 1/T_2)$

Pick out the wrong statement?

- A. Fluxing material like lime is added in clay to reduce the vitrification temperature
- B. Main constituents of clay are alumina and silica
- C. Addition of sand in ceramic materials makes it non-plastic, increases its fusion point and reduces its shrinkage on burning
- D. Vitrification of fireclay material is done to increase its porosity**

Calorific value of bituminous coal may be around _____ Kcal/kg?

- A. 500
- B. 1500
- C. 6500**
- D. 20000

2 litres of nitrogen at N.T.P. weighs _____ gms ?

- A. 14
- B. 2.5**
- C. 28
- D. 1.25

Gasoline extracted from natural gas (by compression and cooling) is called the _____ gasoline?

- A. Polymer
- B. Unleaded**
- C. Casing head
- D. Straight run

Those solutions in which there is no volume change upon mixing the components in the liquid state and which, when diluted do not undergo any heat change (i.e. heat of dilution is zero), are called _____ solutions?

- A. **Ideal**
- B. Real
- C. Isotonic
- D. None of these

The usual energy consumption in electric arc furnace steel making is _____ KWh/ton of steel ?

- A. 60 – 100
- B. **400 – 700**
- C. 1200 -1500
- D. 2000 – 2300

Which of the following is a copolymer ?

- A. PVC
- B. **Bakelite**
- C. Polythene
- D. Teflon

The main aim behind cooling the digested chip at the bottom portion of the digester by injecting cold black liquor is to _____?

- A. **Avoid mechanical weakening of fibre**
- B. Remove lignin by way of crystallisation
- C. Increase the cellulose content
- D. None of these

Relative cost of chemical process plants in India is about _____ percent more than the similar plants in U.S.A ?

- A. 15

B. 35

C. 55

D. 75

Which of the following has the highest density and the lowest melting point ?

A. Stainless steel

B. Titanium

C. Lead

D. Aluminium

Souders Brown equation given by, $U = K_v \sqrt{(\rho_l - \rho_v)/\rho_v}$, is used for the calculation of the _____ in a continuous distillation column?

A. Diameter of the bubble cap column

B. Diameter of the sieve plate column

C. Tray pressure drop

D. Residence time in the downcomer for the disengagement of entrained vapour

Softening point of high density polythene is about _____ °C?

A. 85

B. 135

C. 165

D. 205

Complete removal of _____ from gasoline is done by Unisol process using caustic soda and methyl alcohol?

A. Waxes

B. Mercaptans

C. Asphalt

D. Diolefins

The fluid velocity varies as the cube of the cylindrical pipe diameter in case of steady state laminar flow at constant pressure drop for _____ fluid?

A. Newtonian

B. Pseudo-plastic

- C. Dilatent
- D. Bingham plastic

During bottling of cold drinks (e.g. Pepsi), the main resistance to mass transfer for the absorption of carbon dioxide in water lies in the _____?

- A. Gas film
- B. Liquid film**
- C. Liquid-gas interface
- D. None of these

Plexiglass (also called Lucite) because of its high optical transparency is used for making lenses. It is chemically _____?

A. Polymethyl methacrylate (PMMA)

- B. Polytetrafluoroethylene (PTFE)
- C. Polycarbonates
- D. Phenolic resins

An alloy of iron containing 4% carbon is called _____?

- A. High carbon steel
- B. Wrought iron
- C. Mild steel
- D. None of these**

Boiling point elevation of an ideal solution _____?

A. Increases rapidly with temperature rise

- B. Decreases rapidly with temperature rise
- C. In independent of pressure
- D. Both B. and C.

E.m.f. generated by thermocouples is of the order of _____?

- A. Milli volts**
- B. Micro volts

- C. Volts
- D. Kilo volts

At a given temperature, the equilibrium yield of SO_3 obtained from the oxidation of SO_2 is proportional to (where, P = pressure of the system) ?

- A. P
- B. \sqrt{P}**
- C. P^2
- D. $1/P$

Dryness fraction of wet steam is defined as the ratio of mass of vapour in the mixture to the mass of mixture _____ calorimeter is not used for measuring the dryness fraction of steam?

- A. Bomb**
- B. Separating
- C. Bucket
- D. Throttling

Sand is dried in foundries in a _____ drier?

- A. Rotary
- B. Fluidised bed**
- C. Vacuum
- D. Spray

Which of the following is the most important rubber compounding ingredient which is used to improve wearing qualities of both natural rubber & SBR by imparting toughness ?

- A. Phosphorous
- B. Carbon black**
- C. Pine oil
- D. Rosin

Straight silicon steel (containing Si from 0.5 to 5%) because of their low hysteresis loss and high magnetic permeability are used for electrical appliances. Which of the following electrical appliances made of silicon steel contains maximum percentage of silicon (about 4%) ?

- A. Armature of small motors/generators
- B. Generators and small motors
- C. Induction motors
- D. High frequency transformers**

Pick out the wrong statement ?

- A. Weldability of high carbon steel is poorer compared to low carbon steel
- B. Invar is a magnetic alloy**
- C. Magnetic permeability of the diamagnetic material is less than one
- D. Martenitic transformation never goes to completion (i.e., 100%) at room temperature

Gradually varied flow in open channel is a/an _____ flow?

- A. Steady uniform
- B. Steady non-uniform**
- C. Unsteady uniform
- D. Unsteady non-uniform

Which of the following heat treatment processes is used for softening the hardened material ?

- A. Normalising
- B. Tempering**
- C. Annealing
- D. None of these

The internal energy of an incompressible fluid depends upon its _____ ?

- A. Pressure
- B. Temperature**

- C. Both A. & B
- D. Neither A. nor B

The octane number of aviation gasoline may be _____?

- A. 79
- B. 87
- C. 97
- D. > 100**

Inorganic impurities causing water pollution is _____?

- A. Fats
- B. Carbohydrates
- C. Salts of metals**
- D. Protein

_____ chart is a graph related to Antoine equation ?

- A. Ostwald
- B. Cox**
- C. Mollier's
- D. Enthalpy-concentration

A process stream of dilute aqueous solution flowing at the rate of 10 Kg.s^{-1} is to be heated. Steam condensate at 95°C is available for heating purpose, also at a rate of 10 Kg.s^{-1} . A 1 – 1 shell and tube heat exchanger is available. The best arrangement is _____?

- A. Counter flow with process stream on shell side**
- B. Counter flow with process stream on tube side
- C. Parallel flow with process stream on shell side
- D. Parallel flow with process stream on tube side

Heat release during phase change is observed in case of a/an _____?

- A. Boiler
- B. Condenser**
- C. Evaporator
- D. All A. B. & C.

Use of I-control along with P-control facilitates ?

- A. Elimination of offset**
- B. Reduction of offset
- C. Reduction of stability time
- D. None of these

More than 95% of _____ is present in corundum ?

- A. SiO₂
- B. Al₂O₃**
- C. CaSiO₂
- D. MgO

In case of a shell and tube heat exchanger, the minimum shell thickness for carbon steel (inclusive of corrosion allowance) depends on shell diameter and is in the range of _____ mm?

- A. 3-5
- B. 5-11**
- C. 8-15
- D. 12-18

In a single evaporator system, the steam economy _____ by creating vacuum in the evaporator?

- A. Increases**
- B. Decreases
- C. Remain constant
- D. May increase or decrease, depends on the vacuum

In "Imperial Smelting Process" for extraction of zinc, zinc vapour thus produced

is quenched in the external condenser by the use of the following

_____?

- A. Jet of water at high pressure
- B. Blast of air
- C. Mixture of water and air
- D. Rain of molten lead**

A system in which there is exchange of energy but not of mass, is called a/an

_____ system?

- A. Isolated
- B. Open
- C. Insulated
- D. Closed**

A 2 kg object weighs 1.8 kgf on a spring balance. The value of 'g' at that location in m/sec² is _____?

- A. 8.82**
- B. 9.81
- C. 10.88
- D. 0.95

Which of the following pipe bends will incur the largest head loss ?

- A. U-bend**
- B. 30° bend
- C. 45° bend
- D. 90° bend

An autothermal reactor is _____?

- A. Most suitable for a second order reaction
- B. Most suitable for a reversible reaction
- C. Completely self-supporting in its thermal energy requirements**
- D. Isothermal in nature

Pick the odd man out of the following?

A. Calorising

B. Pack carburising

C. Nitriding

D. Cyaniding

The heats of vaporisation of CS₂, C₂H₅OH & H₂O are 26.8, 38.6 & 40.6 KJ/kg.mole respectively. The order of decreasing inter-molecular forces in these liquids is _____?

A. H₂O > C₂H₅OH > CS₂

B. CS₂ > C₂H₅OH > H₂O

C. H₂O > CS₂ > C₂H₅OH

D. CS₂ > H₂O > C₂H₅OH

Graphite is corroded by _____?

A. Sulphuric acid (10%)

B. Sea water

C. Hydrochloric acid

D. None of these

A dephlegmator is a _____?

A. Total condenser

B. Vacuum evaporator

C. Partial condenser

D. Double pipe heat exchanger

In multipass welds, shot peening is done after each pass to _____?

A. Close the surface porosity

B. Break the continuity of columnar grains

C. Flatten the weldment

D. Introduce texture in the weld

Heat transfer co-efficient (h) for a fluid flowing inside a clean pipe is given by $h = 0.023 (K/D) (DV\rho/\mu)^{0.8} (CP.\mu/k)^{0.4}$. This is valid for the value of NRe equal to _____?

- A. 4000
- D. > 10000**

Ammonium chloride solution is stored/ treated in _____ vessels/pipes?

- A. Plain carbon steel
- B. Stainless steel
- C. Rubber or durmet-20 lined**
- D. Lead

Thermal conductivity based continuous flue gas analyser makes use of varying thermal conductivity of the constituents of flue gases. Which of the following constituents of flue gases has the maximum thermal conductivity ?

- A. CO₂**
- B. N₂
- C. O₂
- D. CO

Which of the following has the least (almost negligible) effect on the solubility of a solute in a solvent ?

- A. Temperature
- B. Nature of solute
- C. Pressure**
- D. Nature of solvent

$f = 16/NRe$, is valid for _____?

- A. Turbulent flow
- B. Laminar flow through an open channel
- C. Steady flow

D. None of these

Actual operating speed of a ball mill may vary from 65 to 80% of the critical speed. Which of the following duties would require the ball mill to be operated at maximum percentage of critical speed ?

- A. Wet grinding in low viscous suspension
- B. Wet grinding in high viscous suspension
- C. Dry grinding of large particles (upto 1.25 cms)
- D. Dry grinding of large particles in un-baffed mills**

Which of the following is not a component of depreciation cost ?

- A. Repairs and maintenance cost**
- B. Loss due to obsolescence of the equipment
- C. Loss due to decrease in the demand of product
- D. Loss due to accident/breakdown in the machinery

Polymers are _____ ?

- A. Micro-molecules
- B. Macromolecules**
- C. Sub-micromolecules
- D. None of these

Catalyst used in ammonia synthesis uses _____ as a promoter?

- A. Pt
- B. K₂O**
- C. Al₂O₃
- D. Ni

Pick out the wrong statement ?

- A. A pale color of petroleum product indicates lower viscosity**
- B. Color of petroleum products indicates the degree of refinement
- C. Lighter petroleum distillates are lighter in color than the heavier residual oils
- D. Fluorescence of oils helps to detect its adulteration

Open channel liquid flow is most conveniently measured by

a _____?

- A. Hot wire anemometer
- B. Notch**
- C. Rotameter
- D. Segmental orifice

Which is the most matured coal ?

- A. Lignite
- B. Bituminous
- C. Semi-anthracite
- D. Anthracite**

Lower BWG means _____ of the tube?

- A. Lower thickness
- B. Lower cross-section**
- C. Outer diameter
- D. Inner diameter

Maximum consumption of limestone is in the _____ industry?

- A. Iron and steel
- B. Cement
- C. Glass
- D. Fertiliser**

Arrhenius equation shows the variation of _____ with temperature?

- A. Reaction rate
- B. Rate constant**
- C. Energy of activation
- D. Frequency factor

Ethanolamine is an absorbent used for the removal of _____ from air/gas?

- A. HF
- B. SO₂
- C. H₂S
- D. Both B. & C.**

Which of the following is not used as a medium for high temperature heating ?

- A. Dowtherm
- B. Mercury**
- C. Liquid metal (e.g. molten sodium)
- D. Fused salts (e.g., an eutectic mixture of 53% KNO₃, 40% NaNO₂ and 7% NaNO₃)

Yellow phosphorus is transported under _____?

- A. Air
- B. Water**
- C. Nitrogen
- D. Helium

_____ of rubber decreases after its vulcanisation?

- A. Resistance to the action of organic solvent
- B. Tackiness**
- C. Maximum service temperature
- D. Tensile strength

A particle A of diameter 10 microns settles in an oil of specific gravity 0.9 and viscosity 10 poise under Stoke's law. A particle B with diameter 20 microns settling in the same oil will have a settling velocity ?

- A. Same as that of A
- B. One fourth as that of A**
- C. Twice as that of A
- D. Four times as that of A

Nichol's chart deals with _____?

- A. A.R. vs. phase lag of first order
- B. A.R. vs. phase lag of second order
- C. Closed loop values vs. open loop values**
- D. Frequency response values of controllers

For a binary mixture distillation process, the degree of freedom is 2. However, if the pressure is fixed in this process, the number of independent variables in this process will be _____?

- A. 1**
- B. 0
- C. 2
- D. 3

Pick out the wrong statement?

- A. Denier is defined as weight in gm of 9000 metres length of a fibre, while tex is defined as weight in gm of 1000 metres length of fibre
- B. Crimp is a measure of the difference between the length of the straightened and unstraightened fibre
- C. Dacron fibres, acrylic fibres, viscose rayon fibres & cellulose acetate fibres are all prepared by wet spinning**
- D. Nylon fibres have greater water absorption capacity than polyester fibres

Decomposition rate of a liquid 'X' which decomposes as per the reaction as shown in the bellow figure is given by _____?

- A. $K_1 \cdot CX$
- B. $(K_1 + K_2 + K_3) CX$
- C. $(K_1 + K_2) CX$**
- D. $(K_2 + K_3) CX$

Exothermic reactions are best carried out in _____?

- A. A CSTR
- B. CSTR in series

- C. A plug flow reactor followed by CSTR
- D. CSTR followed by a plug flow reactor**

In a roll crusher, the specific power consumption and the production rate is affected by the _____?

- A. Reduction ratio
- B. Differential roll speed
- C. Both A. and B.**
- D. Neither A. nor B.

Maximum permissible sulphur content in steel is _____ percent ?

- A. 0.015**
- B. 0.055
- C. 0.505
- D. 0.805

Thermal efficiency of a Carnot engine can approach 100%, only when the temperature of the _____?

- A. Cold reservoir approaches zero
- B. Hot reservoir approaches infinity
- C. Either A. or B**
- D. Neither A. nor B

Fractional solvent extraction _____?

- A. Employs only one solvent
- B. Employs two solvents**
- C. Results in low interfacial tension
- D. None of these

Traces of liquid tar fog present in coke oven gas is separated using _____?

- A. Electrostatic precipitator**
- B. Cyclone separator

- C. Strainer
- D. None of these

What is the maximum theoretical suction lift (metres) of a reciprocating pump ?

- A. 5
- B. 10**
- C. 50
- D. 100

Permanent hardness of water is due to the presence of calcium & magnesium _____ ?

- A. Bi-carbonates
- B. Sulphates & chlorides**
- C. Carbonate
- D. None of these

Fog is an example of colloidal system of _____ ?

- A. Solid dispersed in gas
- B. Solid dispersed in liquid
- C. Liquid dispersed in gas**
- D. Gas dispersed in liquid

Which of the following is not a polyolefin ?

- A. Polystyrene
- B. Polypropylene
- C. Neoprene**
- D. None of these

Speed of industrial paddle agitator ranges from _____ rpm?

- A. 1 to 5
- B. 20 to 100**
- C. 500 to 750
- D. 1000 to 2000

In case of a vertical tube evaporator, with increase in the liquor level, the _____ is increased?

- A. Velocity of circulation
- B. Liquor-film co-efficient
- C. Both A. and B.
- D. Neither A. and B.**

Limestone powder is injected during pulverised coal burning in boilers to _____ the flue gases?

- A. Reduce SO₂ content in**
- B. Catalytically convert SO₂ to SO₃ in
- C. Increase the dew point of
- D. None of these

Any shell opening greater than 5 cms for a storage tank must be reinforced for reason of _____?

- A. Preventing the local overstressing of the shell around the opening**
- B. Reduction of discontinuity in shape at the junction
- C. Making the joint leak proof
- D. None of these

A riveted joint does not fail by _____ of rivets?

- A. Tearing
- B. Shearing
- C. Tearing of the plate across a row
- D. None of these**

Colloidal mills are used for _____ grinding?

- A. Coarse
- B. Intermediate
- C. Fine
- D. Ultrafine**

Which of the following is not a binder for coal briquetting ?

- A. Coal tar
- B. Bitumen
- C. Molasses
- D. None of these**

For a given Reynold number as d/D for an orifice increases, C_d will (where, d & D are orifice & pipe diameters respectively)?

- A. Increase**
- B. Decrease
- C. Remain constant
- D. Either A. or B.; depends on other factors

Variation of equilibrium pressure with temperature for any two phases of a given substances is given by the _____ equation?

- A. Gibbs-Duhem
- B. Maxwell's
- C. Clapeyron**
- D. None of these

Which of the following will favour the reverse reaction in a chemical equilibrium reaction ?

- A. Increasing the concentration of one of the reactants
- B. Increasing the concentration of one or more of the products**
- C. Removal of at least one of the products at regular interval
- D. None of these

Which of the following is not a by-product recovered in a high temperature coal carbonisation plant ?

- A. Benzol
- B. Pitch-cresote mixture (PCM)

C. Naphthalene

D. Ethylene

Thermosetting polymers are _____?

A. Injection moulded

B. Cast molded

C. Extruded

D. None of these

Coke oven walls are lined with _____ bricks?

A. Silica

B. Tar-dolomite

C. Low thermal conductivity

D. Fire clay

For the gas absorption, the height of a transfer unit, based on the gas phase is given by (G : superficial molar gas velocity, L : superficial molar liquid velocity, FG : mass transfer co-efficient, moles/m², a : interfacial area per unit volume of tower) ?

A. $G/(FG \cdot a)$

B. $FG/(G \cdot a)$

C. $(G \cdot a)/FG$

D. $L/(FG \cdot G)$

Which area is used in case of heat flow by conduction through a cylinder ?

A. Logarithmic mean area

B. Arithmetic mean area

C. Geometric mean area

D. None of these

For a fluid rotating at constant angular velocity about vertical axis as a rigid body, the pressure intensity varies as the _____?

- A. **Square of the radial distance**
- B. Radial distance linearly
- C. Inverse of the radial distance
- D. Elevation along vertical direction

Pick out the wrong statement?

- A. Insulating refractories used in place of regular refractory bricks are usually called light weight refractories, and they have similar composition as heavy bricks
- B. Graphite refractories are also called plumbago refractories
- C. **Superduty fireclay bricks correspond to a pyrometric cone equivalent of 26-28**
- D. Calcined magnesite is also called dead burnt magnesite

Lead lined equipments & vessels are suitable for handling

_____?

- A. Hydrochloric acid (10%)
- B. Nitric acid
- C. **Sulphuric acid upto 60°C**
- D. All A., B. and C.

Magnesium and calcium _____ cause temporary hardness of water?

- A. Carbonates
- B. **Bicarbonates**
- C. Phosphates
- D. Sulphates

All resistances during washing of cake _____?

- A. Increases
- B. Decreases
- C. **Remain constant**
- D. None of these

Pipes for bi-cycle frames are made of _____ steel?

- A. Hot rolled
- B. Chrome carbon
- C. Cold rolled**
- D. Stainless

Sulphuric acid is mixed with ground phosphate rock (to produce phosphoric acid) in a steel digester lined with _____?

- A. Acidic refractory**
- B. Rubber
- C. Karbate
- D. Lead or acid proof bricks

Which form of silica has the highest specific gravity ?

- A. Quartz**
- B. Cristobalite
- C. Tridymite
- D. All have the same specific gravity

A vapor whose partial pressure is less than its equilibrium vapor pressure is called the _____ vapor?

- A. Saturated
- B. Superheated**
- C. Unsaturated
- D. Dry gaseous

A cube, sphere & a thin circular plate (all having same mass and made of same material) are all heated to 300°C and allowed to cool in natural air. Which one will cool the slowest ?

- A. Cube
- B. Plate
- C. Sphere**
- D. All will cool at the same rate

The equilibrium constant for a chemical reaction at two different temperatures is given by _____?

- A. $K_{p2}/K_{p1} = -(\Delta H/R) (1/T2 - 1/T1)$
- B. $K_{p2}/K_{p1} = (\Delta H/R) (1/T2 - 1/T1)$
- C. $K_{p2}/K_{p1} = \Delta H (1/T2 - 1/T1)$
- D. $K_{p2}/K_{p1} = -(1/R) (1/T2 - 1/T1)$

In most of the mechanically agitated liquid-liquid extractors, baffles or horizontal compartmental plates are provided, which helps in _____?

- A. Reducing the axial mixing
- B. Increasing the rate of extraction
- C. Maintaining the concentration difference between the two phases
- D. All A , B & C.

Which of the following is an example of stress corrosion ?

- A. Season cracking of brass
- B. Caustic embrittlement of steel
- C. Both A. & B.
- D. Neither A. nor (B)

Transition from laminar to turbulent zone in free convection heat transfer is governed by the critical value of ?

- A. Grashoff number
- B. Grashoff number & Reynolds number
- C. Reynolds number
- D. Grashoff number & Prandtl number

For the gaseous reaction $2A \rightarrow B$, where the feed consists of 50 mole % A and 50 mole % inerts, the expansion factor is _____?

- A. 1
- B. -0.5

C. -0.25

D. 0

The internal energy of an ideal gas is a function of its _____ only?

A. Molecular size

B. Volume

C. Pressure

D. Temperature

Which is not an alumino-silicate refractory ?

A. Fireclay bricks

B. Mullite bricks

C. Tar dolomite bricks

D. High alumina bricks

Which is the stable form of silica upto 1470°C ?

A. Quartz

B. Cristobalite

C. Tridymite

D. None of these

In a free vortex, the _____ ?

A. Velocity changes linearly with radial distance

B. Flow is necessarily rotational

C. Radial component of velocity is same everywhere

D. Stream lines are not circular

Naphtha in a fertiliser plant is used as a source of _____ ?

A. Fuel

B. H₂

C. N₂

D. O₂

Thermal diffusivity of a material _____?

- A. Has the unit m^2 / sec
- B. Is defined as $K/\rho \cdot C_p$
- C. Is the ratio of thermal conductivity to thermal capacity
- D. All A., B. and C.**

For absorbers, high pressure drop results in _____?

- A. Increased efficiency
- B. Decreased efficiency
- C. High operating cost**
- D. Better gas liquid contact

j_H factor for heat transfer is not a function of the _____ number?

- A. Reynolds
- B. Nusselt
- C. Grashoff
- D. Both B. & C.**

Sensible heat absorbed by 1 lb of water when it is heated from 32 to 212°F may be around _____ BTU?

- A. 180**
- B. 970
- C. 3.97
- D. Data insufficient, can't be predicted

_____ is produced using Polycondensation Reaction?

- A. Polythene
- B. Phenol formaldehyde**
- C. Poly vinyl chloride
- D. None of these

For a spontaneous process, free energy _____?

- A. Is zero

- B. Increases
- C. Decreases whereas the entropy increases**
- D. And entropy both decrease

Plasticisers are added to polymers to improve their _____?

- A. Tensile strength
- B. Softness & flexibility**
- C. Acid resistance
- D. Alkali resistance

Heat of formation of an element in its standard state is _____?

- A. 0**
- B. 0
- D. A function of pressure

What is the thermal conductivity of a perfect heat insulator ?

- A. Zero**
- B. One
- C. ∞
- D. Between 0 and ∞

Soft coke is not _____?

- A. Produced by low temperature carbonisation of coal
- B. A domestic fuel
- C. Used in blast furnaces**
- D. None of these

Which of the following will increase the volume of a real gas by four times ?

- A. Doubling the absolute temperature as well as pressure of the gas
- B. Reducing pressure to one fourth at constant temperature**
- C. Reducing temperature to one fourth at constant pressure
- D. Reducing the temperature to half and doubling the pressure

Corrosiveness of steam condensate is due to the presence of _____?

- A. CO₂
- B. Dissolved O₂
- C. Both A. & B.**
- D. Neither A. nor B.

The unit of specific heat at constant pressure, C_p , in SI unit is _____?

- A. W/m²°C
- B. J/kg°K**
- C. W/m°K
- D. J/m³°K

'Ice point' is designated on Fahrenheit temperature scale by _____?

- A. 0°
- B. 32°**
- C. 62°
- D. 212°

Free energy change at equilibrium is _____?

- A. Zero**
- B. Positive
- C. Negative
- D. Indeterminate

Entropy of the system decreases, when _____?

- A. Snow melts into water
- B. A gas expands spontaneously from high pressure to low pressure
- C. Water is converted into ice
- D. Both B. & C**

If the pressure on 100 c.c. of air is halved, then its volume (at the same temperature) would be _____ c.c?

- A. 100
- B. 50
- C. 205
- D. 200**

Boundary layer thickness in laminar flow over a flat plate increases as (where, d = distance from the leading edge.) ?

- A. \sqrt{d}**
- B. $d^{1/3}$
- C. d^2
- D. $d^{2/3}$

Turbidity of water is an indication of the presence of _____ ?

- A. Suspended inorganic matter**
- B. Dissolved solids
- C. Floating solids
- D. Dissolved gases

In a distillation column, with increase in the reflux ratio, the heat removed in the cooler _____ ?

- A. Increases**
- B. Decreases
- C. Remains unaffected
- D. And the heat required in reboiler decreases

In counter flow compared to parallel flow, ?

- A. LMTD is greater
- B. Less surface area is required for a given heat transfer rate
- C. Both A. and B.**
- D. More surface area is required for a given heat transfer rate

The term Biological Oxygen Demand (BOD) is used in relation to

_____?

- A. Potable water
- B. Cooling water
- C. Distilled water
- D. Industrial effluents**

Which of the following mainly decides the current to be employed in arc welding

?

- A. Electrode size**
- B. Plate thickness
- C. Voltage across the arc
- D. Welded portion length

The formation of oxide film on a metal due to atmospheric exposure reduces its _____?

- A. Toughness
- B. Stiffness
- C. Creep limit**
- D. All A., B. & C.

High amount of sulphur and phosphorous in coke causes

_____?

- A. Decrease in its calorific value
- B. Increase in its strength
- C. Brittleness of steel made by using it**
- D. None of these

Which of the following is not affected by temperature changes ?

- A. Fugacity
- B. Activity co-efficient
- C. Free energy

D. None of these

The ratio of lateral strain to linear strain is termed as the _____?

- A. Poisson's ratio**
- B. Bulk modulus
- C. Modulus of elasticity
- D. Shear modulus

Propeller type centrifugal pumps are most suitable for _____?

- A. High capacity at high heads
- B. High capacity at low heads**
- C. Low capacity at high heads
- D. Low capacity at low heads

A perfect black body is a perfect _____ of radiation?

- A. Absorber
- B. Emitter
- C. Both A. & B.**
- D. Neither A. nor B.

The centre to centre distance between two consecutive baffles in a shell and tube heat exchanger is called the baffle pitch or baffle spacing, which is more than 1/5th the I.D. of the shell. Which of the following is not a function of the baffles ?

- A. To increase the residence time of shell side fluid
- B. To provide support to the tube bundle
- C. To reduce the induced vibration in the tubes
- D. To increase the tube side heat transfer co-efficient by inducing turbulence**

The vapour pressure of a solution (made by dissolving a solute in a solvent) is _____ that of the pure solvent?

- A. Less than
- B. More than
- C. Equal to
- D. Either more or less; depends on the solvent

The main reason for dividing a tall packed tower into series of small towers is to _____?

- A. Minimise the overall pressure drop
- B. Avoid flooding
- C. Reduce liquid hold up
- D. Avoid channelling**

A single pass air heater is connected to a two pass unit. For the air flow rate and other conditions remaining the same, the film heat transfer co-efficient for air will vary in the ratio of _____?

- A. 2
- B. 20.8**
- C. 20.2
- D. None of these

Hydrochloric acid is _____ corrosive to common metals?

- A. Least
- B. Not
- C. Mildly
- D. Highly**

There are one octahedral void and _____ tetrahedral void in the closest packing of atoms ?

- A. One
- B. Two**
- C. Three
- D. None of these

_____ is used for examining the macro-structure of a material?

- A. Metallurgical microscope
- B. Optical microscope
- C. X-rays
- D. Visual inspection by naked eye**

Radiation heat transfer rates does not depend upon the _____?

- A. Type of absorbing surface
- B. Distance between the heat source and the object receiving the heat
- C. Surface area and temperature of the heat source
- D. None of these**

The boiling & freezing points on a newly defined temperature scale in degree 'D' are 400°D & 100°D respectively. The temperature reading corresponding to 60°C on this new temperature scale will be equal to _____ $^{\circ}\text{D}$?

- A. 140
- B. 180
- C. 240
- D. 280**

Small scale evaporation is done in a _____?

- A. Heat exchanger
- B. Condenser
- C. Multiple effect evaporator
- D. Steam jacketed kettle**

On prolonged exposure to high concentration of carbon monoxide (> 5000 ppm), man dies because _____?

- A. Of clotting of blood
- B. Of jamming of respiratory tract
- C. It forms carboxyhemoglobin by combining with haemoglobin of blood, thereby making it incapable of absorbing oxygen**

D. It forms CO₂ by combining with oxygen present in the blood

Cermets are _____?

- A. Composite material containing both ceramic & metallic constituents
- B. Having high strength & resistance to high temperature
- C. Used in space vehicles, missiles & nuclear energy plants
- D. All A., B. and C.**

Evaporative cooling process employs a combination of cooling and humidification in which the _____?

- A. Sensible heat is added
- B. Sensible heat is removed and the latent heat is added**
- C. Latent heat is removed
- D. Sensible heat is added and latent heat is removed

Which is a high grade pulp ?

- A. Rag pulp
- B. Mechanical pulp
- C. Sulphate pulp**
- D. Sulphite pulp

_____ rubber is generally used for making 'O' rings used for vacuum sealings?

- A. Natural
- B. Neoprene**
- C. Butadiene
- D. Nitrile

Which of the following types of reactors is the safest from operation point of view ?

- A. A vapor phase reactor**
- B. Pot type reactor
- C. A liquid phase reactor

D. A liquid phase catalytic reactor

Identify the correct statement?

A. Sphalerite is zinc oxide

B. The first law of the thermodynamics is stated as $\delta E = \delta Q - \delta W$

C. Lead can be produced in a blast furnace

D. T. ferrooxidans is a fungus that can be used for leaching chalcopyrite

Chemical formula of BHC, which is an insecticide is _____?

A. C₆H₆Cl₆

B. C₆Cl₆

C. C₆H₅Cl

D. C₆H₄Cl₂

The leaching solvent used in Baeyer's process for the purification of bauxite is _____?

A. Ammonium hydroxide

B. Sodium carbonate

C. Sodium hydroxide

D. Ammonium carbonate

With increasing alumina content, the fusion point of high alumina refractories _____?

A. Increases

B. Decreases

C. Remain constant

D. May increase or decrease; depends on its alumina content

Which of the following is the lightest of engineering metals ?

A. Magnesium

B. Aluminium

C. Titanium

D. Tin

Maximum permissible concentration (i.e. TLV) of DDT in public water supply system is _____ micro gram (μ g)/litre?

- A. 22
- B. 42**
- C. 332
- D. 1050

Minimum reflux ratio in a distillation column results in _____?

- A. Optimum number of trays
- B. Minimum reboiler size
- C. Maximum condenser size**
- D. Minimum number of trays

A metal oxide is reduced by heating it in a stream of hydrogen. After complete reduction, it is found that 3.15 gm of the oxide has yielded 1.05 gm of the metal. It may be inferred that the _____?

- A. Atomic weight of the metal is 4
- B. Equivalent weight of the metal is 4**
- C. Atomic weight of the metal is 2
- D. Equivalent weight of the metal is 8

Fermentation is adversely affected by the _____?

- A. Presence of air
- B. Absence of air
- C. High concentration**
- D. Presence of ammonium salts

A batch reactor is _____?

- A. Suitable for gas-phase reactions on commercial scale
- B. Suitable for liquid phase reactions involving small production rate**
- C. Least expensive to operate for a given rate
- D. Most suitable for very large production rate

Pick out the wrong statement pertaining to the design of a long tube vertical evaporator ?

- A. Tube dia is 3-6 cms, while tube length in 3-6 metres
- B. Steam is fed to the shell, whereas the liquor is filled inside the tube
- C. Liquor level is maintained at 1/3rd to 1/2 of the height of the tube
- D. None of these**

Which of the following is not an ore of uranium ?

- A. Pitchblende
- B. Kyanite**
- C. Carnotite
- D. Rescolite

Vulcanisation of rubber decreases its _____ ?

- A. Tensile strength
- B. Resistance to organic solvents
- C. Tackiness**
- D. Working temperature range

Cation exchanger is regenerated usually with _____ ?

- A. NaOH
- B. H₂SO₄**
- C. Hydrazine
- D. Alum solution

The ratio of the largest load in a test to the original cross-sectional area of the test specimen is called the _____ stress?

- A. Yield point
- B. Breaking
- C. Ultimate**
- D. None of these

Configuration of Bourdon spring tube is never made of _____ shape?

- A. **Circular**
- B. Semi-circular
- C. Helical
- D. Spiral

The chamber process is _____?

- A. Preferred over contact process for producing 98 to 100% H₂SO₄ and various oleums
- B. Non-catalytic and operates only on pyrites
- C. A batch process for directly producing high strength (98 to 100%) H₂SO₄
- D. **None of these**

Use of water as a manometric liquid suffers from the disadvantage of its _____?

- A. Low vapour pressure
- B. Corrosive nature
- C. **High vapour pressure**
- D. High boiling point

Most Cermets, which normally have high thermal conductivity and high thermal shock resistance, comprises of ceramic & metallic components of _____ percent respectively?

- A. **80 and 20**
- B. 20 and 80
- C. 50 and 50
- D. 60 and 40

Gas chromatography is used for the measurement of _____?

- A. Temperature
- B. Pressure
- C. **Concentration**
- D. Flow rate

A sphere of radius 'R1' is enclosed in a sphere of radius 'R2'. The view (or shape) factor for radiative heat transfer of the outer sphere with respect to the inner sphere is _____?

- A. 0
- B. $R2/(R1+R2)$**
- C. 1
- D. $(R1/R2)^2$

Pick out the wrong statement ?

- A. 'Reduced temperature' of a substance is the ratio of its existing temperature to its critical temperature, both expressed on Celsius scale**
- B. 'Reduced pressure' is the ratio of the existing pressure of a substance to its critical pressure
- C. 'Reduced volume' is the ratio of the existing molal volume of a substance to its critical molal volume
- D. None of these

Ratio of pressure and inertia force gives _____ number?

- A. Weber
- B. Mach
- C. Euler**
- D. Froude

The term "approach" in a cooling tower refers to the difference in the temperature of the _____?

- A. Cold water leaving the tower and the wet bulb temperature of the surrounding air**
- B. Hot water entering the tower and the wet bulb temperature of the surrounding air
- C. Hot water entering and the cooled water leaving the cooling tower
- D. None of these

Common salt is produced from sea water in India generally by the _____ method?

- A. Freeze drying
- B. Solar evaporation**
- C. Electrolytic
- D. None of these

Duralumin is an alloy of _____?

- A. Aluminium, copper and manganese**
- B. Aluminium, nickel and silicon
- C. Aluminium and nickel
- D. None of these

The ratio of moles of a reactant converted into the desired product to that converted into unwanted product is called _____?

- A. Operational yield
- B. Relative yield
- C. Selectivity**
- D. None of these

Cd for the orifice plate varies from _____?

- A. 0.58 to 0.8**
- B. 0.93 to 0.98
- C. 0.2 to 0.3
- D. 0.02 to 0.03

Platinum resistance thermometer can be used upto antimony point which is _____ °C, and is the temperature of equilibrium between solid antimony & liquid antimony at normal atmospheric pressure?

- A. 961.93
- B. 630.74**
- C. 1064.43
- D. 1261.93

In case of a close thermodynamic system, there is _____ across the

boundaries?

- A. No heat and mass transfer
- B. No mass transfer but heat transfer**
- C. Mass and energy transfer
- D. None of these

1 kg/m² is equal to _____ mm water column?

- A. 1**
- B. 10
- C. 100
- D. 1000

The advantage of using a 1 – 2 shell and tube heat exchanger over a 1 – 1 shell and tube heat exchanger is _____?

- A. Lower tube side pressure drop
- B. Lower shell side pressure drop
- C. Higher tube side heat transfer co-efficient**
- D. Higher shell side heat transfer co-efficient

Wetted wall tower experiment determines the _____?

- A. Molal diffusivity
- B. Volumetric co-efficient
- C. Mass transfer co-efficient**
- D. None of these

Refractory materials are never used in the construction of _____?

- A. Segar cones
- B. Orton cones
- C. Pressure vessels**
- D. Ovens & retorts

Floating head heat exchangers are used for the _____?

- A. Heat transfer between corrosive fluids

- B. Cases where temperature difference between the shell and the tubes is more ($>50^{\circ}\text{C}$)**
C. Co-current heat transfer systems
D. Counter-current heat transfer systems

Matte smelting is used in the extraction of _____?

- A. Lead
B. Zinc
C. Aluminium
D. Copper

Chemical name of Grignard reagent is _____?

- A. Sodium thiosulphate
B. Ethyl magnesium chloride
C. Sodium sulphite
D. Sodium bicarbonate

Trade name of _____ is neoprene?

- A. Polychlorophrene**
B. Polyisoprene
C. Polytetrafluoroethylene
D. Poly vinyl acetate

Heating of _____ to 120°C , produces plaster of paris ?

- A. Blue vitriol
B. Gypsum
C. Calcium silicate
D. Calcium sulphate

Dry air is a mixture of _____?

- A. Vapors
B. Gases
C. Both A. & B.
D. Neither A. nor B.

Out of the following size reduction equipments, the maximum feed size can be accepted by the _____?

- A. Tube mill
- B. Ball mill
- C. Jaw crusher**
- D. Jet pulveriser

The equivalent diameter for fluid flow through a channel of constant non-circular cross section of area 'A' is given by (where, P = perimeter of the channel in contact with the fluid) ?

- A. $4 A/P$**
- B. A/P
- C. $4 P/A$
- D. \sqrt{A}

The terminology used for the bottom most product from the vacuum crude distillation unit is _____?

- A. Residual crude
- B. Residuuum**
- C. Reduced crude
- D. Petrolatum

The equation relating E, P, V and T which is true for all substances under all conditions is given by $(\partial E/\partial V)_T = T(\partial P/\partial T)_H - P$. This equation is called the _____?

- A. Maxwell's equation
- B. Thermodynamic equation of state**
- C. Equation of state
- D. Redlich-Kwong equation of state

Fertiliser value of a nitrogenous fertiliser is expressed in terms of its

_____ content?

- A. N₂
- B. KNO₃
- C. NO₂
- D. NHO₃

At _____ reflux, theoretical number of plates in a distillation column is calculated using Fenske-Underwood equation?

- A. Operating
- B. Total**
- C. Minimum
- D. Maximum permissible

Run of mine (ROM) coal is crushed by a _____ for use in domestic ovens?

- A. Jaw crusher
- B. Hammer crusher**
- C. Ball mill
- D. Tube mill

Addition of calcium oxide to water produces _____?

- A. Exothermic heat
- B. Hissing sound
- C. Slaked lime
- D. All A , B. & C .**

A gas performs the maximum work, when it expands _____?

- A. Non-uniformly
- B. Adiabatically
- C. Isobarically**
- D. Isothermally

Benzoyl chloride is not used as a catalyst in the manufacture

of _____?

- A. Polystyrene
- B. Polyvinyl acetate
- C. Polypropylene**
- D. Polyvinyl chloride-co-vinyl acetate

Annealing of cast iron _____?

- A. Softens it to facilitate machining**
- B. Decreases the free carbon
- C. Increases the strength
- D. None of these

1m³ is approximately equal to _____?

- A. 28 litres
- B. 35 ft³**
- C. 4.5 litres
- D. 4.5 ft³

Compound coke ovens are those which can be heated by _____?

- A. Both steam and electrical power
- B. Lean gas (e.g., B.F. gas)
- C. Rich gas (e.g., coke oven gas)
- D. Both B. and C.**

Carbon content in steel is _____ percent?

- A. 0.1-2**
- B. 4-6
- C. 2-4
- D. 0.001-0.01

The characterisation factor of a crude oil is calculated as 12.5. It means that; it is _____?

- A. Paraffinic**
- B. Naphthenic
- C. Intermediate
- D. None of these

The ratio of volumes of the mixed reactor to the plug flow reactor (for identical feed composition, flow rate, conversion, and for all positive reaction orders) is always ?

- A. 1
- B. < 1
- C. > 1**
- D. Equal to the order of reaction

After throttling, gas temperature _____ ?

- A. Decreases**
- B. Increases
- C. Remain same
- D. May increase or decrease; depends on the nature of the gas

Constituents of stellite are _____ ?

- A. Zinc, copper and nickel
- B. Cobalt, chromium and tungsten**
- C. Zinc, aluminium and nickel
- D. Nickel, cobalt and vanadium

Phenolic water generated in coke ovens & by-product plant of a steel plant are disposed off by _____ ?

- A. Quenching of hot coke**
- B. Discharging in the river stream
- C. Filtration and recycling for cooling coke oven gas
- D. None of these

Which of the following is the common pollutant emitted from metallurgical

smelters, thermal power plant and cement plants ?

- A. NO_x
- B. Hg
- C. SO₂**
- D. F

The blades of a centrifugal impeller are said to be curved forward, if the _____ of the motion of impeller blades?

- A. Inlet tip of a blade curves in a direction opposite to that
- B. Outlet tip of a blade curves in a direction opposite to that
- C. Inlet tip of a blade is towards the direction
- D. Outlet tip of a blade is towards the direction**

Nitrobenzene (boiling point = 210.6°C) is steam distilled at 1 atm pressure.

Nitrobenzene will distil off _____ °C?

- A. At < 100**
- B. At > 210.6
- C. Between 100 and 210
- D. None of these

Velocity of the thermal neutron (< 0.025 eV) used for fission of U-235 is around _____ m/sec?

- A. 1
- B. 2200**
- C. 3×10^{11}
- D. 9×10^{21}

The relative saturation of a partially saturated mixture of vapour and gas can be increased by _____ of the mixture?

- A. Reducing the total pressure
- B. Increasing the total pressure
- C. Reducing the temperature

D. Both B. and C.

Bulk diffusion in catalyst pore _____ with increase in pressure?

- A. Increases
- B. Decreases**
- C. Remains unchanged
- D. Increases exponentially

Routh stability method uses _____ loop transfer function?

- A. Open
- B. Closed**
- C. Either A. or B.
- D. Neither A. nor B.

In a continuous flow stirred tank reactor, the composition of the exit stream _____?

- A. Is same as that in the reactor**
- B. Is different than that in the reactor
- C. Depends upon the flow rate of inlet stream
- D. None of these

The exit cone angle in case of a standard Venturimeter is _____ the entrance cone angle?

- A. Smaller than**
- B. Greater than
- C. Equal to
- D. Either A. or B.

Moist climate is the most favourable factor in the site selection for a _____?

- A. Steel plant
- B. Textile factory**
- C. Petroleum refinery

D. Coke oven battery

Fireclay bricks are never used in the _____?

A. Beehive oven

B. Coke oven walls

C. Zinc roaster

D. Lead blast furnace

Presence of 0.3 to 0.5% arsenic in copper increases its _____?

A. Ductility

B. Malleability

C. Tenacity & hardness

D. Electrical conductivity

Cp is expressed in S.I. unit as _____?

A. J/kg.°K

B. 0°K

C. W/m².°C

D. W/m.°K

Silicon percentage in iron castings to have maximum hardness should be about _____?

A. 0.3

B. 0.5

C. 0.8

D. 2.5

Use of hydrated lime in water treatment _____?

A. Before filtration, reduces the bacterial load on filters

B. After filtration, combats the corrosiveness of water due to the presence of O₂ & CO₂

C. Is to adjust the pH value

D. All A , B. and C.

The most commonly used resin for making reinforced plastic is _____?

- A. **Unsaturated polyester**
- B. Polypropylene
- C. Polyurethane
- D. Nylon-6

Pressure exerted by a liquid depends upon its _____?

- A. Surface tension
- B. **Density**
- C. Viscosity
- D. Buoyancy

Drag force acting on a body does not depend upon the _____?

- A. Density of the fluid
- B. **Density of the body**
- C. Velocity of the body
- D. Projected area of the body

Degree of freedom of a system consisting of a gaseous mixture of H_2 and NH_3 will be _____?

- A. 0
- B. 1
- C. 2
- D. **3**

Cylindrical shell thickness of rotary drier is generally _____ mm?

- A. 2-3
- B. 18-22
- C. **6-8**
- D. 12-15

For contacting a highly soluble gas with a liquid _____?

- A. Bubble the gas through liquid**
B. Spray the liquid on gas stream
C. Either A. or B. would suffice
D. None of these

Raw materials required for the production of CAN (Calcium ammonium nitrate) is NH_3 _____?

- A. HNO_3 & limestone**
B. CO_2 & H_2SO_4
C. HNO_3 & NH_4Cl
D. CO_2 & KNO_3

Pick out the wrong statement ?

- A. Addition of methane to the furnace atmosphere reduces decarburising by hydrogen
B. Nitrogen in presence of steam decarburises high carbon steel, whereas hydrocarbon gases carburise the surface of steel at annealing temperatures
C. Active nitrogen (formed by cracking ammonia at the metal surface) cause nitride formation with increase in surface hardness
D. None of these

Nitrogen in coal _____?

- A. Is present upto 1-2%
B. Comes from protein in parent vegetable matter
C. Is recovered as ammonia during its carbonisation
D. All A., B. and C.

Log mean temperature difference (LMTD) cannot be used, if _____?

- A. Heat transfer co-efficient over the entire heat exchanger is not constant
B. There exists an unsteady state
C. The heat capacity is not constant and there is a phase change

D. None of these

Maximum consumption of lead is in the manufacture of _____?

A. Storage batteries

B. Solder alloys

C. Electric cable sheathing

D. Lead lined vessels

18/8 stainless steel means, that it contains _____?

A. 18% chromium and 8% nickel

B. 18% chromium and 8% molybdenum

C. 18% nickel and 8% chromium

D. 18% molybdenum and 8% chromium

Montecatini process is a widely used process for the manufacture of _____?

A. Urea

B. Calcium ammonium nitrate

C. Triple superphosphate

D. None of these

A jig is used while _____ a hole?

A. Boring

B. Counter boring

C. Drilling

D. Enlarging

Liquid gradient over a tray can be minimised by _____?

A. Providing a higher skirt clearance or a higher weir

B. Decreasing the number of rows of caps through which the liquid flows or by decreasing the

velocity of liquid flow past the caps or by reducing the distance along the tray through

which

the liquid must flow

C. Using split flow, radial flow or cascade flow for column diameter large than 4 ft

D. All A., B. and C.

The excess energy of reactants in a chemical reaction required to dissociate into products is termed as the _____ energy?

A. Activation

B. Potential

C. Binding

D. Threshold

Maximum shrinkage in volume occurring during burning/firing of dried refractories may be as high as _____ percent?

A. 10

B. 15

C. 20

D. 30

Water entrained by circulating air in cooling towers is termed as _____?

A. Drift

B. Blow down

C. Vapor load

D. None of these

Mass of a positron is same as that of a/an _____?

A. Electron

B. α -particle

C. Proton

D. Neutron

Thermal wells are used in the temperature measurement

to _____?

- A. Guard against corrosive and oxidising action on thermocouple materials
- B. Reduce measuring lag
- C. Increase the fidelity
- D. Increase the sensitivity

Main pollutant present in automobile exhaust is _____?

- A. CO
- B. CO₂
- C. NO
- D. Hydrocarbons

Thoria _____?

- A. Has high fusion temperature ($> 3000^{\circ}\text{C}$) but poor resistance to thermal shock
- B. Has high resistance to basic slags
- C. Which is expensive & radioactive, is used in crucibles for melting high purity metals
- D. All A., B. and C.

Wrought iron does not have _____?

- A. Uniform strength in all directions
- B. Ability to hold protective coating
- C. High ductility & corrosion resistance
- D. Easily weldable characteristics

A boiling water reactor is the one, in which the _____?

- A. Coolant water is allowed to boil in the core of the reactor
- B. Coolant water, after being heated in the reactor core, generates steam in a boiler
- C. Pressurised water is pumped into the core
- D. Fuel and the coolant are thoroughly mixed to form a homogeneous solution

The _____ of a vapor pressure thermometer is a functioning element?

- A. Pointer
- B. Bourdon tube

- C. Bulb
- D. None of these

Maximum sulphur percentage in low sulphur heavy stock (LSHS) furnace oil is about _____?

- A. 0.1
- B. 1**
- C. 2.5
- D. 3.5

Dehydrogenation of Isopropanol produces _____?

- A. Propyl alcohol
- B. Acetone**
- C. Trichloroethylene
- D. Formaldehyde

'Particulate' air pollutants are finely divided solids and liquids. Which of the following is not a „particulate“ ?

- A. Dust & mists
- B. Smoke & fumes
- C. Photochemical smog & soot
- D. None of these**

The order of a chemical reaction _____?

- A. Can be determined only experimentally
- B. Can be determined from the stoichiometry of the reaction**
- C. Cannot be zero
- D. Can be fractional

Filter medium resistance is important during the _____ of filtration?

- A. Early stages**
- B. Final stages
- C. Entire process

D. None of these

Charles' law for gases states that _____?

A. $V/T = \text{Constant}$

B. $V \propto 1/T$

C. $V \propto 1/P$

D. $PV/T = \text{Constant}$

For spontaneous changes in an isolated system ($S = \text{entropy}$)

_____?

A. $ds = 0$

B. $ds < 0$

C. $ds > 0$

D. $ds = \text{Constant}$

Which is not an acidic refractory ?

A. Silica

B. Fireclay

C. High alumina refractory

D. Carbon black

The yield of straight run LPG from crude oil is about _____ weight percent?

A. 20-25

B. 1-1.5

C. 10-15

D. 0.1-0.2

Select the correct statement from the following?

A. The frequency response of a pure capacity process is unbounded

B. The phase lag of a pure time delay system decreases with increasing frequency

C. The amplitude ratio of a pure capacity process is inversely proportional to frequency

D. The amplitude ratio of a pure time delay system increases with frequency

The reduction ratio for fine grinders is _____?

- A. 5-10
- B. 10-20
- C. 20-40
- D. As high as 100**

A BTU/hr.ft.² °F is equal to _____?

- A. 1 kcal/hr. m²°C
- B. 4.88 kcal/hr. m.²°C**
- C. 1 kcal/hr. m².°K
- D. None of these

Carbon refractories have very high _____?

- A. Wetting characteristics
- B. Refractoriness
- C. Thermal conductivity
- D. Both B. and C.**

The slope of the operating line for a single component co-current absorber when plotted in terms of mole ratio units is _____?

- A. 0
- B. ∞
- C. -ve**
- D. +ve

A butane isomerisation process produces 70 k.mole/hr of pure iso-butane. A purge stream removed continuously, contains 85% n-butane and 15% impurity (mole%). The feed stream is n-butane containing 1% impurity (mole%). The flow rate of the purge stream will be _____?

- A. 3 kmole/hr
- B. 4 kmole/hr**

- C. 5 kmole/hr
- D. 6 kmole/hr

Suspended solid present in the waste water generated in blast furnace gas cooling and cleaning plant is removed by _____?

- A. Biological oxygen pond
- B. Radial settling tank (thickener) using coagulant (lime & ferrous sulphate)**
- C. Lagoons
- D. Filtration

Log mean temperature difference in case of multi-pass shell and tube heat exchanger is always _____?

- A. Less than arithmetic mean value**
- B. More than arithmetic mean value
- C. More than geometric mean value
- D. Both B. & C.

The equivalent diameter of channel of a constant non-circular cross-section of 3 cm by 6 cm will be _____ cms?

- A. 20
- B. 12
- C. 8
- D. 2**

_____ resistance is not involved in the combustion of a carbon particle?

- A. Gas film
- B. Ash**
- C. Chemical reaction
- D. None of these

A solid metallic block weighing 5 kg has an initial temperature of 500°C. 40 kg of

water initially at 25°C is contained in a perfectly insulated tank. The metallic block is brought into contact with water. Both of them come to equilibrium. Specific heat of block material is 0.4 kJ.kg⁻¹. K⁻¹. Ignoring the effect of expansion and contraction and also the heat capacity to tank, the total entropy change in kJ.kg⁻¹, K⁻¹ is _____?

- A. -1.87
- B. 0**
- C. 1.26
- D. 3.91

The general formula of naphthenes is _____?

- A. C_nH_{2n} + 2
- B. C_nH_{2n-6} (where, n ≥ 6)**
- C. C_nH_{n-4}
- D. Same as that for olefins i.e. C_nH_{2n}

Which of the following is not a manufactured fuel ?

- A. Furnace oil
- B. Bagasse**
- C. Semi-coke
- D. Kerosene

Tempering of a material does not improve its _____?

- A. Machinability**
- B. Toughness
- C. Internal stress level
- D. Softness

The preferred material of construction for storage tanks for 98% sulphuric acid is _____?

- A. Aluminium
- B. Lead**

- C. Stainless steel 316
- D. Mild steel

Pick out the wrong statement pertaining to the design of a basket type evaporator ?

- A. It is used for high viscosity liquor having large rate of scaling**
- B. The tube bundle is suspended on bracket
- C. There is no central downtake
- D. Downtake is formed by the annular space between the bundle and the shell

In SI units, thermal conductivity is expressed in _____ ?

- A. Watt/m.°K**
- B. Watt/m². °K
- C. Watt/m². °K
- D. Watt/m⁴. °K

Which of the following processes consumes hydrogen ?

- A. Fluid catalytic cracking**
- B. Visbreaking
- C. Propane deasphalting
- D. None of these

Large quantity of silica gel is normally dried in a _____ dryer?

- A. Freeze
- B. Through circulation**
- C. Rotary vacuum
- D. Tray

Which of the following thermocouples is capable of measuring a temperature of -50°C ?

- A. Platinum-platinum + rhodium**
- B. Chromel-Alumel
- C. Iron-constantan

D. Copper-constantan

_____ content of the phosphate rock is the pollutant of primary interest in a phosphatic fertiliser plant ?

A. Calcium

B. Fluorine

C. Phosphorous

D. Sulphur

The adiabatic saturation curve for a vapour-gas mixture is _____?

A. Straight line

B. Slightly concave upward

C. Slightly concave downward

D. None of these

A _____ mill is a revolving mill divided into two or more sections by perforated partitions in which preliminary grinding takes place at one end and the finishing grinding at the discharge end?

A. Compartment

B. Tube

C. Rod

D. Pebble

$(1/V) (\partial V/\partial T)_P$ is the mathematical expression _____?

A. Joule-Thomson co-efficient

B. Specific heat at constant pressure (C_p)

C. co-efficient of thermal expansion

D. Specific heat at constant volume (C_V)

In a good rimming steel _____?

A. Carbon and silicon should be low

- B. Silicon should be low but carbon should be high
- C. Both silicon & carbon should be high
- D. Silicon should be high but carbon should be low

Base suspension fertiliser essentially contains _____?

- A. 13% N₂ and 43% P₂O₅**
- B. 43% N₂ and 13% P₂O₅
- C. 43% N₂ and 13% K₂O
- D. 43% K₂O and 43% P₂O₅

Catalytic desulphurisation process used for sweetening of straight run gasoline and kerosene uses _____ as catalyst?

- A. Bauxite
- B. Fuller's earth
- C. Activated clay
- D. All A., B. & C.**

An ideal refractory should have high _____?

- A. Spalling rate
- B. Fusion point**
- C. Shrinkage ability
- D. None of these

Cast iron and steel pipes are produced by _____ casting?

- A. Die
- B. Investment
- C. Slush
- D. True centrifugal**

Presence of nitrogen and phosphorous in waste water discharged into lakes and ponds causes _____?

- A. Foaming
- B. Odour nuisances

C. Undesirable plant growth

D. Turbidity

From Arrhenius law, a plot of $\log_e K$ versus $1/T$ gives a straight line with a slope of $(-E/R)$. The unit of E/R is _____?

- A. k cal
- B. k cal/°K
- C. °K**
- D. k cal. °K

Polymethyl methacrylate (PMMA) which is also known as Perspex and is produced by bulk polymerisation of methyl methacrylate is not a _____ polymer?

- A. Thermoplastic
- B. Thermosetting**
- C. Linear
- D. Glass like transparent

Cavitation in a centrifugal pump can be avoided by keeping the _____?

- A. Inlet pressure high**
- B. Outlet pressure low
- C. Inlet pressure low
- D. Outlet pressure high

The main constituent of rock phosphate is _____?

- A. Mono-calcium phosphate
- B. Di-calcium phosphate**
- C. Fluorspar
- D. None of these

The first law of thermodynamics is a statement of conservation

of _____?

- A. Heat
- B. Momentum
- C. Energy**
- D. Work

Presence of a small amount of water in the organic systems can be determined by the _____ method?

- A. Electrical conductivity
- B. Polarimetry
- C. Emission spectroscopy
- D. Dielectric constant and loss factor**

The radioisotope used to study the thyroid gland is _____?

- A. Iodine**
- B. Cobalt
- C. Iron
- D. Carbon

Nickel is not used as a catalyst in the _____?

- A. Fischer-Tropsch process
- B. Shift conversion
- C. Hydrogenation of oil
- D. Ostwald's process of HNO₃ manufacture**

In an ideal gas mixture, fugacity of a species is equal to its _____?

- A. Vapor pressure
- B. Partial pressure**
- C. Chemical potential
- D. None of these

Glass lined vessels are not used for handling _____?

- A. Dilute H₂SO₄
- B. Dilute HNO₃
- C. Dilute HCl
- D. Hydrofluoric acid**

Photochemical smog is formed from automobile exhaust _____?

- A. By reaction of hydrocarbon & nitric oxide in presence of sunlight
- B. Appears only on sunny days
- C. Is harmful for crops and trees also besides causing eye irritation & asthma
- D. All A., B. & C.**

Contact lenses for eyes are made of Perspex, which is nothing but _____?

- A. poly-methyl-methacrylate**
- B. Polystyrene
- C. Unsaturated polyester
- D. Polypropylene

Catalyst used in the catalytic polymerisation is _____?

- A. Phosphoric acid on kieselguhr**
- B. Aluminium chloride
- C. Nickel
- D. Vanadium pentoxide

The ratio of the depth of flow to the diameter of the channel for maximum discharge in a circular channel in open channel flow is _____?

- A. 0.1
- B. 0.55
- C. 0.95**
- D. 1.85

Which of the following is not an industrial screening equipment ?

- A. Sharpies centrifuge**

- B. Vibrating screen
- C. Grizzly
- D. Trommel

Which of the following filled system expansion thermometers has the lowest positive temperature measurement capability ?

- A. Mercury in glass thermometer
- B. Alcohol in glass thermometer**
- C. Fused metal (Na or K) in steel thermometer
- D. Nitrogen in steel thermometer

The line of action of the buoyant force acts through the _____?

- A. Centroid of the displaced volume of fluid**
- B. Centre of gravity of a submerged body
- C. Centroid of the volume of any floating body
- D. None of these

Schmidt number and Lewis number for pure air at atmospheric conditions are respectively _____?

- A. < 1 and ≈ 1**
- B. 1 and 0
- C. > 1 and ≈ 1
- D. 0 and ≈ 1

Most common stainless steel type 316, which is highly resistant to corrosion contains _____?

- A. 16-13% Cr 10-14% Ni and 2-3% Mo**
- B. 20-22% Cr, and 8-10% Ni
- C. 2-4% Cr, 22% Ni and 2-4% Mo
- D. None of these

1 centistoke is equal to _____ Redwood I seconds?

- A. 1
- B. 4.08**
- C. 0.408
- D. 40.8

Nitrogen content of urea is about _____ percent ?

- A. 10
- B. 46**
- C. 80
- D. 94

Which of the following agitators having a large blade area, rotating at slow speed is used for mixing high viscosity liquids (> 50000 centipoise) ?

- A. Propeller
- B. Helical screw**
- C. Flat blade turbine
- D. Curved blade turbine

Fusion point of a basic refractory material is _____ ?

- A. Reduced by the addition of acid oxides**
- B. Increased by the addition of acid oxides
- C. Not affected by the addition of acid oxides
- D. Always less than 1000°C

Electrometallurgical methods of metal extraction is normally used for those metals _____ ?

- A. Whose oxide/ore is not reduced by carbon
- B. Which fall in the category of alkali & alkaline earth metals
- C. Which stands higher in the electrochemical series of the metal
- D. All A, B. & C.**

Glauber's salt is chemically represented by _____ ?

A. Na₂SO₄.10H₂O

B. CaCl(OCl)

C. CaSO₄.H₂O

D. (NH₄)₂SO₄

The amount of tetraethyl lead added to improve the octane number of motor gasoline is around _____ c.c per gallon of petrol?

A. 3

B. 300

C. 3000

D. 1000

Noise level heard inside a bus in busy city traffic or inside a sub-way train corresponds to about _____ decibels?

A. 75

B. 95

C. 120

D. 140

The unit of filter medium resistance is _____?

A. cm⁻¹

B. gm/cm⁻¹

C. cm/gm⁻¹

D. gm⁻¹

Cold cracking in the heat affected zone of a high strength steel weld can take place because of the _____?

A. Retained austenite

B. Martensite formation

C. Relatively high sulphur content in the base metal

D. Sufficient hydrogen present in the welding arc

Hardening of steel is not possible, unless it is heated _____

critical point ?

- A. Above the highest
- B. Above the lowest**
- C. Between the first & second
- D. Between the second & third

Permanent hardness of water can be removed by _____ ?

- A. Addition of soda ash to it
- B. Treating it with zeolites
- C. Passing it through sodium hexametaphosphate
- D. All A , B, and C.**

Reynolds number of a fluid flowing in a circular pipe is 10,000. What will be the Reynolds number when the fluid velocity is decreased by 30% & the pipe diameter is increased by 30% ?

- A. 9,100**
- B. 13,000
- C. 7,000
- D. 2,550

Condensing film co-efficient for steam on horizontal tubes ranges from 5000 to 15000 Kcal/hr.m².°C. Condensation of vapor is carried out inside the tube in a shell and tube heat exchanger, when the _____ ?

- A. Higher condensing film co-efficient is desired
- B. Condensate is corrosive in nature**
- C. Lower pressure drop through the exchanger is desired
- D. Temperature of the incoming vapor is very high

Which of the following can be manufactured using powder metallurgy techniques ?

- A. Brake linings
- B. Bearings

C. Carbide tool tips

D. All A, B and C

Silicon carbide is a/an _____?

A. Adhesive

B. Abrasive

C. Type of glass

D. Brittle material

Which of the following binary systems is an example of a maximum boiling azeotrope ?

A. Water-hydrochloric acid

B. Acetone-carbon disulphide

C. Water-ethyl alcohol

D. n-heptane-n-octane

A gas occupies a volume of 283 c.c at 10°C. If it is heated to 20°C at constant pressure, the new volume of the gas will be _____ c.c?

A. 283

B. 566

C. 293

D. 141.5

_____ is not used as the control rod material in a nuclear reactor ?

A. Cobalt

B. Hafnium

C. Cadmium

D. Boron

Chemical potential (an intensive property) of a substance is a force that drives the chemical system to equilibrium and is equal to its partial molar properties. The ratio of chemical potential to free energy of a pure substance at constant

temperature and pressure is _____?

- A. 0
- B. 1**
- C. ∞
- D. None of these

Nylon-6 as compared to Nylon-66 is having higher _____?

- A. Hardness
- B. Abrasion/resistance
- C. Melting point
- D. None of these**

Which of the following is the most important deterrents to an extended use of pulverised coal in boiler firing ?

- A. Ash disposal problem**
- B. Excessive fly ash discharge from the stack
- C. Higher power consumption in its transportation
- D. Erosion of induced draft fan blades

What is the critical rotation speed in revolutions per second, for a ball mill of 1.2 m diameter charged with 70 mm dia balls ?

- A. 0.5
- B. 1.0
- C. 2.76
- D. 0.66**

Preheating of _____ the flame temperature?

- A. The gaseous fuel before combustion decreases
- B. Combustion air decreases
- C. Either the fuel or the air or both, increases**
- D. Either the fuel or the air does not affect

If Prandtl number is greater than the Schmidt number, then

the _____?

- A. Thermal boundary layer lies inside the concentration boundary layer
- B. Concentration boundary layer lies inside the thermal boundary layer
- C. Thermal & concentration boundary layers are of equal thickness
- D. Hydrodynamic (i.e., momentum) boundary layer is thicker than the other two

High alumina refractories are used in the _____?

- A. Dome of blast furnace stoves
- B. Electric arc furnace roof
- C. Glass melting furnaces
- D. All A., B. and C.

Coal tar (produced by high temperature carbonization) is the main source of _____?

- A. Aromatic compounds
- B. Aliphatic compounds
- C. Paraffins
- D. Olefins

The pressure drop per unit length of pipe incurred by a fluid 'X' flowing through pipe is Δp . If another fluid 'Y' having both the specific gravity & density just double of that of fluid 'X', flows through the same pipe at the same flow rate/average velocity, then the pressure drop in this case will be _____?

- A. Δp
- B. $2\Delta p$
- C. Δp^2
- D. $\Delta p/2$

Hydrogenation of vegetable oils is a/an _____ reaction ?

- A. Endothermic
- B. Autocatalytic

C. Exothermic

D. Homogenous

_____ are normally subjected to sub-zero treatment?

A. Highly stressed parts

B. Gauges or precision parts

C. Cold rolled sheets

D. Non machinable materials

“Breathing loss” on storage of gasoline occurs due to the

_____?

A. Presence of unsaturated air

B. Fluctuation of ambient temperature during day and night

C. Both A. and B.

D. Neither A. nor B.

Internal energy of an ideal gas _____?

A. Increases with increase in pressure

B. Decreases with increase in temperature

C. Is independent of temperature

D. None of these

Which is the best fertiliser for paddy ?

A. Ammonium sulphate

B. Nitro-phosphate

C. Superphosphate

D. Potassium nitrate

Phenol is not shipped in _____?

A. Nickel lined steel tank cars

B. Galvanised or tin lined drums

C. Boxed glass carboys

D. Cast iron containers

Gas analysis is commonly done using the _____?

- A. Thermal conductivity cell**
- B. X-ray diffraction
- C. Mass spectrometer
- D. Emission spectrometer

Second law of thermodynamics is concerned with the _____?

- A. Amount of energy transferred
- B. Direction of energy transfer**
- C. Irreversible processes only
- D. Non-cyclic processes only

A high pressure boiler generates steam at a pressure greater than _____ kg/cm² ?

- A. 10
- B. 30
- C. 50
- D. 80**

In troposphere (the weather domain), the temperature 't' at height 'h' above the sea level in metres is given by (where, temperature at sea level is 15°C and t is in °C.) ?

- A. $t = 15 - 0.0065 h$**
- B. $t = 15 + 0.0065 h$
- C. $t = 0.0035 h - 15$
- D. $t = 15 - 0.0035 h$

A polymer is termed as an 'elastomer', if its percentage elongation is more than 100%. An elastomer is termed as 'rubber' if its percentage elongation is more than _____ percent ?

- A. 150

- B. 200**
- C. 300
- D. 400

Degree of carbonisation of coal during coke making can be roughly judged by the _____ of the coke produced?

- A. Colour
- B. Moisture content
- C. Ash content
- D. Volatile matter**

In a cooling tower, water becomes cool by _____?

- A. Loosing sensible heat**
- B. Heat transfer to surroundings
- C. Vaporisation due to heat loss to air
- D. Loosing latent heat

Organic catalysts differ from the inorganic catalyst in the sense that the former is _____?

- A. Active at cryogenic temperatures only
- B. Prohibitively costly
- C. Proteinous in nature**
- D. Active at very high temperature only

Beehive coke ovens are made of _____ bricks?

- A. Silica**
- B. Fireclay
- C. Silicon carbide
- D. Corundum

Multiple effect evaporators ar used to _____?

- A. Increase the steam economy & decrease the capacity
- B. Increase the steam economy & the capacity**

- C. Decrease the steam economy & the capacity
- D. Decrease the steam economy & increase the capacity

Dissolved oxygen content in river water is around _____ ppm?

- A. 5**
- B. 100
- C. 250
- D. 500

Pick out the correct statement?

- A. If an insoluble gas is passed through a volatile liquid placed in a perfectly insulated container, the temperature of the liquid will increase
- B. A process is irreversible as long as ΔS for the system is greater than zero
- C. The mechanical work done by a system is always equal to $\int P.dV$
- D. The heat of formation of a compound is defined as the heat of reaction leading to the formation of the compound from its reactants**

A weir is used to measure the large water discharge rate from a river or from an open channel. A weir is not of _____ shape?

- A. Circular**
- B. Rectangular
- C. Triangular
- D. Trapezoidal

The approximate height of a blast furnace having a useful volume of 2000 m³ is about _____ metres ?

- A. 25
- B. 35
- C. 55**
- D. 75

Centrifugal pump made of pyrex or glass can't be used to

pump _____?

A. Milk and fruit juices

B. Alkaline solutions

C. Dilute H₂SO₄ at room temperature

D. Brine

For the same process conditions, the reflux ratio of an unlagged distillation column _____?

A. Decreases in winter

B. Increases in winter

C. Increases in summer

D. None of these

Molten soap mass is transported by a _____ pump?

A. Diaphragm

B. Reciprocating

C. Gear

D. Centrifugal

Moisture in a solid exerting an equilibrium vapour pressure equal to that of the pure liquid at the same temperature is called the _____ moisture ?

A. Unbound

B. Critical

C. Free

D. Bound

The rate controlling step in the manufacture of silicone rubber is the _____?

A. Polymer termination step

B. Condensation of siloxane to silicone

C. Initial hydrolysis of silicone monomer

D. None of these

With increase in temperature, the total emissivity of conductors _____?

A. Increases

B. Decreases

C. Remain same

D. Decreases linearly

The fluid property, due to which, mercury does not wet the glass is _____?

A. Surface tension

B. Viscosity

C. Cohesion

D. Adhesion

The 'shanks system' of leaching (i.e., counter-current multiple contact leaching) is used for _____?

A. Recovery of tannis from the tree barks and woods

B. Leaching sodium nitrate from Chilean nitrate bearing rock

C. Both A. and B.

D. Neither A. nor B.

The highest melting pure oxide (m.p. > 3000°C) is _____?

A. Thoria

B. Alumina

C. Beryllia

D. Zirconia

Entrainer used in Azeotropic distillation should _____?

A. Form a low boiling azeotrope with one of the constituents of the mixture

B. Form a new azeotrope of low relative volatility with one of the constituents of the mixture

- C. Have high latent heat of vaporisation
- D. Have high viscosity to provide high tray efficiency

Orion is _____?

- A. A copolymer
- B. A condensation polymer
- C. Obtained by polymerising vinyl cyanide**
- D. All A., B. and C.

What products do we get on electrolysis of saturated brine using steel cathode and graphite anode in an electrolytic cell ?

- A. Cl₂ & Na
- B. Cl₂ & H₂
- C. O₂ & H₂
- D. Cl₂, H₂ & NaOH solution**

To handle smaller quantity of fluid at higher discharge pressure, use a _____ pump?

- A. Reciprocating**
- B. Centrifugal
- C. Volute
- D. Rotary vacuum

Pick out the wrong statement ?

- A. Debt-equity ratio of a chemical company describes the lenders contribution for each rupee of owner's contribution i.e., debt-equity ratio = total debt/net worth
- B. Return on investment (ROI) is the ratio of profit before interest & tax and capital employed (i.e. net worth + total debt)
- C. Working capital = current assets + current liability**
- D. Turn over = opening stock + production closing stock

Panel test determines the _____ of refractories?

- A. Fusion point
- B. Spalling resistance**
- C. Slag penetration resistance
- D. Refractoriness under load (RUL)

Pick out the wrong statement ?

- A. A ferromagnetic material becomes paramagnetic above the 'Curie temperature'
- B. Permanent magnets are made of hard materials, whereas electromagnets require soft magnetic materials
- C. Soft magnetic materials (e.g., pure iron) have higher permeability and low hysteresis loss and coercive forces

D. Tungsten steel and alnico are not hard magnetic materials

Work done in an adiabatic process between two states depends on the _____?

- A. Rate of heat transmission
- B. Initial state only
- C. End states only**
- D. None of these

Energy of the sun arises mainly from _____ reactions?

- A. Fusion**
- B. Fission
- C. Combustion
- D. None of these

Cavitation occurs in a centrifugal pump when the suction pressure is _____?

- A. Less than the vapour pressure of the liquid at that temperature**
- B. Greater than the vapour pressure of the liquid at that temperature

- C. Equal to the vapour pressure
- D. Equal to the developed head

_____ column is used in gas absorption process ?

- A. Wetted wall
- B. Sieve/perforated tray
- C. Bubble cap
- D. Packed**

Electric furnace method for production of phosphorous uses phosphate rock and _____ ?

- A. Phosphoric acid
- B. Coke
- C. Sulphuric acid
- D. Silica and coke**

Maximum theoretical suction lift for water at 15°C by a centrifugal pump is 34 ft. The same for water at 90°C will be _____ ft?

- A. 40
- B. 34
- C. 8**
- D. 37

In case of a reversible process (following $pvn = \text{constant}$), work obtained for trebling the volume ($v_1 = 1 \text{ m}^3$ and $v_2 = 3 \text{ m}^3$) is maximum, when the value of 'n' is _____ ?

- A. 0**
- B. 1
- C. $\gamma = 1.44$
- D. 1.66

According to six-tenths-factor rule, if the cost of a given unit at one capacity is

known, then the cost of similar unit with " times the capacity of the first unit is approximately equal to _____ times the cost of the initial unit?

- A. n
- B. $n^{0.6}$**
- C. $n^{0.4}$
- D. \sqrt{n}

_____ does not contain tin as an alloying material?

- A. Brass**
- B. Pewter
- C. Solder
- D. Babbitt metal

Rancidity of the fatty oil can be reduced by its_____?

- A. Decoloration
- B. Hydrogenation**
- C. Oxidation
- D. Purification

On moving the feed line (q-line) from saturated liquid feed (vertical position) to saturated vapor feed (horizontal feed), if the slope of both the operating lines are to be increased, then it will result in_____?

- A. Greater degree of separation with a fixed number of trays
- B. Increased reboiler load
- C. Increased reflux ratio**
- D. None of these

Ceramics are produced from silicates or clayish materials: Which of the following is not a ceramic material ?

- A. Slag cement
- B. Glasses
- C. Porcelain/Potteries

D. Teflon

Which is an amorphous material ?

- A. Glass**
- B. Mica
- C. Brass
- D. Cast iron

The calorific value of L.D. converter gas is about _____ Kcal/Nm³?

- A. 1800**
- B. 800
- C. 4500
- D. 10000

Which of the following has maximum hydrogen/carbon ratio (by weight) ?

- A. Naphtha
- B. Gasoline**
- C. Diesel
- D. Fuel oil

Carbon Content by weight in air dried wood may be about _____ percent?

- A. 10
- B. 25
- C. 50**
- D. 80

Solvent used in the Udex (glycol) extraction process for removal of light aromatics from cracked naphtha is _____?

- A. Propane
- B. Diethylene glycol
- C. Aqueous solution (10% water) of diethylene glycol**
- D. Methyl ethyl ketone (MEK)

Moisture in a substance exerting an equilibrium vapour pressure less than that of pure liquid at the same temperature is called the _____ moisture?

- A. Bound**
- B. Unbound
- C. Critical
- D. None of these

In a shell and tube heat exchanger, the flow rate of heating/cooling fluid is the _____ variable?

- A. Load
- B. Controlled
- C. Manipulated**
- D. None of these

_____ equation relates the thermal conductivity of a solid to its temperature ?

- A. Antoine
- B. Kopp's
- C. Lee's**
- D. Kistyakowsky**

Carbon supply in pack carburising process is in the form of _____?

- A. Charcoal**
- B. Calcium carbide
- C. Hydrocarbon oil
- D. Graphite

Furnace oil consumption in a furnace for a given duty employing preheated combination air (at 300°) may be reduced by about _____ percent as

compared to the use of atmospheric combustion air?

- A. 5
- B. 10
- C. 20**
- D. 35

Furnace aerodynamics is related to the _____ in the furnace?

- A. Movement of gases**
- B. Measurement of flue gas volume
- C. Temperature control
- D. Pressure adjustment

Radioactive decay is a _____ change?

- A. Chemical
- B. Nuclear**
- C. Physical
- D. None of these

Spent fuel from the nuclear thermal reactor contains _____?

- A. Fission products
- B. Plutonium
- C. Unused fuel
- D. All A., B. & C.**

Wrought iron is not _____?

- A. Ductile & resistant to corrosion/rusting
- B. Weldable easily
- C. Having uniform strength in all directions**
- D. Having maximum tensile strength along the lines of slag distribution

Dilute wine was used as a thermometric liquid initially to develop temperature scale. First empirical temperature scale developed was the _____ scale?

- A. Kelvin
- B. Centigrade
- C. Fahrenheit**
- D. Reaumer

Thermal equivalent of electrical power in practical calculation is _____ kcal/kWh ?

- A. 746
- B. 3000**
- C. 1000
- D. 550

Pick out the wrong statement?

- A. To make 100 kg of a solution containing 40% salt by mixing solution A (containing 25% salt) and solution B (containing 50% salt), the amount of solution A required is 40 kg
- B. 1.2 gm atoms of carbon and 1.5 gm moles of oxygen are reacted to give 1 gm mole of carbon dioxide. The limiting reactant is carbon. The percent excess reactant supplied is 25
- C. A gas bubble at a pressure of P_g is passed through a solvent with a saturation vapour pressure of P_s . If the time of passage of the bubble is long and air is insoluble in the solvent, the mole fraction of solvent in the bubble will be equal to P_s/P_g
- D. A supersaturated solution of a sparingly soluble solute, at a concentration of C, is being fed to a crystalliser at a volumetric flow rate of V. The solubility of the solute is C_1 . The output rate of solids from an efficient crystalliser is $(C + C_1) V$**

The rate of solid-liquid extraction is limited by the _____ ?

- A. Phase change of the solute as it dissolves in the solvent
- B. Diffusion of the solute through the solvent in the pores to the outside of the particle
- C. Diffusion of the solute from the solution in contact with the particle to the main bulk of the solution
- D. All A , B. & C.**

Coke oven gas is stripped of its H₂S and mercaptans content

by _____?

- A. Absorption in wash oil
- B. Adsorption on bog iron bed**
- C. Bubbling it through dilute sulphuric acid
- D. Adsorption on silica gel

Though, theoretically the adsorption & desorption isotherms is expected to coincide but sometimes at least a part of the isotherms does not coincide and this phenomenon is known as adsorption hysteresis. In such cases, the desorption equilibrium pressure is _____ that obtained for adsorption?

- A. Lower than**
- B. Higher than
- C. Same as
- D. Either same or higher than

A centrifugal pump is called a turbine pump, if it is having a _____?

- A. Turbine type impeller
- B. Vaned diffusion casing**
- C. Rotating vaned volute
- D. None of these

If the amount of the steam used in steam distillation is increased, the temperature of distillation _____?

- A. Increases
- B. Decreases**
- C. Remains unchanged
- D. Depends on relative volatility

One ton of refrigeration is not equivalent to the heat removal rate of _____?

- A. 200 BTU/minute
- B. 50 kcal/minute
- C. 50 kJ/sec**
- D. 3.5 KW

Enamels _____ ?

- A. Give good glossy finish**
- B. Are same as varnish
- C. Are prepared from non-drying oil
- D. Do not contain pigment

World's worst radioactive pollution was caused by nuclear reactor disaster which occurred in _____ ?

- A. Arizona (U.S.A.)
- B. Chernobyl (undivided U.S.S.R.)**
- C. Pennsylvania (U.S.A.)
- D. Moscow (U.S.S.R.)

_____ explains the equilibrium constant for any chemical reaction?

- A. Henry's law
- B. Law of mass action**
- C. Hess's law
- D. None of these

Dacron (or Terylene) fibres as compared to nylon fibres have _____ ?

- A. Better heat & acid resistant properties
- B. Poorer resistance to alkalis
- C. Poorer dyeability
- D. All A , B. and C.**

Efficiency of power transmission (ϵ) through a circular pipe is given by $(h_t - h_f)/h_t$, which has a maximum value of _____ percent?

- A. 33:3
- B. 50
- C. 66.6**
- D. 88.8

The reaction in which the rate equation corresponds to a stoichiometric equation, is called a/an _____ reaction?

- A. Elementary**
- B. Non-elementary
- C. Parallel
- D. Autokinetic

Number of gm moles of solute dissolved in 1 kg of solvent is called its _____?

- A. Normality
- B. Molarity
- C. Molality**
- D. Formality

Which of the following is concerned with both heat and mass transfer ?

- A. Lewis relationship**
- B. Nusselt number
- C. Kutateladze number
- D. Froude number

Which of the following is preferred for riveting ?

- A. Lap joint
- B. Butt joint**
- C. Either A. or B.
- D. Neither A. nor B.

Which of the following relationship is valid for the equilibrium position of the float in a Rotameter? (Where, D_f = Drag force on the float B_f = Buoyant force on

the float $W_f = \text{Weight of the float}$)?

- A. $D_f + B_f = W_f$
- B. $D_f = B_f + W_f$
- C. $D_f + B_f + W_f = 0$
- D. None of these

Resistance of an electrical conductor is proportional to its (where, $l = \text{length}$ and $A = \text{crosssectional area of the conductor}$) _____?

- A. A
- B. l
- C. A^2
- D. Both A. & B.

The rate of reaction does not decrease appreciably as the reaction proceeds in case of _____ reactions?

- A. Autocatalytic
- B. Exothermic
- C. Endothermic
- D. Autothermal

Filtration rate does not depend upon the _____?

- A. Pressure drop & area of filtering surface
- B. Resistance of the cake & the septum
- C. Properties of the cake & the filtrate
- D. None of these

Fats as compared to oils have _____?

- A. More unsaturated glycerides of fatty acids
- B. Less unsaturated glycerides of fatty acids
- C. Much higher reactivity to oxygen
- D. Lower melting point

The vacuum maintained in vacuum distillation unit for reduced crude is about

_____ mm Hg?

- A. 1.2
- B. 12
- C. 120**
- D. 700

When the feed to a distillation column is a saturated liquid, slope of the feed line is _____?

- A. Zero
- B. Unity
- C. Infinity**
- D. None of these

The diffusivity D . in a binary gas mixture is related to the temperature (T) as _____?

- A. $D \propto T$
- B. $D \propto T^{0.5}$
- C. $D \propto T^{1.5}$**
- D. $D \propto T^2$

_____ is a special constituent of chlorophyll without which photosynthesis is not possible ?

- A. Calcium
- B. Nitrogen**
- C. Phosphorous
- D. Hydrogen

The work done in an adiabatic change in a particular gas depends upon changes in the _____ only?

- A. Temperature**
- B. Specific heat
- C. Volume

D. Pressure

Though liquid ammonia itself is a fertiliser (with 82% nitrogen content) yet it is commonly not used as such in a tropical country like India, because it _____?

- A. Has a pungent smell
- B. Vaporises at normal temperature**
- C. Is toxic and highly corrosive
- D. Is in short supply

Polycondensation of saturated dicarboxylic acid with polyhydric alcohol produces _____?

- A. Epoxy resin
- B. Polyamide
- C. Alkyd resin**
- D. Phenolic resin

Pick out the wrong statement ?

- A. Low ozone layer thickness in polar regions is due to cold climatic conditions
- B. Amount of unburnt hydrocarbons emitted by two stroke petrol engine is more as compared to that emitted by a four stroke engine
- C. Carbon monoxide present in the two stroke petrol engine exhaust is much less as compared to that emitted from a four stroke engine**
- D. Mercury as a pollutant can enter the blood stream & the digestive system/ lungs and is responsible for causing Minamata disease

A centrifugal pump has the following specifications: Power = 4 H.P.; Speed = 800 rpm Head = 8 metres Flow = 1000 litres/minutes. If its speed is halved, then the new head will be _____ metres?

A. 2

- B. 4
- C. 8
- D. 5.5

When the liquid phase and vapour phase of a binary system obeys Raoult's and Dalton's law respectively, the relative volatility is the ratio of _____?

- A. Vapour pressure of component A to that of component B**
- B. Vapour pressure of component A to the total pressure
- C. Vapour pressure of component A to the partial pressure of A
- D. Partial pressure of component A to the total pressure

$(N_{Re} \cdot N_{Sc})$ is termed in mass transfer operation as the _____ number?

- A. Stanton
- B. Sherwood
- C. Peclet**
- D. None of these

Heat transfer co-efficient (h_1) for liquids increases with _____?

- A. Increasing temperature**
- B. Decreasing temperature
- C. Decreasing Reynolds number
- D. None of these

A Venturimeter measures the _____?

- A. Velocity head
- B. Pressure
- C. Point velocity
- D. None of these**

Which of the following expressions defines the Baume gravity scale for liquids

heavier than water ?

- A. $(141.5/G) - 131.5$
- B. $145 - (145/G)$**
- C. $200 (G-1)$
- D. $(400/G) - 400$

Crystal size in a continuous crystalliser depends upon the _____ ?

- A. Rate of heat transfer
- B. Degree of turbulence
- C. Degree of super-saturation
- D. All A., B. and C**

Octane number of gasoline produced by two stage fluidised catalytic cracking process is _____ ?

- A. 80
- B. 87
- C. 92
- D. 97**

Temperature of _____ cannot be measured by an optical or radiation pyrometer?

- A. Hot blast (air) from stoves**
- B. Molten slag flowing out of blast furnace
- C. Combustion space in boilers
- D. Rotary limestone calcination kiln

Sub zero treatment of steel is done to _____ ?

- A. Suppress martensite transformation
- B. Enhance its working performance in sub zero atmosphere
- C. Reduce the retained austenite in hardened steel**
- D. Induce temper brittleness after its hardening

The wall thickness for a large high pressure pipeline is determined by the consideration of the _____?

- A. Axial tensile stress in the pipe
- B. Forces exerted by static and dynamic action at bends
- C. Circumferential pipe-wall tension**
- D. Temperature stresses

Which of the following has the lowest Prandtl number ?

- A. Molten sodium (a coolant used in fast breeder reactor)**
- B. Water
- C. Transformer oil
- D. Dilute H₂SO₄

Dean number is concerned with the _____?

- A. Fluid-particle interaction
- B. Fluid flow through helical pipes**
- C. Power consumption in agitated vessels
- D. Psychrometry

_____ of carbon blocks in the hearth of blast furnace helps in avoiding skull formation, when it becomes cold?

- A. High thermal conductivity
- B. Low porosity
- C. Non-wetting characteristics**
- D. High density

How many atoms are present in one gm-atom of an element ?

- A. 2×10^{23}
- B. 6×10^{23}**
- C. 6×10^{32}
- D. 5×10^5

Salt content (measured as sodium chloride) in electrically desalted crude oil

comes down to a level of about _____ ptb (pounds per thousand barrel) ?

- A. 0.03
- B. 3**
- C. 35
- D. 70

Cartridge filters are termed as 'edge' filters, because of the fact that the _____ ?

- A. Disks have very sharp edge
- B. Solids are not deposited at the edge of the disk
- C. Bulk of the solids are removed at the periphery of the disks**
- D. None of these

Radiator of an automobile engine is a _____ type of heat exchanger?

- A. Co-current
- B. Cross-current
- C. Counter-current
- D. Direct contact**

Pensky-Marten apparatus is used for those oils, whose flash points are _____ °F?

- A. < 120
- B. > 120**
- C. < 90
- D. 90-110

Pick out the wrong statement ?

- A. 'Hold back' is defined as the fraction of material that stays longer than the mean residence time
- B. Study of non-ideal flow reactor is done experimentally by stimulus-response technique
- C. For studying a chemical reaction, it is desirable to monitor the reactants during initial stages

and the products during the final stages of reaction

D. A batch reactor cannot be used to study the kinetics of catalytic reaction

Pick out the wrong statement about the design of sieve plate column and the bubble cap column ?

A. The downcomer design and the residence time in the downcomer is almost same for sieve

plate and bubble cap columns

B. Weir length for a bubble cap plate is the same as that for the sieve plate

C. Weir height for a bubble cap plate column is the same as that for a sieve plate column

D. Weir height in case of a bubble cap plate ranges from 50 to 150 mm and is higher than the sieve plate

Flame photometry is used for the determination of compositional analysis of _____?

A. Solids

B. Alkali metals

C. Natural gas

D. Isotopes

Most of the fibre forming polymers are crystalline in nature, one of the exceptions being _____ which is amorphous in nature?

A. Nylon

B. Polyacrylonitrile

C. Polypropylene

D. Polyester

The half life period of a radioactive element is 100 days. After 400 days, one gm of the element will be reduced to _____ gm?

A. 1/4

B. 1/8

C. 1/2

D. 1/16

Segar cones are used for the determination of _____ of refractories?

A. Softening temperature

B. Spalling resistance

C. Electrical conductivity

D. Resistance to slag attack

Polystyrene is a light, transparent, thermoplastic material used for making _____?

A. Toys and combs

B. Packaging bags

C. Non-sticking utensils

D. Electrical insulation

Tabling process used for separating two materials of different densities by passing the dilute pulp over a table/deck, which is inclined from the horizontal surface at an angle of about _____?

A. 1 to 2°

B. 2 to 5°

C. 5 to 10°

D. 10 to 15°

Two dimensional stream function _____?

A. Relates velocity and pressure

B. Is constant along a stream line

C. Is constant along an equipotential surface

D. None of these

Steam is preferred to be used as a heating medium in heat exchangers, because of its _____?

A. Low cost

B. High latent heat

- C. Non-corrosive condensate
- D. High film co-efficient

Number of poles in a system with transfer function $1/(s^2 + 2s^2 + 1)$ is _____?

- A. 2
- B. 5
- C. 3**
- D. 1

Smoke point of kerosene expresses its _____?

A. Burning characteristics

- B. Luminosity characteristics
- C. Aromatic content directly
- D. Lamp wick wetting characteristics

In extraction, as the temperature increases, the area of heterogeneity (area covered by binodal curve) _____?

A. Decreases

- B. Increases
- C. Remains unchanged
- D. None of these

Filter medium resistance is that offered by the _____?

- A. Filter cloth
- B. Embedded particles in the septum
- C. Filter cloth and the embedded particle collectively**
- D. None of these

When the wavelength of incident X-rays increases, the angle of diffraction _____?

A. Decreases

- B. Increases
- C. Remain constant
- D. Shows no systematic variation

The weakest sound that can be heard by a person in a quiet environment is equivalent to _____ decibel ?

- A. 1**
- B. 5
- C. 10
- D. 50

Addition of grog in fireclay brick during its manufacture is advantageous, because it results in _____ ?

- A. Less shrinkage in heating, decreased apparent porosity & increased specific gravity
- B. High strength & thermal spalling resistance
- C. Less addition of water to get a workable plasticity & lesser time required for drying the raw refractories and hence increased rate of production
- D. All A., B. and C.**

Rubber latex is an example of a _____ fluid?

- A. Pseudo plastic**
- B. Bingham plastic
- C. Dilatent
- D. Newtonian

A negative gain margin expressed in decibels means a/an _____ system?

- A. Stable
- B. Unstable**
- C. Critically damped
- D. None of these

Pick out the wrong statement?

- A. Benzopyrene which causes cancer is present in traces in tobacco, charcoal & petrol driven automobile exhaust
- B. NO₂ is capable of penetrating the troposphere and can absorb both ultraviolet & visible light
- C. Hydrocarbon pollutants are produced by sweet gum, oak & natural rubber trees
- D. H₂S is not at all produced during combustion of sulphur bearing fuels as all the sulphur is oxidised to SO₂**

Low pressure Zeigler process for the manufacture of polythene uses a catalyst which is _____?

- A. Ni
- B. V₂O₅
- C. Fe
- D. Aluminium triethyl combined with titanium tetrachloride**

The major reason of hydrodynamic noise (i.e., noise resulting from liquid flow) is _____?

- A. Pipe vibrations
- B. Cavitation**
- C. Boundary layer separation
- D. Fluctuation in liquid flow

A chemical change takes place when iron _____?

- A. Rusts**
- B. Melts
- C. Is heated
- D. None of these

Chemically, mullite refractories is _____?

- A. 3Al₂O₃.2SiO₂**

- B. Al₂O₃
- C. ZrSO₄
- D. ThO₂

Which of the following is coking ?

- A. Vitrain**
- B. Fussain
- C. Both A. & B.
- D. Neither A. nor B.

In _____ process, there is an increase in entropy with no degradation of energy ?

- A. Isothermal expansion**
- B. Isochoric heat addition
- C. Polytropic expansion
- D. Isobaric heat addition

While starting an axial flow pump, its delivery valve should be kept _____ ?

- A. Open**
- B. Closed
- C. Either open or closed
- D. None of these

As per the Indian boiler regulation (IBR), the type of joint preferred for the circumferential joint is the _____ joint ?

- A. Butt
- B. Lap**
- C. Welded
- D. None of these

Heat required to raise the temperature of a body by 1 °C is called

its _____?

- A. Heat capacity
- B. Specific heat capacity
- C. Thermal conductivity
- D. Water equivalent

Large process vessels operating under extreme temperature and pressure conditions are normally clad/ lined with materials like stainless steel, aluminium, nickel & its alloys, copper & its alloys and titanium. The cladding thickness is generally about _____ percent of the total thickness?

- A. 1 to 5
- B. 10 to 20
- C. 30 to 40
- D. 40 to 50

Naphthalene recovered from coke oven gas is used _____?

- A. As moisture proof coating on fibres
- B. As moth balls (insecticides)
- C. As a fuel in furnaces
- D. For making electrodes

Amount of energy that a material can absorb before its fracture is a measure of its _____?

- A. Toughness
- B. Resilience
- C. Malleability
- D. Ductility

Water is entering a storage tank at a temperature T_0 and flow rate Q_0 and leaving at a flow rate Q and temperature T . There are negligible heat losses in the tank. The area of cross-section of the tank is A_0 . The model that describes the dynamic variation of temperature of water in the tank with time is given

as _____?

- A. $Q_0(T_0 - T) = A_c \cdot h \cdot (dT/dt)$
- B. $Q_0 T_0 - Q_T = A_c \cdot h \cdot (dT/dt)$
- C. $Q(T_0 - T) = A_c \cdot h \cdot (dT/dt)$
- D. $Q(T_0 - T) = A_c \cdot (dTH/dt)$

The change in enthalpy, when a unit quantity of gas is absorbed by relatively large quantity of adsorbent (on which a definite concentration of the adsorbed gas already exists) is termed as the _____?

- A. **Differential heat of adsorption**
- B. Heat of wetting
- C. Integral heat of adsorption
- D. None of these

Lead is _____?

- A. Not resistant to corrosion
- B. Used as a cathodic material
- C. Not used as pigment (in its compound forms) for paints
- D. **Used as a shock absorber (in mattress form) between the foundation and steel framework of skyscraper buildings**

Select the correct statement?

- A. **The discharge through a Venturimeter depends upon Δp only and is independent of orientation of the meter**
- B. A Venturimeter with a given gage difference discharges at a greater rate, when the flow is vertically downward through it, than when the flow is vertically upward
- C. For a given pressure difference, the discharge of gas is greater through a Venturimeter, when compressibility is taken into account, than when it is neglected
- D. The overall pressure loss is the same in a given pipe line, whether a Venturimeter or a nozzle

with the same throat dia is used

A nitrogenous fertiliser contains 20% N₂. It could be _____?

- A. Ammonium nitrate
- B. Calcium ammonium nitrate (CAN)**
- C. Urea
- D. Ammonium chloride

In Hydrofining catalytic desulphurisation process for sweetening of petroleum products, use of hydrogen _____?

- A. Enhances the desulphurisation process
- B. Minimises coke formation
- C. Both A. and B.**
- D. Neither A. nor B.

Which of the following is not a measure component necessarily to be present in fertilisers ?

- A. Nitrogen
- B. Potassium
- C. Phosphorous
- D. Sulphur**

Horsepower required for a roll crusher is directly proportional to its _____?

- A. Reduction ratio
- B. Capacity
- C. Both A. & B.**
- D. Neither A. nor B.

Wet grinding in a revolving mill _____ as compared to dry grinding ?

- A. Gives less wear on chamber walls
- B. Requires more energy
- C. Increases capacity**

D. Complicates handling of the product

While the fuel fired furnace can be used upto a maximum temperature of about 1700°C, the electric furnace can be used upto a temperature of about _____ °C?

- A. 2000
- B. 3000
- C. 4500**
- D. 6000

'Absorption with chemical reaction' is involved in the removal of _____ ?

- A. Carbon dioxide from gaseous stream using alkaline solution**
- B. Benzol from coke oven gas using solar oil/wash oil
- C. Ammonia from coke oven gas using refrigerated water
- D. Tar from coke oven gas in primary gas coolers using chilled water

Softening of hardened steel is done by its _____ ?

- A. Normalising
- B. Tempering**
- C. Annealing
- D. Carburising

Rate of a chemical reaction is not influenced by the _____ ?

- A. Catalyst
- B. Temperature
- C. Reactants concentration
- D. Number of molecules of reactants taking part in a reaction**

Pick out the false statement pertaining to water treatment ?

- A. Aeration of water is effective in CO₂ removal
- B. The zeolite water softening process reduces the hardness of water by not more than 50%**

- C. Sodium sulphate or sodium carbonate do not cause hardness in water
- D. Water with pH value less than 7, is acidic

The preferred reacting system for oxidation of o-xylene to phthalic anhydride is _____?

- A. Jacketed liquid phase CSTR**
- B. Jacketed steam heated multitubular reactor
- C. Multitubular reactor with cooling
- D. Multistage multitubular reactor with interstage cooling

Kaolin is a/an _____?

- A. Refractory material**
- B. Synthetic resin
- C. Artificial abrasive
- D. Blue pigment

Which of the following is not a natural polymer ?

- A. Nucleic acids e.g. RNA and DNA
- B. Polysaccharides
- C. Polyisoprene
- D. Polyurethane**

Though kinetics of ammonia synthesis dictates the use of low temperature for high equilibrium conversion, yet it is kept moderately high (550°C), because at low temperature _____?

- A. Rate of reaction is very low**
- B. Very high pressure is required resulting in costly pressure vessel
- C. Space velocity of gas is very low resulting in decreased conversion
- D. None of these

The partial molar enthalpy of a component in an ideal binary gas mixture of composition Z, at a temperature T and pressure P, is a function only

of _____?

- A. T
- B. T and P**
- C. T, P and Z
- D. T and Z

The minimum plate spacing in most of the petroleum refinery distillation columns (of dia > 3 ft) is normally _____ inches?

- A. 6
- B. 12
- C. 18**
- D. 36

Which is the best tube arrangement (in a shell and tube heat exchanger) if the fluids are clean and non-fouling ?

- A. Square pitch
- B. Triangular pitch**
- C. Diagonal square pitch
- D. None of these

Balls in a ball mill are usually made of _____?

- A. Steel**
- B. Cast iron
- C. Stainless steel
- D. Bronze

Austempering process results in the formation of _____ structure ?

- A. Martensitic
- B. Bainitic**
- C. Carburised
- D. Stressed

Emf developed by a thermocouple, while measuring a temperature of 600°C is about 5.5 mV. The type of thermocouple used is _____?

- A. Chromel-alumel
- B. Iron-constantan
- C. Platinum-platinum + rhodium**
- D. Either A., B. or C.

Boiler tube size is specified by its thickness and _____ diameter ?

- A. Outside**
- B. Inside
- C. Mean
- D. None of these

In hindered settling, the particles are _____?

- A. Placed farther from the wall
- B. Not affected by other particles and the wall
- C. Near each other**
- D. None of these

The process of heating the cold pressed metallic powder is called _____ in powder metallurgy?

- A. Precipitation
- B. Fusion
- C. Sintering**
- D. Agglomeration

Maximum use of petroleum coke is in _____?

- A. Adsorption refining operation
- B. Fuel gas manufacture
- C. Carbon electrode manufacture**
- D. Iron ore reduction

Which of the following is the hardest material ?

- A. Topaz
- B. Quartz
- C. Corundum**
- D. Fluorite

Presence of soluble organics in polluted water causes _____ ?

- A. Undesirable plants growth
- B. Depletion of oxygen**
- C. Fire hazards
- D. Explosion hazards

Pick out the wrong statement?

- A. Fluid movement under the influence of buoyant forces resulting from change in density takes place in case of natural convection
- B. The ratio $NNu/NRe \cdot Npr$ is called the Stanton number
- C. The Peclet number is a measure of the ratio of energy transport by convection to that by conduction
- D. The Colburn jH factor for heat transfer is given by $Nst Npr$**

Extractor temperature is maintained at -20°C in Edeleanu process to reduce the _____ of kerosene?

- A. Smoke point
- B. Paraffins**
- C. Aromatics
- D. Naphthenes

Capacity of flight conveyor in tons/hr is given by (where, W & D = width and depth of flight respectively in metre V = speed of the conveyor, metre/second ρ = bulk density of material, kg/m^3) ?

- A. $3.6 W.D.V.\rho$**
- B. $3.6 W.D.V$
- C. $3.6 W.V.\rho$

D. 3.6 D.V.ρ

Helical screw agitator is used for _____?

- A. **Mixing highly viscous pastes**
- B. Blending immiscible liquids
- C. Mixing liquids at very high temperature ($> 250\text{ }^{\circ}\text{C}$)
- D. None of these

Filtrate flow rate in case of a rotary drum vacuum filter (in which $R_m \ll R_c$) is proportional to _____ and the cycle time (where, μ = filtrate viscosity R_m = filter medium resistance R_c = cake resistance)?

- A. $\sqrt{\mu}$
- B. **$1/\sqrt{\mu}$**
- C. $1/\mu$
- D. $1/\mu^2$

Capacity of a refractory brick to withstand-sudden changes in temperature is denoted by the property called _____?

- A. **Spalling resistance**
- B. Refractoriness
- C. Refractoriness under load (RUL)
- D. None of these

Teflon is _____?

- A. Phenol formaldehyde
- B. An inorganic polymer
- C. **Poly tetra-fluoro-ethylene (P.T.F.E.)**
- D. A monomer

To counteract the bad effects of strain hardening on a cold formed part, it must be _____?

- A. Tempered

- B. Normalised
- C. Annealed**
- D. Hardened

Ceramic recuperators compared to metallic recuperators for the same duty_____?

- A. Are lighter
- B. Occupy more space**
- C. Are less costly
- D. Have higher pressure differential between flue gas & air side

Working of linear variable differential transducer (LVDT) is based on the principle of variable_____?

- A. Capacitance
- B. Resistance
- C. Mutual inductance**
- D. None of these

Starting material for the production of styrene butadiene rubber (SBR) is_____?

- A. Ethyl alcohol
- B. Ethylene
- C. Both A. & B.**
- D. Neither A. nor B.

Ammonium sulphate can be produced by reacting gypsum with_____?

- A. Ammonia
- B. Ammonium carbonate**
- C. Nitric acid
- D. None of these

The first law of thermodynamics is a restatement of the law of conservation of _____?

- A. Mass
- B. Energy**
- C. Momentum
- D. None of these

The internal energy of the combustion products is _____ compared to that of reactants?

- A. More
- B. Less**
- C. Equal
- D. More or less; (depends on the state of fuel.)

Separation of particles of various sizes, shapes and densities by allowing them to settle in a fluid is called _____?

- A. Classification**
- B. Froth floatation
- C. Thickening
- D. Clarification

Density of high density polythene is about _____ gm/c.c ?

- A. 1.18
- B. 1.05
- C. 0.95**
- D. 0.99

Heat transfer to the water wall in a high pressure water wall type boiler furnace is mainly by _____?

- A. Conduction
- B. Convection
- C. Radiation**

D. Both A. & B.

Piezometric head is the sum of the _____ heads?

- A. Elevation & kinetic energy
- B. Elevation & pressure**
- C. Kinetic energy & pressure
- D. None of these

Vegetable oils are hydrogenated in a _____ reactor?

- A. Slurry**
- B. Plug flow
- C. Homogeneous catalytic
- D. None of these

Dilatometer is used to measure _____?

- A. Stress
- B. Strain
- C. Deflection
- D. Contraction/expansion due to changes in temperature**

Prilling of urea should be accomplished (in a sprayer) just above the melting point of urea with minimum of retention time, otherwise it will result in _____?

- A. Low bulk density product
- B. Biuret formation**
- C. Non-spherical prills
- D. Substantially wet non-flowing and sticky product

Threshold energy in a reaction is equal to the _____?

- A. Activation energy
- B. Normal energy of reactants
- C. Sum of A. & B.**
- D. Neither A. nor B.

It takes 6 hours to dry a wet solid from 50% moisture content to the critical moisture content of 15%. How much longer it will take to dry the solid to 10% moisture content, under the same drying conditions? (The equilibrium moisture content of the solid is 5%) ?

- A. 15 min
- B. 51 min
- C. 71 min**
- D. 94 min

In fluid flow, and heat and mass transfer, one encounters (i) kinematic velocity (μ), (ii) molecular diffusivity (ζ) and thermal diffusivity (α). The units of these quantities are ?

- A. μ , α and θ all have units of m/s
- B. μ , α and θ all have units of m²/s
- C. α and θ have units of m²/s, while μ has unit of m/s**
- D. α and θ have units of m/s, while μ has unit of m²/s

The critical radius of insulation for a spherical shell is (where, K = thermal conductivity of insulating material h_0 = heat transfer coefficient at the outer surface) ?

- A. K/h_0
- B. $2K/h_0$**
- C. h_0/K
- D. $h_0/2K$

In open channel flow in a rectangular channel, the ratio between the critical depth and the initial depth, when a hydraulic jump occurs

is _____ ?

- A. 0.5
- B. 0.84
- C. 1.84**

D. 1.25

Glass pipes can be joined by _____?

- A. Flanges
- B. Welding
- C. Soldering
- D. Bell and spigot joint**

In Kraft process of paper manufacture, white cooking liquor consists of caustic soda _____?

- A. Sodium sulphide & sodium carbonate**
- B. Sodium sulphite & sodium carbonate
- C. Sodium sulphite & sodium sulphide
- D. None of these

The elastic strain energy of a unit length of an edge dislocation as compared to that of a screw dislocation is _____?

- A. More**
- B. Equal
- C. Less
- D. Double

A good quality coal should have _____?

- A. Low fusion point of ash
- B. High ash content
- C. High sulphur content
- D. None of these**

Lagooning process is mainly a means of the _____?

- A. Sludge disposal**
- B. Reduction of excessive flow in sewers
- C. Biological treatment of wastes
- D. None of these

With increasing flow rate, the hydraulic efficiency of a centrifugal pump _____?

- A. Monotonically decreases**
- B. Decreases and then increases
- C. Remains constant
- D. Increases and then decreases

Hydrogenation of oil takes place in a/an _____ reactor ?

- A. Autothermal
- B. Trickle bed**
- C. Plug flow
- D. None of these

The unit of heat transfer co-efficient in SI unit is _____?

- A. $J/M^2^{\circ}K$
- B. $W/m^2^{\circ}K$**
- C. $W/m^{\circ}K$
- D. $J/m^{\circ}K$

Sillimanite ($Al_2O_3.SiO_2$) refractory, which is a neutral refractory, is not used in _____?

- A. Pottery furnace
- B. Glass melting furnace
- C. Crucibles
- D. Gas retorts**

Temperature of preheated air used for the transportation of pulverised coal through pipes to the burner of a boiler furnace is restricted to a maximum limit of about $300^{\circ}C$ to avoid the _____?

- A. Requirement of large volume combustion chamber
- B. Risk of explosion**

- C. Chances of clinker formation
- D. Incomplete combustion of coal

The kinematic viscosity (in stoke) and the absolute/dynamic viscosity (in poise) are the same for _____ at room temperature ?

- A. Air
- B. Water**
- C. Mercury
- D. Alcohol

Square steel key is normally strong in failure by shear & crushing. Keys are normally made of _____ steel bars?

- A. Hot rolled mild
- B. Cold rolled mild**
- C. Forged
- D. Machinable stainless

A fluid energy mill is used for _____?

- A. Cutting
- B. Grinding
- C. Ultra-grinding**
- D. Crushing

Very tall packed towers are divided into series of beds to _____?

- A. Reduce the overall pressure drop
- B. Avoid channelling**
- C. Reduce liquid hold-up
- D. Avoid flooding

The rolling process cannot be used to produce _____?

- A. Plates
- B. Rods

C. Tubes

D. Wires

Which is the most practical and economical method for removal of suspended solid matter from polluted water ?

A. Sedimentation

B. Skimming off

C. Chlorination

D. Biological oxidation

Low viscosity absorbent is preferred for reasons of _____ ?

A. Rapid absorption rates and good heat transfer characteristics

B. Improved flooding characteristics

C. Low pressure drop on pumping

D. All A., B. and C.

Which of the following mechanical conveyors does not come under the division „scrapers“ ?

A. Ribbon conveyor

B. Flight conveyor

C. Bucket elevators

D. Drag conveyor

The molar composition of a gas is 10% H₂, 10% O₂, 30% CO₂ and balance H₂O. If 50% H₂O condenses, the final mole percent of H₂ in the gas on a dry basis will be _____ ?

A. 10%

B. 5%

C. 18.18%

D. 20%

When liquid and vapour phase of multi-component system are in equilibrium (at

a given temperature and pressure), then chemical potential of each component is _____?

- A. Same in both the phases
- B. Zero in both the phases
- C. More in vapour phase
- D. More in liquid phase

A good solvent used for absorption should not have very high _____?

- A. Viscosity
- B. Vapor pressure
- C. Freezing point
- D. All A., B. & C.

Which is the most thermally efficient furnace _____?

- A. Reheating furnace
- B. Reverberatory furnace
- C. Rotary kilns
- D. Boiler furnace

Heat sensitive materials with very high latent heat of vaporisation may be economically separated using _____?

- A. Liquid extraction
- B. Distillation
- C. Evaporation
- D. Absorption

Which of the following is directly concerned with Psychrometry ?

- A. Lewis relationship
- B. Galileo number
- C. Weber number
- D. Dean number

Weep holes provided in the plates of a distillation column

_____?

- A. Facilitate draining out liquid from a tray when the unit is not in operation
- B. Are normally located near the overflow weir so that any delivery of liquid during operation follows approximately the same path as the overflow fluid
- C. Must be large enough (usually 1/4" to 5/8" dia) to prevent plugging but should not deliver excessive amount of fluid during operation
- D. All A., B. and C.**

In general, the specific heats of aqueous solutions _____ with increase in the concentration of the solute?

- A. Increase
- B. Decrease**
- C. Remain unchanged
- D. None of these

A system undergoes a change from a given initial state to a given final state either by an irreversible process or by a reversible process, then (where, ΔS_1 and ΔS_R are the entropy changes of the system for the irreversible and reversible processes respectively) ?

- A. ΔS_1 is always ΔS_R
- C. ΔS_1 is always $> \Delta S_R$**
- D. ΔS_1 is always $= \Delta S_R$

In an incompressible fluid, the density is _____?

- A. Greatly affected by moderate changes in pressure
- B. Greatly affected only by moderate changes in temperature
- C. Not affected with moderate change in temperature & pressure**
- D. Sensible to changes in both temperature & pressure

_____ is normally used for the manufacture of refrigerator components and transistor parts?

- A. Polypropylene
- B. Polystyrene**
- C. Polyester
- D. Polyurethane

Which of the following equations applies to the fluid flow through a packed bed for very large Reynolds number ?

- A. Fanning equation
- B. Blake-Plummer equation**
- C. Hagen-Poiseuille equation
- D. Kozeny-Carman equation

Buoyant force _____?

- A. For non-symmetrical bodies is not vertical
- B. Depends on the depth of the submergence of the floating body
- C. Depends on the weight of the floating body**
- D. None of these

It is not desirable to design a heat exchanger for LMTD correction factor, F_T , of less than _____?

- A. 0.99
- B. 0.95
- C. 0.80**
- D. 0.55

A metallic alloy in which one of the constituent metal is _____, is called an amalgam?

- A. Zinc
- B. Mercury**
- C. Lead

D. Tin

Unit of surface tension in S.I. unit is _____?

A. Watt/m

B. Joule/m²

C. Newton/m²

D. Joule/m

If two pure liquid constituents are mixed in any proportion to give an ideal solution, there is no change in _____?

A. Volume

B. Enthalpy

C. Both A. & B

D. Neither A. nor B

Foot valve provided in the pump is a _____ valve?

A. Direction control

B. Back pressure

C. Relief

D. Pressure reduction

Electro-magnetic spectrum range, which is important for radiation varies from _____ microns?

A. 1 to 100

B. 0.5 to 50

C. 10 to 100

D. 100 to 1000

Noise pollution level in a chemical plant is expressed in _____?

A. Roentgen

B. Decibel

C. Hertz

D. None of these

A bed of spherical particles (specific gravity 2.5) of uniform size $1500 \mu\text{m}$ is 0.5 m in diameter and 0.5 m high. In packed bed state, the porosity may be taken as 0.4 . Ergun's equation for the above fluid-particle system (in SI units) is given below: $\Delta P/L = 375 \times 10^3 V_0 M + 10.94 \times 10^6 V_2 O M$ (SI units) If water is to be used as the fluidising medium, in actual operation, the above bed has a height = 1 m . What is the porosity of the fluidised bed ?

- A. 0.2
- B. 0.5
- C. 0.7**
- D. 0.8

What is the dispersion number for a plug flow reactor ?

- A. 0**
- B. ∞
- C. 1
- D. -1

Nusselt number is related to Grashoff number (Gr) in turbulent & laminar flow respectively, in respect of free convection over a vertical flat plate as _____ ?

- A. $Gr^{0.25}$, Gr**
- B. $Gr^{0.25}$, $Gr^{0.33}$
- C. Gr, $Gr^{0.25}$
- D. $Gr^{0.33}$, $Gr^{0.25}$

The ratio of pressure forces to inertial forces is called the _____ number?

- A. Froude
- B. Euler**
- C. Reynold
- D. Mach

Abrasion index of blast furnace coke should be around _____ percent?

- A. 20
- B. 35
- C. 55
- D. 80**

In the Kraft (sulphate) process for the paper manufacture, the digester is made of _____?

- A. Cast iron
- B. Stainless steel
- C. Karbate carbon
- D. Wrought iron

Liners of bags are usually made of _____?

- A. Polythene
- B. PVC
- C. Polypropylene**
- D. Polyesters

Flooding in a distillation column is detected by a sharp _____?

- A. Increase in Murphree plate efficiency
- B. Decrease in pressure drop
- C. Decrease in liquid hold up in the column
- D. Increase in pressure drop**

_____ is used as a flux in the extraction of iron from iron ore (haematite) in blast furnace?

- A. Bauxite
- B. Limestone**
- C. Quartz
- D. Manganese

Large scale drying of wheat is done in a _____ dryer?

- A. Fluidised bed
- B. Spouted bed**
- C. Tray
- D. Vacuum rotary

Efficient burning of anthracite coal requires _____?

- A. Low preheat of air
- B. Fine grinding**
- C. High excess air
- D. All A., B. and C

An alloy used as thermocouple material comprises of 40% nickel and 60% copper. It is called _____?

- A. Constantan**
- B. Kanthal
- C. Chromel
- D. German silver

Hazardous/polluting chemical industries should have an 'exclusion zone' with a green belt and general public access prohibited around it, covering a radius of _____ metres?

- A. 100
- B. 1000**
- C. 400
- D. 4000

Multiple effect evaporation accounts for _____?

- A. Steam economy**
- B. Lower operating costs
- C. Investment economy
- D. None of these

When an unsaturated air-water mixture is heated at constant pressure, then _____ ?

- A. The partial pressure of water vapour increases
- B. The specific humidity decreases
- C. The relative humidity increases
- D. The relative humidity decreases**

For a feed back control system to be stable, the _____ ?

- A. Roots of the characteristic equation should be real
- B. Poles of the closed loop transfer function should lie in the left half of the complex plane**
- C. Bode plots of the corresponding open loop transfer function should monotonically decrease
- D. Poles of the closed loop transfer function should lie in the right half of the complex plane

Which of the following is an example of cathodic protection of metals against corrosion ?

- A. Painted steel
- B. Galvanised iron**
- C. Case hardened steel
- D. Lead lined reactor

Bucket elevators are not suitable for the vertical lifting of _____ materials?

- A. Fine (e.g. – 200 mesh size coal)
- B. Sticky (e.g. clay paste)**
- C. Small lumpy (e.g. grains and sand)
- D. Free flowing

Heat flux increases with temperature drop beyond the Leiden frost point in the plot of heat flux vs. temperature drop for a boiling liquid, because _____ ?

- A. Convection becomes important
- B. Conduction becomes important
- C. Radiation becomes important**
- D. Sub-cooled boiling occurs

The individual mass transfer co-efficients (moles/m²s) for absorption of a solute from a gas mixture into a liquid solvent are, $K_L = 4.5$ and $K_G = 1.5$. The slope of the equilibrium line is 3. Which of the following resistance (s) is (are) controlling ?

- A. Liquid side
- B. Gas side**
- C. Interfacial
- D. Both liquid and gas side

Hydrochloric acid is stored in a _____ steel vessel?

- A. Lead lined
- B. Rubber lined**
- C. Glass lined
- D. Stainless

Constantan used in thermocouples is an alloy of _____?

- A. Iron & copper
- B. Copper & aluminium
- C. Lead & tin
- D. None of these**

Carbon is present in the form of _____ in grey cast iron ?

- A. Spheroids
- B. Nodular aggregates of graphite
- C. Flakes**
- D. Cementite

In catalytic alkylation, higher iso-butane to olefin ratio

gives _____?

- A. **Low final boiling point product**
- B. Higher yield
- C. Both A. and B.
- D. Neither A. nor B.

The most important property for a jet fuel is its _____?

- A. Viscosity
- B. **Freezing point**
- C. Calorific value
- D. Flash point

_____ substances present in sewage are removed in grit chamber during sewage treatment?

- A. Organic
- B. Fatty
- C. **Inorganic**
- D. Dissolved

Pick out the wrong statement about the design of a sieve plate column ?

- A. An increased weir height improves the tray efficiency at the cost of high plate pressure drop; optimum weir height being 40-90 mm for column pressure above atmospheric and 6-12 mm for vacuum columns
- B. For segmental downcomers, the chord length is 60-80% of the column diameter. An initial value of downcomer area of 12% is taken in the design
- C. Width of the calming section provided at the inlet and outlet sides of the plate is 75 mm for column diameter below 1.5 metres and 100 mm for larger diameter columns
- D. **Minimum recommended downcomer residence time for the disengagement of entrained vapour is the same for both foaming and non-foaming liquids, which is about 20 seconds**

Flash point of diesel/kerosene ($>50^{\circ}\text{C}$) is determined by the _____?

- A. **Abel apparatus**

- B. Pensky-Martens apparatus
- C. Saybolt chromometer
- D. None of these

The rate at which a chemical substance reacts is proportional to its _____?

- A. Active mass**
- B. Molecular weight
- C. Equivalent weight
- D. Atomic weight

Absolute zero pressure can be attained at a temperature of _____?

- A. 0°C
- B. 50°K
- C. 0°R**
- D. None of these

In a reaction, the threshold energy is equal to (where, A = activation energy N = normal energy of reactants) ?

- A. A
- B. N
- C. A + N**
- D. A – N

Helmholtz free energy A. is defined as _____?

- A. $A = H - TS$
- B. $A = E - TS$**
- C. $A = H + TS$
- D. None of these

Which of the following mineral dressing operations is termed as 'comminution'?

- A. Panning

- B. Spiralling
- C. Tabling
- D. None of these**

The Nusselt number for fully developed (both thermally and hydrodynamically) laminar flow through a circular pipe whose surface temperature remains constant is _____?

- A. 1.66
- B. 88.66
- C. 3.66**
- D. Dependent on N_{Re} only

If an ideal solution is formed by mixing two pure liquids in any proportion, then the _____ of mixing is zero?

- A. Enthalpy
- B. Volume
- C. Both A. & B.**
- D. Neither A nor B

Starting raw material for the manufacture of Maleic anhydride is _____?

- A. n-butene
- B. Benzene
- C. Either A. or B.**
- D. Neither A. nor B.

Berl saddle made of carbon cannot be used for _____?

- A. Alkalis
- B. SO_2
- C. H_2SO_4
- D. Oxidising atmosphere**

Stoke's law is valid, when the particle Reynolds number is

_____?

- A. < 1
- B. > 1
- C. < 5
- D. None of these

LSHS is a type of furnace oil, which _____?

- A. Is more viscous than high viscosity furnace oil (HVFO)
- B. Stands for low sulphur heavy stock
- C. Is an ideal fuel for metallurgical furnaces due to its lower sulphur content (< 1%)
- D. All A., B. and C.

_____ shaped roof is most commonly used for cylindrical tanks?

- A. Cone
- B. Dome
- C. Umbrella
- D. Flat

Value of Nusselt number [$Nu = (hD/k)$] for the heat transfer by conduction from a droplet or a spherical particle to a surrounding stagnant film

is _____?

- A. 0.5
- B. 2
- C. 10
- D. 100

Factor of safety (i.e., overdesign factor) in heat transfer equipments is about _____ percent more than the actual/theoretical design factor?

- A. 5-10
- B. 15-20
- C. 30-35

D. 35-40

Baffle spacing is generally _____ the I.D. of the shell ?

- A. More than
- B. Not greater than
- C. Not less than one fifth of
- D. Both B. and C.**

In case of physical adsorption, the difference between heat of adsorption and heat of normal condensation is _____ ?

- A. Equal to the heat of formation of surface compound
- B. Equal to the heat of wetting**
- C. Zero
- D. Called integral heat of adsorption

Zeigler process _____ ?

- A. Produces high density polythene**
- B. Uses no catalyst
- C. Produces low density polythene
- D. Employs very high pressure

Construction expenses are roughly _____ percent of the total direct cost of the plant ?

- A. 2
- B. 10**
- C. 30
- D. 50

Highly caking coals _____ ?

- A. Produce weak coke
- B. Produce strong coke
- C. May damage the coke oven walls during carbonisation
- D. Both B. and C.**

Ceramic recuperators (made of SiC) is economical, only when used for preheating combustion air above _____ °C?

- A. 250
- B. 650**
- C. 850
- D. 1000

Dense soda ash used in the manufacture of glass, is chemically represented by _____?

- A. Na_2CO_3
- B. $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$
- C. $\text{Na}_2\text{CO}_3 \cdot \text{H}_2\text{O}$**
- D. Na_2HCO_3

With increase in the capacity of screens, the screen effectiveness _____?

- A. Remains unchanged
- B. Increases
- C. Decreases**
- D. Decreases exponentially

The characteristic dimensionless groups for heat transfer to a fluid flowing through a pipe in laminar flow are _____?

- A. Re , Gz
- B. Nu , Pr
- C. Nu , Pr , Re
- D. Nu , Gz**

Addition of _____ to steel does not impart hardness?

- A. Nickel
- B. Copper**

- C. Chromium
- D. Silicon

Occurrence of 'case hardening' during drying of a high moisture solid cake _____ the drying rate?

- A. Increases
- B. Decreases**
- C. Does not affect
- D. Exponentially increases

The rate of a chemical reaction is almost doubled for every 10°C rise in temperature. The rate will increase _____ times, if the temperature rises from 10 to 100°C?

- A. 256
- B. 512**
- C. 112
- D. 612

With increase in temperature, the atomic heat capacities of all solid elements _____?

- A. Increases**
- B. Decreases
- C. Remains unchanged
- D. Decreases linearly

Orsat apparatus _____?

- A. Gives flue gas analysis on dry basis
- B. Determines N₂ in flue gas indirectly
- C. Can't determine CO in flue gas, if it is < 0.2%
- D. All A., B. & C.**

An exothermic reaction takes place in an adiabatic reactor. The product

temperature _____ reactor feed temperature?

- A. Is always equal to
- B. Is always greater than**
- C. Is always less than
- D. May be greater or less than

With increase in the alumina content, the refractoriness of high alumina refractories _____?

- A. Increases**
- B. Decreases
- C. Remain same
- D. May increase or decrease

_____ scrap can be recycled & reutilised?

- A. Bakelite
- B. Epoxy resin
- C. Polythene**
- D. None of these

Relative humidity is the ratio of the _____?

- A. Partial pressure of the vapour to the vapour pressure of the liquid at room temperature
- B. Partial pressure of the vapour to the vapour pressure of the liquid at gas temperature**
- C. Actual humidity to saturation humidity
- D. None of these

Refractories are dried in the _____?

- A. Rotary kilns
- B. Tunnel kilns**
- C. Sun
- D. None of these

In an exothermic chemical reactor, the manipulated variable is the flow rate of _____?

A. Coolant

- B. Reactants
- C. Product
- D. None of these

In a furnace with heating element temperature at 1700°C , the dominant mechanism of heat transfer will be _____?

- A. Conduction

B. Radiation

- C. Natural convection
- D. Forced convection

Pick out the wrong statement pertaining to the design of the distillation column?

- A. Generally, a skirt clearance of 0.5" to 1.5' is recommended to prevent plugging of the slots by residue build up
- B. The purpose of the slot is to disperse the gas into the liquid in the form of small bubbles
- C. If sufficient slot area is not provided, the gas may pass through the skirt clearance

D. None of these

Pressure drag does not depend upon the _____?

- A. Roughness of surface of the body
- B. Pressure of main flow only
- C. Length of the body in flow direction
- D. All A., B. and C.**

In the low Reynolds number region, the drag force on a sphere is proportional to _____?

- A. V**
- B. V^2
- C. V^4
- D. $V^{0.5}$

Dacron is a _____?

- A. Condensation polymerisation product of Hexamethylene diamine and adipic acid
- B. Condensation polymerisation product of dimethyl terephthalate (DMT) and ethylene glycol
- C. Thermosetting material
- D. None of these**

Emission spectroscopy is used for _____?

- A. Solids and metal analysis**
- B. Determining water purity
- C. Determination of CO₂ in gases
- D. NO_x determination

Increasing sulphur content in pig iron tends to make it _____?

- A. Soft
- B. Hard**
- C. Tough
- D. Ductile & malleable

Oxygen content in a flue gas was found to be 4%. It implies that excess air used for combustion was around _____ percent?

- A. 4
- B. 96
- C. 20**
- D. 40

Direct costs component of the fixed capital consists of _____?

- A. Contingencies
- B. Onsite and offsite costs**
- C. Labour costs
- D. Raw material costs

For a cold dilute feed to produce thick viscous liquor, backward feeding as compared to forward feeding results in _____?

- A. Increased economy
- B. Decreased economy
- C. Lower capacity
- D. No effect on economy

Pick out the wrong statement ?

- A. Polymeric fibres are never produced by addition polymerisation
- B. Property of tackiness is exhibited by uncured rubber
- C. Sharp melting point is not observed in thermoplastic polymers
- D. Polythene generally has an excellent resistance to ultra violet rays

_____ is removed from water by lime-soda process?

- A. Foul smell and taste
- B. Iron and manganese
- C. Temporary hardness
- D. Permanent hardness

Pick out the wrong statement?

- A. Ten times dilution of a normal solution (N) reduces its normality to N/10
- B. When equal weights of oxygen and methane are mixed in an empty reactor at room temperature, then the fraction of total pressure exerted by the oxygen is 1/2
- C. Volume occupied by 9.034×10^{23} atoms of oxygen in ozone (O₃) at NTP will be 11200 c.c
- D. One kg mole of an ideal gas at N.T.P occupies 22400 Nm³

Pick out the wrong statement?

- A. Exit age description function E. and internal age distribution function (I) are related as, $E = -(dI/d\theta)$
- B. Chemisorption studies are useful in the determination of catalyst surface area and pore size distribution
- C. A higher temperature favours the reaction of higher activation energy

D. A catalyst increases the potential energy barrier over which the reactants must pass to form products

Which of the following is desirable in petrol (gasoline) but undesirable in kerosene ?

- A. Paraffins
- B. Aromatics
- C. Mercaptans**
- D. Naphthenic acid

Air at a particular humidity is heated in a furnace. The new dew point _____ ?

- A. Decreases
- B. Increases**
- C. Depends on the extent of heating
- D. Remain unchanged

Sticky material can be dried in a _____ dryer ?

- A. Tray**
- B. Rotary
- C. Fluidised bed
- D. None of these

Sound produced by an automobile horn heard at a distance of 1.5 metres corresponds to about _____ decibels?

- A. 90
- B. 120**
- C. 150
- D. 180

Disinfection of water is done to remove _____ ?

- A. Color
- B. Bad taste

C. Foul odour

D. Bacteria

The effect of solid boundary on the fluid flow is confined to the boundary layer, except for fluids ?

A. Having high viscosities

B. Moving at low velocities

C. Both A. & B.

D. Neither A. nor B.

Factory manufacturing cost is the sum of the direct production cost _____?

A. Fixed charges and plant overhead cost

B. And plant overhead cost

C. Plant overhead cost and administrative expenses

D. None of these

The heat treatment process applied to cold formed steel parts is _____?

A. Normalising

B. Tempering

C. Artificial ageing

D. Solution annealing

Theoretical capacity of crushing rolls in tons/hr is given by (where, V = peripheral velocity, m/sec. W = width of rolls, m D_r = distance between rolls ρ = density of material to be crushed, kg/m³ here, $V = \pi ND$ where, N = speed of the rolls in rotation per second (rps) D = diameter of rolls, m) ?

A. $3.6 V.W.D_r.\rho$

B. $3.6 V.W. \rho$

C. $3.6 W.D_r.\rho$

D. $3.6 V.W.D_r/\rho$

High pressure at the bottom of a distillation tower handling heat sensitive materials results in _____?

- A. Thermal decomposition of bottoms**
- B. Increased relative volatility
- C. Erosion of the tower
- D. Very efficient operation

What is the ratio of the velocity at the axis of the pipe to the mean velocity of flow in case of pipe flow under viscous condition ?

- A. 0.5
- B. 0.67
- C. 1
- D. 2**

Brittleness induced due to the presence of sulphur in steel can be reduced by adding _____?

- A. Manganese**
- B. Magnesium
- C. Vanadium
- D. Copper

Portland cement consists mainly of _____?

- A. CaO & SiO₂**
- B. SiO₂ & Al₂O₃
- C. CaO & Al₂O₃
- D. CaO & Fe₂O₃

If the specific heat of gaseous products of combustion of a fuel is high, the adiabatic flame temperature will be _____?

- A. Low**
- B. High

- C. Very high, if the fuel is of low calorific value
- D. None of these

Rate of heat release in a furnace, which is the measure of heat intensity, is defined as _____?

- A. kcal/hr/m³ combustion space**
- B. kcal/m³ combustion space
- C. kcal/hr
- D. None of these

Which of the following is not an extensive property ?

- A. Free energy
- B. Entropy
- C. Refractive index**
- D. None of these

Penetration theory relates the average mass transfer co-efficient (K) with diffusivity D. as _____?

- A. $K \propto D$
- B. $K \propto \sqrt{D}$**
- C. $K \propto D^{1.5}$
- D. $K \propto D^2$

A refrigeration cycle is the same as a _____ cycle?

- A. Turbine
- B. Heat engine
- C. Reversed heat engine**
- D. None of these

SO₃ is absorbed using H₂SO₄ in a _____?

- A. Cast iron packed tower
- B. Stainless steel plate tower
- C. Packed steel tower lined with acid proof bricks**

D. None of these

The capacity of double-effect evaporator is less than half of the capacity of two single effects, each of which is operating over same terminal temperature difference, when the _____ ?

A. Solution has an elevation of boiling point

B. Evaporators operate under vacuum

C. Evaporators operate at atmospheric pressure

D. None of these

Leakage in a cooking gas cylinder is detected by _____ ?

A. Radio-isotopes

B. Pouring soap solution on the surface and locating the gas bubbles

C. Halide torch

D. Pungent smell of mercaptans present in the gas

Path followed by water jet issuing from the bottom of a water tank will be a _____ ?

A. Parabola (vertex being at the opening)

B. Hyperbola

C. Horizontal straight line

D. Zig-zag path (which is geometrically undefined)

In a furnace employing forced draught as compared to induced draught _____ ?

A. Air is sucked in, so air leaks are more and hence the furnace efficiency is reduced

B. The fan operates hot and hence blades are liable to corrosion and erosion

C. Positive pressure exists in the furnace

D. None of these

Dust laden air can be purified using a _____ ?

A. Cyclone separator

- B. Bag filter
- C. Gravity settler
- D. Tubular centrifuge

Linear polymers are normally _____?

- A. Thermosetting
- B. Thermoplastic**
- C. Elastometric
- D. Having extremely high softening point

_____ plant emits large amount of SO₂ as an air pollutant?

- A. Nitric acid
- B. Sulphuric acid**
- C. Chlor alkali
- D. Iron & steel

Flow rate measurement of hostile acids and alkalis can be most suitably done by a/an _____?

- A. Venturimeter
- B. Orificemeter
- C. Magnetic flow meter**
- D. Hot wire anemometer

Maximum size reduction in a ball mill is done by the, _____ action?

- A. Attrition
- B. Compression
- C. Impact**
- D. Cutting

Vetrocoke solution is _____?

- A. A mixture of K₂CO₃ and As₂O₃**
- B. K₂SO₄
- C. A mixture of Na₂CO₃ and As₂O₃

D. Na₂SO₄

A plait point is the point on the solubility curve, where the tie line reduces to a point. What is the number of plait point for a ternary system containing two pairs of partially miscible liquids ?

- A. 0
- B. 1
- C. 2
- D. 3

Temperature of a furnace fired with low calorific value fuel gas (i.e. lean gas) can be increased by _____?

- A. Preheating the combustion air
- B. Oxygen enrichment of combustion air
- C. Preheating the fuel gas
- D. All A., B. & C.

Concentration of NaOH solution produced by mercury electrolytic cell is about _____ percent?

- A. 10
- B. 25
- C. 50
- D. 98

Nylon-66 is so named because the _____?

- A. Average degree of polymerisation of the polymer is 1966
- B. Number of carbon atoms between two nitrogen atoms are 6
- C. Number of nitrogen atoms between two carbon atoms are 6
- D. Polymer was first synthesised in 1966

Growth of _____ is promoted by the presence of manganese in water?

- A. Files
- B. Algae
- C. Micro-organisms**
- D. Mosquitoes

“When a system in equilibrium is subjected to a change in temperature, pressure or concentration, the equilibrium is displaced in a direction which tends to undo the effect of the change.” This is called the _____?

- A. Le-Chatelier principle**
- B. Kopp’s rule
- C. Law of corresponding state
- D. Arrhenius hypothesis

In a packed absorption tower, if the equilibrium and operating lines are both straight lines, then the ratio, HETP/HTUOG _____ the absorption factor?

- A. Increases with increase in
- B. Is one at unity value of
- C. Both A. and B.**
- D. Neither A. nor B.

The function of a transducer is to _____ ?

- A. Modify the input signal
- B. Amplify the input signal
- C. Convert the primary signal into a more useful quantity, usually an electric impulse**
- D. Codify/decodify the input signal

The wavelength at which the maximum monochromatic emissive power occurs for a black body, is (where, T = absolute temperature of the black body)?

- A. αT
- B. $\alpha \times 1/T$**
- C. αT^4

D. Independent of T

Which of the following is not a good moderating material ?

- A. Concrete
- B. Boron
- C. 18/8 stainless steel
- D. All A., B. and C.**

Ratio of inertial forces to surface tension forces is called the _____ number?

- A. Euler
- B. Froude
- C. Mach
- D. Weber**

An elastic behaviour of materials is expressed in terms of _____ ?

- A. Hysteresis loop area
- B. Stress-strain curve
- C. Relaxation time**
- D. None of these

For an ideal plug flow reactor, the value of Peclet number is _____ ?

- A. 0**
- B. 1
- C. 10
- D. ∞

Which of the following theories of origin of petroleum does not explain the presence of nitrogen & sulphur compounds in crude oil ?

- A. Modern theory
- B. Carbide theory**
- C. Engler theory
- D. All A., B. and C.

Coke having higher porosity has _____?

- A. Lower bulk density
- B. Lower strength
- C. Higher reactivity
- D. All A., B. and C.**

The hydraulic radius for flow in a rectangular duct of cross-sectional dimension H, W is _____?

- A. $\sqrt{HW/\pi}$
- B. $HW/2 (H + W)^2$**
- C. $HW/4 (H + W)^2$
- D. $2HW/(H + W)$

Chance process is used for the _____?

- A. Cleaning of coal**
- B. Concentration of iron ore
- C. Concentration of pyrites
- D. Water treatment

Brine solution is stored/treated in _____ lined vessels/pipes?

- A. Rubber
- B. Lead
- C. Glass
- D. Nickel**

Terylene is _____?

- A. Same as Dacron
- B. A polyester
- C. Both A. & B.**
- D. Neither A. nor B.

Invar contains the highest percentage of _____?

- A. Vanadium
- B. Iron**
- C. Tungsten
- D. Cobalt

Maximum heat transfer rate is achieved in _____ flow?

- A. Co-current
- B. Counter-current
- C. Turbulent**
- D. Laminar

Which of the following is not a revolving/tumbling mill used for size reduction ?

- A. Compartment mill
- B. Pebble mill
- C. Cage mill**
- D. Rod mill

With diminishing cross-sectional area in case of subsonic flow in a converging nozzle, the _____?

- A. Velocity increases
- B. Pressure decreases
- C. Both A. & B.**
- D. Neither A. nor B.

_____ is the static characteristics of an instrument?

- A. Response
- B. Time lag
- C. Drift**
- D. Dynamic error

Pick out the correct statement ?

- A. Jet engine can work, where there is no atmosphere
- B. Rocket engines cannot work, where there is no atmosphere

- C. Rocket engines carry oxygen required for the combustion in the form of oxidiser
- D. Jet engines also carry oxidiser

Irradiation of water by ultraviolet light of suitable wavelength is commonly used for disinfection of water in _____ ?

A. Food industry

- B. Municipal sewage treatment
- C. Petroleum refinery
- D. Iron & steel plant

Function of thinner in a paint is to _____ ?

- A. Accelerate the oxidation of oil
- B. Prevent gelling of the paint

C. Suspend pigments & dissolve film forming materials

- D. Form a protective film

Pick out the wrong statement ?

- A. Absorption factor is constant, when the equilibrium and operating lines are straight
- B. In case of a stripper, the equilibrium curve is always below the operating line**
- C. In case of an absorber, the operating line is always above the equilibrium curve
- D. In the absorption of low solubility gases, the liquid film is the controlling resistance

Which of the following alloys does not contain nickel ?

- A. Chlorinet – 2 alloy
- B. Monel
- C. Inconel
- D. Babbitt metal**

In a boiling curve, the peak heat flux is called the _____ point?

- A. Nusselt
- B. Leidenfrost**
- C. Boiling
- D. Burnout

Soluble silica present in boiler feed water can be removed by _____?

- A. Coagulation
- B. Filtration
- C. Anion exchanger**
- D. Preheating it

A balance sheet for an industrial concern shows _____?

- A. The financial condition at any given time**
- B. Only current assets
- C. Only fixed assets
- D. Only current and fixed assets

Beryllia (which is used in making crucibles for melting uranium & thorium) is superior to alumina in all respects for high temperature ($> 1900^{\circ}\text{C}$) use, except _____?

- A. Cost**
- B. Electrical conductivity
- C. Thermal conductivity
- D. Fusion point

In case of a ternary system involving two liquid components and a solute, the ratio of the concentration of the solute in the two phases at equilibrium is called the distribution co-efficient. The distribution co-efficient depends upon the _____?

- A. Solute concentration
- B. Temperature
- C. Both A. & B.**
- D. Neither A. nor B.

What is the reflux ratio at total reflux ?

- A. Zero
- B. Infinity**
- C. Unity
- D. Data insufficient

Which is an example of closed system ?

- A. Air compressor
- B. Liquid cooling system of an automobile**
- C. Boiler
- D. None of these

Froth floatation is the most suitable for treating _____?

- A. Iron ores
- B. Sulphide ores**
- C. Quartzite
- D. None of these

The pump impeller and the turbine runner in a hydraulic torque converter _____?

- A. Have the same diameter
- B. Have different diameters**
- C. Are directly coupled
- D. None of these

Concentration of a solution expressed in terms of _____ is independent of temperature?

- A. Molarity
- B. Normality
- C. Molality**
- D. None of these

In case of unsaturated air _____?

- A. Dew point < wet bulb temperature

B. Wet bulb temperature < dry bulb temperature

C. Both A. and B.

D. Neither A. nor B.

Corrosion rate cannot be lowered by reducing the _____ of the corroding medium?

A. Concentration

B. Velocity

C. Temperature

D. None of these

$PV^\gamma = \text{Constant}$ (where, $\gamma = C_p/C_v$) is valid for a/an _____ process?

A. Isothermal

B. Isentropic

C. Isobaric

D. Adiabatic

Water filtration rate in a slow sand filter ranges from _____ litres/m²/hr?

A. 10 to 20

B. 100 to 200

C. 1500 to 2500

D. 4000 to 5000

The OH⁻ concentration in a solution having pH value 3 is _____?

A. 10⁻³

B. 10⁻¹⁰

C. 10⁻¹¹

D. 10⁻¹³

Which of the following is an ore of iron ?

A. Galena

- B. Chalcopyrite
- C. Hematite**
- D. Bauxite

Which of the following is a green house gas other than CO₂ ?

- A. Methane
- B. Nitrous oxide
- C. Chlorofluoro carbons (CFC)
- D. All A., B. and C.**

A coal having high ratio of volatile matter to fixed carbon as compared to a coal having low ratio of volatile matter to fixed carbon _____?

- A. Is less liable to spontaneous combustion on storage
- B. Is more difficult to ignite and produces a shorter flame
- C. Requires smaller combustion space and less secondary air
- D. None of these**

Convective heat transfer co-efficient in case of fluid flowing in tubes is not affected by the tube length/diameter ratio, if the flow is in the _____ zone?

- A. Laminar
- B. Transition
- C. Both A & B
- D. Highly turbulent**

Which of the following is affected by the temperature ?

- A. Fugacity
- B. Activity co-efficient
- C. Free energy
- D. All A, B. & C**

Only small amount of evaporation of water produces large cooling effects

because of its _____?

- A. Large latent heat
- B. Low viscosity
- C. Small latent heat
- D. None of these

Which of the following may be used to measure the rate of nuclear disintegration ?

- A. Geiger-Muller Counter
- B. Cyclotron
- C. Cold chamber
- D. Mass spectrograph

For a cyclic process, a fixed ratio between heat and work _____?

- A. Always exists
- B. May exist
- C. Never exists
- D. Is difficult to predict

Rotary kilns in cement industry are lined with _____bricks?

- A. Fireclay
- B. Silica
- C. Lead
- D. High alumina & high magnesia

What is the value of Fanning friction factor f' for smooth pipe at $N_{Re} = 10^6$ approximately ?

- A. 0.003
- B. 0.01
- C. 0.1
- D. 0.3

Phosphoric acid is prepared from _____?

- A. Cryolite
- B. Chalcopyrite
- C. Rock phosphate**
- D. None of these

Which of the following is not used as a binder in coal briquetting ?

- A. Tar
- B. Molasses
- C. Pitch
- D. Line**

An approximately _____ process exemplifies the flow of a gas through a very long pipe of uniform cross-section ?

- A. Adiabatic
- B. Isothermal**
- C. Isentropic
- D. Isochoric

Deformation drag, which is caused by widespread deformation of fluid around the immersed body _____?

- A. Occurs when NRe is very small**
- B. Is primarily a friction drag
- C. Is independent of body length
- D. Depends mainly on cross-sectional shape

Cermets are combination of ceramic and metallic materials due to which they have high strength & resistance to high temperature. Cermets are used in the _____?

- A. Hearth of the blast furnace
- B. Nuclear reactors, missiles & space crafts**
- C. Insulation of high temperature furnaces

D. Roof of electric furnaces

Very small amount of air pollutants are present in stratosphere also; though most of the atmospheric pollutants are present in the troposphere. Which of the following atmospheric pollutants does not cause the ozone layer depletion in atmosphere at tremendous rate ?

- A. CO
- B. SO₂
- C. NO_x
- D. CFC (chloro fluoro carbons)

Cannel coal _____ ?

- A. Is non-coking
- B. Has a high volatile matter content and burns with a luminous smoky flame
- C. Is a non-banded coal which can be ignited easily with a match stick or candle flame, hence is so named
- D. All A., B. and C.

Thickness of thermal boundary layer is more compared to that of hydrodynamic boundary layer, when the value of Prandtl number is _____ ?

- A. 1
- B. < 1
- C. > 1
- D. > 5

Tin coating on metals is not done by _____ ?

- A. Spraying
- B. Powder metallurgy
- C. Hot dipping
- D. Electro-deposition

Sulphuric acid is mixed with ground phosphate rock (to produce phosphoric acid) in a steel digester lined with _____?

- A. Acidic refractory
- B. Rubber
- C. Carbate
- D. Lead or acid-proof bricks**

As the reflux ratio, in a continuous counter-current extraction is increased, the number of stages _____?

- A. Increase
- B. Decrease**
- C. Remain unchanged
- D. Can either increase or decrease, depends on the system**

Which of the following would require maximum amount of % excess air for complete combustion ?

- A. Coke oven gas
- B. Furnace oil
- C. Pulverised coal
- D. Lump coal (fixed on chain grate)**

Force between the molecules of the same substance is called _____ force?

- A. Adhesive
- B. Cohesive**
- C. Molecular
- D. Vander Walls

In case of physical adsorption, the heat of adsorption is of the order of _____ kcal/kg mole?

- A. 100
- B. 1000**

- C. 10000
- D. 100000

Promoter used in NH_3 synthesis catalyst is _____?

- A. K_2O
- B. SiO_3
- C. V_2O_5**
- D. U_2O_3

The synthetic fibres produced from _____ are known as rayon?

- A. Lignin
- B. Cellulose**
- C. Polyamides
- D. Ethylene glycol

In McCabe-Thiele method of theoretical plate calculation for a distillation column, the operating lines of stripping and rectifying sections coincide with the diagonal at _____ reflux ?

- A. Total**
- B. Minimum
- C. Operating
- D. Maximum permissible

Wood metal is not used for making _____?

- A. Soft solder
- B. Casting for dental work
- C. Storage tank for storing brine and caustic soda**
- D. Fusible safety plug for pressure cooker

For a binary mixture with low relative volatility, continuous rectification to get pure products will require _____?

- A. Low reflux ratio
- B. Less number of trays

C. Small cross-section column

D. High reflux ratio

For flow of fluids through packed bed, the superficial velocity is _____?

- A. Less than the average velocity through channels
- B. More than the average velocity through channels
- C. Dependent on the pressure drop across the bed
- D. Same as the average velocity through channels

Generally, elliptical dished heads _____?

- A. Are manufactured on 2:1 ratio of major to minor axis and is recommended to be used for pressure vessels operating above a pressure of 1.5 MN/m²
- B. Resist half the pressure rating compared to hemi spherical head provided on the cylindrical shell of the same thickness and diameter
- C. Are approximately as strong as seamless cylindrical shell having the corresponding I.D and O.D
- D. All A., B. and C.**

Which of the following is not a ferromagnetic material ?

- A. Nickel
- B. Cobalt
- C. Aluminium**
- D. Iron

Crushing efficiency is the ratio of the _____ ?

- A. Surface energy created by crushing to the energy absorbed by the solid**
- B. Energy absorbed by the solid to that fed to the machine
- C. Energy fed to the machine to the surface energy created by crushing
- D. Energy absorbed by the solid to the surface energy created by crushing

Dust collection efficiency of electrostatic precipitator can be as high as 99.9%. Maximum temperature and pressure of dust laden gas that can be cleaned in an electrostatic precipitator is respectively ?

- A. 200°C and 5 atm
- B. 1000°C and 10 atm**
- C. 500°C and 50 atm
- D. 1000°C and 500 atm

The sphericity of a cylinder of 1 mm diameter and length 3 mm is _____ ?

- A. 0.9**
- B. 0.78
- C. 0.6
- D. 0.5

Wrought iron is having very high _____ ?

- A. Hardness
- B. Strength
- C. Corrosion resistance**
- D. Susceptibility to changes in its properties by heat treatment

Age hardening is concerned with _____ ?

- A. Copper
- B. Brass
- C. Duralumin**
- D. Silver

McCabe-Thiele method _____ ?

- A. Uses molal units for material and energy balance**
- B. Uses weight fractions to express liquid and vapour composition
- C. Can use any type of units
- D. Is more accurate than Ponchon-Savarit method

According to the 'law of mass action', the rate of reaction is directly proportional to the _____?

- A. Equilibrium constant
- B. Volume of the reaction vessel
- C. Nature of the reactants
- D. Molar concentration of the reactants**

The conversion of a reactant, undergoing a first order reaction, at a time equal to three times the half life of the reaction is ?

- A. 0.875**
- B. 0.5
- C. 0.425
- D. Data insufficient to calculate

Pick out the wrong statement ?

- A. In a flanged and standard dished head, the crown radius is \leq shell outside diameter
- B. In a flanged and shallow dished head, the crown radius is $>$ shell outside diameter
- C. Flat head covers are most suitable for larger vessels operating at very high pressure**
- D. Flanged only head is a type of flat head in which gradual change in the shape at the centre results in reduced local stresses

Which of the following phenomenon will exhibit the minimum heat transfer ?

- A. Boiling
- B. Forced convection in air
- C. Free convection in air
- D. Conduction in air**

Exothermic neutralisation reaction between caustic soda and dodecylbenzene sulfonic acid produces sodium dodecylbenzene sulphate, which is a/an?

- A. Explosive
- B. Soap
- C. Detergent**

D. Analgesic drug

The reaction $A + B \rightarrow C$ has been conducted in a reactor as shown below. The numbers of balances (material) that can be made around the reactor are _____?

- A. 1
- B. 2
- C. 3**
- D. 4

Colour of fireclay bricks is _____?

- A. Light buff to reddish buff**
- B. Yellow
- C. Black
- D. None of these

Which one can be directly solidified from gaseous state without entering into liquid state ?

- A. Helium
- B. Oxygen
- C. Carbon dioxide**
- D. None of these

Phthalic anhydride is used _____?

- A. In making PVC
- B. As plasticisers**
- C. In insecticides manufacture
- D. For making nylon-6

The controlling resistance in a rotary drum vacuum filter is the _____ resistance?

- A. Piping

B. Cake

- C. Filter medium
- D. None of these

Heating a mixture of phosphate rock, coke and sand in an electric furnace produces_____?

- A. Phosphoric acid
- B. Ammonium phosphate

C. Phosphorous

- D. Superphosphate

In the context of the chemical process industries, the term BOD is normally associated with the_____?

- A. Characterisation of solid wastes
- B. Organic concentration in gaseous effluents

C. Characterisation of liquid effluents

- D. Characterisation of boiler feed water

Junker's calorimeter is used to determine the calorific value of_____?

- A. Pulverised coal

B. Gaseous fuels

- C. Fuel oil
- D. None of these

Magnesite refractories are used for the construction of those furnaces, which are_____?

- A. Not required to resist the corrosive action of basic slag
- B. Not subjected to fluctuation in temperature
- C. Used for raising & maintaining high temperature

D. Both B. and C.

Corrosion of metals cannot be prevented by its _____?

- A. Tempering
- B. Chromising
- C. Aluminising
- D. Alloying

Centre of pressure of a plane surface of arbitrary shape immersed vertically in a static mass of fluid _____?

- A. Lies above the centroid of the plane surface
- B. Is independent of the specific weight of the fluid**
- C. Is different for different fluids
- D. Is at the centroid of the plane surface

The boundary layer thickness at a given section along a flat plate _____ with increasing Reynold's number?

- A. Increases
- B. Decreases**
- C. Remain same
- D. May increase or decrease

Steel balls are manufactured by _____?

- A. Sintering
- B. Casting
- C. Cold heading**
- D. Spinning

Specify the material of construction suitable for handling concentrated HNO_3 at 100°C ?

- A. High silicon iron, Kel-F and Teflon**
- B. Tin and wood
- C. Silicone rubber
- D. Stainless steel

Beehive coke oven _____?

- A. Facilitates by-products recovery
- B. Takes 2-3 days for coking of coal but requires no external fuel for heating**
- C. Gives larger yield of coke (around 85%) as compared to by-product ovens
- D. Produces coke with very poor strength

Which is the most suitable instrument for measuring pressure below 3 microns ?

- A. Mcleod gauge
- B. Alphatron
- C. Ionisation gauge**
- D. Bourdon gauge

In a working refrigerator, the value of COP is always _____?

- A. 0
- B. < 0
- C. < 1
- D. > 1**

Steel balls for ball bearings are generally made of _____ steel?

- A. Cast
- B. Stainless
- C. Free carbon
- D. Carbon chrome**

One micron is equal to _____ cm?

- A. 10^{-2}
- B. 10^{-4}**
- C. 10^{-6}
- D. 10^{-8}

In TIG welding, thoriated tungsten electrodes are used, because it _____?

- A. Has higher current carrying capacity
- B. Has better electron emissivity**
- C. Is stronger than ordinary tungsten
- D. Is easy to prepare

The relation among various mass transfer co-efficients (M.T.C) for ideal gases is given by (where, K_c & K_m are M.T.C. for equimolar counter diffusion with concentration & mole fraction respectively as the driving force. and, $K_p =$ M.T.C. for diffusion of a gas through a stagnant inert gas with pressure as driving force) ?

- A. $K_c = K_p = K_m$
- B. $K_c = K_p/RT = K_m \cdot RT/P$
- C. $K_c = K_p \cdot RT = K_m \cdot RT/p$**
- D. None of these

In a muffle furnace, the muffle _____ ?

- A. Retards the heat transfer
- B. Assists in temperature equalisation in the charge
- C. Permits the use of controlled atmosphere for the protection of stock
- D. All A., B. and C.**

Assuming applicability of ideal gas law, the pure component volume of the vapor in a saturated gas can be calculated from theoretical relationship. The volumetric composition of a vapor saturated gas is independent of the _____ ?

- A. Nature of the liquid
- B. Nature of the gas**
- C. Temperature of the liquid
- D. Total pressure

Pick out the extensive property out of the following ?

- A. Surface tension

B. Free energy

- C. Specific heat
- D. Refractive index

Percentage of heavy water in ordinary water is around _____?

- A. 0.015**
- B. 7.54
- C. 0.71
- D. 32.97

The reaction rate almost gets doubled for 10°C rise in temperature. This is due to the fact that the _____?

- A. Increased temperature reduces the activation energy
- B. Fraction of molecules having threshold energy increases**
- C. Collision frequency increases
- D. Value of threshold energy decreases

Aqueous nitric acid is stored in _____ vessel?

- A. Plain carbon steel
- B. Stainless steel
- C. Cast iron**
- D. Thermosetting plastic material

A pressure of 10 m head of water is equivalent to _____ kN/m²?

- A. 98**
- B. 147
- C. 196
- D. 49

For a given fluid, as the pipe diameter increases, the pumping cost _____?

- A. Decreases**
- B. Increases

- C. Remains the same
- D. May increase or decrease, depending upon whether the fluid is Newtonian or non-Newtonian

A compact estimate about the amount of materials handling between various work stations is obtained from the _____?

- A. Gantt chart
- B. Bin chart
- C. String diagram
- D. Travel chart**

Which of the following is the main constituent of the mother liquor produced in salt industry ?

- A. Quick lime
- B. Glauber's salt
- C. Salt petre
- D. Bromine**

Pick out the wrong statement ?

- A. Hammer crushers operate by impact action
- B. Standard screens have circular opening
- C. With increase in mesh number of screens, their diameter in microns decreases
- D. 200 mesh screen has 200 openings per linear cm**

Pick out the wrong statement?

- A. The tensile strength of a brittle material is less than its compressive strength
- B. The compressive strength of a ductile material is less than its tensile strength
- C. In a thick cylindrical shell, the hoop stress is maximum at the inner radius
- D. The value of crushing load is more than that of buckling load for long columns**

Which of the following is the most suitable for extraction in a system having very low density difference ?

- A. Mixer-settler extractor

- B. Centrifugal extractor
- C. Pulsed extractor
- D. Packed extraction tower

Green house effect is accentuated by _____?

- A. Deforestation
- B. Rapid industrialisation
- C. Increased transportation activity
- D. All A., B. and C.

Which of the following is not, a fertile material ?

- A. Th-232
- B. U-238
- C. U-233
- D. None of these

Threshold limit value (TLV) means maximum permissible/acceptable concentration. TLV of phosgene in air is about _____ ppm (parts per million)?

- A. 0.002
- B. 0.2
- C. 1.2
- D. 4.8

Pressure drop (Δp) for a fluid flowing in turbulent flow through a pipe is a function of velocity (V) as _____?

- A. $V^{1.8}$
- B. $V^{-0.2}$
- C. $V^{2.7}$
- D. V^2

Maximum thermal efficiency of boiler may be about _____ percent?

- A. 10

- B. 25
- C. 65
- D. 90**

In which of the following reactions, the equilibrium will shift to the right, if the total pressure is increased ?

- A. $\text{H}_2 + \text{Cl}_2 \rightleftharpoons 2\text{HCl}$
- B. $\text{N}_2 + \text{O}_2 \rightleftharpoons 2\text{NO}$**
- C. $\text{N}_2\text{O}_4 \rightleftharpoons 2\text{NO}_2$
- D. $\text{H}_2 + \text{I}_2 \rightleftharpoons 2\text{HI}$

Pig iron is produced by blast furnaces in India using mostly the iron ore named _____?

- A. Hematite**
- B. Magnetite
- C. Siderite
- D. Chalcopyrite

Which of the following is the most suitable filter for separation of abrasive solids suspended in a corrosive liquid ?

- A. Sand bed filter
- B. Plate and frame filter press
- C. Vacuum filter**
- D. Batch basket centrifuge

Cast irons are generally specified by their _____?

- A. Carbon content
- B. Tensile strength**
- C. Hardness
- D. Manufacturing process

Deacon's method is used for the manufacture of _____?

- A. Glauber's salt

- B. Common salt
- C. Chlorine**
- D. Graphite electrode

Aluminium is extracted from _____?

- A. Chalcocite
- B. Bauxite**
- C. Galena
- D. None of these

Crude oil is pumped by a _____ pump?

- A. Gear
- B. Centrifugal**
- C. Screw
- D. Reciprocating

In a co-current double pipe heat exchanger used for condensing saturated steam over the inner tube, if the entrance and exit conditions of the coolant are interchanged, then the rate of condensation will _____?

- A. Increase
- B. Decrease
- C. Remain unchanged**
- D. Either increase or decrease; depends on the coolant flow rate

When the water is warm, the height to which it can be lifted by a pump _____?

- A. Decreases due to reduced viscosity
- B. Decreases due to reduced vapour pressure**
- C. Increases due to increased vapour pressure
- D. Decreases due to increased frictional resistance

Chemical formula of oleum is _____?

- A. H₂SO₃

- B. H₂SO₄
- C. H₂S₂O₇**
- D. H₂SO₇

Binary distillation involves the mass transfer by _____ at the gas-liquid interface?

- A. Unidirectional diffusion from liquid to gas phase
- B. Unidirectional diffusion from gas to liquid phase
- C. Either A. or B.
- D. A counter diffusion at an almost equal molar rate**

Pick out the wrong statement?

- A. Safety valves are provided in heat exchangers for removal of non-condensable**
- B. Liquid metals and Dowtherm are used for very high temperature heating
- C. In a shell and tube heat exchanger, high pressure fluid is generally routed through the tube
- D. A loop seal or U-seal is provided in a vertical condenser sub-cooler to prevent quick draining of the condensate

The condensate obtained on compression of wet natural gas is termed as _____?

- A. Liquefied natural gasoline
- B. Natural gasoline**
- C. Liquid natural gas
- D. None of these

Photo-chemical reactions occur in presence of _____?

- A. Sunlight**
- B. Darkness
- C. Solid catalysts
- D. Monochromatic radiation only

The yield of tar from high temperature carbonisation of dry coal is about _____ percent?

- A. 3
- B. 12
- C. 22
- D. 0.3

Ultra centrifuges are used for the separation of _____ solid particles?

- A. Coarse
- B. Fine
- C. Colloidal
- D. Dissolved

The overall resistance for heat transfer through a series of flat resistance, is the _____ of the resistances?

- A. Average
- B. Geometric mean
- C. Product
- D. Sum

High ash containing coke _____?

- A. Produces more slag when used in the blast furnace
- B. Has poor strength and abrasion resistance
- C. Is desirable in producer gas manufacture
- D. None of these

Larger depth of liquid on the trays of a distillation column _____?

- A. Leads to high tray efficiency
- B. Results in higher pressure drop per tray
- C. Both A. & B.
- D. Neither A. or B.

Answer: Option B 392. Keeping the pressure constant, to double the volume of a

given mass of an ideal gas at 27°C , the temperature should be raised to _____ $^{\circ}\text{C}$?

- A. 270
- B. 327**
- C. 300
- D. 540

Catalyst used in the catalytic cracking is _____?

- A. Silica-alumina**
- B. Silica gel
- C. Vanadium pentoxide
- D. Nickel

The Reynolds number for an ideal fluid flow is _____?

- A. 4
- B. 2100-4000
- C. 4000
- D. ∞**

Addition of a non-volatile solute to a pure solvent _____?

- A. Increases its freezing point
- B. Increases its boiling point
- C. Decreases its freezing point
- D. Both B. and C.**

According to the kinetic theory, the thermal conductivity of a monatomic gas is proportional to _____?

- A. T
- B. $T^{0.5}$**
- C. $T^{1.5}$
- D. T^2

Washing of coal _____?

- A. Reduces its sulphur and ash content
- B. Controls its ash fusibility and increases its calorific value
- C. Improves its coking properties
- D. All A., B. and C.**

Evaporators used in caustic soda recovery and production plant are made of _____?

- A. Monel metal**
- B. Gun metal
- C. Wood metal
- D. Babbitt metal

Chromium molybdenum steel cannot be welded using _____ welding?

- A. Thermit
- B. Electrical resistance**
- C. Oxy-acetylene
- D. Any of these

An ideal nozzle design aims at _____?

- A. Minimising wall friction
- B. Suppressing boundary layer separation
- C. Both A. & B.**
- D. Neither A. nor B.

Plastics as a material of construction suffer from the drawback of low _____?

- A. Machinability
- B. Density
- C. Strength**
- D. Plastic deformation

Plasticisers are added to synthetic plastics to _____?

- A. Impart flexibility
- B. Improve workability during fabrication
- C. Develop new improved properties not present in the original resin
- D. All A., B. and C.**

Which of the following materials may prove unsuitable for handling acetic acid (glacial & anhydrous) at 40°C ?

- A. Silicone rubber, teflon, porcelain and wood
- B. Nickel, monel, stainless steel and graphite
- C. Aluminium, copper, high silicon iron
- D. Brass, cast iron, mild steel and tin**

Fluid flow through a packed bed is represented by the _____ equation?

- A. Fanning's
- B. Ergun's**
- C. Hagen-Poiseuille's
- D. None of these

Moisture contained by a substance in excess of the equilibrium moisture is called the _____ moisture?

- A. Unbound
- B. Free**
- C. Critical
- D. Bound

Temperature measurement by optical pyrometer is done above _____ point, which is 1063°C ?

- A. Antimony
- B. Gold**
- C. Silver
- D. Nickel

Pick out the wrong statement ?

- A. For all the cylindrical process vessels operating above atmospheric pressure, formed heads are used for closing the vessel
- B. Fouling factor of river water is less than that of sea water
- C. Risers provided in bubble cap trays in the distillation column facilitate the flow of both liquid and vapor
- D. Both B. and C.**

A stream tube is that, which has _____ cross-section entirely bounded by stream lines?

- A. A circular
- B. Any convenient**
- C. A small
- D. A large

Thermit welding is categorised as the _____ welding ?

- A. Forge
- B. Fusion**
- C. Resistance
- D. Arc

Reheating furnace (pusher type) is used for heating _____ ?

- A. Ingots
- B. Slabs**
- C. Steel coils
- D. Steel sheets

Which of the following accounts for the maximum energy release in the nuclear fission process ?

- A. Kinetic energy of fission products**
- B. Radioactive decay of fission products
- C. Instantaneous release of γ -rays
- D. Kinetic energy of neutrons

Under conditions of flooding in packed tower, the gas pressure drop _____?

- A. Decreases rapidly
- B. Increases rapidly
- C. Remain constant
- D. Is maximum**

Which of the following instruments is not used for measuring sub-zero ($<0^{\circ}$) temperatures ?

- A. Platinum resistance thermometer
- B. Mercury in glass thermometer
- C. Vapor pressure thermometer
- D. Radiation pyrometer**

The most economical channel section for the fluid flow is the one for which the discharge is maximum for a given cross-sectional area. Vertical velocity distribution in an open channel for laminar flow can be assumed to be _____?

- A. Parabolic**
- B. Hyperbolic
- C. Straight line
- D. None of these

Spalling of silica bricks occurs due to abrupt volume changes, when it is cooled below a temperature of _____ $^{\circ}\text{C}$?

- A. 770
- B. 570
- C. 270**
- D. 70

Coagulant is used _____ filtration?

- A. Before
- B. After
- C. During
- D. To avoid

_____ prohibits the use of alcohols directly in petrol engines ?

- A. Low octane number
- B. High cost & availability**
- C. Low flash point
- D. Low calorific value

For the case of a fuel gas undergoing combustion with air, if the air/fuel ratio is increased, the adiabatic flame temperature will _____ ?

- A. Increase
- B. Decrease**
- C. Increase or decrease depending on the fuel type
- D. Not change

Mixing vessel used for the chlorination of methane to produce methyl chloride is made of _____ ?

- A. Copper
- B. Cast iron**
- C. Aluminium
- D. High carbon steel

The heat evolved in the combustion of benzene is represented by the equation: $C_6H_6 + 7.5 O_2 = 6CO_2 + 3H_2O$, $\Delta H = 3264.6$ kJ/kg. mole The heat energy change, when 39 gm of C_6H_6 is burnt in an open container, will be _____ kJ/kgmole?

- A. +816.15
- B. +1632.3
- C. -1632.3**

D. -2448.45

The concentration (weight %) of nitric acid produced by the oxidation of ammonia and absorption of nitrogen oxides with water is about _____ percent?

- A. 60
- B. 30
- C. 95
- D. 100

Nitriding of steel is done (in electric furnace) at _____ °C?

- A. 510
- B. 1720
- C. 2210
- D. 910

Trinitrotoluene (TNT), an explosive, is made by the nitration of _____?

- A. Nitrobenzene
- B. Toluene
- C. Nitrotoluene
- D. Benzene

'Solvent naphtha' used mostly as a solvent in paints and perfumery is produced by the _____ of virgin naphtha into small boiling range cuts?

- A. Steam reforming
- B. Distillation
- C. Desulphurisation
- D. None of these

Which of the following is the Clausius-Clapeyron Equation ?

- A. $PV = RT + B/V + y/\sqrt{2} + \dots$

- B. $(P + a/V^2)(V-b) = RT$
C. **$\log_e (p/p_0) = (\lambda/R) (1/T_0 - 1/T)$**
D. $p = [RT/(V - b)] - (a/TV^2)$

The lift of a balloon is _____?

- A. Increased, as it rises to a higher altitude
B. **Due to the weight of the atmospheric air, that it displaces**
C. Not dependent on the temperature of the atmosphere
D. None of these

In a heating process, a heat flow diagram in which the quantities of heat in the various items of a heat balance are represented by the width of a band is called the _____?

- A. Ostwald chart
B. Cox chart
C. **Sankey diagram**
D. None of these

Coke ovens in steel plant are heated by _____?

- A. Electricity
B. Blast furnace gas/mixed gas
C. Coke oven gas
D. **Both B. and C.**

Pick out the wrong statement ?

- A. Visible radiation provides the necessary activation energy in photochemical reactions
B. **The order and molecularity of a complex reaction may not be the same**
C. For a second order reaction, the slope of the graph/plot between rate and (concentration) is equal to the rate constant (k)
D. Molecularity of the reaction is always a whole number greater than zero

With increase in absolute humidity, the dew point of an unsaturated mixture of

air and water vapor (at constant pressure and temperature) ?

- A. **Increases**
- B. Remains unchanged
- C. Decreases
- D. Decreases linearly

About 2-3 hp, power per gallon of a thin liquid provides vigorous agitation in an agitator. 'Power number' in agitation is given by _____?

- A. **$P. gc/n^3. D^2. \rho$**
- B. $P. gc. \rho/\mu^2$
- C. $n^3. D^3. \rho/P. gc$
- D. $P. gc/n^2. D^2. \rho$

Velocity of liquid hydrocarbon fuels in a pipeline cannot be measured by magnetic flowmeters, because their _____ is very low/small?

- A. Thermal conductivity
- B. **Electrical conductivity**
- C. Specific gravity
- D. Electrical resistivity

The average thickness of ozone layer in stratosphere is about _____ dobson unit (DU)?

- A. 20
- B. **230**
- C. 750
- D. 1500

Pick out the wrong statement ?

- A. O₂, NO and NO₂ exhibit paramagnetic properties as a result of unpaired electrons
- B. **CO₂ is the strongest paramagnetic gas**
- C. Paramagnetic susceptibility of gases decreases with temperature
- D. Paramagnetic susceptibility of gases permits the measurement of their concentration

Dehydration of ammonium carbamate to yield urea is a/an _____ reaction?

- A. Exothermic
- B. Endothermic**
- C. Autocatalytic
- D. Catalytic

Height of the flights in the rotary drier is in the range of _____?

- A. 0.08 to 0.12 d**
- B. 0.02 to 0.05 d
- C. 0.2 to 0.5 d
- D. 0.5 to 0.6 d

LMTD can't be used as such without a correction factor for the _____?

- A. Multipass heat exchanger
- B. Baffled heat exchanger
- C. Condensation of mixed vapour in a condenser
- D. All A. B. and C.**

In case of a shell and tube heat exchanger, the effect of L/D on inside film heat transfer coefficient (h_i) vanishes after a Reynold number of _____?

- A. 1000
- B. 3000
- C. 5000
- D. 10000**

Mass transfer co-efficient is defined as _____?

- A. Flux = Co-efficient/concentration difference
- B. Co-efficient = Flux/concentration difference**
- C. Flux=concentration difference/coefficient
- D. None of these

Curve III in the bellow diagram represents a/an _____?

- A. Dilatent fluid
- B. Pseudo plastic fluid**
- C. Ideal plastic
- D. None of these

Which of the following adsorbent is used in the refining of sugar?

- A. Bone charcoal**
- B. Wood charcoal
- C. Silica gel
- D. Activated clay

Rate of leaching increases with increasing _____?

- A. Temperature**
- B. Viscosity of solvent
- C. Pressure
- D. Size of the solid

Gross earning is equal to the total income minus _____?

- A. Total product cost**
- B. Fixed cost
- C. Income tax
- D. None of these

Polymerisation product of C_2F_4 (carbon tetrafluoride) is called P.T.F.E. (poly chloro tetra fluoro ethylene). It is also called _____?

- A. Polyurethane
- B. Silicone rubber
- C. Teflon**
- D. Epoxy resin

Stoke's law is valid, when $N_{Re, p}$ is less than _____?

- A. 2**

- B. 100
- C. 2100
- D. 700

Choose the correct equation ?

- A. $Nu = (Re) (Pr) (Gz)$
- B. $Nu = (Re) (Pr) (St)$**
- C. $Nu = (Re) (Pr)$
- D. $Nu = (Pr) (St)$

A special type of liquid transporting device is the diffuser pump, in which _____ are minimised?

- A. Bearing losses
- B. Disk friction
- C. Shock losses**
- D. Cavitation

The resistance wire used in a hot wire anemometer for conducting electrical current is made of _____?

- A. Copper
- B. Tungsten**
- C. Chromium
- D. Aluminium

In low or standard frequency induction furnace, heat is produced by the _____?

- A. Combination of induced current and skin effect
- B. Induction and resistance**
- C. Current flow through a heating element
- D. None of these

Rayleigh equation applies to _____ distillation ?

- A. Differential**

- B. Flash
- C. Equilibrium
- D. Molecular

Which metal is protected by the layer of its own oxide ?

- A. Iron
- B. Silver
- C. Calcium
- D. Aluminium**

As per Taggart's formula, the capacity (kg/hr) of Jaw & Gyratory crushers (for gapes of 10 to 60 cms) is equal to (where, L = Length of feed opening, cms S = Maximum width of discharge opening, cms) ?

- A. LS
- B. 93 LS**
- C. 250 LS
- D. \sqrt{LS}

Breakeven point represents the condition, when the company runs under no profit no loss condition. In break even analysis, total cost comprises of fixed cost _____ ?

- A. Only
- B. Plus variable cost**
- C. Plus overhead cost
- D. Plus selling expenses

Enzymes belong to the category of _____ ?

- A. Proteins**
- B. Carbohydrates
- C. Vitamins
- D. Fats

Sedimentation on commercial scale occurs in _____?

- A. Classifiers
- B. Thickeners
- C. Rotary drum filters**
- D. Cyclones

Addition of plasticisers to polymers results in partial neutralisation of intermolecular forces of attraction between the macro-molecules thereby increasing its _____?

- A. Tensile strength
- B. Chemical resistance
- C. Flexibility**
- D. All A., B. & C.

Pick out the wrong statement ?

- A. Higher specific gravity of petroleum products means higher C/H ratio
- B. Aromatics have lower specific gravity than corresponding paraffins**
- C. Hydrocarbons of low specific gravity (e.g., paraffins) possess the maximum thermal energy per unit volume
- D. Hydrocarbons of high specific gravity (e.g., aromatics) possess the maximum thermal energy per unit weight

Cellulose percentage in bamboo fibre is about _____?

- A. 10
- B. 20
- C. 50**
- D. 85

Nusselt number (for forced convection heat transfer) is a function of the _____ number?

- A. Prandtl
- B. Reynolds**
- C. Both A. & B.

D. Neither A. nor B.

Turbulent flow generally occurs for cases involving_____?

- A. Highly viscous fluid
- B. Very narrow passages
- C. Very slow motion
- D. None of these**

Adiabatic flame temperature of a fuel is dependent on the initial temperature of_____?

- A. Fuel
- B. Air
- C. Both A. & B.**
- D. Neither A. nor B.

Which of the following accentuates clinkering troubles on furnace grate burning coal ?

- A. Low reactivity of carbonised residue containing high proportion of iron & sulphur
- B. Low forced draft & fuel bed temperature
- C. Thick firebed and preheated primary air
- D. All A., B. and C.**

For pipes that must be broken at intervals for maintenance, the connector used should be a/an_____?

- A. Union**
- B. Tee
- C. Reducer
- D. Elbow

Reduced pressure of a gas is the ratio of its_____?

- A. Pressure to critical pressure**
- B. Critical pressure to pressure
- C. Pressure to pseudocritical pressure

D. Pseudocritical pressure to pressure

For reactions in parallel viz $A \rightarrow P$ (desired product) and $A \rightarrow Q$ (unwanted product), if the order of the desired reaction is higher than that of the undesired reaction, a _____?

- A. Batch reactor is preferred over a single CSTR for high yield
- B. Tubular reactor is preferred over a single CSTR for high yield
- C. Both A. and B.**
- D. Single CSTR is the most suitable

Which of the following is not endothermic in nature ?

- A. Combustion of sulphur**
- B. Gasification of carbon
- C. Thermal cracking of fuel oil
- D. Steam reforming of naphtha

The main use of heavy gas oil produced by the vacuum distillation unit is as a _____?

- A. Blending component for kerosene
- B. Blending component for petrol
- C. Feedstock for fluid catalytic cracking unit**
- D. None of these

The most widely used crude topping column in refineries is the _____ column?

- A. Bubble-cap**
- B. Packed bed
- C. Fluidised bed
- D. Perforated plate

Bio-fertilisers are cheaper, renewable and pollution free. They improve the _____ of the soil?

- A. Nutrient supply
- B. Texture
- C. Water holding capacity
- D. All A., B. and C.**

Softness of silver can be converted into hardness by alloying it with small quantity of _____?

- A. Copper & nickel**
- B. Zinc
- C. Aluminium
- D. Tin

Which of the systems having following transfer functions is stable ?

- A. $1/(s^2 + 2)$
- B. $1/(s^2 - 2s + 3)$
- C. $1/(s^2 + 2s + 2)$**
- D. $\exp(-20s)/(s^2 + 2s - 1)$

Air standard Otto cycle is more efficient than the diesel cycle for the same _____?

- A. Heat addition & compression ratio**
- B. Heat addition & pressure
- C. Compression ratio & pressure
- D. Cylinder dimension & rpm

Refrigeration capacity of a household refrigerator may be round about _____ tons?

- A. 0.15**
- B. 1.5
- C. 4.5
- D. 6.5

Lubricating greases are a mixture of _____?

A. Mineral oil, soap and additives

- B. Mineral oil and metallic soap
- C. Mineral oil and fatty oil
- D. Fatty oil and metallic soap

In power law, $\delta = [A (du/dy)^2 + B]$ then the fluid is _____?

A. Newtonian

- B. Dilatant
- C. Thixotropic
- D. Rheopectic

During sensible heating of humid air _____?

- A. Relative humidity increases
- B. Dew point remains constant
- C. Dry bulb & wet bulb temperature increases

D. Both B & C

Compensation against openings in process vessels for giving inlet and outlet connections, for providing sight glasses and manholes etc. is provided for strength and rigidity. The most efficient type of compensation is of _____ type?

A. Nozzle or rim

- B. Flared out
- C. Fluid in
- D. Ring plate

Refractory bricks are usually dried in a _____ dryer?

- A. Tray
- B. Tunnel**
- C. Conveyor
- D. Festoon

Thermal well made of _____ gives the fastest speed of response, while

measuring temperature by thermocouples?

- A. Steel
- B. Vycor (a glass)**
- C. Nichrome
- D. Inconel

The temperature at which a real gas obeys the ideal gas laws over a wide range of pressure is called the _____ temperature?

- A. Critical
- B. Boyle**
- C. Inversion
- D. Reduced

In case of dry spinning of polymers, the polymer solution in a volatile solvent is forced through the spinnerates into a warm air chamber, where the solvent evaporates leaving behind the polymer in the filament form. Dry spinning is used for _____ fibres?

- A. Polythene
- B. PVC**
- C. Rayon
- D. Polyvinyl acetate

Assuming flow to be laminar, if the diameter of the pipe is halved, then the pressure drop will _____?

- A. Increase**
- B. Decrease
- C. Remain same
- D. Be quadrupled

The ${}^{92}\text{U}238$ emits an α -particle. The product is _____?

- A. ${}^{90}\text{U}234$**
- B. ${}^{90}\text{U}238$

- C. 90U236
- D. 92U236

Two solutions A1 and A2 have pH value of 2 and 6 respectively. It implies that the solution _____?

- A. A2 is more alkaline than solution A2
- B. A1 is highly acidic
- C. A1 is very slightly acidic
- D. Both A. & C.**

Plate and frame filter press is usually made of _____?

- A. Mild steel
- B. Cast iron**
- C. Stainless steel
- D. Galvanised iron

Pick out the correct statement?

- A. Fanning friction factor is inversely proportional to Reynolds number always
- B. The property of a randomly packed bed (with raschig rings) is given by the ratio of the total volume to the volume of voids in the bed
- C. Mach number in an incompressible fluid is always unity
- D. Mach number is given by the ratio of the speed of the fluid to that of sound in the fluid under conditions of flow**

Presence of silicon in steel _____?

- A. Is in the form of free Si
- B. Indicates that steel is not deoxidised properly
- C. Decreases the blow holes formation tendency in castings**
- D. None of these

The equilibrium constant for the reversible reaction as shown in the bellow

figure, is affected by the _____?

- A. Temperature of the system
- B. Presence or absence of inerts
- C. Pressure of the system**
- D. Kinetics of the reaction

Choose the most important factor on which the heat conducted through a wall in a unit time will depend on ?

- A. Thickness of the wall
- B. Area of the wall perpendicular to heat flow
- C. Material of the wall
- D. Temperature difference between the two surfaces of the wall**

Depreciation of machines falls under the indirect expenses head. As per income tax regulations, it is calculated by the _____ method?

- A. Diminishing balance**
- B. Sinking fund
- C. Multiple straight line
- D. Sum of the years digit

Nitrogen content of calcium ammonium nitrate (CAN) is _____ percent?

- A. 10
- B. 25**
- C. 50
- D. 80

The 'laughing gas' is _____?

- A. Nitrous oxide**
- B. Nitric oxide
- C. Nitrogen trioxide
- D. Nitrogen pentoxide

The intensive properties are _____?

- A. Molar volume, density, viscosity and boiling point
- B. Refractive index and surface tension
- C. Both A. and B**
- D. None of these

High temperature carbonisation of coal produces _____?

- A. Inferior coke compared to low temperature carbonisation
- B. Less of gases compared to liquid products
- C. Larger quantity of tar compared to low temperature carbonisation
- D. None of these**

Water content in ground refractory material to be shaped into bricks by hand moulding is about _____ percent?

- A. 5
- B. 20**
- C. 40
- D. 55

Bode diagram are generated from output response of the system subjected to which of the following input ?

- A. Impulse
- B. Step
- C. Ramp
- D. Sinusoidal**

The transfer function for a P-D controller is _____?

- A. $K_c(1+\eta D)$**
- B. $K_c(1 +1/\eta D)$
- C. $K_c \eta D$
- D. $K_c/\eta D$

Which of the following is the most important property for a jet fuel ?

- A. Cloud point
- B. Pour point
- C. Colour
- D. Freezing point**

Nitriding of steel is a process for _____?

- A. Case hardening**
- B. Spheroidising
- C. Normalising
- D. Annealing

Pick out the wrong statement regarding the solubility characteristics of high polymers?

- A. Greater the degree of cross-linking in the polymer, lesser is its solubility
- B. Polymers having more aliphatic character are more soluble in aliphatic solvents, while those polymers having more aromatic character are more soluble in aromatic solvents
- C. Swelling tendency or solubility of polymers in a particular solvent decreases with increase in molecular weight of the solvent
- D. High molecular weight polymers on dissolving gives solution of very low viscosity**

Short/intense flame is produced during combustion of gaseous fuel by using _____?

- A. High amount/current of combustion air**
- B. Low amount/current of combustion air
- C. Preheated secondary air
- D. Very little excess air

True vapour pressure of a petroleum fraction _____ Reid vapour pressure?

- A. Is less than
- B. Is more than
- C. Is same as
- D. May be either more or less than**

The value of the gas-law constant 'R' is 1.987 ?

- A. kcal/kg-mole.°C
- B. Btu/lb-mole.°R
- C. kcal/kg-mole.°K
- D. Both B. & C.**

Thermal shield is used in high powered nuclear reactors to _____?

- A. Protect the walls of the reactor from radiation damage**
- B. Absorb the fast neutrons
- C. Slow down the secondary neutrons
- D. Protect the fuel element from coming in contact with the coolant

Hot blast main (carrying air at 1000°C) in blast furnace are lined with _____ bricks?

- A. Silica
- B. Fireclay**
- C. Magnesite
- D. Zirconia

Pot furnace which is either regenerative or recuperative, is used in the manufacture of _____?

- A. Glass**
- B. Stainless steel
- C. Potteries
- D. Refractory bricks

An aqueous solution of 2.45% by weight H₂SO₄ has a specific gravity of 1.011. The composition expressed in normality is _____?

- A. 0.2500
- B. 0.2528

- C. 0.5000
D. 0.5055

In a vapor-liquid contacting equipment, the overall gas phase mass transfer coefficient (M.T.C), K_G is related to individual co-efficients (K_G and K_L) as

_____ ?

- A. $K_G = 1/K_G + m/K_L$
B. $1/K_G = 1/K_G + m/K_L$
 C. $1/K_G = 1/K_L + m/K_G$
 D. $K_G = 1/K_L + m/K_G$

Accurate temperature measurement performance of a radiation pyrometer cannot be affected, if the ?

- A. Enhancement or attenuation of radiation occurs in the sighting path
B. Object and surrounding are at almost the same temperature
 C. Object has varying emissivity
 D. Object is transparent

Work index is the gross energy (kWh/tonne of feed) necessary to reduce a very large feed to such a size that 80% of product particles will pass through a 0.1 mm screen. The value of work index determined for wet grinding should be multiplied with _____ to get the same for dry grinding?

- A. 1.0
 B. 0.5
C. 1.34
 D. 4.34

Pick out the wrong statement ?

- A. The annual depreciation rate for machinery and equipments in a chemical process plant is about 10% of the fixed capital investment
 B. Annual depreciation rate of buildings in a chemical plant is about 3% of its initial cost

C. Insurance rates on annual basis in a chemical plant may be about 1% of the fixed capital investment

D. In a chemical industry, research and development cost amounts to about 15% of net sales realisation (NSR)

Zeolite is a/an _____ ?

A. Naturally occurring clay which is capable of exchanging cations

B. Abrasive material

C. Catalyst used in shift conversion

D. None of these

Catalyst carriers _____ ?

A. Have very high selectivity

B. Increase the activity of a catalyst

C. Provide large surface area with a small amount of active material

D. Inhibit catalyst poisoning

With increase in K_2/K_1 in case of a unimolecular type elementary reactions as shown in the bellow figure, the fractional yield of 'R' in mixed reactor (for a given conversion of 'A') ?

A. Decreases

B. Increases

C. Increases linearly

D. Remain same

For an isothermal process, the internal energy of a gas _____ ?

A. Increases

B. Decreases

C. Remains unchanged

D. Data insufficient, can't be predicted

Which of the following is a dimensionless parameter ?

- A. Angular velocity
- B. Specific weight
- C. Kinematic viscosity
- D. None of these**

Low thermal conductivity of heat insulating materials is due to its _____?

- A. Dense structure
- B. High proportion of air space**
- C. High specific heat
- D. None of these

Solvent used in the deasphalting process is _____?

- A. Furfural
- B. Phenol
- C. Propane**
- D. Hexane

In case of grinding in a ball mill _____?

- A. Wet grinding achieves a finer product size than dry grinding
- B. Its capacity decreases with increasing fineness of the products
- C. Grinding cost and power requirement increases with increasing fineness of the products
- D. All A., B. and C**

The Reynolds number of the liquid was increased 100 fold for a laminar falling film used for gas-liquid contacting. Assuming penetrating theory is applicable, the fold increase in the mass transfer co-efficient (K_c) for the same system is _____?

- A. 100
- B. 10**
- C. 5
- D. 1

A moderator _____ the neutrons?

- A. Slows down**
- B. Absorbs
- C. Accelerates
- D. Reflects

Theoretical head developed by a centrifugal pump does not depend upon the _____ the impeller?

- A. Radius of
- B. Speed of
- C. Fluid velocity leaving
- D. None of these**

U-235 content in enriched uranium, that is normally used in power reactors (e.g., at Tarapur atomic power plant), is about _____ percent?

- A. 85
- B. 50
- C. 3**
- D. 97

C/H ratio is the maximum in case of _____?

- A. Coal**
- B. Furnace oil
- C. Natural gas
- D. Naphtha

Function of sodium thiosulphate (hypo) in development of photographic film/plate is to _____?

- A. Brighten the faint images
- B. Remove metallic silver
- C. Convert silver chloride to silver
- D. Remove unexposed silver halide**

Abel apparatus is used for those oils, whose flash points are _____°F?

- A. < 120
- B. > 120
- C. > 280
- D. 300-600

Zeigler – Natta catalyst ($\text{AlR}_3 - \text{AlCl}_3$) is used in the polymerisation of _____?

- A. Vinyl acetate
- B. Vinyl chloride
- C. Propylene
- D. Styrene

With rise in temperature, the heat capacity of a substance _____?

- A. Increases
- B. Decreases
- C. Remains unchanged
- D. Either A. or B.; depends on the substance

The co-efficient of discharge of an orificemeter is a function of _____?

- A. Reynolds number at the orifice
- B. Ratio of orifice dia to pipe dia
- C. Both A. and B.
- D. None of the above parameters, and has a constant value of 0.61

Differential manometer measures the _____?

- A. Absolute pressure
- B. Gauge pressure
- C. Pressure difference
- D. Pressure gradient

Which of the following gases will have the- highest kinetic energy per mole at the same pressure & temperature ?

- A. Chlorine
- B. Nitrogen
- C. Ethane
- D. All the gases will have the same KE**

In panel test for spalling resistance, the average face temperature of panel assembly is maintained at _____ °C for 24 hours?

- A. 700
- B. 1000
- C. 1600**
- D. 2000

Number of gm moles of solute dissolved in one liter of a solution is called its _____?

- A. Equivalent weight
- B. Molarity**
- C. Molality
- D. Normality

The exit age distribution curve $E(t)$ for an ideal CSTR with the average residence time, η , is given by _____?

- A. $e^{-t/\eta}$
- B. $e^{-t/\eta}/\eta$**
- C. $1 - e^{-t/\eta}$
- D. $1 - (e^{-t/\eta}/\eta)$

'Fouling factor' used in the design of a multipass shell and tube heat exchanger is a _____?

- A. Non-dimensional factor
- B. Factor of safety**

- C. Conversion factor for individual film heat transfer co-efficient to overall heat transfer coefficient
- D. None of these

The critical moisture content in case of drying indicates the _____ rate period?

- A. Beginning of falling**
- B. Beginning of constant
- C. End of falling
- D. None of these

Polyvinyl chloride (PVC) is _____?

- A. A thermosetting material
- B. A condensation polymerisation product
- C. Made by employing emulsion polymerisation**
- D. None of these

For dynamic strain measurement, the Wheatstone bridge used is of _____ type ?

- A. Voltage sensitive null
- B. Voltage sensitive deflected**
- C. Current sensitive deflected
- D. None of these

The most resistant material to alkaline corrosion is _____?

- A. Duriron
- B. Nickel**
- C. Aluminium
- D. Carbate

A catalyst _____?

- A. Initiates a reaction
- B. Lowers the activation energy of reacting molecules**

- C. Is capable of reacting with any one of the reactants
- D. Cannot be recovered chemically unchanged at the end of a chemical reaction

90% of the caprolactam is converted to nylon-6 on its condensation polymerisation in the reactor maintained at _____ °C ?

- A. < 0
- B. 10-30**
- C. 250-280
- D. 500-600

Pearlite comprises of _____ ?

- A. 87% cementite & 13% Fe
- B. 87% ferrite & 13% cementite**
- C. 93.33% ferrite & 6.67% C
- D. 87% ferrite & 13% C

Which of the following is an additive used for improving the cetane number of diesel ?

- A. Tetraethyl lead**
- B. Tetramethyllead
- C. Ethyl nitrate or acetone
- D. None of these

Molecular weight of petrol may be about _____ ?

- A. 40-60
- B. 100-130**
- C. 250-300
- D. 350-400

One kg of carbon for theoretically complete combustion requires _____ kg of air?

- A. 11.5**
- B. 0.5

- C. 23
- D. 12

Which of the following is not a natural fiber ?

- A. Silk
- B. Viscose rayon**
- C. Wool
- D. Cotton

The ratio of hydrodynamic boundary layer to thermal boundary layer thickness in case of liquid metals is _____ ?

- A. < 1**
- B. 1
- C. > 1
- D. 2

Higher fuel combustion efficiency cannot be achieved by _____ ?

- A. Preheating of fuel gases & combustion air
- B. Reducing sulphur content in the fuel**
- C. Adopting proper fuel firing technique & fuel preparation
- D. Supplying correct amount of combustion air

Simultaneous doubling of the absolute temperature of a gas and reduction of its pressure to half will result in _____ in the volume of the gas?

- A. No change
- B. Doubling**
- C. 1/4th reduction
- D. Fourfold increase

What is the critical radius of insulation (cms) for a metallic cylinder, if the convective heat transfer co-efficient with the ambient atmosphere is $5 \text{ W/m}^2 \cdot ^\circ\text{K}$? Thermal conductivity of metal and insulation material are 40 and 0.1

W/m. $^{\circ}$ K respectively ?

- A. 2
- B. 8
- C. 10
- D. 40

Gibbs free energy of mixing at constant pressure and temperature is always _____?

- A. 0
- B. ∞
- C. + ve
- D. - ve

Polymerisation process in which two or more monomers of chemically different nature take part is called _____?

- A. **Copolymerisation**
- B. Addition polymerisation
- C. Chain polymerisation
- D. None of these

The main factor on which the behaviour of a mass of fluidised solid depends mainly is the _____?

- A. Fluid characteristics
- B. Particle size
- C. **Both A. and B.**
- D. Neither A. nor B.

Water separator index (modified) (WSIM) of a petrol fuel is the measure of its _____?

- A. Emulsification tendency
- B. **Water separation characteristics**
- C. Water content

D. Water absorbing capacity from atmosphere

The temperature in the calcium carbide furnace is _____ °C ?

- A. 200-300
- B. 700-850
- C. 2000-2200**
- D. 4000-4500

A rise in temperature _____ ?

- A. Normally tends to increase the reaction rate
- B. Does not affect a catalysed reaction
- C. Does not affect photo-chemical reaction rates
- D. All A., B. and C.**

Thermistors are used in _____ devices?

- A. Voltage measuring
- B. Temperature measuring
- C. Temperature compensating
- D. Both B. & C.**

Catalytic oxidation-dehydrogenation of methyl alcohol produces _____ ?

- A. Formaldehyde**
- B. Phenol
- C. Acetone
- D. Maleic anhydride

Bristles of tooth brushes are made of _____ ?

- A. Nylon-6
- B. Nylon-66**
- C. Polystyrene
- D. PVC

Presence of manganese in alloy steel improves its _____?

- A. Corrosion resistance
- B. Cutting ability
- C. Abrasion resistance & toughness**
- D. Elasticity & creep resistance

At room temperature, the product $[H^+][OH^-]$ in a solution is 10^{-14} moles/litre. If, $[OH^-] = 10^{-6}$ moles/litre, then the pH of the solution will be

_____?

- A. 6
- B. 8**
- C. 10
- D. 12

Refractory bricks burnt at very high temperature have got _____?

- A. Greater resistance to corrosion by slags**
- B. Less resistance to corrosion by slags
- C. High spalling tendency
- D. None of these

With increase in the reflux ratio for a fixed production from a continuous binary distillation column, the _____ decreases?

- A. Fixed charges initially**
- B. Running cost of cooling water for condenser
- C. Vapour & liquid load both
- D. Running cost of steam for reboiler

Which of the following oxides is not present in hematite iron ore ?

- A. Titanium oxide
- B. Calcium oxide
- C. Cobalt oxide**
- D. Manganese oxide

The solvent used in liquid-liquid extraction should have _____ less than one?

- A. Selectivity
- B. Distribution co-efficient
- C. Both A. and B.
- D. Neither A. nor B.**

Which is almost absent in crude petroleum ?

- A. Olefins
- B. Mercaptans**
- C. Naphthenes
- D. Cycloparaffins

Coal based fertiliser plants at Ramagundam (Andhra Pradesh) and Talcher (Orissa) ?

- A. Use coal for heating purpose
- B. Gasify coal to get hydrogen from coal gas**
- C. Use coal as filler in fertiliser
- D. Use coal as conditioner in fertiliser

Argon is the third largest constituent of air (followed by N₂ & O₂). Its percentage by volume in air is _____?

- A. 0.14
- B. 0.34
- C. 0.94**
- D. 1.4

The extensive properties are _____?

- A. Volume, mass and number of moles
- B. Free energy, entropy and enthalpy
- C. Both A. and B**
- D. None of these

Plunger pumps are used for _____?

- A. Higher pressure**
- B. Slurries
- C. Viscous mass
- D. None of these

Which of the following is not an insecticide ?

- A. Hydrocyanic acid
- B. Nicotine
- C. Sodium fluoride
- D. Hexane**

Electrostatic separation of minerals from each other is based on their differences in the following property ?

- A. Densities
- B. Magnetic permeabilities
- C. Electrical conductivities**
- D. Hardness

Regenerators are normally provided in the _____?

- A. Glass melting furnace
- B. Open hearth furnace
- C. By product coke ovens
- D. All A., B. and C.**

Calorific value of both the solid & liquid fuels can be determined by using _____ calorimeter?

- A. Junker's
- B. Bomb**
- C. Boy's
- D. None of these

Which of the following is not present in bagasse fibre ?

- A. Cellulose
- B. Lignin
- C. Pentogens
- D. None of these**

Pick out the correct statement ?

- A. Entropy and enthalpy are path functions
- B. In a closed system, the energy can be exchanged with the surrounding, while matter cannot be exchanged
- C. All the natural processes are reversible in nature**
- D. Work is a state function

Chemical potential of ith component of a system is given by _____?

- A. $\mu_i = (\partial F / \partial n_i)_{T, P, n_j}$**
- B. $\mu_i = (\partial A / \partial n_i)_{T, P, n_j}$
- C. $\mu_i = (\partial F / \partial n_i)_{T, P}$
- D. $\mu_i = (\partial A / \partial n_i)_{T, P}$

Drag co-efficient C_D , in Stoke's law range is given by _____?

- A. $C_D = 16 / Re.p$
- B. $C_D = 24 / Re.p$**
- C. $C_D = 18.4 / Re.p$
- D. $C_D = 0.079 / Re.p$

During combustion of gaseous fuels, deficiency of air _____?

- A. Lengthens the flame**
- B. Tends to shorten the flame
- C. Does not affect the flame length
- D. Increases the flame temperature

To get ultrafine particles, the equipment used is a _____?

- A. Ball mill
- B. Rod mill
- C. Hammer crusher
- D. Fluid energy mill**

The value of $\gamma = c_p/c_v$. at $< 500^\circ\text{C}$ for air & most common gases can be safely assumed to be _____?

- A. 0.8
- B. 1
- C. 1.4**
- D. 1.8

Entropy of an ideal gas depends upon its _____?

- A. Pressure
- B. Temperature
- C. Both A. & B**
- D. Neither A. nor B

1000 Kg of liquid at 30°C in a well stirred vessel has to be heated to 120°C , using immersed coils carrying condensing steam at 150°C . The area of the steam coils is 1.2 m^2 and the overall heat transfer co-efficient to the liquid is $1500 \text{ W/m}^2\cdot^\circ\text{C}$. Assuming negligible heat loss to the surrounding and specific heat capacity of the liquid to be $4 \text{ kJ/kg}\cdot^\circ\text{C}$, the time taken for the liquid to reach desired temperature will be _____?

- A. 15 min
- B. 22 min
- C. 44 min
- D. 51 min**

For which of the following unit operations, Lewis number is of significance?

- A. Adsorption
- B. Binary distillation

C. Gas absorption

D. Humidification

Half life period of decomposition of a liquid 'A' by irreversible first order reaction is 12 minutes. The time required for 75% conversion of 'A' is _____ minutes?

A. 18

B. 24

C. 6

D. 12

Which of the following acts as a natural source of air pollution ?

A. Forest fire

B. Deforestation

C. Volcanic eruption

D. None of these

Turbine flow meters are suitable for _____?

A. Very limited flow ranges

B. Cryogenic flow measurements

C. Aerospace and in air borne applications

D. Both B. and C.

The unit of frequency factor in Arrhenius equation is _____?

A. Same as that of rate constant

B. Same as that of activation energy

C. Dimensionless

D. None of these

The transfer function for an ideal proportional plus reset controller (reset time T) is _____?

A. $K_c[1 + (1/TS)]$

B. $K_c(1 + TS)$

- C. $K_c/(1 + TS)$
- D. $K_c/[1 + (s/T)]$

Feed for reforming is generally _____?

A. Naphtha or straight run gasoline

- B. Reduced crude
- C. Vacuum gas oil
- D. Atmospheric gas oil

Use of water having dissolved oxygen in boilers promotes _____?

A. Corrosion

- B. Sequestration
- C. Scale formation
- D. None of these

The softest material just next to talc in the Mohs scale is _____?

- A. Quartz
- B. Gypsum**
- C. Feldspar
- D. Fluorite

A high vapour velocity is required for high plate efficiency in a sieve plate column. The satisfactory value of operating vapor velocity for design purpose in sieve plate column is about _____ percent of the flooding velocity?

- A. 45
- B. 60
- C. 80**
- D. 95

Rate of a chemical reaction is not affected by the _____?

- A. Catalyst
- B. Temperature

C. Reactant's concentration

D. Number of molecules of reactants taking part in the reaction

A dummy activity is used in PERT network to describe the _____?

A. Precedence relationship

B. Resource idleness

C. Resource restriction

D. Necessary time delay

Which of the systems having the following transfer function is stable ?

A. $1/(S^2 + 2)$

B. $1/(S^2 - 2S + 3)$

C. $1/(S^2 + 2S + 2)$

D. $\exp(-20S)/(S^2 + 2S - 1)$

Azeotropism for ethyl alcohol-water system disappears by _____?

A. Increasing temperature

B. Decreasing pressure

C. Increasing pressure

D. No means

A cylindrical storage tank can have a self supported conical roof ?

A. If its diameter is less than 15-20metres

B. If its diameter is more than 50 meters

C. If the thickness of the roof is more than that of the cylindrical shell

D. Irrespective of its diameter

What is the unit of kinematic viscosity in SI unit ?

A. M²/sec

B. N/m². sec

C. Kg. sec/m

D. None of these

Ozone is _____?

- A. A primary pollutant
- B. A secondary pollutant
- C. Impervious to ultra-violet rays
- D. Both B. and C.**

An aqueous solution of methanol is to be distilled in a tray column. High pressure steam is available as a source of heat. For a given reflux ratio and overhead composition, two options are being explored; (i) a reboiler is used and (ii) no reboiler is used but steam is fed directly to the bottom of the column. As compared to option (i), in option (ii) _____?

- A. Less number of trays are required**
- B. Composition of the residue remains unchanged
- C. More number of trays are required but the residue composition remains unchanged
- D. More number of trays are required and the residue composition is more dilute in methanol

Shaft/rotor speed is most accurately measured by a _____?

- A. Frequency counter
- B. Tachometer
- C. Strobometer**
- D. Speedometer

In the manufacture of viscose rayon, the raw material used industrially is _____?

- A. Eucalyptus wood
- B. Bamboo
- C. Bagasse
- D. Fine teak wood**

Pump used for the transportation of molten sodium in a fast breeder reactor is a/an _____ pump?

- A. Reciprocating
- B. Plunger
- C. Electromagnetic**
- D. Gear

What is the degree of freedom for a system comprising liquid water equilibrium with its vapour ?

- A. 0
- B. 1**
- C. 2
- D. 3

In a/an _____ reactor, there is exchange of heat with the surroundings with sizeable temperature variation?

- A. Adiabatic
- B. Isothermal
- C. Non-adiabatic**
- D. None of these

1 BTU/lb. $\leftarrow^{\circ}\text{F}$ is equivalent to _____ kcal/kg. $^{\circ}\text{C}$?

- A. 1**
- B. 2.42
- C. 1.987
- D. 4.97

A first order reaction requires two unequal sized CSTR. Which of the following gives higher yield ?

- A. Large reactor followed by smaller one
- B. Smaller reactor followed by larger one
- C. Either of the arrangement A. or B. will give the same yield**

D. Data insufficient, can't be predicted

Nusselt number is the ratio of the _____?

- A. Temperature gradient of the wall to that across the entire pipe
- B. Temperature difference to the temperature gradient at the wall
- C. Heat flux at the wall to that across the entire pipe**
- D. None of these

High rate of heating of coke ovens _____?

- A. May damage its walls due to abrupt excessive swelling of coal**
- B. Produces larger size coke
- C. Increases the time of carbonisation
- D. None of these

A binary liquid Azeotropic mixture has boiling point higher than either of the components, when it shows _____ deviation from Raoult's Law?

- A. Positive
- B. Negative**
- C. No
- D. None of these

Combination of metals and ceramics are called _____?

- A. Metalloy
- B. Cermets**
- C. Pellets
- D. Non-crystalline ceramics

Which of the following is an acidic constituent of B.F. slag ?

- A. SiO₂**
- B. FeO
- C. MgO
- D. CaO

Work hardenable alloy steel used to make the bucket wheel excavators, blades of bulldozers and other earth moving equipments contain iron, carbon and _____?

- A. Manganese
- B. Silicon
- C. Nickel
- D. Chromium

The ability of a material to absorb energy in the elastic range is a measure of its _____?

- A. Toughness
- B. Resilience
- C. Malleability
- D. Brittleness

The main use of activated carbon in water treatment is to control _____?

- A. Bacterial growth
- B. Taste and odour
- C. Turbidity
- D. None of these

A 0.5 m high bed made up of a 1 mm dia glass sphere (density 2500 kg/m³) is to be fluidised by water (density 1000 kg/m³). If at the point of incipient fluidisation, the bed voidage is 40%, the pressure drop across the bed is _____?

- A. 4.4 KPa
- B. 2.94 KPa
- C. 3.7 KPa
- D. None of these

_____ is the separation technique used for desalination of sea

water ?

- A. Thermal diffusion
- B. Reverse osmosis**
- C. Adsorption
- D. Absorption

Maximum allowable concentration of CO₂ in air for safe working is _____ ppm (parts per million)?

- A. 50
- B. 1000
- C. 2000
- D. 5000**

A radioactive isotope undergoes decay with respect to time following _____ law?

- A. Logarithmic
- B. Exponential**
- C. Linear
- D. Inverse square

In water treatment, alum [Al₂(SO₄)₃] is used for the process of _____ ?

- A. Filtration
- B. Coagulation**
- C. Sedimentation
- D. Disinfection

Coal is heated in presence of air to a temperature of about _____ °C, while determining its ash content for proximate analysis?

- A. 500
- B. 750**
- C. 950

D. 1100

The rate equation for the reaction represented by as shown in the bellow figure, is given by $-r_x = K_1 \cdot C_x / (1 + K_2 C_x)$. At high value of C_x (i.e., $K_2 C_x \gg 1$), the order of the reaction and the rate constant are respectively _____?

A. Zero order & K_1/K_2

B. Zero order & K_1

C. First order & K_1

D. First order & K_1/K_2

The most important requirement for aluminium industry is the availability of cheap _____?

A. Ore

B. Electrical power

C. Labour

D. Abundant water

A series of equal payments (e.g., deposit or cost) made at equal intervals of time is known as _____?

A. Perpetuity

B. Capital charge factor

C. Annuity

D. Future worth

The process employing desorption of the absorbed solute by a solvent is called _____?

A. Elution

B. Osmosis

C. Reverse osmosis

D. Sublimation

Steady state one dimensional heat flow by conduction as given by Fourier's law does not assume that _____?

- A. There is no internal heat generation
- B. Boundary surfaces are isothermal
- C. Material is anisotropic**
- D. Constant temperature gradient exists

Low temperature oxidation of coal is accelerated by the _____?

- A. Storage in large heaps**
- B. Storage in compressed piles
- C. Absence of porous or friable particles
- D. All A., B. and C.

The equation relating friction factor to Reynold number, $f^{-0.5} = 4 \log_e (NRe/vf)^{-0.4}$, is called the _____ equation?

- A. Nikuradse**
- B. Von-Karman
- C. Blasius
- D. Colebrook

What causes convective acceleration in fluid flow ?

- A. Steep slope in flow
- B. Unsteady nature of flow
- C. Non-uniformity of flow**
- D. Turbulence in flow

A pipe is defined as 'hydraulically smooth', if the friction factor _____?

- A. Is not a function of Reynolds number
- B. For a given Reynolds number remains constant even on further smoothening of the pipe**

- C. Is zero irrespective of the Reynolds number
- D. None of these

In which of the following gaseous phase reactions, the equilibrium of the reaction remains unaffected by pressure changes ?

- A. $2O_3 \rightleftharpoons 3O_2$
- B. $N_2 + O_2 \rightleftharpoons 2NO$**
- C. $2NO_2 \rightleftharpoons N_2O_4$
- D. $2SO_2 + O_2 \rightleftharpoons 2SO_3$

Bimetal strips are not used in _____ ?

- A. Bimetallic thermometers
- B. Thermocouples**
- C. Thermostats
- D. Relays for opening & closing of electrical circuits

Oxygen cylinders used for autogenous (cutting/welding) purposes are _____ ?

- A. Seamless & made of steel**
- B. Heat treated before use
- C. Made by sand casting
- D. Welded steel cylinders

Pick out the wrong statement?

- A. In a first order reaction, $A \rightarrow$ products; the reaction becomes slower as it proceeds, because the concentration of A decreases and the rate is proportional to the concentration of A
- B. Transition state theory approaches the problem of calculating reaction rates by concentrating on the idea of activated complexes
- C. According to the penetration theory, the mass transfer co-efficient decreases, if the exposure time of an eddy to the solute decreases**

D. If the rate of an irreversible reaction, $A + B \rightarrow 2C$ is $k.CA.CB$, then the reaction is always elementary

A Newtonian fluid is that _____?

- A. Which follows Newton's law of motion
- B. Which needs a minimum shear, before it starts deforming
- C. For which shear & deformation are related as $T = \mu (\partial u / \partial y)$**
- D. None of these

The carbonating tower used in Solvay process of soda ash manufacture is made of _____?

- A. Cast iron**
- B. Stainless steel
- C. Karbate
- D. Lead lined steel

Locomotive boiler tubes are made of _____ alloys?

- A. Arsenic copper**
- B. Magnesium
- C. Aluminium
- D. Nickel

Acetaldehyde is produced by hydration of acetylene in a sulphuric acid solution of mercuric sulphate. Hydration tower is made of _____?

- A. Rubber lined mild steel**
- B. Lead lined mild steel
- C. Aluminium
- D. Cast iron

Arsenic pollutant is not generated in _____ industries?

- A. Tanneries
- B. Glass & ceramic
- C. Beverages**

D. Any of these

Resistance of a gas in a vessel is given by (where, P = pressure, V = volume of the vessel, n = no. of moles of the gas, R = gas constant) ?

- A. V/nRT
- B. nRT/V
- C. nRT/P
- D. P/nRT

Fireclay bricks are used in the _____ ?

- A. Coke ovens regenerator
- B. **Outer lining of L.D. converter**
- C. Hearth bottom of blast furnace
- D. Coke oven walls

Correct viscosity of furnace oil at the burner tip for proper atomisation is about 25 centistokes. To reduce the viscosity of high viscosity furnace oil (250 centistokes) to the correct atomisation viscosity (i.e. 25 cst), it should be preheated to about _____ °C?

- A. 70
- B. 85
- C. **105**
- D. 145

Radiation energy is emitted by all the substances, which are above _____ ?

- A. **0°K**
- B. 0°C
- C. 100°C
- D. Room temperature

Caking index of coal blend used for blast furnace coke making is

about _____?

- A. 8
- B. 12
- C. 22**
- D. 36

In case of a vertical tube evaporator, with increase in the liquor level, the _____?

- A. Capacity of the evaporator is decreased**
- B. Capacity of the evaporator is increased
- C. True temperature drop increases
- D. Both B. and C.

Alumina-graphite bricks are used for lining the _____?

- A. Slide gate in teeming laddies
- B. Continuous casting systems
- C. Both A. and B.**
- D. Neither A. nor B.

Smog is _____?

- A. Nothing but black smoke
- B. A combination of smoke and fog**
- C. A liquid particle resulting from vapor condensation
- D. A solid particle e.g. fly-ash

Carbon particles accumulated on the catalyst used in the gas oil cracking lies in the category of _____ poison?

- A. Deposited**
- B. Chemisorbed
- C. Selectivity
- D. Stability

Threshold limit value (TLV) of CO in air is _____ ppm?

- A. 5
- B. 50**
- C. 2000
- D. 5000

There are thirteen metals which are treated as pollutants. Which of the following metals is not a pollutant ?

- A. Mercury
- B. Arsenic
- C. Aluminium**
- D. Lead

_____ balls capable of grinding the feed in a ball mill gives the maximum efficiency ?

- A. Cast iron
- B. Minimum size**
- C. Maximum size
- D. Elliptical

Non-metallic diaphragm used as pressure sensor in instruments is generally made of _____ ?

- A. Teflon
- B. Synthetic rubber**
- C. Bakelite
- D. Thick paper

Kopp's rule is helpful in finding the _____ ?

- A. Heat capacities of solids**
- B. Heat capacities of gases
- C. Molal heat capacities of gases
- D. Activation energy

Filtration should be stopped in a filter press, if the _____ ?

- A. Cake becomes very dense
- B. Liquor stops flowing out to the discharge
- C. Filtration pressure rises suddenly
- D. Both B. & C.**

Moisture content of a substance when at equilibrium with a given partial pressure of the vapour is called the _____ moisture?

- A. Free
- B. Unbound
- C. Equilibrium**
- D. Bound

Gibbs-Duhem equation _____?

- A. States that $n_1d\mu_1 + n_2d\mu_2 + \dots n_jd\mu_j = 0$, for a system of definite composition at constant temperature and pressure**
- B. Applies only to binary systems
- C. Finds no application in gas-liquid equilibria involved in distillation
- D. None of these

The behaviour of a metal specimen, which when plastically strained in tension reduces its yield stress in compression and vice versa; is termed as the _____?

- A. Work hardening
- B. Bauschinger effect**
- C. Creeping effect
- D. Stress recovery effect

Which of the following is an additional step in the manufacture of paper from bagasse as compared to that from bamboo ?

- A. Depithing**
- B. Digestion
- C. Bleaching

D. None of these

The organic acid monomer in nylon-66 is _____?

- A. Sebacic acid
- B. Terephthalic acid
- C. Adipic acid**
- D. Benzoic acid

Temperature of hot gases flowing in a pipe is measured by a thermocouple inserted in the thermal well. The thermal well made of _____ will facilitate the most accurate measurement of the temperature ?

- A. Copper**
- B. Steel
- C. Aluminium
- D. Brass

The maximum head that can be developed by a single impeller is _____ ft?

- A. 25
- B. 100
- C. 250-300**
- D. 1000

With increase in solvent rate, the number of transfer units, N_{toG} , for a fixed degree of absorption from a fixed amount of gas _____?

- A. Increases
- B. Decreases**
- C. Decreases linearly
- D. Remain unaffected

Dry saturated steam can be converted into super heated steam by _____?

- A. Increasing its cross-sectional area of flow
- B. Passing it through a pressure reducing valve**
- C. Forcing it downwards through a vertical tube
- D. None of these

Electromagnetic radiations propagate in vacuum with a velocity of _____ metre/second?

- A. 3×10^5
- B. 3×10^8**
- C. 3×10^{10}
- D. 3×10^{12}

Choose the correct statement?

- A. Coking tendency increases with increasing molecular weight**
- B. Coking tendency decreases with increasing molecular weight
- C. Higher pressure enhances coke formation
- D. Coking is an exothermic reaction

Compound having large heat of formation is _____?

- A. More stable**
- B. Less stable
- C. Not at all stable (like nascent O₂)
- D. Either more or less stable; depends on the compound

Polyvinyl acetate is never used for making _____?

- A. Moulded articles**
- B. Fibres
- C. Adhesives
- D. All A., B. & C.

Phenolic water generated in coke ovens & by-product plant attached to an integrated steel plant containing phenol in concentration of less than 100 mg/litre can be removed by _____?

- A. Chlorination
- B. Treating in biological oxygen pond**
- C. Chemical coagulation
- D. None of these

Outer combustion chamber of blast furnace stove is lined with _____ bricks?

- A. Fireclay**
- B. Silica
- C. Chrome magnesite
- D. Zirconia

In a binary distillation column, if the feed contains 40 mole % vapour, the q line will have a slope of _____?

- A. 1.5
- B. -0.6
- C. -1.5**
- D. 0.6

Normal temperature and pressure (N.T.P.) corresponds to _____?

- A. 0°C and 760 mm Hg
- B. 15°C and 760 mm Hg
- C. 20°C and 760 mm Hg**
- D. 0°C and 1 kgf/cm²

Automobile exhaust is passed through two compartments catalytic converter employing platinum as catalyst for _____?

- A. Conversion of CO into CO₂ in the second compartment
- B. Conversion of NO_x into N₂ and NH₃ in the first compartment
- C. Oxidation of unburnt hydrocarbon fuel in the second compartment
- D. All A., B. and C.**

Sulphuric acid solution having a specific gravity of 1.20 at room temperature is used mainly for the _____?

- A. Fertiliser manufacture
- B. Car battery solution**
- C. Synthesis of oleum
- D. Water treatment

Capacity of a rotary gear pump can be varied by _____?

- A. Changing the speed of rotation
- B. Bleeding air into suction
- C. Bypassing liquid from the suction or discharge line
- D. All A., B. and C.**

A fluid which has a linear relationship between the magnitude of applied shear-stress and the resulting rate of deformation is called a/an _____ fluid?

- A. Newtonian**
- B. Non-Newtonian
- C. Ideal
- D. Incompressible

Entropy change in case of reversible adiabatic process is _____?

- A. Minimum
- B. Zero**
- C. Maximum
- D. Indeterminate

Pick out the correct statement?

- A. Hot worked materials are subjected to annealing to remove internal stresses
- B. Annealing of steel hardens it slightly
- C. Normalising of a material induces stresses
- D. Tempering of a material improves ductility & toughness but reduces hardness & brittleness**

German silver in an alloy of _____?

- A. Copper, nickel and zinc
- B. Copper, aluminium and silver
- C. Silver, zinc and aluminium
- D. Silver, nickel and zinc

The ideal size of round bubble caps to be used in industrial distillation column having a diameter of 3-6 metres is _____ cms?

- A. 5
- B. 15
- C. 7.5
- D. 50

The Mach number for hypersonic flow of compressible fluid is _____?

- A. 1
- B. > 1
- C. > 4
- D. < 2

Sewage sludge is _____ type of non-Newtonian fluid?

- A. Dilatant
- B. Bingham plastic
- C. Pseudo plastic
- D. None of these

At a fixed pressure, the humidity depends upon the partial pressure of vapor in the mixture. Humidity of a vapour free gas is _____ percent.?

- A. 100
- B. 0
- C. 50
- D. Between 0 and 100

The most unsuitable reactor for carrying out reactions in which high reactant concentration favours high yields is _____?

- A. Backmix reactor
- B. Plug flow reactor
- C. Series of CSTR
- D. PFR in series

The constants (K_b , K_r and K_k) used in the laws of crushing (i.e., Bond's law, Rittinger's law and Kick's law) depend upon the _____?

- A. Feed material
- B. Type of crushing machine
- C. Both A. & B.
- D. Neither A. nor B.

Carbon disulphide is mainly used in the production of _____?

- A. Viscose rayon
- B. Corundum
- C. Plasticiser for unsaturated polyester
- D. Paints

Fixed carbon in coal is defined as _____?

- A. That present in volatile matters
- B. The total quantity of carbon present in the coal
- C. Hundred minus the percentage of volatile matter, ash and moisture
- D. The one which is present in the residue after combustion

Which of the following processes is not an example of adsorption applied to gaseous separations ?

- A. Recovery of valuable solvent vapors from dilute mixture with air and other gases
- B. Dehumidification of air and gas
- C. Removal of objectionable odour and impurities from industrial gases

D. Decolouration of yellow glycerine

During constant rate period, the rate of drying decreases with the _____?

- A. Decrease in air temperature
- B. Increase in air humidity
- C. Both A. and B.**
- D. Neither A. nor B.

An endothermic aqueous phase first order irreversible reaction is carried out in an adiabatic plug flow reactor. The rate of reaction ?

- A. Is maximum at the inlet of the reactor**
- B. Goes through a maximum along the length of the reactor
- C. Goes through a minimum along the length of the reactor
- D. Is maximum at the exit of the reactor

Wood is corroded by _____?

- A. Hydrochloric acid
- B. SO₂ (dry or wet)
- C. Chlorine (dry or wet)
- D. All A., B. and C.**

If a single tube pass heat exchanger is converted to two passes; for the same flow rate, the pressure drop per unit length in tube side will _____ times?

- A. Increase by 1.8
- B. Decrease by 22
- C. Increase by 21.6**
- D. None of these

The basic filtration equation is given as $dt/dV = (\mu/A \Delta P) \cdot [(\alpha \cdot CV/A) + R_m]$, where, V is volume of the filtrate; A is the filtration area, α is specific cake

resistance, μ is viscosity of the filtrate, and C is the concentration of the solids in the feed slurry. In a 20 minutes constant rate filtration, 5 m³ of filtrate was obtained. If this is followed by a constant pressure filtration, how much more time in minutes, it will take for another 5 m³ of filtrate to be produced? Neglect filter medium resistance, R_m ; assume incompressible cake ?

- A. 10
- B. 20**
- C. 25
- D. 30

_____ is produced using molasses as the starting raw material ?

- A. Methyl alcohol
- B. Ethyl alcohol**
- C. Benzol
- D. Dimethyl ether

Neutrons have mass approximately equal to that of _____ atoms?

- A. Hydrogen**
- B. Helium
- C. Deuterium
- D. None of these

In chemical dehumidification process _____ ?

- A. Wet bulb temperature increases
- B. Dry bulb temperature remains constant**
- C. Dew point temperature increases
- D. Dry bulb temperature increases

Triple point of water is _____ ?

- A. 0.01 °C**
- B. 492°R
- C. 0°K

D. -273°C

[Read More Details about this Mcq](#)

Temperature control of an exothermic chemical reaction taking place in a CSTR is done with the help of cooling water flowing in a jacket around the reactor.

The types of valve and controller action to be recommended are _____?

- A. Air to open valve with the controller direct acting
- B. Air to close valve with the controller indirect acting
- C. Air to open valve with the controller indirect acting**
- D. Air to close valve with the controller direct acting

Molecular weight of plastics ranges from _____?

- A. 5000 to 10000
- B. 20000 to 250000**
- C. 500 to 5000
- D. 10^6 to 10^9

Pick out the wrong statement ?

- A. Kraft method of pulp manufacture can process all types of fibrous raw materials
- B. Digestion time for bagasse is less than that for wood base materials
- C. Both temperature and pressure in the digester is less in case of the sulphite method as compared to that in the sulphate method
- D. None of these**

Viscosity index of a lubricating oil _____?

- A. Is the measure of its flash point
- B. Is the measure of variation of viscosity with temperature**
- C. Should be low
- D. None of these

The ratio, (propeller agitator dia/tank dia) is normally taken

as _____ ?

- A. 0.15-0.30
- B. 0.5-0.65
- C. 0.75-0.85
- D. 0.60-0.90

The 'bomb' in the bomb calorimeter is made of _____ ?

- A. Molybdenum stainless steel
- B. Mild steel
- C. High silicon iron (14% Si)
- D. Copper

The material of construction of pressure mills used for squeezing out the juice from sugar cane is _____ ?

- A. Stainless steel
- B. Cast iron
- C. Mild steel
- D. Monel

Potential function is applicable only for _____ flow?

- A. Irrotational
- B. Turbulent
- C. Steady
- D. None of these

The composition of fresh feed to the high temperature, high pressure urea autoclave is _____ ?

- A. Excess liquid ammonia and liquefied CO₂
- B. Excess liquid ammonia and compressed CO₂ gas
- C. Liquid ammonia and excess compressed CO₂
- D. Compressed ammonia gas and excess compressed CO₂

Zeolite used in water softening process (cation exchange) is regenerated by

washing with _____?

- A. Brine
- B. Chloramines
- C. Sodium bisulphite
- D. Liquid chlorines

Arrhenius equation represents graphically the variation between the _____ and temperature?

- A. Rate of reaction
- B. Frequency factor
- C. Rate constant
- D. Activation energy

Low pressure Zeigler process of polythene manufacture _____?

- A. Employs a pressure of 30 kgf/cm²
- B. Achieves an yield of 95-98% based on ethylene
- C. Produces very low density polythene
- D. Does not use any catalyst for polymerisation

What is the unit of thermal conductivity ?

- A. Kcal/hr. m² °C
- B. Kcal/hr.m.°C
- C. Kcal/hr.m
- D. Kcal/hr. °C

Copper is dissolved from its ore by H₂SO₄ in a percolation tank made of _____?

- A. Wood
- B. Stainless steel
- C. Reinforced concrete lined with lead
- D. High silicon iron (14% Si)

TLV of mercury in potable (drinking) water is about _____ ppm?

- A. **0.001**
- B. 0.1
- C. 1
- D. 5

'Mixed gas' used in steel plants is a mixture of _____?

- A. **B.F. gas and coke oven gas**
- B. Coke oven gas and converter gas
- C. Coke oven gas and L.P.G
- D. Blast furnace gas and naphtha vapor

High concentration of carcinogenic hydrocarbon pollutants in atmospheric air causes _____?

- A. **Cancer**
- B. Silicosis
- C. Respiratory disease (e.g., asthma)
- D. Reduced crop yield

An isothermal aqueous phase reversible reaction, $P \rightleftharpoons R$, is to be carried out in a mixed flow reactor. The reaction rate in $\text{k.mole/m}^3 \cdot \text{h}$ is given by, $r = 0.5C_P - 0.125C_R$. A stream containing only P enters the reactor. The residence time required (in hours) for 40% conversion of P is _____?

- A. 0.80
- B. 1.33
- C. **1.60**
- D. 2.67

Generally _____ are subjected to galvanising (i.e., zinc coating)?

- A. Non-ferrous metals
- B. Non-metals
- C. **Low carbon steels**

D. Stainless steel

Actual lift of a pump is always less than the theoretical lift and is limited by the _____?

- A. Specific gravity & temperature of the liquid
- B. Leakage & pressure decreasing at higher elevations
- C. Frictional resistance through pipes, fittings & passages
- D. All A., B. and C.**

Iron ore hematite is concentrated using _____?

- A. Electromagnetic separation mainly
- B. Gravity separation**
- C. Froth floatation
- D. Roasting

_____ have the same mass number, but different nuclear charge ?

- A. Isotopes
- B. Isobars**
- C. Isotones
- D. None of these

Heat transfer by _____ may not necessarily require the presence of a medium?

- A. Conduction
- B. Natural convection
- C. Forced convection
- D. Radiation**

Babbitt metal is not a _____?

- A. Tin base alloy
- B. White metal
- C. Lead base alloy
- D. Pure metal**

Interchain forces are the weakest in case of _____?

- A. Plastics
- B. Fibres
- C. Elastomers
- D. Both rubber & elastomers**

The reaction $A(l) \rightarrow R(g)$ is allowed to reach equilibrium conditions in an autoclave. At equilibrium, there are two phases, one a pure liquid phase of A and the other a vapor phase of A, R and S. Initially A alone is present. The numbers of degrees of freedom are ?

- A. 1
- B. 2**
- C. 3
- D. 0

Pick out the wrong statement ?

- A. Strongly caking coal should not be used in the Lurgi gasifier
- B. Acetylene gas cannot be used for illumination purpose**
- C. Water gas is called blue gas because of the color of the flame, when it is burnt
- D. Gaseous fuels require less percentage of excess air for combustion as compared to liquid fuels

Tall oil obtained as a by-product from the black liquor recovery is _____?

- A. A black, sticky & viscous liquid
- B. Used in the manufacture of greases, emulsions & soaps
- C. Composed mainly of rosin & fatty acids
- D. All A , B. & C.**

Yield strength of a polycrystalline metal with an average grain size „d’, is proportional to _____?

- A. $d^{1/2}$
- B. $d-1/2$**
- C. d
- D. $d-1$

A filter press is _____?

A. A batch filter

- B. Not suitable, if the liquid is the main product
- C. Having prohibitively high maintenance cost
- D. Not suitable for wide range of materials under varying operating conditions of cake thickness and pressure

_____ of the coal is the basis for Seylor's coal classification?

- A. Proximate analysis
- B. Ultimate analysis**
- C. Caking index
- D. Calorific value

Tesla metre per ampere (T. m/A) is the unit for the measurement of _____?

- A. Magnetic susceptibility
- B. Magnetic moment
- C. Permeability of free space**
- D. Flux density

The reason for excessive clinker formation in gas producers is the _____?

- A. Use of coal/coke containing a high % of fines and ash
- B. Use of fuel having too low an ash fusion temperature
- C. Development of hot spots in the fuel bed and an abnormally high rate of gasification
- D. All A., B. and C.**

The continuity equation _____?

- A. Is independent of the compressibility of the fluid
- B. Is dependent upon the viscosity of the fluid
- C. Represents the conservation of mass**
- D. None of these

In case of liquid petrofuels, momentary combustion is observed at its _____?

- A. Flash point**
- B. Preheating temperature corresponding to viscosity of 25 centistokes
- C. Flame temperature
- D. Fire point

Finely ground calcium aluminate & silicate is a/an _____?

- A. Cermet
- B. Cement**
- C. Abrasive
- D. Explosive

Calcination of gypsum produces _____?

- A. Plaster of Paris**
- B. Salt cake
- C. Nitre cake
- D. Lime

Size reduction of fibrous materials like wood, asbestos, mica etc. is done by a disintegrator exemplified by the _____?

- A. Blake jaw crusher
- B. Cage mill**
- C. Stamp mill
- D. Bradford's breaker

Phenolic antiseptics are added in the _____ soap?

- A. Shaving
- B. Medicated**
- C. Metallic
- D. Transparent

Naphthalene is used for making_____?

- A. Insecticides (e.g. moth balls)
- B. Unsaturated polyesters
- C. Drug intermediates e.g. β -naphthol
- D. All A., B. and C.**

The vapor pressure of water at 100°C is_____?

- A. 100 N/m²
- B. 76 cms of Hg**
- C. 13.6 cms of Hg
- D. 760 mm wc

Capillary rise of mercury in a small diameter tube is proportional to (where, d = diameter of the tube, ζ = surface tension of mercury)_____?

- A. d
- B. $1/d$
- C. ζ**
- D. $1/\zeta$

For every 10°C rise in temperature, the rate of chemical reaction doubles. When the temperature is increased from 30 to 70°C, the rate of reaction increases _____ times?

- A. 8
- B. 12
- C. 16**
- D. 32

Free energy change of mixing two liquid substances is a function of

the _____?

- A. Concentration of the constituents only
- B. Quantities of the constituents only
- C. Temperature only
- D. All A, B. and C**

In case of design of a shell and tube heat exchanger _____?

- A. Minimum cleaning lane of 6.5 mm is provided, when tubes are on a square pitch
- B. Minimum tube sheet thickness (in which tubes are fixed) is equal to the O.D. of the tube upto 15 mm tube diameter; and for > 15 mm tube diameter, tube sheet thickness is smaller than tube diameter
- C. O.D. of the tube is 6 to 40 mm while the tube lengths used are 0.5, 2.5, 3.0, 4.0, 5.0, 6 metres
- D. All A., B. & C.**

For a laminar flow of fluid in a circular tube, 'h₁' is the convective heat transfer co-efficient at velocity 'V₁'. If the velocity is reduced by half and assuming the fluid properties are constant, the new convective heat transfer co-efficient is _____?

- A. 1.26 h₁
- B. 0.794 h₁**
- C. 0.574 h₁
- D. 1.741 h₁

Permanent loss in a Venturimeter is about _____ percent of the pressure drop in the upstream cone?

- A. 1
- B. 10**
- C. 40
- D. 70

For turbulent flow of Newtonian fluid in a circular cross-section pipe, the ratio of maximum to average fluid velocity is _____?

- A. 0.5
- B. 1**
- C. 0.66
- D. < 0.5

Dry chlorine can be handled in a vessel made of _____?

- A. Iron or steel**
- B. PVC
- C. Nickel
- D. Brass

Coalification means the _____?

- A. Process of conversion of lignite into anthracite**
- B. Underground gasification of coal
- C. Complete combustion of coal
- D. Direct hydrogenation of coal

The expression for entropy change, $\Delta S = n C_p \cdot \ln (T_2/T_1)$, is valid for the _____ of a substance?

- A. Simultaneous pressure & temperature change
- B. Heating
- C. Cooling
- D. Both B. and C**

Bernoulli's equation is not applicable, when the flow is _____?

- A. Irrotational
- B. Incompressible
- C. Viscous
- D. All A., B. & C.**

Choose the set of pressure intensities that are equivalent ?

- A. **4.33 psi, 10 ft. of water, 8.83 inches of Hg**
- B. 4.33 psi, 10 ft. of water, 20.7 inches of Hg
- C. 10 psi, 19.7 ft. of water, 23.3 inches of Hg
- D. 10 psi, 19.7 ft. of water, 5.3 inches of Hg

Material of construction of foundry crucible is _____?

- A. Lead
- B. Stainless steel
- C. **Graphite**
- D. Cast iron

Graphite is a good _____?

- A. Thermal & electrical insulator
- B. Conductor of heat
- C. Conductor of electricity
- D. **Both B. & C.**

The chemical potential for a pure substance is _____ its partial molal free energy?

- A. More than
- B. Less than
- C. **Equal to**
- D. Not related to

Chemical reaction rate of a component depends upon the _____?

- A. Composition of the component only
- B. Temperature of the system
- C. Pressure of the system
- D. **All A., B. and C.**

Phase lag of the frequency response of a second order system to a sinusoidal forcing function _____?

- A. Is 30°
- B. Is 90° at the most
- C. Approaches 180° asymptotically**
- D. Is 120°

For a single component two phase mixture, the number of independent variable properties are _____?

- A. Two
- B. One**
- C. Zero
- D. Three

In a reversible chemical reaction having two reactants in equilibrium, if the concentration of the reactants are doubled, then the equilibrium constant will _____?

- A. Remain the same**
- B. Be halved
- C. Also be doubled
- D. Become one fourth

The non-dimensional temperature gradient in a liquid at the wall of a pipe is the _____?

- A. Heat flux**
- B. Nusselt number
- C. Prandtl number
- D. Schmidt number

Chemical formula of 'salt cake' is _____?

- A. Na_2SO_4**
- B. CaSO_4
- C. MgSO_4
- D. BaSO_4

Calcination reaction of limestone ($\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$) goes to completion in the rotary kiln, because _____?

- A. CaO is not dissociated
- B. CO₂ escapes continuously**
- C. Of high calcination temperature
- D. CaO is more stable than CaCO₃

In evaporators, lowering the feed temperature _____?

- A. Increases the heating area required
- B. Reduces the economy
- C. Both A. and B.**
- D. Decreases the heating area required

An under-designed steam trap will _____?

- A. Waste steam
- B. Destroy itself of acceleration wear due to rapid recycling
- C. Back up condensate and cause water hammer in steam line**
- D. None of these

In step growth polymerisation, condensation occurs in a stepwise manner with or without the elimination of smaller molecules. An example of step growth polymerisation product is _____?

- A. Terylene**
- B. Polybutadiene
- C. PVC
- D. Polypropylene

Melting of ice exemplifies a/an _____?

- A. Adiabatic process
- B. Endothermic reaction**
- C. Exothermic reaction
- D. Process involving a chemical reaction

With increase in temperature, the thermal conductivity of fresh lubricating oil _____?

- A. Increases
- B. Decreases**
- C. Remains unchanged
- D. May increase or decrease; depends on its composition

Presence of high amount of silicon in cast iron _____?

- A. Suppresses the decomposition of Fe₃C
- B. Increases the formation of graphite**
- C. Increases the contraction of the metal
- D. Reduces its fluidity

The main reaction in reforming is the _____?

- A. Dehydrogenation of naphthenes**
- B. Hydrogenation of naphthenes
- C. Hydrocracking of paraffins
- D. Saturation of olefins

In stripping section of continuous distillation column, the _____?

- A. Liquid is stripped of high boiler
- B. Liquid is enriched with high boiler**
- C. Vapour is stripped of low boiler
- D. None of these

If heat transfer rate varies with the time, it is termed as _____?

- A. Forced convection
- B. Steady state conduction
- C. Monochromatic radiation
- D. None of these**

In the ammonia synthesis reaction, $N_2 + 3H_2 \rightleftharpoons 2NH_3 + 22.4 \text{ kcal}$, the formation

of NH_3 will be favoured by _____ ?

- A. High temperature
- B. Low pressure
- C. Low temperature only
- D. Both low temperature and high pressure**

1 gm mole of an alcohol whose molecular weight is 74 contains 48 gms of carbon, 10 gms of hydrogen and 16 gms of oxygen. Its molecular formula is _____ ?

- A. $\text{C}_4\text{H}_9\text{OH}$**
- B. $\text{C}_3\text{H}_7\text{OH}$
- C. $(\text{C}_2\text{H}_5)_2\text{CHOH}$
- D. $\text{C}_2\text{H}_5\text{OH}$

Length/diameter ratio of a ball mill is _____ ?

- A. 1.5
- B. 1
- C. < 1**
- D. > 1

Chain growth polymerisation is a process, in which the monomers are added in a chain fashion, and it requires an initiator to produce the free radical. An example of chain growth polymerisation products is _____ ?

- A. Nylon-66
- B. Teflon**
- C. Polyester
- D. Bakelite

A reasonably general expression for vapour-liquid phase equilibrium at low to moderate pressure is $\phi_i y_i P = Y_i x_i f_i^\circ$ where, ϕ_i is a vapor fugacity component, Y_i is the liquid activity coefficient and f_i° is the fugacity of the pure component i . the K_i value ($Y_i = K_i x_i$) is therefore, in general a function of

_____?

- A. Temperature only
- B. Temperature and pressure only
- C. Temperature, pressure and liquid composition x_i only**
- D. Temperature, pressure, liquid composition x_i and vapour composition y_i

Experimental study of laminar fluid flow through a circular tube was conducted by _____?

- A. Reynolds
- B. Hagen and Poiseuille**
- C. Pascal
- D. Blake-Plummer

In case of a centrifugal pump, the theoretical head developed is dependent on the _____ the impeller?

- A. Speed of
- B. Diameter of
- C. Fluid velocity leaving
- D. All A., B. and C.**

The interchange factor for radiation heat transfer from surface 'x' to surface 'y' in case of an infinite parallel planes with emissivities ϵ_x & ϵ_y is given by _____?

- A. $\epsilon_x + \epsilon_y$
- B. $\epsilon_x \cdot \epsilon_y$
- C. $1/\epsilon_x + 1/\epsilon_y$
- D. $(\epsilon_x + \epsilon_y)/(\epsilon_x + \epsilon_y - \epsilon_x \cdot \epsilon_y)$**

For maximum discharge through a chimney, its height should be _____?

- A. 200 meters
- B. Infinitely long

C. More than 105.7 metres

D. Equal to the height of the hot gas column producing draught

Carbon refractories _____?

A. Do not burn/oxidise, when exposed to air on heating

B. Are not attacked by slags, as they are not wetted by melts

C. Do not resist temperature fluctuations

D. Have extremely low thermal & electrical conductivities

Which characteristic of a fluid is not important in deciding its route in a shell and tube heat exchanger ?

A. Corrosiveness

B. Fouling characteristic

C. Viscosity

D. None of these

Pick out the wrong statement ?

A. Chamber process of sulphuric acid manufacture produces pure acid of concentration < 80%

B. Contact process of sulphuric acid manufacture produces pure acid of concentration \geq 98%

C. 75% oleum can be produced by distillation of 20% oleum

D. Contact process of sulphuric acid manufacture uses nickel as the catalyst

Dilatometer is used for the determination of _____ of refractories?

A. Modulus of rupture

B. Permanent linear change

C. Resistance to CO attack

D. RUL

Producer gas comprises mainly of _____?

A. CO & N₂

B. CO & H₂

- C. CO₂ & N₂
- D. CO₂ & H₂

Anthracite can be used for _____?

- A. Recarbonising steel
- B. Making carbon electrodes
- C. Blending with highly coking coal to check its swelling which helps in saving coke even walls from damage and to produce high strength coke
- D. All A., B. and C.**

During conversion of ammonium carbamate into urea, presence of large excess of water _____?

- A. Increases the yield of urea
- B. Adversely affects the yield of urea**
- C. Reduces the evaporator load by diluting the urea solution
- D. Does not affect the yield of urea

Raoult's law does not apply, when the _____?

- A. Size of component molecules are not equal
- B. Attractive forces between like and unlike molecules in the solution are approximately equal
- C. Component molecules are non-polar**
- D. Chemical combination or molecular association between unlike molecules takes place in the formation of solution

The number of H⁺ in 1 c.c solution of pH 13 is _____?

- A. 6.023×10^{13}
- B. 6.023×10^{10}
- C. 6.023×10^7**
- D. 10^{13}

The uniformity of a gas fluidised bed depends upon the _____ of the solid particles?

- A. Size
- B. Surface properties
- C. Both A. and B.**
- D. Neither A. nor B.

Which of the following is not a component of the fixed capital for a chemical plant facility ?

- A. Raw materials inventory**
- B. Utilities plants
- C. Process equipment
- D. Emergency facilities

_____ is a thermosetting plastic ?

- A. PVC
- B. Polythene
- C. Bakelite**
- D. Polystyrene

_____ is the response curve for a step input signal from a reactor ?

- A. S-curve
- B. C-curve**
- C. I-curve
- D. None of these

Starting raw material for the manufacture of alum is _____ ?

- A. Alumina
- B. Gypsum
- C. Bauxite**
- D. Ammonium bicarbonate

Name the endothermic reaction out of the following ?

- A. Catalytic cracking
- B. Hydrocracking
- C. Dehydrogeneration of Naphthene to produce aromatic**
- D. Catalytic polymerisation

Which of the following is a batch furnace ?

- A. Cupola**
- B. Reheating furnace
- C. Glass tank furnace
- D. None of these

The local surface conductance for laminar film condensation on vertical surface is (where, t = film thickness) _____?

- A. $\propto t$
- B. $\propto 1/t$**
- C. $\propto \sqrt{t}$
- D. Independent of 't'

The following heat engine produces power of 100,000 kW. The heat engine operates between 800 K and 300 K. It has a thermal efficiency equal to 50% of that of the Carnot engine for the same temperature. The rate at which heat is absorbed from the hot reservoir is _____?

- A. 100,000 kW
- B. 160,000 kW
- C. 200,000 kW
- D. 320,000 kW**

Compressibility factor (i.e., the ratio of actual volume of gas to the volume predicted by ideal gas law) for all gases are _____?

- A. Always greater than one
- B. Same at the same reduced temperature
- C. Same at the same reduced pressure

D. Both B. & C

For given number of passes, pitch & tube diameter, the maximum number of tubes that can be accommodated in a shell of tripled inside diameter will be _____ times?

A. About 9

B. Considerably more than 9

C. Considerably less than 9

D. About 3

Which of the following operations does not involve leaching ?

A. Dissolving gold from ores

B. Dissolving pharmaceutical products from bark or roots

C. Dissolving sugar from the cells of the beet

D. Removing nicotine from its water solution by kerosene

The unit of 'time constant' of a system is the same as that of _____?

A. Velocity

B. TimeC. (Time)⁻¹

D. None of these

Thermoplastic materials _____?

A. Do not soften on application of heat

B. Are heavily branched molecules

C. Are solvent insoluble

D. None of these

Pick out the correct statement ?

A. Higher hold up of the solid in the rotary dryer results in better exposure of the solids to the gas

B. The 'Hatta number' is important in problems involving gas absorption without chemical

reaction

C. For a non-reacting binary mixture of ideal gases, the partial pressure distribution of both

components is linear in the case of steady state equimolar counter-diffusion

D. Total reflux in case of distillation operation requires infinite number of plates for a binary system separation

Mineral matter content (M) and ash content A. in coal are approximately related as _____?

A. $M = 1.1A$

B. $M = A$

C. $M = 1.5A$

D. $M = 2A$

SiO₂ percentage in firebrick is about _____?

A. 35-40

B. 55-60

C. 80-85

D. > 94

Gummy & sticky materials like molasses, sugar etc. are best transported/handled by using a _____ conveyor?

A. Drag

B. Ribbon

C. Screw

D. Slat

When the steel is subjected to normalising, its _____ decreases?

A. Yield point

B. Ductility

C. Ultimate tensile strength (UTS)

D. None of these

For any system, the _____ heat of solution is dependent on the temperature and the adsorbate concentration?

- A. Integral
- B. Differential
- C. Both A. & B.**
- D. Neither A. nor B.

A 'unit process' is exemplified by the _____?

- A. Distillation
- B. Hydrogenation of oils**
- C. Absorption
- D. Humidification

High thermal conductivity of a refractory material is not important, when it is to be used in the _____?

- A. Coke oven regenerators
- B. Muffle furnace
- C. Blast furnace**
- D. Recuperators

Dust content in raw blast furnace gas is about _____ gm/Nm³; hence it is cleaned to the dust level of about < 10 mg /Nm³ before use?

- A. 15-30**
- B. 1-2
- C. 70-100
- D. 150-200

Viscosity of a polymer solution or melt _____?

- A. Decreases with increase in molecular weight
- B. Decreases with increase in temperature
- C. Increases with increase in temperature**
- D. Does not vary with temperature rise

In continuous filtration (at a constant pressure drop), filtrate flow rate varies inversely as the _____?

- A. Square root of the velocity**
- B. Square of the viscosity
- C. Filtration time only
- D. Washing time only

For the irreversible elementary reactions in parallel as shown in the bellow figure, the rate of disappearance of 'X' is equal to _____?

- A. CA (K1 + K2)**
- B. CA (K1 + K2)/2
- C. CA . K1/2
- D. CA . K2/2

Dacron is a _____?

- A. Condensation product of Hexamethylene diamine and adipic acid
- B. Thermosetting material
- C. Condensation product of dimethyl terephthalate and ethylene glycol
- D. None of these**

In area meter (e.g., Rotameter), with increase in the fluid flow rate, the _____?

- A. Pressure drop increases linearly
- B. Pressure drop is almost constant**
- C. Area through which fluid flows does not vary
- D. None of these

For a cylindrical vessel of moderate height, the weld joint efficiency for joints parallel to the cylindrical axis is given as 1.0; while for joints along the girth (circumference) it is given as 0.8. In calculating the shell wall thickness using code formula for an internally pressurised cylindrical vessel, what value of weld

joint efficiency should be used ?

- A. 0.8
- B. 0.9
- C. 1.0
- D. (0.8)0.5

Pick out the wrong statement pertaining to a shell and tube heat exchanger ?

- A. The minimum value of baffle spacing is 50 mm
- B. The maximum value of baffle spacing is equal to the I.D. of the shell
- C. The maximum unsupported tube span is generally about 75 times tube diameter, but is reduced to about 60 times for aluminium, copper & alloys of these
- D. Disk and doughnut baffle is the most commonly used baffle**

Viscosity of atmospheric air may be about _____ centipoise?

- A. 0.015**
- B. 1.5
- C. 15
- D. 150

The driving potential for the crystal growth during crystallisation is the _____ of the solution?

- A. Concentration
- B. Viscosity
- C. Super-saturation**
- D. Density

Which of the following is not a unit of reaction rate ?

- A. Moles for med/(surface of catalyst) (time)
- B. Moles formed/volume of reactor) (time)
- C. Mole formed/volume of catalyst) (time)
- D. None of these**

Oxygen percentage in the flue gas coming out of a gaseous fuel fired furnace

should be ideally about _____ percent?

- A. < 2
- B. < 5
- C. < 8
- D. < 10

The molecularity and the order of reaction respectively, for the hydrolysis of methyl acetate in presence of acids are _____?

- A. 2 & 1
- B. 11 & 2
- C. 2 & 2
- D. 1 & 1

The noble metals _____?

- A. Are exemplified by Na, K and Li
- B. Do not resist corrosion very strongly
- C. **Are the lowermost in the electro-chemical series of metals**
- D. None of these

Massecuite is a terminology used in the _____ industry ?

- A. Paint
- B. Oil hydrogenation
- C. Soap
- D. **Sugar**

The disintegration rate of a radioactive element _____?

- A. Progressively increases
- B. **Progressively decreases**
- C. Remains constant throughout
- D. May increase or decrease depending on the material

Energy equivalent to one atomic mass unit (amu) is _____ MeV?

- A. 9.31

- B. 93.1
- C. 931**
- D. 9310

Number of secondary neutron emitted on fission of an atom of U-235 by slow neutron bombardment is _____?

- A. 3**
- B. 235
- C. 200
- D. 92

Global warming may result in _____?

- A. Flood
- B. Cyclone
- C. Decrease in food productivity
- D. All A., B. and C.**

Panel test determines the _____ of refractories?

- A. Fusion point
- B. Spalling resistance**
- C. Slag penetration resistance
- D. Refractoriness under load (RUL)

The thermal radiation emitted by a body is proportional to T^n , where T is its absolute temperature. The value of 'n' is exactly 4 for _____?

- A. Black painted bodies only
- B. All bodies**
- C. Polished bodies only
- D. A black body

With increase in pressure, the relative volatility for a binary system _____?

- A. Increases

B. Decreases

C. Remains same

D. Either A. or B., depends on the system

What is the selectivity index, if the grade of tailings & concentrate is the same ?

A. 0

B. ∞

C. 1

D. 0.5

In packed towers provided with saddle packing, liquid redistributors are positioned at every _____ times column diameter or 6 metres whichever is less?

A. 2-3

B. 5-8

C. 10-15

D. 20-25

Salt is the basic raw material for the manufacture of _____?

A. Cement

B. Glass

C. Potteries

D. Caustic soda

The normal stress is the same in all directions at a point in a fluid, only when the fluid _____?

A. Is at rest & has zero viscosity

B. Is frictionless

C. Fluid layer has no motion relative to an adjacent layer of fluid

D. is incompressible & frictionless

High alumina refractory compared to fireclay bricks

have _____?

- A. Less load bearing capacity
- B. Less resistance to slag attack
- C. Low refractoriness
- D. High resistance to thermal shock and creep**

Coke ovens in steel plant are heated by _____?

- A. Electricity
- B. Coke oven gas
- C. Mixed gas
- D. Both B. & C.**

The catalytic cracking of heavier petroleum fraction is done to produce mainly _____?

- A. Gasoline
- B. Asphalt
- C. Diesel oil**
- D. Tar

“The ratio of the total emissive power to the absorptivity for all bodies is same at thermal equilibrium”. This is _____ law?

- A. Kirchoff's**
- B. Planck's
- C. Wien's displacement
- D. Stefan-Boltzmann

Horsepower increase of a centrifugal gas compressor without altering the volumetric flow rate will _____ the gas discharge pressure?

- A. Increase**
- B. Decrease
- C. Not change
- D. Exponentially decrease

Use of chlorine in the treatment of sewage _____?

- A. Helps in grease separation**
- B. Increases the biological oxygen demand (BOD)
- C. Causes bulking of activated sludge
- D. Aids in flocculation

Final product of uranium extraction plant at Jadugoda (Bihar) is _____?

- A. Uranium
- B. Uranium oxide
- C. Uranium carbide
- D. Magnesium diuranate**

Agitator is provided in a crystalliser for _____?

- A. Avoiding deposition on cooler surfaces
- B. Formation of nuclei
- C. Crystal growth
- D. All A., B. and C.**

Main use of soft coke is as _____ fuel?

- A. Domestic**
- B. Blast furnace
- C. Foundry
- D. None of these

Which of the following has the highest gross calorific value ?

- A. Blast furnace gas
- B. Coke oven gas
- C. Carburetted water gas
- D. Oil refinery gas**

Presence of even 0.005% of _____ in copper makes it highly brittle, rendering it useless for wire-drawing?

- A. Oxygen
- B. Arsenic
- C. Antimony
- D. Bismuth**

Location of vena-contracta in an orificemeter does not depend upon the _____?

- A. Type of orifice**
- B. Density, viscosity & compressibility of the fluid
- C. Ratio of pipe diameter to orifice diameter
- D. Pipe roughness

_____ is not a case hardening process?

- A. Carburising
- B. Nitriding
- C. Cyaniding
- D. Annealing**

Carborundum consists mainly of _____?

- A. Bauxite
- B. Silicon carbide**
- C. Boron carbide
- D. Calcium carbide

Which of the following is not accomplished by agitation of liquids in agitators ?

- A. Dispersing gas in liquid
- B. Blending of immiscible liquids**
- C. Dispersing immiscible liquid in form of emulsion
- D. Suspending solid particles

Roof of a basic electric furnace is made of _____ bricks?

- A. Superduty fireclay
- B. Silica**

- C. Chromite
- D. None of these

Reciprocal of sphericity is termed as the _____?

- A. Specific surface ratio
- B. Shape factor**
- C. Sauter diameter
- D. Surface area per unit mass

Heat of reaction is a function of the _____?

- A. Pressure
- B. Temperature
- C. Both A. & B.**
- D. Neither A. nor B.

_____ are used for the separation of coarse particles from a slurry of fine particles?

- A. Thickeners
- B. Classifiers**
- C. Hydrocyclones
- D. Decanters

Plate towers are preferred to packed towers, when large temperature changes are involved, because of the reason that the _____?

- A. Packing may be crushed due to thermal expansion/contraction of the components of the equipments**
- B. Pressure drop in the equipment will be very high
- C. Viscosity variation of the fluids may cause channelling/flooding
- D. None of these

For a reversible process involving only pressure-volume work _____?

- A. $(dF)_T, p = 0$
- C. $(dF)_T, p = 0$**
- D. $(dA)_T, v < 0$

In which of the following case of mixing of a strong acid with strong base (each of 1N concentration), temperature increase will be the highest ?

- A. 30 c.c acid and 30 c.c base**
- B. 20 c.c acid and 25 c.c base
- C. 15 c.c acid and 35 c.c base
- D. 35 c.c acid and 15 c.c base

Which of the following is the most widely used cracking process in oil refineries ?

- A. Dubbs process
- B. T.C.C. moving bed process
- C. Fluidised bed catalytic cracking process**
- D. Houdry's fixed bed process

The order of preference for feedstock to a catalytic reformer is _____ ?

- A. Catalytic naphtha – coking naphtha – virgin naphtha
- B. Coking naphtha – virgin naphtha – catalytic naphtha**
- C. Virgin naphtha – catalytic naphtha – coking naphtha
- D. Virgin naphtha – coking naphtha – catalytic naphtha

If pH value of an acidic solution is decreased from 5 to 2, then the increase in its hydrogen ion concentration is _____ times?

- A. 10
- B. 100
- C. 1000**
- D. 10000

Large scale usage of flash distillation is practised in _____?

- A. Soap manufacturing
- B. Ammonia synthesis plant
- C. Polymerisation industry
- D. Petroleum refining**

Joule-Thomson co-efficient for a perfect gas is _____?

- A. Zero**
- B. Positive
- C. Negative
- D. None of these

Phosphorus vapour comprises of _____?

- A. P
- B. P₂
- C. P₃
- D. P₄**

Plant tranquillisers _____?

- A. Hold back stem growth and halt plants at a desired height**
- B. Cause early maturation of plants
- C. Accelerate ripening of food and grain
- D. Produce seedless fruit

The cooling rate required to freeze 1 ton of water at 0°C into ice at 0°C in 24 hours is _____ BTU/hr?

- A. 100
- B. 200**
- C. 1000
- D. 2000

Critical temperature is defined as the temperature above which a gas will _____?

- A. Not liquify (barring exceptions)
- B. Immediately liquify
- C. Never liquify however high the pressure may be**
- D. None of these

Which of the following does not require preheating during storage in the storage tank as well as during atomisation through burners ?

- A. PCM
- B. Tar
- C. Light diesel oil**
- D. Low viscosity furnace oil

In the reaction, $C + O_2 \rightarrow CO_2$; $\Delta H = -94$ kcal. What is the heat content (enthalpy) of O_2 ?

- A. -94 kcal
- B. > -94 kcal
- C. < -94 kcal
- D. Zero**

Polypropylene compared to polythene is _____?

- A. Harder
- B. Stronger
- C. Lighter
- D. All A., B. and C.**

Hydrogen in liquid steels is dissolved _____?

- A. As tiny gas bubbles**
- B. In the atomic form
- C. In the ionic form
- D. In the molecular form

Which of the following would require least amount of secondary air for combustion ?

- A. Coke breeze containing 25% ash and 2% volatile matter**
B. Anthracite containing 10% volatile matter and 8% ash
C. Bituminous coal containing 20% ash and 25% volatile matter
D. Semi-bituminous coal containing 25% ash and 20% volatile matter

Liquid/petroleum fuel storage tanks are built underground (as in case of petrol pumps), when the storage capacity is less than _____ kilolitres?

- A. 20
B. 30
C. 45
D. 85

Baffle width is normally taken as _____ times the tank diameter?

- A. 0.1-0.12**
B. 0.4-0.5
C. 0.45-0.6
D. 0.2-0.45

The clearance between two tubes in a shell and tube heat exchanger is known as 'ligament', whose minimum value is _____ the outside diameter of the tube, but in no case it should be less than 4.5 mm?

- A. Equal to
B. Half
C. One fourth
D. Three fourth

The vessel dispersion number ($D/\mu L$) for plug flow is _____?

- A. 0**
B. 500
C. 750
D. ∞

The temperature at which ferromagnetic material can no longer be magnetized

by the outside forces, is termed as the _____?

- A. Critical point
- B. Curie temperature**
- C. Inversion temperature
- D. Eutectic temperature

For which pair of the fuel gases, calorific value (C.V.) of one fuel is almost double that of the other on volume basis (i.e., kcal/Nm³), while the C.V. is same on weight basis (i.e., kcal/kg) ?

- A. Propane and acetylene**
- B. Propane and LPG
- C. Sewage gas and gobar gas
- D. B.F. gas and coke oven gas

Which of the following decreases during evaporative cooling process with recirculated water supply ?

- A. Wet bulb temperature
- B. Relative humidity
- C. Partial pressure of vapour
- D. None of these**

_____ is used for determining the tensile strength of steels ?

- A. Hydraulic press
- B. Universal testing machine**
- C. Mechanical press
- D. None of these

Kel-F is a material, which is _____?

- A. Chemically known as Polychlorotrifluoroethylene (PTFE)
- B. Having excellent chemical & high temperature resistance (upto 200°C)
- C. Having elastomeric properties
- D. All A., B. and C.**

The number of degrees of freedom for a mixture of ice and water (liquid) are _____?

- A. 3
- B. 2
- C. 1**
- D. 0

A masonry structure built below ground level, where biochemical reaction takes place due to anaerobic bacteria is called _____?

- A. Cesspool
- B. Lagoon
- C. Skimming mill
- D. Septic tank**

Addition of silicon to cast iron _____?

- A. Promotes graphite module formation
- B. Improves its ductility
- C. Does not promote graphite flakes formation
- D. Increases the fluidity of molten metal**

Shortest distance between two tubes is _____?

- A. Called tube pitch
- B. Called tube clearance**
- C. More in case of triangular pitch as compared to square pitch of tube layout
- D. None of these

Visbreaking process is used mainly for making _____?

- A. High cetane diesel
- B. High octane gasoline
- C. Fuel oil**
- D. Smoke free kerosene

Efficiency of a heat engine working on Carnot cycle between two temperature

levels depends upon the _____?

- A. Two temperatures only**
- B. Pressure of working fluid
- C. Mass of the working fluid
- D. Mass and pressure both of the working fluid

The majority charge carriers in p-type silicon are _____?

- A. Free electrons
- B. Ions
- C. Conduction electrons
- D. Holes**

Which is an anticing compound ?

- A. Amyl nitrate
- B. Alcohols**
- C. Mercaptans
- D. Pyridine

Cavitation in a pump creates so many undesirable effects. Out of the following, which is not an undesirable effect created by cavitation ?

- A. Decrease in effect
- B. Increase in thrust
- C. Develops noise
- D. Develops high pressure**

Which of the following is not a dimension-less parameter ?

- A. Euler number
- B. Specific gravity
- C. Fanning friction factor
- D. None of these**

Good design of the casing of a centrifugal pump aims at minimising the _____?

- A. Cavitation
- B. Frictional losses
- C. Kinetic energy loss**
- D. Static head

When the wet steam is throttled but still remains wet at the exit of the throttle valve, then its temperature & dryness fraction respectively_____?

- A. Decreases & increases**
- B. Increases & increases
- C. Increases & decreases
- D. Decreases & decreases

Pick out the wrong unit conversion of mass transfer co-efficient?

- A. $1 \text{ lb/hr.ft}^3.\text{atm.} = 4.8182 \text{ kg/hr.m}^2.\text{bar}$
- B. $1 \text{ kg/hr.m}^2.\text{atm} = 0.98687 \text{ kg/hr. m .bar}$
- C. $1 \text{ lb/hr.ft}^2 = 4.8823 \text{ kg/hr.m}^2$
- D. $1 \text{ kg/hr.m}^2 = 4.8823 \text{ lb/hr.ft}^2$**

Fuel combustion is never cent per cent efficient due to_____?

- A. Incomplete combustion
- B. Dry gas/stack gas loss
- C. Moisture loss
- D. All A., B. and C.**

In a single stage extraction process, 10 kg of pure solvent S (containing no solute A) is mixed with 30 kg of feed F containing A at a mass fraction $x_f = 0.2$. The mixture splits into an extract phase E and a raffinate phase R containing A at $x_B = 0.5$ and $x_R = 0.05$ respectively. The total mass of the extract phase is (in Kg) ?

- A. 6.89
- B. 8.89**
- C. 10

D. 8.25

Entropy, which is a measure of the disorder of a system, is _____?

- A. Independent of pressure
- B. Independent of temperature
- C. Zero at absolute zero temperature for a perfect crystalline substance**
- D. All A, B. & C

Which of the following must be followed by the flow of a fluid (real or ideal)? (I) Newton's law of viscosity. (II) Newton's second law of motion. (III) The continuity equation. (IV) Velocity of boundary layer must be zero relative to boundary. (V) Fluid cannot penetrate a boundary?

- A. I, II, III
- B. II, III, V**
- C. I, II, V
- D. II, IV, V

In natural convection heat transfer, the correlating parameter is the _____?

- A. Graetz number
- B. Eckert number
- C. Grashoff number**
- D. Bond number

Which of the following is the most efficient for removal of very finely divided suspended solids and colloidal matter from the polluted water stream ?

- A. Sedimentation tank
- B. Circular clarifier
- C. Mechanical flocculation
- D. Chemical coagulation**

Hydraulic diameter for non-circular ducts is equal to _____ times the area of flow divided by the perimeter?

- A. Two
- B. Three
- C. Four**
- D. Eight

Presence of SO₂ in furnace gases attacks the ferrous metal by way of _____?

- A. Accelerating the rate of scaling
- B. Causing metal embrittlement
- C. Attacking the grain boundaries; particularly severe on low carbon and nickel bearing steels at high temperature
- D. All A., B. and C.**

Sherardizing process is used for _____?

- A. Surface coating**
- B. Heat treatment of high speed steel
- C. Cold working on metals
- D. None of these

Percentage of drum submerged in the slurry in case of rotary drum filter is _____?

- A. 3
- B. 30**
- C. 85
- D. 25

_____ of quicklime produces slaked lime ?

- A. Hydration**
- B. Dehydration
- C. Hydrogenation

D. None of these

The trace metal present in insulin is _____?

- A. Cu
- B. Zn**
- C. Fe
- D. Ni

The caking of crystals can be prevented by _____?

- A. Maintaining high critical humidity
- B. Maintaining low critical humidity
- C. Coating the product with inert material
- D. Both A. and C.**

Dies for wire drawing are generally made of _____?

- A. Mild steel**
- B. Stainless steel
- C. Carbides
- D. High carbon steel

Chloramines are used in water treatment for _____?

- A. Disinfection and control of taste & odour**
- B. Corrosion control
- C. Removing turbidity
- D. Control of bacteria

Recrystallisation temperature of steel is _____ °C?

- A. 50
- B. 300
- C. 500
- D. 800**

Plate efficiency _____?

A. Is a function of the mass transfer between liquid and vapour

- B. Increases due to foaming
- C. Increases due to liquid entrainment
- D. Increases due to weeping and dumping of liquid

The hottest part of the flame lies in its _____ zone?

A. Non-luminous

- B. Luminous
- C. Yellow
- D. Unburnt gases

A non-linear chemical system is exemplified by a/an _____?

- A. Isothermal CSTR
- B. Mixer
- C. Non-isothermal CSTR**
- D. None of these

Which of the following is not the commercial name of poly-methyl-methacrylate (PMMA) ?

A. Styrofoam

- B. Lucite
- C. Perspex
- D. Plexiglass

A binary liquid Azeotropic mixture has boiling point lower than either of the components, when it shows _____ deviation from Raoult's Law?

A. Positive

- B. Negative
- C. No
- D. None of these

With increase in the porosity, thermal spalling resistance of fireclay brick _____?

- A. Increases
- B. Decreases
- C. Remain same
- D. May increase or decrease

Spalling of a refractory means its _____?

- A. Softening
- B. Fracture due to uneven expansion at high temperature**
- C. Resistance to compressive loads
- D. Resistance to chemical action of gases and molten fluxes

99.5% purity oxygen is used in _____?

- A. Cutting and welding by oxy-acetylene flame
- B. Hospitals for medicinal purposes
- C. Gas masks and artificial breathing apparatus
- D. All A, B, and C.**

Cast iron has very high _____?

- A. Compressive strength**
- B. Ductility
- C. Shock resistance
- D. Resistance to brittleness

_____ polythene is most prone to stress-cracking ?

- A. High density**
- B. Low density
- C. Cross-linked
- D. Linear low density

Walls, roofs & combustion chambers of annealing furnaces are made of _____ bricks?

- A. High duty fireclay**
- B. Silica

- C. Mullite
- D. Carborundum

1 BTU/ft³ is approximately equal to _____ kcal/m³?

- A. 1
- B. 9**
- C. 4
- D. 252

The Prandtl mixing length is _____?

- A. Zero at the pipe wall and is a universal constant
- B. Independent of radial distance from the pipe axis
- C. Independent of the shear stress
- D. Useful for computing laminar flow problems**

An increase in the liquid resistance to interphase mass transfer and a resultant reduction in plate efficiency is caused by _____?

- A. An increase in liquid viscosity
- B. An increase in relative volatility for rectification columns
- C. Decrease in gas solubility for absorbers
- D. All A., B. and C.**

Diaphragm pumps are used to transport _____?

- A. Solids
- B. Liquids
- C. Fluids
- D. Slurries**

Kopp's rule is useful for the determination of _____?

- A. Molal heat capacities of gases
- B. Heat capacities of solids**
- C. Activation energy
- D. Heat capacities of gases

Ball mills and tube mills with flint or porcelain balls are used for size reduction of _____?

- A. Asbestos
- B. Rubber
- C. Non-metallic ores**
- D. Limestone

Radiant energy received by a body is proportional to (where, d = the distance between the object emitting radiation and that receiving it.) ?

- A. \sqrt{d}
- B. d
- C. d^2**
- D. $d^{1.5}$

An irreversible aqueous phase reaction, $A + B \rightarrow P$, is carried out in an adiabatic mixed flow reactor. A feed containing 4 kmole/m^3 of each A and B enters the reactor at $8 \text{ m}^3/\text{hr}$. If the temperature of the exit stream is never to exceed 390 K , what is the maximum inlet feed temperature allowed? Data: Heat of reaction = -50 kJ/mole Density of the reacting mixture = 1000 kg/m^3 Specific heat of reacting mixture = 2 kJ/kg.K The above data can be assumed to be independent of temperature and composition?

- A. 190
- B. 290**
- C. 390
- D. 490

Horsepower requirement for given pump capacity depends upon the _____?

- A. Specific gravity of the liquid
- B. Suction lift
- C. Discharge head

D. All A., B. and C.

Foul odour and bad taste of water is removed by treating with _____?

- A. Alum
- B. Bleaching powder
- C. Activated carbon**
- D. Copper sulphate

Which of the following is a non-fissile material ?

- A. Plutonium-239
- B. Uranium-235
- C. Uranium-233
- D. Thorium-232**

Temperature during hydrogenation of oil should not be more than 200°C , otherwise it will result in _____?

- A. Pyrolysis of oil
- B. Sintering of porous catalyst
- C. Hydrogen embrittlement
- D. All A, B. and C.**

In Biot number, the characteristic length used is the ratio of the _____ of the solid?

- A. Volume to surface area**
- B. Perimeter to surface area
- C. Surface area to volume
- D. Surface area to perimeter

The ratio of the hydraulic radius to the diameter of the channel, for maximum mean velocity of flow in a circular channel, in open channel flow is _____?

- A. 0.3
- B. 0.9
- C. 0.03
- D. 0.66

Fugacity co-efficient of a substance is the ratio of its fugacity to _____?

- A. Mole fraction
- B. Activity
- C. Pressure**
- D. Activity co-efficient

Crushing strength of a refractory _____?

- A. Increases with rise in service temperature
- B. Decreases with rise in service temperature**
- C. Is unaffected with change in service temperature
- D. Decreases with increase in porosity

“The equilibrium value of the mole fraction of the gas dissolved in a liquid is directly proportional to the partial pressure of that gas above the liquid surface”. This statement pertaining to the solubility of gases in liquid is the _____ law?

- A. Raoult's
- B. Henry's**
- C. Amagat's
- D. None of these

The binary diffusivity in gases does not depend upon the _____?

- A. Pressure
- B. Temperature
- C. Nature of the components

D. None of these

In case of liquid-liquid binary diffusion, diffusivity of one constituent into another is not dependent on the _____?

- A. Temperature and pressure
- B. Concentration
- C. Nature of the constituents

D. None of these

Pressure drop for turbulent fluid flow through a circular pipe is given by _____?

- A. $64/Re$
- B. $32\mu LV/gc.D^2$
- C. $4f (L/D) (v^2/2gc). \rho$**
- D. $f (L/D) (v^2/2gc). \rho$

Bernoulli's equation describes the _____?

- A. Mechanical energy balance in potential flow**
- B. Kinetic energy balance in laminar flow
- C. Mechanical energy balance in turbulent flow
- D. Mechanical energy balance in boundary layer

Cement clinker is reduced to fine size by a _____?

- A. Roll crusher
- B. Ball mill
- C. Tube mill**
- D. Hammer mill

With increase in the concentration of the adsorbate, the integral heat of adsorption _____?

- A. Increases
- B. Decreases**
- C. Remains unchanged

D. May increase or decrease; depends on the type of adsorbate

Nicotine is _____ ?

- A. A volatile alkaloid
- B. Obtained by treating by-products of the tobacco processing industry
- C. Both A. and B.**
- D. Neither A. nor B.

The specific heat of saturated water vapour at 100°C is _____ ?

- A. ∞
- B. -ve**
- C. 0
- D. +ve

Which of the following elements is not included in the scope of market analysis ?

- A. Competition from other manufactures
- B. Product distribution
- C. Opportunities
- D. Economics**

For an incompressible fluid, the bulk modulus of elasticity is _____ ?

- A. 5 kg/m³
- B. ∞ N/m²**
- C. 1 N
- D. 0 N/m

Which of the following equipments is not used for gas dispersion ?

- A. Agitated vessels
- B. Bubble cap tray towers
- C. Perforated sieve tray towers
- D. Spray towers**

To improve the machinability of steel, it is generally subjected to _____?

- A. Spheroidising
- B. Tempering
- C. Normalising
- D. Annealing

Reaction of dilute sulphuric acid with phosphate rock produces _____?

- A. Phosphoric acid
- B. Superphosphate
- C. Triple superphosphate
- D. Gypsum

Coke oven regenerators are made of _____ bricks?

- A. Fire clay
- B. Silica
- C. Low thermal conductivity
- D. High electrical conductivity

High aniline point of a petrofuel (say diesel) indicates that _____?

- A. It is highly aromatic in nature
- B. It is highly paraffinic in nature
- C. It has a very low diesel index
- D. Its ignition quality is very poor

Hess's law of constant heat summation is based on conservation of mass. It deals with _____?

- A. Equilibrium constant
- B. Reaction rate
- C. Changes in heat of reaction
- D. None of these

Percentage of alcohol in beer may be around _____ percent?

- A. 2-8
- B. 18-23
- C. 27-32
- D. 1-4

During which of the following operating conditions of an automobile, carbon monoxide content in the exhaust gas is maximum ?

- A. Idle running
- B. Acceleration
- C. Cruising
- D. Deceleration

During decarburising of a plain carbon steel, the thickness of ferrite layer growth is proportional to _____ ?

- A. Time
- B. Square root of time
- C. Square of time
- D. Cube of time

Flow of filtrate through the cake in a plate and frame filter press is best described by the _____ equation?

- A. Kozeny-Carman
- B. Hagen-Poiseuille's
- C. Fanning's
- D. Kremser

Sphericity for a non-spherical particle is given by (where, V and S are volume and surface area respectively of one particle. and, D = equivalent diameter of particle)?

A. 6.V/D.S

B. V/6D.S

C. D.S/V

D. V/D.S

Systemic insecticides _____?

A. Are absorbed throughout the plant

B. Kill insects following external bodily contact

C. Are stomach poisons

D. Emit poisonous vapour

_____ treatment is done for appreciable improvement in viscosity index of lubricating oil?

A. Acid

B. Solvent extraction

C. Alkali

D. Clay

Wrought iron is a suitable material of construction for handling _____ solutions?

A. Dilute acidic

B. Concentrated acidic

C. Alkalis & alkaline

D. None of these

The maximum discharge through a circular channel takes place, when the depth of the fluid flow is _____ times the pipe diameter?

A. 0.25

B. 0.5

C. 0.66

D. 0.95

Periclase is _____?

A. Crystalline form of MgO

B. MgCO₃

C. ZrSO₄

D. Amorphous magnesite

Paper like thin plastic articles can be produced by _____?

A. Blow moulding

B. Vacuum thermo forming

C. Injection moulding

D. None of these

Which of the following adsorbent is used to decolourise yellow glycerine ?

A. Silica gel

B. Alumina

C. Fuller's earth

D. Activated carbon

In case of a multipass shell and tube heat exchanger, providing a baffle on the shell side _____ the heat transfer rate?

A. Increases

B. Decreases

C. Does not affect

D. May increase or decrease, depends on the type of baffle

The diffusivity D . in a binary gas mixture is related to the pressure (P) as _____?

A. $D \propto P^{0.5}$

B. $D \propto 1/P^{0.5}$

C. $D \propto 1/P$

D. $D \propto 1/P^{1.5}$

As the C/H ratio of the fuel increases, the amount of CO₂ formed on combustion _____ for the same percentage of excess air?

- A. Decreases
- B. Increases**
- C. Remain same
- D. May increase or decrease depending on the type of fuel

Softening temperature of coal ash is a measure of the _____ of coal?

- A. Caking tendency
- B. Coking tendency
- C. Clinkering tendency**
- D. Size stability

Excessive use of chemical fertilisers causes shrivelling of the roots and wilting of the plant, because the _____?

- A. Osmotic pressure of the soil water becomes less than that of the plant sap
- B. Soil becomes too alkaline
- C. Osmotic pressure of the soil water becomes higher than that of the plant sap**
- D. Soil becomes too acidic

_____ cannot control the noise pollution ?

- A. Use of silencers
- B. Green house gases**
- C. Vibration damping
- D. Tree plantation

What is the overall transfer function (C/R) of the following block diagram if $G = G_1 \cdot G_2 \cdot G_3$ and $H = H_1 \cdot H_2$?

- A. $1/(1 + GH)$
- B. $G/(1 + GH)$**
- C. $H/(1 + GH)$
- D. $G/(1 - GH)$

DDT should not be allowed to come in contact with iron (during its manufacture) to _____?

A. Avoid its decomposition

- B. Prevent sulphonation of the monochlorobenzene by the acid catalyst
- C. Achieve non-hygroscopic property
- D. None of these

The new nucleus formed after β -decay of a radioactive element has _____?

A. Less atomic number

- B. Less atomic weight
- C. More atomic number
- D. More atomic weight

Various efficiencies of a centrifugal pump are related as (where, ϵ_m = mechanical efficiency ϵ_v = volumetric efficiency. ϵ_{ma} = manometric efficiency ϵ_o = overall efficiency) ?

A. $\eta_{ma} \times \eta_m \times \eta_v = \eta_o$

B. $\eta_m = \eta_v \cdot \eta_{ma}$

- C. $\eta_{ma} = \eta_m \times \eta_v$
- D. $\eta_v = \eta_m \times \eta_{ma}$

What is the dynamic error in a critically damped second order instrument for a ramp input (At) ?

- A. 0.5 AT
- B. 2 AT**
- C. \sqrt{AT}
- D. 1.5 AT

In SI units, fouling factor is expressed in _____?

A. m^2K/W

- B. W/m^2K
- C. m^2K
- D. m^2K/W

Evaporator used for concentrating tomato juice is made of

_____?

- A. Nickel
- B. Brass
- C. Stainless steel-glass lined**
- D. Cast iron-rubber lined

Valves in pipe size of 2" and under are normally made

of _____?

- A. Wrought iron
- B. Brass**
- C. Bronze
- D. Monel

German silver is an alloy of copper, nickel and _____?

- A. Zinc**
- B. Silver
- C. Tin
- D. Lead

The ratio of the area of openings in one screen (Taylor series) to that of the openings in the next smaller screen is _____?

- A. 1.5
- B. 1
- C. $\sqrt{2}$
- D. None of these**

Gravity stamp mill is meant for the _____ crushing?

- A. Primary
- B. Intermediate
- C. Fine**
- D. Ultrafine

Increase in the specific gravity of petroleum products indicates _____?

- A. Decrease in paraffin content
- B. Increase in thermal energy per unit weight
- C. Increase in aromatic content
- D. Higher H/C ratio

The pressure at a point in a fluid is not the same in all directions, when the fluid is viscous and _____?

- A. Moving
- B. Static
- C. Cold
- D. Hot

Pick out the correct statement ?

- A. Deforestation helps in controlling the green house effect
- B. Global warming is detrimental for increase in food productivity and may cause flood and cyclone**
- C. Lightening discharges are natural source of production of SO₂ & H₂S pollutant
- D. Sulphur dioxide causes death by asphyxiation

One of the specific gravity scales is "Brix" (used specifically for sugar solution). It is defined as _____?

- A. Brix = (400/G) – 400**
- B. Brix = 200 (G-1)
- C. Brix = 145 – (145/G)
- D. None of these

Molality is defined as the number of gm moles of solute per _____ of solvent?

- A. Litre

- B. kg
- C. gm.mole
- D. gm

_____ present in coal is not determined in its ultimate analysis ?

- A. Fixed carbon**
- B. Total carbon
- C. Hydrogen
- D. Nitrogen

The characterisation factor of crude petroleum oil is around _____?

- A. 3
- B. 11**
- C. 22
- D. 28

Which of the following conveyors cannot be recommended for transportation of abrasive materials ?

- A. Belt conveyor
- B. Apron conveyor
- C. Flight conveyor**
- D. Chain conveyor

Unbreakable crockeries are made from _____ polymers?

- A. Polystyrene**
- B. Melamine
- C. Polystyrene
- D. Polyurethane

Teflon is _____?

- A. Phenol formaldehyde
- B. An inorganic polymer

C. Polytetrafluoroethylene (PTFE)

D. A monomer

The overall heat transfer co-efficient for a shell and tube heat exchanger for clean surfaces is $U_0 = 400 \text{ W/m}^2\text{.K}$. The fouling factor after one year of operation is found to be $h_{d0} = 2000 \text{ W/m}^2\text{.K}$. The overall heat transfer co-efficient at this time is _____?

A. $1200 \text{ W/m}^2\text{.K}$ B. $894 \text{ W/m}^2\text{.K}$ **C. $333 \text{ W/m}^2\text{.K}$** D. $287 \text{ W/m}^2\text{.K}$

Grams of butane (C_4H_{10}) formed by the liquefaction of 448 litres of the gas (measured at (STP) would be _____?

A. 580

B. 640

C. 1160

D. Data insufficient; can't be computed

Maximum size reduction in a fluid energy mill is achieved by _____?

A. Compression

B. Interparticle attrition

C. Cutting

D. Impact

Turn down ratio of a burner _____?

A. Should be as low as possible i.e., 1 : 2

B. Should be 1:1 for a batch type furnace

C. Is the ratio of maximum to minimum permissible heat input rates

D. Is normally much more for a continuous furnace as compared to a batch furnace

Smoke is produced due to _____?

- A. Insufficient supply of combustion air and insufficient time for combustion
- B. Poor quality of fuel and improper mixing of fuel & combustion air
- C. Poor design & overloading of furnace
- D. All A., B. and C.**

In a shell and tube heat exchanger, the shell side fluid velocity can't be changed by changing the _____?

- A. Tube layout
- B. Tube diameter**
- C. Tube pitch
- D. Number of baffles

In case of a pipe of constant cross-sectional area, the maximum fluid velocity obtainable is _____?

- A. The velocity of sound**
- B. Dependent on its cross-sectional area
- C. Dependent on fluid viscosity
- D. Dependent on fluid density

Which of the following is used as a binding material in soap to improve soap texture ?

- A. Rosin
- B. Borax**
- C. Benzyl acetate
- D. Sodium carbonate

Coke used for the production of calcium carbide should have _____?

- A. Low ash content
- B. Low ignition temperature
- C. High electrical resistivity

D. All A , B. and C.

The ratio of the shear stress to the principal stress on a principal plane is _____?

- A. 0
- B. 1
- C. 1/2
- D. 1/3

The heat treatment to which the steel wire containing > 0.25% carbon is subjected to is _____?

- A. Full annealing
- B. Bright annealing
- C. Patenting**
- D. None of these

Mixing of plastic solids is generally facilitated by _____?

- A. Dispersion
- B. Mastication
- C. Kneading**
- D. None of these

Thorium is mainly used _____?

- A. For the manufacture of gas mantles**
- B. As a fissile fuel in a nuclear reactor
- C. In the manufacture of hydrogen bomb
- D. In the treatment of cancer

For a thermodynamic system containing 'x' chemical species, the maximum number of phases that can co-exist at equilibrium is _____?

- A. x
- B. x + 1
- C. x + 2**

D. $x + 3$

Which of the following is not the triple point of water ?

- A. 32°R
- B. 273°K
- C. 492°R
- D. 32°F

For water evaporating into unsaturated air under adiabatic conditions and at constant pressure, the _____ remains constant throughout the period of vaporisation ?

- A. Dry bulb temperature
- B. Wet bulb temperature**
- C. Humidity
- D. Relative saturation

The longitudinal stress induced in a thin walled cylindrical vessel under internal pressure is _____ ?

- A. $pd/2t$
- B. $pd/4t$**
- C. pd/t
- D. $pd/8t$

Velocity of a small particle of diameter ' D_p ' at a distance ' r ' from the rotational axis of a cyclone rotating at an angular speed ' ω ' is given by (the other symbols are as per standard notation) ?

- A. $[(D_p/18) \cdot (\rho_s - \rho/\mu)] \omega^2 r$
- B. $[(D_p^2/18) \cdot (\rho_s - \rho/\mu)] \omega^2 r$
- C. $[(D_p/18) \cdot (\rho_s - \rho/\mu)] \omega^2 r^2$
- D. $[(D_p^2/18) \cdot (\rho_s - \rho/\mu)] \omega^2 r$**

Reciprocating pumps are not able to compete with the centrifugal pump for

industrial use, mainly because these pumps have _____?

- A. Very low speeds
- B. Smaller discharge
- C. Higher capital & maintenance cost**
- D. High vibrations

A catalyst promoter _____?

- A. Improves the activity of a catalyst**
- B. Acts as a catalyst support
- C. Itself has very high activity
- D. All A., B. and C.

Raw materials are charged in the iron blast furnace using _____?

- A. Bucket elevator
- B. Skip hoist**
- C. Screw conveyor
- D. None of these

A pure drug is administered as a sphere and as a cube. The amount of drug is the same in the two tablets. Assuming that the shape and size do not influence the mass transfer, the ratio of rate of dissolution in water at $t = 0$ for the cubic to spherical tablet is _____?

- A. 0.54
- B. 1.04
- C. 1.24**
- D. 1.94

Carbon black is pulverised in a _____?

- A. Hammer crusher
- B. Ball mill**
- C. Roll crusher

D. Gyrotory crusher

Drills are usually made of _____ ?

A. Cermets

B. High speed steel

C. Alloy steel

D. Tungsten carbide

Sphericity of a cubical particle, when its equivalent diameter is taken as the height of the cube, is _____ ?

A. 0.5

B. 1

C. $\sqrt{2}$

D. $\sqrt{3}$

_____ law of thermodynamics ascertains the direction of a particular spontaneous process?

A. Zeroth

B. First

C. Second

D. Third

Work done by a/an _____ process is determined by $\int p. dv$?

A. Adiabatic

B. Quasi-static

C. Isothermal

D. Isentropic

Aryl benzene sulphonate (ABS) is a _____ ?

A. Detergent

B. Plasticiser for unsaturated polyester

C. Starting material for the synthesis of glycerine

D. Coating ingredient for photographic film

Cold crushing strength of ordinary fireclay brick is about 950 kg/cm². On exposure to a temperature of about 1500°C, its crushing strength may come down to as low as _____ kg/cm²?

- A. 450
- B. 250
- C. 150
- D. 65**

Melting of wax is accompanied with _____ in entropy?

- A. Increase**
- B. Decrease
- C. No change
- D. None of these

The rate constant of a chemical reaction increases by 100 times when the temperature is increased from 400 °K to 500 °K. Assuming transition state theory is valid, the value of „E/R’ is _____?

- A. 8987°K
- B. 9210°K**
- C. 8764°K
- D. 8621°K

Gibbs phase rule finds application, when heat transfer occurs by _____?

- A. Conduction
- B. Convection
- C. Radiation
- D. Condensation**

Which of the following is not an alloy of tin ?

- A. White-bearing metal

- B. Pewter type metal
- C. Soft solder
- D. German silver**

Which of the following has maximum thermal conductivity ?

- A. Iron**
- B. Coal
- C. Nitrogen
- D. Tar

Quicksand is an example of a _____ fluid?

- A. Bingham plastic
- B. Dilatant**
- C. Newtonian
- D. Pseudo plastic

In the X-ray radiography technique, the tube voltage for thicker plates as compared to thin plates, should be _____?

- A. Higher, as it gives higher wavelength
- B. Lower, as it gives higher wavelength
- C. Higher, as it gives shorter wavelength**
- D. Lower, as it gives shorter wavelength

The wet and 'dry bulb temperature for a vapour-gas mixture are 25°C and 30°C respectively. If the mixture is heated to 45°C at constant pressure, the wet bulb temperature will be _____ °C?

- A. 25
- B. > 25**
- C. < 25
- D. – 25

Babbitt metal used for making bearings should have _____?

- A. High co-efficient of friction between journal and bearing**

- B. Ability to retain lubricant on its surface
- C. Low co-efficient of friction between journal and bearing
- D. Both B. & C.

Hydraulic radius is the ratio of _____?

- A. Wetted perimeter to flow area
- B. Flow area to wetted perimeter**
- C. Flow area to square of wetted perimeter
- D. Square root of flow area to wetted perimeter

The rate of a homogeneous reaction is a function of _____?

- A. Temperature and pressure only
- B. Temperature and composition only
- C. Pressure and composition only
- D. All temperature, pressure and composition**

Pick out the wrong statement ?

- A. Gross revenue is that total amount of capital received as a result of the sale of goods or service
- B. Net revenue is the total profit remaining after deducting all costs excluding taxes**
- C. The ratio of immediately available cash to the total current liabilities is known as the cash ratio
- D. Consolidated income statement based on a given time period indicates surplus capital and shows the relationship among total income, costs & profit over the time interval

Solutions having the same osmotic pressure are called _____ solutions?

- A. Dilute
- B. Ideal
- C. Isotonic**
- D. Saturated

Diffusion co-efficient of a metal in a solid solution depends upon its ?

- A. Composition
- B. Temperature
- C. Both A. & B.**
- D. Neither A. nor B.

In the gaseous diffusion process of uranium enrichment, the natural uranium is converted into gaseous _____?

- A. Uranium oxide
- B. Uranium hexafluoride**
- C. Uranium carbide
- D. Uranium sulphate

Fourier's law applies to the heat transfer by _____?

- A. Convection
- B. Radiation
- C. Conduction**
- D. All A., B. & C.

Which of the following fluid forces are not considered in the Navier-Stoke's equation ?

- A. Gravity forces
- B. Viscous forces
- C. Pressure forces
- D. Turbulent forces**

The sum of reflectivity and absorptivity for an opaque body is equal to _____?

- A. 0.5
- B. 1**
- C. 0
- D. 2

Catalyst used in the manufacture of NH_3 by Haber's process is finely divided _____?

- A. Nickel
- B. Iron**
- C. Vanadium pentoxide
- D. Alumina

In case of a ball mill ?

- A. Coarse feed requires a larger ball**
- B. Fine feed requires a larger ball
- C. Operating speed should be more than the critical speed
- D. None of these

Ordinary mercury in glass thermometer is used for measuring temperature upto 120°C . However, for measuring higher temperature upto _____ $^\circ\text{C}$, thermometer is made by filling nitrogen under pressure above the mercury, which stops the evaporation of mercury and reduces the chance of broken thread of mercury?

- A. 250
- B. 350
- C. 550**
- D. 700

The half life period of a radioactive substance is best determined by counting the number of alpha particles emitted per second in a Geiger Muller counter from its known quantity. If the half life period of a radioactive substance is one month, then _____?

- A. $3/4$ th of it will disintegrate in two months
- B. It will completely disintegrate in two months**
- C. It will completely disintegrate in four months
- D. $1/8$ th of it will remain intact at the end of four months

Cost of piping in a fluid processing unit (e.g., distillation) of a chemical process plant is about _____ percent of the fixed capital investment ?

- A. 4
- B. 13**
- C. 22
- D. 34

Entropy of a substance remains constant during a/an _____ change?

- A. Reversible isothermal
- B. Irreversible isothermal
- C. Reversible adiabatic**
- D. None of these

Which of the following is directly concerned with the heat transfer ?

- A. Strouhal number
- B. Sherwood number
- C. Euler number
- D. Grashoff number**

_____ paper is used in the manufacture of newsprint paper ?

- A. Ground-wood**
- B. Board
- C. Tissue
- D. Wrapping

_____ is used for producing a thick suspension from a thin slurry?

- A. Cartridge filter
- B. Rotary drum vacuum filter
- C. Pressure filter thickener**
- D. Plate and frame filter press

Heating the Hypo-eutectoid steels to 30°C above the upper critical temperature

line, soaking at that temperature and then cooling slowly to the room temperature to form a pearlite & ferrite structure is called _____?

- A. Tempering
- B. Hardening
- C. Annealing**
- D. Normalising

Economy of a multiple effect evaporator depends upon the _____?

- A. Heat balance consideration**
- B. Rate of heat transfer
- C. Both A. and B.
- D. Neither A. nor B.

Factor of safety is the ratio of the _____ stress to the working stress?

- A. Tensile
- B. Compressive
- C. Yield**
- D. Bearing

Steam is to be condensed in a shell and tube heat exchanger, 5 m long with a shell diameter of 1 m. Cooling water is to be used for removing the heat. Heat transfer co-efficient for the cooling water, whether on shell side or tube side is the same. The best arrangement is _____?

- A. Vertical heat exchanger with steam on tube side
- B. Vertical heat exchanger with steam on shell side**
- C. Horizontal heat exchanger with steam on tube side
- D. Horizontal heat exchanger with steam on shell side

The compressibility factor of a gas is given by (where, V_1 = actual volume of the

gas V_2 = gas volume predicted by ideal gas law) _____?

- A. V_1/V_2
- B. V_2/V_1
- C. $V_1 - V_2$
- D. $V_1.V_2$

For removal of very small amounts of precipitate from large volume of water, the most suitable filter is the _____ filter?

- A. Plate & frame
- B. Shell & leaf
- C. **Sand**
- D. Rotary vacuum

Which of the following parameters is increased by use of finned tube in a multipass shell and tube heat exchanger ?

- A. Tube side pressure drop and the heat transfer rate
- B. Convective heat transfer co-efficient
- C. Effective tube surface area for convective heat transfer
- D. **All A. B. and C.**

Heating of ferromagnetic materials to a temperature above Curie temperature makes it _____?

- A. Insulator for heat & electricity transmission
- B. Ferritic
- C. **Behave like paramagnetic materials**
- D. Superconductor

With increase in moisture content of coal, its _____?

- A. Calorific value increases sometimes
- B. Bulk density always decreases
- C. Clinkering tendency during combustion increases
- D. **None of these**

Penicillin is made employing _____ fermentation process?

- A. Continuous
- B. Aerobic batch**
- C. Anaerobic batch
- D. None of these

Volumetric composition of flue gas analysed with the Orsat apparatus is : CO₂ = 12%, O₂ = 8%, CO = nil, N₂ = 80%. This flue gas composition indicates that _____?

- A. Pure oxygen has been used for combustion
- B. Nitrogen percentage in the fuel is very high
- C. Excess air has been used for combustion**
- D. Hydrogen is not present in the fuel

_____ is the most commonly used 'filter aid'?

- A. Diatomaceous earth**
- B. Fuller's earth
- C. Vermiculite
- D. Semi-plastic clay

Coffee is prepared from coffee beans by leaching with _____?

- A. Cold water
- B. Hot water**
- C. Dilute hot caustic solution
- D. Naphtha

Softening of hardened steel is done by its _____?

- A. Normalising**
- B. Tempering
- C. Annealing
- D. Carburising

The heat transfer by radiation from a mild steel surface is to be reduced by

reducing the emissivity of the surface. This can be best achieved by _____?

- A. Painting the surface black
- B. Painting the surface white (with aluminium paint)**
- C. Giving the surface a mirror finish
- D. Roughening the surface

Equivalent diameter of a particle is the diameter of the sphere having the same _____?

- A. Ratio of surface to volume as the actual volume**
- B. Ratio of volume to surface as the particle
- C. Volume as the particle
- D. None of these

Failure of a material is termed as fatigue failure, if it fails below the yield point. The resistance to fatigue failure of a material is measured by the _____?

- A. Ultimate tensile strength (U.T.S.)
- B. Endurance limit**
- C. Elastic limit
- D. None of these

High pressure at the bottom of a distillation tower handling heat sensitive materials results in _____?

- A. Thermal decomposition of bottoms**
- B. Increased relative volatility
- C. Erosion of the tower
- D. Very efficient operation

Which of the following is not shipped in mild steel containers ?

- A. Acetone
- B. Ammonia

C. Ethyl alcohol

D. Formic acid

Duriron is _____?

A. Acid resistant, brittle and very hard

B. High silicon iron

C. Prone to breakage due to thermal expansion because of its very high co-efficient of thermal expansion

D. All A., B. and C.

Fuel for a nuclear reactor (thermal) is _____?

A. Uranium

B. Plutonium

C. Radium

D. None of these

Film boiling is usually not desired in commercial equipments, because _____?

A. The heat transfer rate is low in view of the large temperature drop

B. It is difficult to maintain

C. It is not economic

D. None of these

The atomic number of an element is equal to the number of _____ present in its atom?

A. Neutrons

B. Electrons

C. Protons

D. Either B. or C.

For the same flow rate of a fluid, the pressure drop is the least for _____?

- A. Venturimeter
- B. Orificemeter
- C. Flow-nozzle
- D. Δp is same for all

Bag filter design is predominantly dependent on gas temperature, as it affects the gas density & viscosity and the selection of filtering material. The pressure drop in a bag filter is _____?

- A. Inversely proportional to viscosity of gas
- B. Proportional to the viscosity & density of the gas
- C. Proportional to the pressure of the gas
- D. **Both B. and C.**

Gross national product (GNP) means the total value of _____ in a country ?

- A. **Goods produced**
- B. Gold reserve
- C. Earning of the citizens
- D. Taxes paid

Tricresyl phosphate is chemically represented as _____?

- A. **$(\text{CH}_3 \text{C}_6 \text{H}_4)_3 \text{PO}_4$**
- B. $\text{Ca}_{10}(\text{PO}_4)_3\text{F}_6$
- C. $(\text{NH}_4)_2\text{HPO}_4$
- D. $\text{NH}_4\text{H}_2\text{PO}_4$

Specific/molar Gibbs free energy for a pure substance does not change during _____?

- A. Sublimation
- B. Vaporisation
- C. Melting
- D. **Either A, B. or C.**

Styrene butadiene rubber is commercially manufactured by _____?

- A. Bulk polymerisation
- B. Suspension polymerisation
- C. Solution polymerisation
- D. Emulsion polymerisation**

A pollutant P degrades according to first order kinetics. An aqueous stream containing P at 2 kmole/m³ and volumetric flow rate 1m³ /h requires a mixed flow reactor of volume V to bring down the pollutant level to 0.5 kmole/m³. The inlet concentration of the pollutant is now doubled and the volumetric flow rate is tripled. If the pollutant level is to be brought down to the same level of 0.5 k.mole/m³, the volume of the mixed flow reactor should be increased by a factor of _____?

- A. 7**
- B. 6
- C. 3
- D. 7/3

Transparent soaps (e.g. Pears) are _____?

- A. Usually soft soap (made from coconut oil) in which cane sugar & alcohol are added and finally washed with methylated spirit to achieve transparency**
- B. Metallic soaps with frothing agent and free Stearic acid to achieve transparency
- C. Metallic soaps with frothing agent from which glycerine has not been recovered
- D. None of these

Presence of MgO in alumino-silicate refractories _____ its refractoriness ?

- A. Increases
- B. Lowers**
- C. Does not affect
- D. Either A. or B.; depends on its quantity

Bernoulli's equation does not apply to the functioning of a/an _____?

- A. Venturimeter
- B. Orificemeter
- C. pitot tube
- D. None of these**

Which type of heat exchanger is preferred for heavy heat loads ?

- A. Double pipe
- B. Plate fine
- C. Series and parallel set of shell and tube**
- D. None of these

Unbreakable crockeries are made from _____ polymers?

- A. Polystyrene
- B. Melamine
- C. Polystyrene
- D. Polyurethane**

Which of the following is not a mixed fertiliser ?

- A. Nitrophosphate
- B. Calcium ammonium nitrate (CAN)**
- C. Ammonium phosphate
- D. None of these

Operating temperature and pressure in catalytic reforming is about _____?

- A. 1-5 Kgf/cm² & 200°C
- B. 15-45 Kgf/cm² & 450-550°C**
- C. 50 – 75 kgf/cm² & 600 – 800°C
- D. 5-10 kgf/cm² & 150 – 250°C

The reciprocal of stripping factor is termed as _____?

- A. Selectivity index
- B. Relative volatility
- C. Absorption factor**
- D. Murphree efficiency

Thermal diffusivity of a refractory brick is high, when its _____ is high?

- A. Density
- B. Specific heat
- C. Thermal conductivity**
- D. None of these

_____ is the most suitable lubricant for drawing mild steel wires?

- A. Kerosene
- B. Water
- C. Sodium stearate**
- D. Lime water

Clausius Clapeyron equation applies to the _____ process?

- A. Sublimation
- B. Melting
- C. Vaporisation
- D. All A., B. & C.**

Which of the following is not a micro component present in coal ?

- A. Micrinite
- B. Clarain**
- C. Fusinite
- D. Liptinite

Pick out the wrong statement ?

- A. Pulverised fuel can be completely burnt with less percentage of excess air compared to

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lump

coal

B. Low grade coal can be used, but generally high volatile matter coals are more suitable for

making pulverised fuel

C. Regulation of furnace temperature and atmosphere (oxidising or reducing) is easily possible

with pulverised fuel firing

D. None of these

The term 'angle of nip' is concerned with the operation of the _____ crushers?

A. Jaw

B. Roll

C. Gyratory

D. None of these

Pick out the wrong statement?

A. Clausius-Clapeyron equation relates the latent heat of vaporisation to the slope of the vapor pressure curve

B. At the boiling point of liquid at the prevailing total pressure, saturated absolute humidity is infinite

C. Percentage saturation and relative saturation are numerically equal for an unsaturated vapor gas mixture

D. Clapeyron equation is given by $dP/dT = (\lambda/T) (V_G - V_L)$; where, P = vapor pressure, T = absolute temperature, λ = latent heat of vaporisation, V_G and V_L = volumes of gas and liquid respectively

Visbreaking _____ ?

A. Uses natural gas as feed

B. Is carried out at atmospheric pressure

C. Produces fuel oil of lower viscosity

D. Produces gasoline only

The enthalpy change when ammonia gas is dissolved in water is called the heat of _____?

- A. Solution**
- B. Formation
- C. Dilution
- D. Combustion

Hollander beater used during paper pulp manufacture does not facilitate the _____ of fiber?

- A. Cutting
- B. Fibrillation
- C. Hydration
- D. Strengthening**

The decrease in the atomic number is not observed in case of _____?

- A. Electron capture
- B. β -emission**
- C. α -emission
- D. Positron emission

Low temperature carbonisation of coal takes place at _____ °C?

- A. 300
- B. 1100
- C. 700**
- D. 900

Feed forward controller accounts for the _____ changes?

- A. Set point
- B. Load**
- C. Both A. & B.
- D. Neither A. nor B.

A straight line is obtained on plotting reciprocal of filtration rate vs. the volume of filtrate for _____ flow of filtrate?

- A. Compressible cakes and laminar
- B. Incompressible cake and laminar**
- C. Compressible cake and turbulent
- D. Incompressible cake and turbulent

In Joule-Thomson porous plug experiment, the _____?

- A. Enthalpy does not remain constant
- B. Entire apparatus is exposed to surroundings
- C. Temperature remains constant
- D. None of these**

Platinum and silver are corroded by _____?

- A. Caustic soda solution
- B. Phosphoric acid
- C. Sulphuric acid (10%)
- D. None of these**

Unsteady uniform flow is represented by flow through a/an _____?

- A. Long pipe at constant rate
- B. Long pipe at decreasing rate**
- C. Expanding tube at increasing rate
- D. Expanding tube at constant rate

Out of the following, the _____ pipe has the least corrosion resistance?

- A. Mild steel
- B. Copper
- C. Cast iron
- D. Wrought iron**

Molecular weight of a polymer is equal to the molecular weight of the repeat unit multiplied by the degree of polymerisation. What is the molecular weight of poly vinyl chloride (PVC), if its degree of polymerisation is 800 ?

- A. 50000
- B. 51600
- C. 49200
- D. 50800

Aluminium storage vessel can be used to store _____?

- A. Aqua regia
- B. Ferrous sulphate
- C. Hydrochloric acid (10%)
- D. None of these

Film boiling occurs at _____ pressure?

- A. Atmospheric
- B. Sub-atmospheric
- C. Negative
- D. Very high

Pick out the wrong unit conversion of heat transfer rate?

- A. 1 kcal/hr = 1.163 Watt
- B. 1 Watt = 1.163 kcal/hr
- C. 1 BTU/ft².hr = 2.712 kcal/m².hr
- D. 1 kcal/m².hr = 0.3687 BTU/ft².hr = 1.163 Watt/m²

In nylon-66, the first and second numbers (i.e., 6) respectively designate the number of carbon atoms present in the _____?

- A. Diamine and the ring
- B. Dibasic acid and the ring
- C. Diamine and the dibasic acid
- D. None of these

If the thermal conductivity of a wall material is independent of temperature, the steady state temperature distribution in the very large thin plane wall having steady, uniform surface temperature follows _____ law?

- A. Hyperbolic
- B. Parabolic
- C. Linear**
- D. Logarithmic

With increase in pressure drop (for a given particle size), the dust collection efficiency of a cyclone separator will _____?

- A. Increase**
- B. Decrease
- C. Remain unaffected
- D. Increase or decrease depending on the nature of the dust

Prandtl and Reynold's analogies are identical for Prandtl number value of _____?

- A. 0
- B. 0.5
- C. 1**
- D. 5

In the manufacture of urea, the intermediate chemical formed is _____?

- A. Biuret
- B. Ammonium carbamate**
- C. Ammonium carbonate
- D. None of these

_____ is not a single oxide-refractory?

- A. Zirconia

B. Silicon carbide

C. Magnesia

D. None of these

In industrial nomenclature, alcohol means_____?

A. Butyl alcohol

B. Propyl alcohol

C. Ethanol

D. Methyl alcohol

Broaching tools are usually made of_____?

A. Cermets

B. High speed steel

C. Tungsten carbide

D. Stellite

Which of the following rubbers has the widest service temperature range (-75 to 275°C) ?

A. Butyl rubber

B. Silicon rubber

C. Nitrile rubber

D. Silicone rubber

Which of the following gases is having the widest explosion limit (about 2 to 81% gas in gasair mixture), rendering it the property of the most explosive gas ?

A. Hydrogen

B. Acetylene

C. Carbon monoxide

D. Ammonia

Branched chair polymers as compared to linear polymers have

_____?

A. Higher melting point

- B. Higher tensile strength
- C. Lower density**
- D. None of these

During drying operation, it is easier to remove the _____ moisture ?

- A. Equilibrium
- B. Critical
- C. Unbound**
- D. Bound

Vegetable oils contain large quantity of glycerides of unsaturated acids. When the vegetable oils contain high amount of saturated fatty acids, it is termed as _____ oil?

- A. Drying
- B. Semi-drying
- C. Non-drying**
- D. None of these

Lewis number (Le) is _____ ?

- A. $Sc \times Pr$**
- B. $Pr \times St$
- C. $Sh \times Pr$
- D. $St \times Sh$

In a totally irreversible isothermal expansion process for an ideal gas, $\Delta E = 0$, $\Delta H = 0$. Then ΔQ and ΔS will be _____ ?

- A. $\Delta Q = 0$, $\Delta S = 0$
- B. $\Delta Q = 0$, $\Delta S = +ve$**
- C. $\Delta Q = 0$, $\Delta S = -ve$
- D. $\Delta Q = +ve$, $\Delta S = +ve$

The inlet pressure in a constant rate filtration _____?

- A. **Increases continuously**
- B. Decreases gradually
- C. Remains constant
- D. None of these

High _____ is an undesirable property for a good refrigerant?

- A. Specific heat
- B. Latent heat of vaporisation
- C. **Viscosity**
- D. Specific vapor volume

High sulphur content in a fuel _____ of the flue gases?

- A. Decreases the dew point
- B. Increases the dew point
- C. Reduces the combustion efficiency by limiting the permissible temperature reduction
- D. **Both B. and C.**

The presence of impurities in iron _____?

- A. Increases its melting point
- B. Does not affect its melting point
- C. **Decreases its melting point**
- D. Makes it malleable

Vibration upto 100 kilo hertz can be most accurately measured by a _____ type accelerometer ?

- A. Preloaded spring
- B. **Piezoelectric**
- C. Bonded strain gauge
- D. None of these

Identification of pipelines carrying different liquids and gases is done by the _____ of the pipe?

- A. Diameter
- B. Colour**
- C. Altitude
- D. None of these

Boiling range of motor gasoline is an indication of the _____?

- A. Case of starting
- B. Rate of acceleration**
- C. Vapour locking tendency
- D. All A., B. and C.

If response of a control system is to be free of offset and oscillation, the most suitable controller is _____?

- A. Proportional controller
- B. Proportional-derivative (PD) controller
- C. Proportional-integral (PI) controller
- D. Proportional integral-derivative (PID) controller**

The time of oscillation of a floating body is _____?

- A. Longer, if Metacentric height is increased
- B. Independent of the Metacentric height
- C. Dependent on the buoyant forces only
- D. None of these**

For an isothermal reversible compression of an ideal gas _____?

- A. Only $\Delta E = 0$
- B. Only $\Delta H = 0$
- C. $\Delta E = \Delta H = 0$**
- D. $dQ = dE$

Lead pipes are not safe for carrying drinking water, because water, containing dissolved oxygen attacks lead thereby forming poisonous $Pb(OH)_2$. Lead pipes are readily corroded by _____?

- A. Dilute HCl
- B. Acetic acid**
- C. Concentrated H₂SO₄
- D. None of these

The refractory lining of the bottom in a basic electric arc furnace is made of _____?

- A. Silica
- B. Alumina
- C. Magnesite**
- D. Fireclay

For identical situation, condensing film coefficient in case of a horizontal condenser is almost _____ the value expected in case of vertical condenser?

- A. Half
- B. Twice
- C. Thrice**
- D. Five times

In the Newton's law range, the terminal velocity of a solid spherical particle falling through a stationary fluid mass is _____ the fluid viscosity?

- A. Directly proportional to
- B. Inversely proportional to**
- C. Inversely proportional to the square root of
- D. Independent of

A liquid is pumped at the rate of 600 litres using 1000 rpm. If the rpm is changed to 1100, the liquid pumped is _____ litres?

- A. 600
- B. 660**
- C. 1.1

D. 60

Humid volume, at a given temperature is a/an _____ function of humidity?

- A. Inverse
- B. Exponential
- C. Linear**
- D. Logarithmic

The basic constituent of vegetable oils is _____?

- A. Triglyceride**
- B. Fatty acids
- C. Fatty alcohol
- D. Mono esters

A Rotameter through which air at room temperature and atmospheric pressure is flowing gives a certain reading for a flow rate of 100 cc/sec. If helium (molecular weight 4) is used and Rotameter shows the same reading, the flow rate (cc/sec) is _____?

- A. 26
- B. 42
- C. 269**
- D. 325

The value of work index does not change materially from one equipment to another. If the value of work index determined for close circuit grinding is W_i , then the same for open circuit grinding will be _____?

- A. $0.5 W_i$
- B. W_i
- C. $1.34 W_i$**
- D. $3.34 W_i$

Pick out the correct statement ?

- A. A catalyst speeds up the forward reaction but slows shown the reverse reaction
- B. Addition of catalyst changes the equilibrium constant
- C. Pressure changes do not change the equilibrium concentrations**
- D. The composition of equilibrium is changed by catalyst

_____ is not an important refinery process for upgrading the quality of lubricating oil ?

- A. Deoiling**
- B. Solvent refining
- C. Clay treatment
- D. Hydro-treatment

Dies for wire drawing are generally made of _____ ?

- A. Mild steel
- B. Stainless steel
- C. Carbides**
- D. High carbon steel

What is the value of 'q' for saturated vapor feed to a distillation column? (where q = fraction of the feed stream that is liquid ?

- A. 0**
- B. 1
- C. 1

A sample of natural gas containing 80% methane (CH₄) and rest nitrogen (N₂) is burnt with 20% excess air. With 80% of the combustibles producing CO₂ and the remainder going to CO, the Orsat analysis in volume percent is _____ ?

- A. CO₂ : 6.26, CO : 1.56, O₂ : 3.91, H₂O :15.66, N₂ : 72.60
- B. CO₂ : 7.42, CO : 1.86, O₂ : 4.64, N₂:86.02**
- C. CO₂ : 6.39, CO : 1.60, O₂ : 3.99, H₂O:25.96, N₂:72.06

D. CO₂ : 7.60, CO : 1.90, O₂ : 4.75, N₂ : 85.74

Which of the following exemplifies a three dimensional fluid flow ?

- A. **Fluid flow at the inlet to a nozzle**
- B. Fluid flow between parallel plates
- C. Viscous fluid flow between converging plates
- D. None of these

Overall thermal efficiency of a lumpy coal fired suitably designed heating furnace, if operated & maintained properly may be about _____ percent?

- A. 10-15
- B. **25-30**
- C. 45-50
- D. 65-70

Toothpaste is a _____ ?

- A. Bingham plastic
- B. Pseudo-plastic
- C. Newtonian liquid
- D. **Dilatent**

Which of the following processes follows the hardening process for reducing the hardening strains & increasing the toughness of the steel part ?

- A. Anodising
- B. **Tempering**
- C. Carburising
- D. Annealing

In a chemical reaction, represented by as shown in the bellow figure, it is observed that the (i) Rate of reaction increases by a factor of 4 on doubling the concentration of the reactant. (ii) Rate of reaction increases by a factor of 9 on

trebling the concentration of the reactant. Then the rate of the reaction is proportional to (where, C_A = concentration of the reactant) _____?

- A. C_A
- B. C_A^2**
- C. C_A^3
- D. C_A^4

The most commonly used nuclear fuel in boiling water reactor is _____?

- A. Enriched uranium**
- B. Natural uranium
- C. Plutonium
- D. Monazite sand

Bomb calorimeter is used to determine the (where, GCV – Gross Calorific Value. NCV – Net Calorific Value.) ?

- A. GCV at constant pressure
- B. GCV at constant volume**
- C. NCV at constant pressure
- D. NCV at constant volume

Lime and soda ash are added to water to remove _____?

- A. Bicarbonates & sulphates of calcium and magnesium**
- B. Undesirable taste and odour
- C. Bacteria
- D. Its corrosiveness

According to Bode stability criterion, a system is unstable, if the open loop frequency response exhibits an amplitude ratio exceeding unity at frequency for which phase lag is _____?

- A. 0°

- B. 45°
- C. 90°
- D. 180°**

The _____ pressure is measured by a static tube?

- A. Dynamic
- B. Static**
- C. Total
- D. None of these

In case of plain carbon steel, butt welded joints are used for shell plate thickness \leq _____ cms?

- A. 1.2
- B. 0.5
- C. 3.8**
- D. 6.8

Which of the following processes is followed by unsaturated air (with dry bulb temperature 12°C and relative humidity 47%) passing through water spray washer (temperature of water being constant at 40°C)?

- A. Humidification only
- B. Heating only
- C. Both heating and humidification**
- D. Evaporative cooling

Monel metal is an alloy of _____?

- A. Molybdenum and nickel
- B. Nickel and copper**
- C. Molybdenum and aluminium
- D. Molybdenum and zinc

Esterification reaction _____?

- A. Produces soap

- B. Is reversible
- C. Is a reaction between an alcohol and an organic acid
- D. All A, B. and C.**

For gasoline, the flash point ($<50^{\circ}\text{C}$) is determined by the _____?

- A. Abel apparatus
- B. Pensky-Marten's apparatus
- C. Saybolt chromometer
- D. None of these**

Out of the following substances, one ton of _____ will store the maximum heat for a rise of 30°C in temperature ?

- A. Steel
- B. Lignite
- C. Water**
- D. Lime stone

_____ has the highest melting point out of the following ?

- A. Tungsten**
- B. Zirconium
- C. Molybdenum
- D. Tantalum

The mass number of an element is equal to the number of _____ in the nucleus?

- A. Electrons
- B. Neutrons
- C. Protons
- D. Neutrons plus protons (i.e., nucleons)**

Which of the following is not a principal alloying element for the structural steel

?

- A. Molybdenum
- B. Nickel
- C. Manganese
- D. Chromium

Cermets are _____ materials?

- A. Refractory
- B. Reinforced
- C. Abrasive
- D. Fully metallic

Natural gasoline is produced _____?

- A. From oil wells
- B. In oil refineries
- C. By natural gas stripping
- D. None of these

“A claming section” before the liquid flows into the downcomer is provided to _____?

- A. Permit release of entrained vapour in the liquid
- B. Reduce the discharge fluctuation
- C. Ensure better vapour-liquid contact
- D. Cool the liquid before it flows down

The reaction in which one of the products of reaction acts as a catalyst is called a/an _____ reaction?

- A. Biochemical
- B. Photochemical
- C. Catalytic
- D. Autocatalytic

A chemical reaction is of zero order, when the reaction rate is (where, $C_A =$

concentration of reactant) ?

- A. $\propto CA$
- B. $\propto 1/CA$
- C. Independent of temperature
- D. None of these**

Char value of Kerosene is the amount of charred oil deposition on the wick obtained after burning it in a standard wick lamp at a standard rate for 24 hours. Char value of a good quality kerosene should be less than _____ mg/kg of kerosene?

- A. 1
- B. 20**
- C. 100
- D. 500

Clausius-Clapeyron equation is applicable to _____ equilibrium processes?

- A. Solid-vapor
- B. Solid-liquid
- C. Liquid-vapor
- D. All A, B. and C**

In Newton's law of viscosity, which states that the shear stress is proportional to the _____ Co-efficient of viscosity is called dynamic or absolute viscosity (where, V = velocity, V_g = velocity gradient) ?

- A. V^2
- B. $1/V^2$
- C. $1/V_g$
- D. V_g**

In shell and tube heat exchangers, straight tie rods are used to _____?

- A. Hold baffle in space**
- B. Fix the tubes in position
- C. Account for thermal strain
- D. None of these

_____ is the temperature at which a gas-vapor mixture becomes saturated, when cooled at constant total pressure out of contact with a liquid ?

- A. Dew point**
- B. Bubble point
- C. Dry bulb temperature
- D. Wet bulb temperature

The operating line for an absorber is curved, when plotted in terms of _____ ?

- A. Mole fractions
- B. Mole ratios
- C. Partial pressure**
- D. Mass fractions

A sand mixture was screened through a standard 10-mesh screen. The mass fraction of the oversize material in feed, overflow and underflow were found to be 0.38, 0.79 and 0.22 respectively. The screen effectiveness based on the oversize is _____ ?

- A. 0.50**
- B. 0.58
- C. 0.68
- D. 0.62

The purpose of nitriding the steel is to _____ ?

- A. Harden its surface**
- B. Soften its surface
- C. Improve its reliability

D. None of these

For liquid flow through a packed bed, the superficial velocity as compared to average velocity through the channel in the bed is _____?

A. More

B. Less

C. Equal

D. Independent of porosity

Which of the following does not come under the category of 'secondary nutrient' for plant growth ?

A. Calcium

B. Magnesium

C. Sulphur

D. Oxygen

Dead zone is the _____?

A. Same as time constant

B. Same as transportation lag

C. Maximum change in the variable that does not change the reading of the instrument

D. None of these

The emission of an α -particle causes the resultant nucleus to have _____?

A. More atomic weight and less atomic number

B. Less atomic weight and less atomic number

C. Less atomic weight and more atomic number

D. None of these

Main pollutants released from iron & steel industry is _____?

A. CO, CO₂ & SO₂

B. H₂S, NO & SO₃

C. CO₂, H₂S & NO₂

D. SO₃, NO₂ & CO₂

Aniline point is the temperature at which _____?

- A. Equal weight of diesel & the aniline are completely miscible
- B. Equal weight of aniline & the test sample are completely miscible
- C. Equal volume of aniline & the test sample are completely miscible**
- D. Aniline vaporises

Purity of electrical grade aluminium should be \geq _____ percent?

- A. 95
- B. 99.5**
- C. 85
- D. 90

LPG when brought to atmospheric pressure & temperature will be a _____?

- A. Liquid lighter than water
- B. Liquid heavier than water
- C. Gas lighter than air
- D. Gas heavier than air**

Hydrazine (N₂H₄) is used mainly as a/an _____?

- A. Explosive
- B. Rocket fuel**
- C. Detergents additive
- D. None of these

Hard pitch is used for making _____?

- A. Pulverised fuel**
- B. Perfumes
- C. Insecticides
- D. Plastics

In a counter flow heat exchanger, hot fluid enters at 170°C & leaves at 150°C, while the cold fluid enters at 50°C & leaves at 70°C. The arithmetic mean temperature difference in this case is _____ °C?

- A. 20
- B. 60
- C. 120
- D. ∞**

Volume of blast furnace slag is about _____ times the volume of hot metal (pig iron) of the same weight ?

- A. 1.5
- B. 3**
- C. 5
- D. 7

Calorific value of furnace oil is about _____ Kcal/kg?

- A. 10,000**
- B. 15,000
- C. 5,000
- D. 20,000

Ethyl mercaptan is added to the Doctor negative LPG for facilitating the detection of its leakage (by bad odour) to the extent of about _____ ppm?

- A. 1
- B. 50**
- C. 5000
- D. 10000

A mineral is termed as 'ore', if _____ ?

- A. A metal can be economically extracted from it**
- B. It contains $\geq 40\%$ metal

- C. The metal present in it is costly
- D. All A , B. and C.

The wall thickness of thin cylindrical shell with hemispherical ends is _____ that of the spherical ends?

- A. Equal to
- B. More than**
- C. Less than
- D. Either B. or C.; depends on maximum permissible internal pressure

Gain margin is equal to the _____ ?

- A. Amplitude ratio
- B. Reciprocal of amplitude ratio**
- C. Gain in P controller
- D. Gain in P-I controller

According to Arrhenius equation of temperature dependency of rate constant for an elementary reaction _____ ?

- A. $k \propto \sqrt{T}$
- B. $k \propto e^{-E/RT}$**
- C. $k \propto T e^{-E/RT}$
- D. None of these

Molecular weight of crude petroleum may be around _____ ?

- A. 50
- B. 250
- C. 1500**
- D. 5000

Which of the following may not need a moderator ?

- A. Candu reactor
- B. Fast breeder reactor**
- C. Homogeneous reactor

D. Pressurised water reactor

Chlorination of benzene is done to produce benzene hexachloride (a pesticide) in a photochemical reactor lined with _____?

A. Carbate

B. Lead or glass

C. Fireclay bricks

D. PVC

Traces of tar fog present in the coke oven gas is removed by _____?

A. Cyclone separator

B. Wet packed scrubber

C. Electrostatic precipitator

D. Washing with monoethanolamine

An ideal PID controller has the transfer function $[1 + (1/0.55) + 0.25]$. The frequency at which the magnitude ratio of the controller is 1, is _____?

A. 0.5/0.2

B. 0.2/0.5

C. 0.2×0.5

D. $1/\sqrt{0.2 \times 0.5}$

Bollman extractor _____?

A. Is a static bed leaching equipment

B. Is used for extraction of oil from oilseed

C. Is a centrifugal extractor

D. Employs only counter-current extraction

Parathion and Malathion are _____?

A. Pesticides

- B. Plasticisers for unsaturated polyesters
- C. Pain-relieving drugs (analgesic)
- D. Tranquilisers

Tetraethyl lead is added to the petrol to increase its octane number, because its octane number is _____?

- A. More than 100**
- B. Round about 100
- C. Between 50 and 100
- D. Less than 25

Gyratory crushers compared to the reciprocating jaw crushers _____?

- A. Have greater capacity per unit of discharge area**
- B. Crush intermittently
- C. Are less suitable for coarse materials
- D. Have less steady power consumption

Main pollutants released from petroleum refineries is _____?

- A. CO, SO₂ & H₂S**
- B. CO₂, NO & SO₃
- C. CO₂, H₂S & NO₂
- D. SO₃, NO₂ & CO₂

_____ is used as a material of construction for the blade of power saw ?

- A. Wrought iron
- B. Stainless steel
- C. Mild steel
- D. High speed steel**

Dislocation cross-slip is difficult in those materials, which

have _____ ?

- A. Large number of slip systems
- B. High work hardening rate
- C. Coarse grain size
- D. Low stacking fault energy**

Pick out the wrong statement ?

- A. Cold rubber (SBR) is superior as compared to hot rubber (SBR)
- B. Polymerisation temperature can modify the properties of SBR
- C. Production of cold SBR employs lower pressure as compared to that of hot SBR
- D. None of these**

For a specific centrifugal air blower operating at constant speed & capacity, the power requirement and pressure vary _____ ?

- A. Directly as square of gas density
- B. Directly as gas density**
- C. Directly as square root of gas density
- D. Inversely as gas density

Brunauer, Emmet and Teller (BET) equation is used to determine the specific surface area of a porous particle but not the pore volume & the porosity of the catalyst bed. Which of the following postulates is not used to derive BET equation ?

- A. Langmuir's assumption applies to every adsorbed layer
- B. There is no dynamic equilibrium between successive layer**
- C. The adsorbed layer may be polymolecular in thickness and the heat of adsorption in each layer (except the first one) is involved in each of the evaporation process
- D. None of these

Lap joints are preferred for plates having thickness _____ mm?

- A. < 12.5

- B. > 3
- C. > 5
- D. 5-10

Crude oil is subjected to vacuum distillation in the last stage, because _____?

- A. High boiling point products like heavy fuel oil & lubricating oils are heat sensitive and may decompose**
- B. Lighter/low boiling products are prone to thermal decomposition
- C. High purity products can be obtained thereby
- D. None of these

A fast breeder reactor employs _____?

- A. Graphite as moderator
- B. Water as coolant
- C. Molten sodium as coolant as well as moderator
- D. U-235 as fuel**

Fluid medium used in the classification technique of mineral beneficiation is _____?

- A. Air
- B. Water
- C. Either A. or B.**
- D. Neither A. nor B.

Maximum amount of thermal radiation is emitted at all wavelengths at any specified temperature by a/an _____ body?

- A. Grey**
- B. Black
- C. Opaque
- D. White

The process of coating steel sheets by zinc to improve its corrosion resistance is called _____?

- A. Calorising
- B. Galvanising**
- C. Zincification
- D. Tempering

Hastelloy C is a good material of construction in chemical process industry, since it is _____?

- A. Highly corrosion resistant and is readily fabricated
- B. Relatively inexpensive although it can be fabricated with some difficulty
- C. Corrosion resistant to most alkalis, particularly because of its copper content
- D. Light and resists attack by acids**

The biochemical treatment applied to sewage effluents is a process of _____?

- A. Dehydration
- B. Reduction
- C. Oxidation**
- D. Polymerisation

Hydraulic mean radius for flow through packed bed of spherical particle of size, 'D_p', with porosity 'ε' is _____?

- A. (D_p/6) (ε/1- ε)**
- B. (D_p/6) (1- ε/ε)
- C. $\frac{2}{3}D_p (1- \epsilon/\epsilon)$
- D. $\frac{2}{3}D_p (\epsilon/1- \epsilon)$

An alkaline solution is used to reduce the concentration of carbon dioxide in a stream from 10% to 0.1% by absorption with irreversible chemical reaction. The overall number of transfer units based on gas phase is ?

- A. 9.21

B. 4.605

C. 100

D. 0.001

The heat capacity of a solid compound is calculated from the atomic heat capacities of its constituent elements with the help of the _____?

A. Trouton's rule

B. Kopp's rule

C. Antoine equation

D. Kistyakowsky equation

The space time is equivalent to the holding time in a steady state mixed reactor for _____?

A. Non-isothermal gas reaction

B. Variable fluid density systems

C. Constant fluid density systems

D. Gas reactions with changing number of moles

Brownian movement is prominent in the particle size range of _____ microns in case of settling of a particle in a fluid?

A. 2 to 3

B. 0.01 to 0.10

C. 200 to 300

D. 100 to 1000

Yield of pitch from distillation of high temperature tar is around _____ percent?

A. 10

B. 25

C. 65

D. 90

_____ is a homopolymer?

- A. Neoprene
- B. Bakelite
- C. Nylon-66
- D. Terylene

With the increase of temperature, the Colburn jH factor _____?

- A. Increases
- B. Decreases
- C. Remains unchanged
- D. May increase or decrease; depending on temperature

No cooling occurs, when an ideal gas undergoes unrestrained expansion, because the molecules _____?

- A. Collide without loss of energy
- B. Do work equal to loss in kinetic energy
- C. Are above the inversion temperature
- D. Exert no attractive force on each other

In a linear polymer, the monomeric units are linked together to form long straight chains. The cross linked or branched chain polymers compared to linear polymers have higher _____?

- A. Densities
- B. Melting point
- C. Tensile strength
- D. Hardness, rigidity & brittleness

The principle applied in liquefaction of gases is _____?

- A. Adiabatic expansion
- B. Joule-Thomson effect

- C. Both A. and B
- D. Neither A. nor B

Titanium metal _____?

- A. Exists in three allotropic forms
- B. Cannot be welded
- C. Is used in oceanographic and space exploration applications
- D. None of these

Mixing of ground refractory material and water is done in a _____ mill?

- A. Pug
- B. Ball
- C. Tube
- D. Rod

The total investment in a project is Rs. 10 lakhs and the annual profit is 1.5 lakhs. If the project life is 10 years, then the simple rate of return on investment is _____?

- A. 15%
- B. 10%
- C. 1.5%
- D. 150%

Which of the following is a suitable absorbent for removal of H₂S from natural gas ?

- A. Vetrocoke solution
- B. Monoethanolamine (MEA)
- C. Dilute
- D. Hot water

Liquefied Petroleum Gas (LPG) in domestic use cylinders is in the liquid form.

The density of LPG in liquid form is about _____ of that of water (i.e. 1 gm/c.c)?

- A. One fourth
- B. One third
- C. Half**
- D. One eighth

Which of the following petrological constitutes is responsible for bright and lustrous black band of bituminous coal ?

- A. Vitrain**
- B. Clarain
- C. Durain
- D. Fussain

For an isothermal second order aqueous phase reaction, $A \rightarrow B$, the ratio of the time required for 90% conversion to the time required for 45% conversion is _____?

- A. 2
- B. 4
- C. 11**
- D. 22

Pyrolysis of kerosene or natural gasoline is done to produce mainly the _____?

- A. Olefins and aromatics**
- B. Lighter paraffins
- C. Stabilised gasoline
- D. Diesel

A cylindrical rod subjected to a tensile strain within the elastic limit undergoes a volume change. If the volume strain is equal to half the tensile strain, then the Poisson's ratio of the rod is _____?

- A. 0
- B. 0.33
- C. 0.44**
- D. 0.25

The rate of an autocatalytic reaction as shown in the bellow figure, is given by $-r_A = k \cdot C_A \cdot C_B$. In this case, the _____?

- A. Plot of $-r_A$ Vs C_A is a straight line with slope k
- B. Plot of $-r_A$ Vs C_A is a hyperbola
- C. Rate of disappearance of reactant A is maximum, where $C_A = C_B$
- D. Both B & C**

Loss of heat from untagged steam pipe to the ambient air is by _____?

- A. Conduction
- B. Convection
- C. Radiation
- D. All A., B. & C.**

In case of vapor-liquid equilibria, which of the following does not account for gas phase deviation from ideality ?

- A. Use of equation of state
- B. Fugacity co-efficient
- C. Activity co-efficient**
- D. None of these

Shampoos are commercially not available in the form of _____?

- A. Powder
- B. Gaseous mixture**
- C. Solution
- D. Emulsion

In the blast furnace, incorporation of water vapour in the blast gives the following effect ?

- A. Increases the reducing potential of the gas**
- B. Increases the flame temperature
- C. No significant change occurs
- D. Increases the hydrogen content in the metal

Specific gravity of hot metal (pig iron) is _____ times that of the blast furnace slag ?

- A. 2
- B. 3**
- C. 0.8
- D. 6

Presence of aromatics in _____ ?

- A. Diesel increases its cetane number
- B. Kerosene increases its smoke point
- C. Petrol increases its octane number**
- D. All A., B. and C.

Which of the following is a non-regenerative fixed bed catalytic reforming process ?

- A. Hydroforming
- B. Thermofor catalytic reforming
- C. Platforming**
- D. Hyperforming

Sum of the powers of the concentration terms in the rate equation is called the _____ of the reaction?

- A. Order
- B. Overall order**
- C. Molecularity

D. None of these

Kick's law assumes that the energy required for size reduction is proportional to the logarithm of the ratio between the initial and the final diameters. The unit of Kick's constant is _____?

- A. kW. sec/kg
- B. kWh/kg
- C. kWh/sec. kg
- D. kg/sec

Sulphuric acid is used as a catalyst in the _____?

- A. Hydrogenation of oils
- B. Gas phase oxidation of SO₂ in chamber process
- C. Alkylation of hydrocarbons
- D. None of these

Inside the distillation column, the _____?

- A. Driving force for the vapour flow is the pressure drop
- B. Liquids are not always at their bubble points
- C. Pressure increases gradually from bottom to the top of the column
- D. None of these

Which of the following impurities reduces the refractoriness of magnesite bricks ?

- A. Al₂O₃
- B. CaO
- C. SiO₂
- D. All A., B. & C.

Hydrogenation of oil/fat does not _____?

- A. Improve its resistance to rancid oxidation
- B. Raise its melting point
- C. Remove double bonds

D. None of these

In the constant rate period of the rate of drying curve for batch drying, _____?

- A. Cracks develop on the surface of the solid
- B. Rate of drying decreases abruptly
- C. Surface evaporation of unbound moisture occurs**
- D. None of these

Which of the following is a co-product during the manufacture of caustic soda by electrolysis of brine ?

- A. Na_2CO_3
- B. NaHCO_3
- C. H_2**
- D. None of these

Which is not a hearth furnace ?

- A. Glass tank furnace
- B. Open hearth furnace
- C. Cupola**
- D. Reheating furnace

(Le/D) for fully open gate valves would be _____?

- A. Much more than that for fully open globe valves
- B. Much less (say 2% than that for fully open globe valves)
- C. Around 7
- D. Both B. and C.**

Hazards associated with the relief valve leakage for extremely hazardous material storage can be taken care of by providing _____?

- A. Rupture diaphragm**
- B. Dikes
- C. Surge chamber

D. None of these

With increase in molecular weight of the gas, the head developed by a centrifugal compressor will _____?

A. Decrease

B. Increase

C. Remain same

D. Unpredictable

In an amorphous material, atoms defy any definite atomic structure and exist in random pattern just like in liquid. Which of the following is an amorphous material ?

A. Tin

B. Lead

C. Zinc

D. Glass

The terminology 'BTX' used in coal tar distillation industry refers to _____?

A. Benzol-toluol-xylol

B. Benzol-toluene-xylene

C. Benzene-toluol-xylol

D. Benzene-toluene-xylene

Separation of two or more components of a liquid solution cannot be achieved by _____?

A. Fractional crystallisation

B. Liquid extraction

C. Absorption

D. Evaporation

Main constituents of cotton fiber is _____?

- A. Lignin
- B. Cellulose**
- C. Starch
- D. Gelatine

For a mixed flow reactor operating at steady state, the rate of reaction is given by _____?

- A. $(FA_0/V) - (dCA/dt)$
- B. $(FA_0/V) + (dCA/dt)$
- C. $(FA_0/V) \times A$**
- D. $-(dCA/dt)$

Rubber lined vessels are corroded by the action of _____?

- A. Aqua regia
- B. Chloroform
- C. Sulphuric acid (95%)
- D. All A., B. and C.**

For the same system, if the same liquid used in an absorber is decreased, the tower height will _____?

- A. Increase**
- B. Decrease
- C. Remain unaffected
- D. Decrease or increase; depends on the type of liquid

When warm and cold liquids are mixed, the heat transfer is mainly by _____?

- A. Conduction
- B. Convection**
- C. Radiation
- D. Both A. & C.

Angular displacement can be measured suitably by

a _____ ?

A. Shaft encoder

- B. Linear variable differential transducer (LVDT)
- C. Stroboscope
- D. Tachometer

Air is to be heated by condensing steam. Two heat exchangers are available (i) a shell and tube heat exchanger and (ii) a finned tube heat exchanger. Tube side heat transfer area are equal in both the cases. The recommended arrangement is _____ ?

A. Finned tube heat exchanger with air inside and steam outside

B. Finned tube heat exchanger with air outside and steam inside

- C. Shell and tube heat exchanger with air inside tubes and steam on shell side
- D. Shell and tube heat exchanger with air on shell side and steam inside tubes

. Refractoriness under load (RUL) of fireclay bricks (under a load of 2 kg/cm²) is _____ °C?

- A. 500
- B. 1000
- C. >1350**
- D. >2000

A Potassic fertiliser contains 50% K₂O. It could be _____ ?

A. Potassium sulphate

- B. Potassium chloride
- C. A mixture of NaCl + KCl
- D. None of these

The main industrial source of emission of hydrogen sulphide air pollutant is _____ ?

- A. Petroleum refineries
- B. Coal based thermal power plants**

- C. Pulp and paper plant
- D. Metallurgical roasting & smelting plant

Soap cannot be used with hard water, because _____?

- A. Hard water contains sulphate
- B. They form insoluble calcium soaps which precipitate**
- C. They attract back the removed dirt
- D. None of these

Reynold's analogy states that (where, St = Stanton number f = friction factor) ?

- A. $St = f/2$**
- B. $St = f/4$
- C. $St = 4f$
- D. $St = f^{1/2}$

Main constituents of Benzol are _____?

- A. Benzene, toluene & xylene**
- B. Tar & creosote
- C. Ammonia & phenol
- D. Anthracene & phenol

Pick out the correct statement?

- A. Loss of electrons from neutral atoms produces negative ions
- B. The radius of nucleus & atomic size are of the order of 10^{-12} cm & 10^{-8} cm respectively**
- C. Gain of electrons by neutral atoms form cations
- D. Proton to neutron ratio in a stable nucleus is 2 : 1

The centre of pressure is _____?

- A. Always below the centroid of the area
- B. Always above the centroid of the area
- C. A point on the line of action of the resultant force**
- D. At the centroid of the submerged area

The thermal emf-temperature relationship of most thermocouples is _____?

- A. Linear
- B. Parabolic**
- C. Exponential
- D. Square root

Tubes are fixed to the tube sheet (a thick circular metallic plate) by the method of tube rolling and brazing (non-removable) or ferrule connection (removable). Thickness of the tube, sheet is normally _____ the outside diameter of the tube but in no case it should be less than 22 mm (7/8")?

- A. Half
- B. Three fourth
- C. Equal to**
- D. 1.5 times

A liquid/gaseous fuel containing hydrocarbons and high amount of sulphur is burnt with 40% excess air. The flue gas still contains large amount of carbon monoxide. This may be due to the _____?

- A. Presence of large quantity of hydrogen in the fuel
- B. Low calorific value of the fuel
- C. High sulphur content in the fuel
- D. Lack of thorough mixing of fuel with air**

An ideal tower packing should not _____?

- A. Have low weight per unit volume
- B. Have large surface area per unit volume
- C. Have large free cross-section
- D. Hold up large amount of liquid in the packing**

For an ideal gas, the compressibility factor _____?

- A. Decreases with pressure rise

B. Is unity at all temperature

- C. Is unity at Boyle's temperature
- D. Zero

Use of higher percentage of lime for bonding silica bricks, reduces their _____?

- A. Strength
- B. Abrasion resistance
- C. Both A. & B.**
- D. Neither A. nor B.

Width and depth of grooves in the tube sheet holes normally are _____ inch respectively?

- A. 1/8 and 1/64**
- B. 1/64 and 1/8
- C. 1/2 and 8
- D. 1/2 and 5

In reverberatory furnace, charge is heated mainly by _____?

- A. Conduction
- B. Natural convection
- C. Radiation of heat from the roof of the combustion chamber**
- D. None of these

Washing of coal does not reduce its _____?

- A. S & P content
- B. Heating value
- C. Fusion point of ash
- D. None of these**

Which property of refractories is the most important for top section of the blast furnace ?

- A. Resistance to abrasion**

- B. Resistance to slag penetration
- C. Stability of volume at high temperature

Presence of nitrogen in high concentration in contaminated air reduces partial pressure of oxygen in lungs, thereby causing asphyxia (suffocation) leading to death from oxygen deficiency. Concentration of N₂ in contaminated air at which it acts as a natural asphyxiate is \geq _____ percent?

- A. 84**
- B. 88
- C. 80
- D. 92

Drag co-efficient in hindered settling is _____ that in free settling?

- A. Less than
- B. Equal to
- C. Not necessarily greater than
- D. Always greater than**

Performance number of a liquid fuel is related to its _____?

- A. Wax content
- B. Spontaneous ignition temperature**
- C. Knocking tendency
- D. Sulphur content

Out of the following places, a nuclear power plant is not located at _____?

- A. Talcher (Orissa)**
- B. Kaiga (Karnataka)
- C. Rawatbhata (Rajasthan)
- D. Kalpakkam (Tamilnadu)

Mercury thermometer can be used to measure the temperature upto

_____ °C?

- A. 100
- B. 250
- C. 350**
- D. 750

Which of the following is an undesirable property of slag produced during the Pyrometallurgical method of metal extraction from its ore ?

- A. High fusibility & fluidity
- B. High thermal conductivity**
- C. Low density
- D. High chemical activity

Which of the following is produced by condensation polymerisation ?

- A. Bakelite**
- B. Polythene
- C. Poly vinyl chloride
- D. Polystyrene

Which of the following has the minimum value of COP for a given refrigeration effect ?

- A. Reverse Carnot cycle
- B. Ordinary vapour-compression cycle
- C. Vapour-compression process with a reversible expansion engine
- D. Air refrigeration cycle**

In petroleum refining, the process used for conversion of hydrocarbons to aromatics is _____?

- A. Catalytic cracking
- B. Catalytic reforming**
- C. Hydrotreating
- D. Alkylation

The minimum tray spacing in distillation column of diameter less than 3 ft is normally _____ inches?

- A. 6
- B. 18
- C. 24
- D. 34

_____ head is the most economical for cylindrical vessels designed for operating at high pressure (> 15 atm.)?

- A. Hemispherical
- B. Dished
- C. **Ellipsoidal**
- D. Conical

Which of the following exercises most powerful influence on the mechanical properties of steel ?

- A. Manganese
- B. **Carbon**
- C. Phosphorous
- D. Silicon

An alkali metal salt of Palmitic acid is known as _____?

- A. Soap
- B. **Metallic soap**
- C. Detergent
- D. Alkaloid

Liquid nitrogen containers can be made from _____?

- A. Ferritic stainless steel
- B. **HSLA steel**
- C. Titanium
- D. Austenitic stainless steel

Electrometallurgy is not involved in the extraction of _____
from its ore?

- A. Aluminium
- B. Tin
- C. Lead
- D. Both B. & C.**

High purity nitrogen is used in _____?

- A. Making protective gas (95% N₂ + 5% H₂) for annealing of cold rolled steel strip coils
- B. Fire fighting purposes
- C. Both A. & B.**
- D. Neither A. nor (B)

Which one is different for the neutral atoms of the isotopes of an element?

- A. Atomic weights**
- B. Atomic numbers
- C. Number of protons
- D. Number of electrons

_____ mill is normally used for grinding of talc?

- A. Tube
- B. Compartment
- C. Ring-roll**
- D. Pebble

In a dry packed bed, the pressure drop will be changed by increasing the flow rate as _____?

- A. V^{1.8}**
- B. V^{-0.8}
- C. V
- D. V⁻¹

Solid particles separation based on the difference in their flow velocities

through fluids is termed as the _____?

- A. Clarification
- B. Classification**
- C. Elutriation
- D. Sedimentation

Which form of sulphur is the most stable at room temperature ?

- A. Plastic
- B. Monoclinic
- C. Rhombic**
- D. Flowers of sulphur

Most of the plastics are safe to be used upto a maximum temperature of _____ °C?

- A. 100
- B. 150**
- C. 350
- D. 450

Pick out the wrong statement?

- A. The disintegration rate of a radioactive substance cannot be increased by heating it
- B. Electrons have negligible mass and unit negative charge
- C. Deuterium atom has one proton and two neutrons in its nucleus**
- D. Cadmium is capable of absorbing neutrons

One kg of saturated steam at 100°C and 1.01325 bar is contained in a rigid walled vessel. It has a volume of 1.673 m³. It cools to 98°C; the saturation pressure is 0.943 bar ; one kg of water vapour under these conditions has a volume of 1.789 m³. The latent heat of condensation (kJ/kg-1) under these conditions is _____?

- A. 40732
- B. 2676

C. 2263

D. 540

In the equation, $PV^n = \text{constant}$, if the value of $n = \pm \infty$, then it represents a reversible _____ process?

A. Adiabatic

B. Isometric

C. Isentropic

D. Isothermal

Moderating material used in a thermal-reactor should be a _____?

A. Good absorber of neutrons

B. Solid substance

C. Poor absorber of neutrons

D. None of these

Thermal efficiency of a limestone calcination rotary kiln may be around _____ percent?

A. 20

B. 40

C. 65

D. 80

Gas holder of a gobar (cow-dung) gas plant is made of _____?

A. Molybdenum stainless steel

B. Tin

C. Mild steel

D. Aluminium

Pick out the wrong statement?

A. The integral method of analysing kinetic data is used when the data is scattered

B. The differential method of analysing kinetic data requires more accurate or larger

amounts of data

C. When the reaction rate is independent of temperature, the reaction is said to be of zero order

D. The ratio of volumes of plug flow reactor to that of mixed reactor is always less than one for identical feed composition, flow rate, conversion and for all positive reaction orders

In triangular co-ordinates, the ternary composition point falls _____ of the triangle?

A. In the corners

B. Inside

C. On the sides

D. None of these

Age hardening is connected with _____?

A. Babbitt metal

B. Gun metal

C. Stainless steel

D. Duralumin

Crude topping column operates at _____ pressure?

A. Atmospheric

B. 10 atm

C. Vacuum

D. 3 atm

Shock resisting steels should possess high _____?

A. Hardness

B. Toughness

C. Tensile strength

D. Wear resistance

The maximum slope of a belt conveyor can be _____?

A. 15°

- B. 30°
- C. 45°
- D. 60°

A coal having high volatile matter content will _____?

- A. Give less yield of tar and gas on carbonisation
- B. Burn with a small non-smoky flame
- C. Have a very high calorific value
- D. None of these

Which is a neutral refractory ?

- A. Graphite
- B. Magnesite chrome
- C. Silica
- D. Magnesia

Tin vessels are corroded by _____?

- A. Anhydrous ammonia
- B. Aromatic solvents
- C. Synthetic detergent solution
- D. None of these

Machinability of hard alloys and tool steels is improved by _____?

- A. Spheroidising
- B. Annealing
- C. Tempering
- D. Normalising

Phosphates (e.g., tricresyl, tributyl, tetrabutyl, triphenyl etc.) are added to polymers to act as _____?

- A. Hardeners
- B. Anti-shrinkage agents

C. Plasticisers

D. Transparency improver

Deoiling is the process of removal of oil from wax. It is done by the _____ process?

A. Solvent extraction

B. Sweating

C. Resettling

D. All A., B. & C.

Atomising steam to fuel oil ratio in a burner should be around _____?

A. 0.5

B. 1.5

C. 2.5

D. 3.5

The film penetration model of mass transfer was enunciated by _____?

A. Gilliland

B. Toor and Marcello

C. Stefan

D. Fick

A heterogeneous reactor is the one, in which the moderator and the _____?

A. Coolant are different materials

B. Coolant are present in different phases (e.g., heavy water and graphite)

C. Fuel are present in different phases (e.g. uranium and heavy water)

D. None of these

Pressure drop through plate tower as compared to that through packed tower,

for the same duty will be _____?

- A. Less
- B. More**
- C. Equal
- D. Either A. or B.; depends on the packing height

Bauxite calcining rotary kilns are lined with _____ bricks?

- A. Fireclay
- B. Carbon
- C. 85% alumina**
- D. Corundum

Particles having diameter greater than $75 \mu\text{m}$ (micrometer = 10^{-6} mm) are called _____?

- A. Grit**
- B. Dust
- C. Powder
- D. Smoke

At $Pr > 1$, conduction in an ordinary fluid flowing through a heated pipe is limited to the _____?

- A. Buffer zone
- B. Turbulent core
- C. Both A. and B.
- D. Viscous sub-layer**

In which of the following reaction equilibrium, the value of equilibrium constant K_p will be more than is K_c ?

- A. $2\text{HI} \rightleftharpoons \text{H}_2 + \text{I}_2$
- B. $\text{N}_2\text{O}_4 \rightleftharpoons 2\text{NO}_2$**
- C. $2\text{SO}_2 + \text{O}_2 \rightleftharpoons 2\text{SO}_3$
- D. None of these

A cylindrical pressure vessel of volume $6 \pi \text{ m}^3$ has to be designed to withstand a maximum internal pressure of 10 atm. The allowable design stress of the material is 125 N/mm^2 and corrosion allowance is 2 mm. The thickness of the vessel for a length/diameter ratio of 3 will be close to _____?

- A. 5 mm
- B. 6 mm
- C. 8 mm
- D. 10 mm**

Dacron is a/an _____?

- A. Polyester**
- B. Unsaturated polyester
- C. Polyamide
- D. Inorganic polymer

Entropy change of the reaction, $\text{H}_2\text{O} (\text{liquid}) \rightarrow \text{H}_2\text{O} (\text{gas})$, is termed as the enthalpy of _____?

- A. Solution
- B. Vaporisation**
- C. Formation
- D. Sublimation

Which of the following constituents present in petroleum is responsible for ash formation ?

- A. Nitrogen compounds
- B. Organometallic compounds
- C. Sulphur compounds**
- D. Oxygen compounds

Reaction of benzene with chlorine gas to produce tri-chlorobenzene exemplifies a/an _____ reaction?

- A. Elementary

- B. Parallel
- C. Consecutive**
- D. None of these

What is the ratio of fluid carrying capacity of two pipes having diameters d_1 and d_2 respectively ?

- A. $(d_1/d_2)^{0.8}$
- B. $(d_1/d_2)^{0.5}$**
- C. d_1/d_2
- D. $(d_1/d_2)^2$

Which tube arrangement in a heat exchanger would facilitate highest heat transfer rate ?

- A. Triangular pitch**
- B. Square pitch
- C. Diagonal square pitch
- D. Heat transfer rate is independent of tube arrangement

Iron alloyed with carbon upto 2% is called _____ ?

- A. Pig iron
- B. Wrought iron
- C. High carbon steel
- D. None of these**

Critical compressibility factor for all substances _____ ?

- A. Are more or less constant (vary from 0.2 to 0.3)**
- B. Vary as square of the absolute temperature
- C. Vary as square of the absolute pressure
- D. None of these

Because of its very high refractoriness of the order of _____ °C, silicon carbide refractories are used in zinc smelting furnace, muffle furnace and for

supporting the wares in tunnel kilns ?

- A. 1800
- B. 2200
- C. 2400
- D. 2700**

Apex angle of conical heads used in the bottom heads of chemical process equipments is usually_____?

- A. 30°
- B. 45°
- C. 60°**
- D. 75°

Amount of coal lost in ash particle, which is carried through the boiler system, depends upon the_____?

- A. Physical nature, ash content and fineness of the coal
- B. Amount of excess air supplied and load on the boiler
- C. Type of burner and combustion chamber
- D. All A., B. and C.**

Fusion point of a basic refractory material is_____?

- A. Reduced by the addition of acid oxides**
- B. Increased by the addition of acid oxides
- C. Not affected by the addition of acid oxides
- D. Always less than 1000°C

With increase in the solute concentration, the specific heat of aqueous solutions _____?

- A. Increases
- B. Decreases**
- C. Remains unchanged
- D. Either A. or B.; depends on the type of solution

Which of the following is the optimum operating condition for an exothermic reversible reaction taking place in a plug-flow reactor ?

- A. Temperature should be high in the beginning and decreased towards the end of the reaction
- B. Very low temperature should be used throughout the reaction
- C. Very high temperature should be used throughout the reaction
- D. None of these

Pick out the correct statement ?

- A. Ponchan-Savarit method is more accurate than McCabe-Thiele method to determine the number of theoretical stages required for the separation of non-ideal binary system by distillation
- B. A sharp decrease in pressure drop is an indication of flooding in a distillation column
- C. Solvent used in extractive distillation should be of high volatility
- D. Flash distillation is suitable for separating components which have very close boiling temperature

Phenol formaldehyde is produced by condensation polymerisation. It is also known as _____?

- A. Teflon
- B. Bakelite**
- C. Polyester
- D. Nylon-66

Mercury is an ideal barometric fluid mainly due to its _____?

- A. High density
- B. Low compressibility
- C. Low capillary action
- D. Very low vapor pressure**

The unit of equilibrium constant of a chemical reaction is the same as that of _____?

- A. Molar concentration
- B. Temperature
- C. Internal energy
- D. None of these**

The most suitable filter for the removal of very small amount of precipitate from very large volumes of water is the _____ filter?

- A. Vacuum
- B. Sand**
- C. Plate & frame
- D. Rotary

Catalyst is a substance, which _____ chemical reaction?

- A. Increases the speed of a
- B. Decreases the speed of a
- C. Can either increase or decrease the speed of a**
- D. Alters the value of equilibrium constant in a reversible

Diatomaceous earth is a/an _____?

- A. Explosive
- B. Filter aid**
- C. Filter medium
- D. Catalyst

Fast breeder reactors are most usable in India, because of our largest _____ deposits?

- A. Thorium**
- B. Plutonium
- C. Uranium
- D. None of these

Elastic failure of a material occurs, when the tensile stress equals yield strength, yield point or the elastic limit. Also, the elastic failure occurs according to

maximum strain theory, when the maximum tensile strain equals (where, ζ = yield strength and E = modulus of elasticity) ?

- A. E
- B. ζ
- C. ζ/E**
- D. E/ζ

Platforming is a _____ process?

- A. Moving bed
- B. Fluidised bed
- C. Non-regenerative & fixed bed**
- D. Regenerative

Hastelloy comprises of _____ ?

- A. Copper and tin
- B. Copper and nickel
- C. Molybdenum and nickel**
- D. Lead and tin

Ammonia leakage in the refrigeration system is detected by _____ ?

- A. Sulphur stick, which on detection gives white smoke**
- B. Using chemical reagents
- C. Its smell
- D. Soap solution

Ability of a material to absorb energy in deformation in the plastic range is characterised as its _____ ?

- A. Ductility
- B. Toughness**
- C. Creep
- D. Resilience

“The rate at which a substance reacts is proportional to its active mass and the rate of a chemical reaction is proportional to the product of active masses of the reacting substances”. This is the _____?

- A. Lewis-Randall rule
- B. Statement of Van't Hoff Equation
- C. Le-Chatelier's principle
- D. None of these**

As the temperature is lowered towards the absolute zero, the value of $\partial(\Delta F)/\partial T$, then approaches _____?

- A. Unity
- B. Zero**
- C. That of the heat of reaction
- D. Infinity

Standard temperature and pressure (S.T.P.) is _____?

- A. 0°C and 750 mm Hg**
- B. 15°C and 750 mm Hg
- C. 0°C and 1 kgf/cm²
- D. 15°C and 1 kgf/cm²

Maximum nitrogen percentage is in _____?

- A. Ammonium sulphate
- B. Calcium ammonium nitrate
- C. Urea
- D. Liquid ammonia**

In case of the decomposition of hydroiodic acid ($2HI \rightleftharpoons H_2 + I_2$), addition of H_2 (at equilibrium condition) will _____?

- A. Increase the partial pressure of I_2
- B. Decrease the partial pressure of HI
- C. Diminish the degree of dissociation of HI**

D. None of these

Which of the following are made out of the carbon steel having carbon content of 0.9 to 1%?

A. Small punches, broaches reamers and springs

B. Cutlery, screws, rivets and files

C. Mandrels, twist drills, small lathe tools and razors

D. Forgings like can shaft, structural steel plate, threading dies and drawing dies

Working principle of bimetallic thermometers is difference in linear co-efficient of thermal expansion of two strips of different metals welded together. Which of the following has the maximum thermal co-efficient of linear expansion ?

A. Nickel

B. Brass

C. Chromel

D. Invar

N_{Sc}/N_{Pr} is called the _____ ?

A. Psychrometric ratio

B. Lewis number

C. Sherwood number

D. Stanton number

Lead is poured into the joint between two _____ pipes ?

A. Mild steel

B. Concrete

C. Cast iron

D. Asbestos cement

Specific speed for a centrifugal pump is _____ ?

A. $N \sqrt{Q}/H^{3/4}$

B. $N \sqrt{Q}/H^{2/3}$

C. $N^{3/5}D^5/H^{1/3}$

D. N VQ/H

Combustion reaction of fuels is a/an _____ reaction?

- A. Auto catalytic
- B. Exothermic**
- C. Endothermic
- D. None of these

Height of liquid in agitation tank is normally maintained equal to the tank diameter. However, if the tank is too tall and a large liquid hold up is desired, then two or more impellers mounted on the same shaft may be used. The clearance between the tank bottom and the bottom most impeller should be about (where, D = impeller diameter) ?

- A. 0.5 D
- B. D**
- C. 1.5 D
- D. 2 D

In flue gas analysis by Orsat's apparatus, oxygen is absorbed by _____?

- A. Potassium hydroxide
- B. Cuprous chloride
- C. Alkaline pyrogallol solution**
- D. None of these

Planck's distribution law is valid for _____ bodies?

- A. Black
- B. White
- C. Coloured**
- D. All A., B. & C.

Which one is preferred for aircraft engine ?

- A. High viscosity index lube oil**
- B. Low viscosity index lube oil
- C. High freezing point aviation fuel
- D. None of these

Mass transfer co-efficient 'K' according to penetration theory varies with mass diffusivity as _____?

- A. $D^{0.5}$**
- B. D
- C. $1/D$
- D. $D^{1.5}$

The main advantage of forced draft over natural draft is that _____?

- A. Combustion of fuel is complete
- B. Smaller height chimney can be used
- C. Furnace control is easier
- D. All A., B. & C.**

Out of two equilibrium curves, first one lies above the diagonal and the second lies below the diagonal in the x-y plot. It means that separation by distillation is _____?

- A. Not possible in the second case unless vacuum is applied
- B. Not possible in the second case unless high pressure is applied
- C. More readily done in the second case compared to first one**
- D. None of these

Number of degrees of freedom for a three phase system in equilibrium comprising of three non-reacting chemical species is _____?

- A. 2**
- B. 0
- C. 1

D. 3

Pick out the correct statement?

- A. Diffusivity decreases with increase in temperature
- B. Diffusivity increases with increase in molecular weight
- C. Diffusivity increases with the size of the individual molecule
- D. None of these**

The rate of heat transfer is a product of overall heat transfer co-efficient, the difference in temperature and the _____?

- A. Heating volume
- B. Heat transfer area**
- C. Nusselt number
- D. None of these

Joule-Thomson co-efficient depends on the _____?

- A. Pressure
- B. Temperature
- C. Both A. & B**
- D. Neither A. nor B

Minimum recommended baffle spacing in a shell and tube heat exchanger is about (where, D = shell diameter)?

- A. 0.2 D**
- B. 0.5 D
- C. 0.66 D
- D. 0.80 D

Shell and leaf filter as compared to plate and frame filter

_____?

- A. Entails less labor cost
- B. Facilitates filtration under higher pressure
- C. Provides more effective washing

D. All A., B. & C.

The Navier-Stokes equation deals with the law of conservation of _____?

- A. Mass
- B. Energy
- C. Both A. & B.

D. Momentum

Steam condenser tubes are made of admiralty brass, in which percentage of zinc & copper are _____ respectively ?

- A. 70 & 30**
- B. 30 & 70
- C. 50 & 50
- D. 90 & 10

Fatigue failure of a material results from _____ stress?

- A. Tensile
- B. Compressive
- C. Fluctuating**
- D. None of these

Ringelmann chart is used for the evaluation of _____ pollution?

- A. Air**
- B. Water
- C. Noise
- D. Radioactive

Main use of hydrazine is _____?

- A. As a rocket fuel**
- B. In water treatment
- C. As a disinfectant
- D. As fire retardant

Thermal pollution of water increases its toxicity and oxidation of oxygen demanding waste besides favouring bacterial growth. A rise in water temperature by 10°C , doubles the toxic effects of _____ present in it?

- A. Coal ash
- B. Potassium cyanide**
- C. Ortho-xylene
- D. None of these

Which one is used to determine the colour of petroleum products ?

- A. Colour comparator**
- B. Saybolt chromometer
- C. Cleveland apparatus
- D. None of these

Coke oven gas consists mainly of _____?

- A. H_2 , & CH_4**
- B. CO , & CO_2
- C. H_2 , & CO
- D. CH_4 , & CO

Very _____ coals are completely devoid of cokability i.e., it is non-coking ?

- A. Young
- B. Mature
- C. Both A & B**
- D. Neither A nor B

Bomb calorimeter can be used to determine the _____ of the coal?

- A. Sulphur content
- B. Calorific value
- C. Both A. & B.**
- D. Neither A. nor B.

A cottrell precipitator makes use of the _____ for dusty air cleaning?

- A. Electric spark
- B. Corona discharge**
- C. Alternating current
- D. None of these

Acetone is produced by catalytic dehydrogenation of _____?

- A. Phenol
- B. Naphthalene
- C. Isopropanol**
- D. Ethyl benzene

Cascade control means _____?

- A. Feed forward control
- B. More than one feed-back loop**
- C. On-off control
- D. One feed-back loop

With increase in pressure (above atmospheric pressure), the C_p of a gas _____?

- A. Increases**
- B. Decreases
- C. Remains unchanged
- D. First decreases and then increases

Particle nature of cathode rays is proved due to the fact that they _____?

- A. Travel in a straight line
- B. Get deflected by magnetic electric field**
- C. Produce fluorescence
- D. Heat the exposed material

Polymers are classified into four categories namely thermosetting, thermoplastic, elastomer and fibre depending upon their _____?

- A. Molecular sizes
- B. Magnitude of intermolecular forces**
- C. Resistance to heat
- D. Polymerisation mechanism

Answer: Option B

A fuel with high heat release rate will _____?

- A. Require smaller combustion chamber**
- B. Have high calorific value
- C. Have high adiabatic flame temperature
- D. None of these

The valve used for very remote and accurate control of fluid is a _____ valve?

- A. Needle**
- B. Globe
- C. Gate
- D. Butterfly

The advantage of backward feed multiple effect evaporators over forward feed units is that _____?

- A. Heat sensitive material can be handled
- B. There is no additional cost of pumping
- C. Most concentrated liquid is at highest temperature**
- D. Equal heat transfer co-efficients exist in various effects

Which of the following is not a mathematical method for evaluation of profitability of a chemical process plant ?

- A. Cash reserve**
- B. Rate of return on investment

- C. Payout period
- D. Discounted cash flow based on full life performance

Hydrochloric acid is also known as _____?

- A. Oil of vitriol
- B. Muriatic acid**
- C. Strong organic acid
- D. Green acid

Heat produced when a steady state current, I passes through an electrical conductor having resistance, ' R ' is _____?

- A. IR
- B. I^2R**
- C. IR^2
- D. I^2R^2

Production of one ton of dry paper pulp requires about _____ tons of bamboo or wood?

- A. 1
- B. 2.5**
- C. 5
- D. 10

The following thermocouple may be used for measuring temperature upto 1873°K _____?

- A. Chromel-alumel
- B. Copper-constantan
- C. Platinum-platinum rhodium**
- D. Iron-constantan

Reduction in the grain size reduces the _____ of the material?

- A. Fatigue resistance
- B. Tensile strength

C. Creep resistance

D. All A., B. & C.

Silicon crystal can be converted to p-type semi-conductor by doping with _____?

A. Phosphorous

B. Nitrogen

C. Carbon

D. Boron

A coal that softens and fuses on heating is _____?

A. Classified

B. Carbonised

C. Caking

D. Non-caking

Silica refractories are not used in _____?

A. Coke oven walls

B. Beehive coke ovens

C. Dome and upper portion of B.F. stoves

D. Open hearth furnace roof

Which furnace employs an I.D. fan for the removal of flue gases from the furnace ?

A. Coke oven

B. Blast furnace stoves

C. Beehive coke oven

D. High pressure boiler

_____ method for profitability evaluation of a project does not account for investment cost due to land ?

A. Net present worth

B. Pay out period

- C. Discounted cash flow
- D. Rate of return on investment

_____ property of steel increases by addition of large amount of silicon in it?

- A. Mechanical
- B. Machining
- C. Magnetic**
- D. Refractory

Film condensation is promoted on a/an _____ surface?

- A. Oily
- B. Coated
- C. Clean & smooth**
- D. Dirty

The bright glow of a combustion process is the characteristic of _____ temperature oxidation of coal?

- A. Fast & high**
- B. Slow & low
- C. Slow & high
- D. Fast & slow

The minimum energy required to allow a chemical reaction to proceed is termed as the 'threshold energy'. Chemical reactions with low activation energy are _____?

- A. Always irreversible
- B. Insensitive to temperature changes**
- C. Mostly irreversible
- D. Highly temperature sensitive

A screen is said to be blinded, when the _____?

- A. Over-sizes are present in undersize fraction
- B. Under-sizes are retained in oversize fraction
- C. Screen is plugged with solid particles**
- D. Screen capacity is abruptly increased

LMTD for counter-flow and parallel flow heat exchanger will be the same, when the _____?

- A. Cold fluid is heated to a certain temperature by condensing steam (isothermal fluid)**
- B. Outlet temperature of both the hot and cold fluid are same
- C. Outlet temperature of hot fluid is less than the outlet temperature of the cold fluid
- D. None of these

The wet bulb temperature is lower in dry air than in wet air at the same temperature. A dry bulb thermometer registers a higher temperature than a wet bulb thermometer except at _____ percent relative humidity ?

- A. 0
- B. 100**
- C. 50
- D. None of these

The major constituents of glass are _____?

- A. Lime, clay and soda ash
- B. Sand, lime and soda ash**
- C. Silica, alumina and clay
- D. Silica, alumina and soda ash

At a given value of E/R (ratio of activation energy and gas constant), the ratio of the rate constants at 500°K and 400°K is 2, if Arrhenius law is used. What will be this ratio, if transition state theory is used with the same value of „ E/R “ ?

- A. 1.6
- B. 2
- C. 2.24

D. 2.5

For ethanol-water system, the lowering of distillate quality from 95% to 92% will cause _____ plate requirement?

- A. No change in theoretical
- B. Marginal decrease in the number of**
- C. Major decrease in the number of
- D. None of these

Reynold's analogy states that _____?

- A. $N_{st} \propto f$**
- B. $N_{st} \propto N_{Re}$
- C. $N_{Nu} \propto f$
- D. $N_{Re} \propto f$

Which property is important for bricks used in the combustion chamber & dome of blast furnace stoves ?

- A. High refractoriness**
- B. High resistance to spalling
- C. High strength and density
- D. All A., B. and C.

Vycor, a widely used material for making 'thermal wells' in temperature measurement, is a _____?

- A. Cermet
- B. Glass**
- C. Thermosetting plastic
- D. Metallic alloy

Most commonly used joint in the underground pipe lines is the _____?

- A. Sleeve joint**

- B. Coupling
- C. Flange
- D. Expansion joint

Thermocol is a spongy, porous, rigid or flexible foamed plastic, obtained by blowing gas/air through molten_____?

- A. Saturated polyester
- B. Polyurethane
- C. Polystyrene
- D. Either B. or C.**

Which of the following properties of a fluid is responsible for offering resistance to shear ?

- A. Surface tension
- B. Viscosity**
- C. Specific gravity
- D. All A., B., and C.

Weight of 1 m³ of humid air as compared to 1 m³ of dry air, under the same conditions, is_____?

- A. Less**
- B. More
- C. Same
- D. Unpredictable

In case of water (Prandtl number ≈ 6) flowing over a flat plate heated over the entire length, the thermal boundary layer thickness as compared to hydrodynamic boundary layer thickness is ?

- A. Less**
- B. More
- C. Equal
- D. Unpredictable

The equation, $NA = (DAB \cdot Pt / RTZ \cdot PBM) (PA1 - PA2)$ is for _____?

- A. Fick's second law of diffusion
- B. Steady state diffusion for stagnant case**
- C. Liquid M.T.C. by Higbie penetration theory
- D. None of these

Which of the following is the lowest cost plastic commercially available ?

- A. Polythene**
- B. Teflon
- C. Bakelite
- D. PVC

A pipe has a porous section of length L as shown in the figure. Velocity at the start of this section of V_0 . If fluid leaks into the pipe through the porous section at a volumetric rate per unit area $q(x/L)^2$, what will be axial velocity in the pipe at any „ x “? Assume incompressible one dimensional flow i.e., no gradients in the radial direction ?

- A. $VX = V_0 + q (x^3/L^2D)$
- B. $VX = V_0 + \frac{1}{3}q (x^3/L^2)$
- C. $VX = V_0 + 2q (x^2/LD)$
- D. $VX = V_0 + (4/3) q (x^3/L^2D)$**

Paddle agitator _____?

- A. Is suitable for mixing low viscosity liquids**
- B. Produces axial flow
- C. Moves at very high speed
- D. None of these

In screen analysis, the notation $+5 \text{ mm}/-10 \text{ mm}$ means particles passing through _____?

- A. 10 mm screen and retained on 5 mm screen
- B. 5 mm screen and retained on 10 mm screen
- C. Both 5 mm and 10 mm screens
- D. Neither 5 mm nor 10 mm screen

Iron & manganese present in the polluted water is removed by _____?

- A. Simple filtration
- B. Oxidation followed by settling & filtration**
- C. Chemical coagulation
- D. Chlorination only

A solid material shows case hardening properties while drying. Which of the following should be controlled to control the drying process ?

- A. Flow rate of inlet air
- B. Relative humidity of outlet air
- C. Humidity of inlet air
- D. Temperature of the solid**

In a homogeneous solution, the activity co-efficient of a component depends upon the _____?

- A. Pressure
- B. Composition
- C. Temperature
- D. All (A), B. and (C)**

The drug used in contraceptives is _____?

- A. Sulfadiazine
- B. Mestranol**
- C. Methyl salicylate
- D. Penicillin

How many atoms are there per unit cell in a body centred cubic lattice system ?

- A. 6
- B. 5
- C. 3
- D. 2**

Main constituent of natural gas is _____?

- A. CH₄ (upto 90%)**
- B. C₂H₆
- C. C₃H₈
- D. H₂

Improper storage condition results in the weathering of coal and spontaneous combustion, which increases its _____?

- A. Caking index
- B. Yield of carbonised products
- C. Friability & oxygen content**
- D. Calorific value

Sulphuric acid saturated with SO₃ is called _____?

- A. Concentrated H₂SO₄
- B. Sulphurous acid
- C. Oleum**
- D. None of these

A natural draft cooling tower is filled with wooden grids, which covers about _____ percent of the tower height?

- A. 10-15**
- B. 30-40
- C. 70-80
- D. 90-100

Which of the following can measure temperatures in the range of – 20 to 300°C ?

- A. Mercury in glass thermometer
- B. Vapor pressure thermometer
- C. Resistance thermometer
- D. None of these**

Which of the following is the most major constituents of air pollutants ?

- A. Oxides of sulphur**
- B. Oxides of nitrogen
- C. Carbon monoxide
- D. Hydrogen sulphide

_____ mill is not a revolving mill ?

- A. Pebble
- B. Compartment
- C. Cage**
- D. Tube

For efficient performance of a blast furnace, the extent of reduction of Wustite (FeO) should be _____ ?

- A. 100% indirect reduction
- B. 100% direct reduction
- C. 50-60% indirect reduction**
- D. 30-40% indirect reduction

Insulin is an _____ drug?

- A. Anti-malarial
- B. Anti-TB
- C. Antibiotic
- D. None of these**

Pick out the wrong statement?

- A. A vapor is termed as a saturated vapor, if its partial pressure equals its equilibrium vapor pressure

- B. A vapor whose partial pressure is less than its equilibrium vapor pressure, is termed as a 'superheated vapor'
- C. The temperature at which a vapor is saturated is termed as the boiling point**
- D. The difference between the existing temperature of a vapor and its saturation temperature (i.e.dew point) is called its 'degree of superheat'

Continuous flue gas analyser makes use of paramagnetic properties of some of its constituents, which move towards the strongest part of the magnetic field thus displacing diamagnetic gases. Which of the following gases is diamagnetic ?

- A. CO₂**
- B. O₂
- C. NO
- D. NO₂

Operating condition in the electrical dehydrators for crude oil is about _____ ?

- A. 6.5 kgf/Cm² & 95°C**
- B. 1 atm. & 110 °C
- C. 20 kgf/cm² & 110°C
- D. 50 atm. and 150°C

Consumable electrodes are used in the _____ welding?

- A. Gas
- B. Arc**
- C. Thermit
- D. Resistance

The peripheral velocity at inlet of a centrifugal pump having inlet diameter of 25 cms and rotating at 950 rpm is _____ m/sec?

- A. 1.8
- B. 12.4**
- C. 186.2
- D. 736.4

A bio-catalyst produced by living cells which acts independent of the cell is called a/an _____?

- A. Substrate
- B. Enzyme**
- C. Nutrient
- D. None of these

The velocity for subsonic flow in a pipeline _____?

- A. Increases in the downstream direction**
- B. Is constant
- C. Decreases in the downstream direction
- D. Is independent of the area of flow

For a non-spherical particle, the sphericity _____?

- A. Is defined as the ratio of surface area of a sphere having the same volume as the particle to the actual surface area of the particle**
- B. Has the dimension of length
- C. Is always less than 1
- D. Is the ratio of volume of a sphere having the same surface area as the particle to the actual volume of the particle

Silicon in steel _____?

- A. Makes it usable in almost all magnetic circuits where alternating current is used
- B. Increases its electrical resistivity and decreases the hysteresis loss
- C. Is present upto 5% & 4% respectively when used in transformers & motor armatures
- D. All 'A', 'B' & 'C'**

Working principle of mercury in glass thermometer is based on the _____ of mercury with increase in temperature?

- A. Increase of pressure

- B. Increase of thermal conductivity
- C. Volumetric expansion**
- D. Differential linear expansion

Out of the following, the alloy which has equal percentage of constituents, is _____?

- A. White metal
- B. Gun metal
- C. Duralumin
- D. Constantan**

_____ mill is not used for grinding wheat into flour and for milling of cereals & other vegetable products.

- A. Buhrstone
- B. Roller
- C. Attrition
- D. Pebble**

The performance of a cascade of CSTR's can be improved by adding _____?

- A. A P.F. reactor in series
- B. A P.F. reactor in parallel
- C. More CSTR's in series**
- D. More CSTR's in parallel

Wrought iron is _____?

- A. High carbon iron
- B. Highly resistance to acid corrosion
- C. Malleable & ductile; and hence is used for chain links, hooks & couplings**
- D. An alloy of iron, chromium & carbon

Centre of pressure in an immersed body is _____ the centre of

gravity?

- A. Above
- B. Below**
- C. At
- D. Either above or below; depends on the liquid density

Nitrogen content of a nitrogenous fertiliser is 35%. It could be _____?

- A. Urea
- B. Ammonium nitrate**
- C. Calcium ammonium nitrate (CAN)
- D. Ammonium sulphate

The order of the chemical reaction as shown in the bellow figure, whose rate equation is given as $-r_A = KCA$ _____

- A. 0
- B. 1
- C. 2
- D. 3**

All the atoms of the world comprise of electrons, proton & neutron except that of _____ atom in which neutron is absent ?

- A. Deuterium
- B. Hydrogen**
- C. Neon
- D. Helium

Main component of bone ash is _____?

- A. Calcium sulphate
- B. Calcium phosphate**
- C. Calcium carbonate
- D. Sodium phosphate

The function of secondary combustion air is to _____?

- A. Pneumatically convey the pulverised coal
- B. Completely burn the volatile matter**
- C. Burn the lumpy coal
- D. None of these

In a shell and tube heat exchanger, square pitch compared to triangular pitch _____?

- A. Gives a higher shell side pressure drop**
- B. Gives a lower shell side pressure drop
- C. Can pack more surface area into a shell of given diameter
- D. None of these

Pure bauxite is the best raw material for the manufacture of high alumina refractories, in which maximum alumina content can be as high as _____ percent?

- A. 55
- B. 70
- C. 80
- D. 90**

Normal depth in open channel flow is the depth of flow in the channel _____?

- A. Corresponding to uniform flow**
- B. Measured normal to the channel bed
- C. Corresponding to steady flow
- D. None of these

The slope of 9-line is determined by the _____?

- A. Reflux ratio
- B. Plate efficiency to be achieved
- C. Thermal condition of the feed**

D. Relative volatility

When a gas in a vessel expands, its internal energy decreases. The process involved is _____?

- A. Reversible
- B. Irreversible
- C. Isothermal
- D. Adiabatic

Increasing the temperature of an aqueous solution will cause decrease in its _____?

- A. Molality
- B. Mole fraction
- C. Weight percent
- D. Molarity

Which of the following thermocouples has the least temperature measurement range ?

- A. Copper-constantan
- B. Chromel-alumel
- C. Platinum-platinum/rhodium
- D. Iron-constantan

When adsorption hysteresis is observed, the desorption equilibrium pressure is _____ that obtained by adsorption?

- A. Always lower than
- B. Always higher than
- C. Same as
- D. Dependent on the system; can be either lower or higher than

The equivalent diameter for pressure drop is _____ that for heat transfer?

- A. Smaller than
- B. Greater than
- C. Equal to
- D. Not related with**

The lowest layer of atmosphere is known as the _____?

- A. Stratosphere
- B. Troposphere**
- C. Ionosphere
- D. None of these

5-200 μm size particles are called _____?

- A. Colloids or aerosols**
- B. Powder
- C. Dust
- D. Smoke

Which of the following nuclear materials is fissile ?

- A. Uranium-238
- B. Thorium-232
- C. Plutonium-239**
- D. None of these

For a liquid in laminar flow through a very long tube, when the exit fluid temperature approaches the wall temperature, the equation to be used is _____?

- A. $Nu = 0.023 Re^{0.8} Pr^{0.4}$
- B. $Nu = (\pi/2) Gz$
- C. $Nu = (2/\pi) Gz$**
- D. $Nu = 2Gz^{0.5}$

The equivalent diameter for the annulus of a double pipe heat exchanger, whose inner pipe has fins on the outside is _____ compared to the

same size pipes without fins?

- A. More
- B. Less**
- C. Same
- D. Unpredictable

Pick out the wrong statement?

- A. Reciprocal of the resistance to heat flow is called thermal conductance
- B. Unit of thermal conductance is $W/^\circ K$
- C. Thermal conductance of a wall of thickness 'L', thermal conductivity 'k' and heat flow area 'A' is kL/A**
- D. None of these

Methyl tertiary butyl ether (MTBE), a high octane (octane no. = 115) gasoline blending component is produced by the simple additive reaction of isobutylene with _____?

- A. Methyl alcohol**
- B. Ethyl alcohol
- C. Methane
- D. Ethane

Color test of water is done with an instrument called _____?

- A. Tintometer**
- B. Colorimeter
- C. Electro-chemical cell
- D. Turbidimeter

Ammonia synthesis gas is produced from fuel oil by _____?

- A. Steam reforming
- B. Hydro-cracking
- C. Partial oxidation**
- D. Hydrogenation

Dehydration of ammonium carbamate (to produce urea) is a/an _____ reaction?

- A. Reversible
- B. Catalytic
- C. Exothermic
- D. Endothermic**

A fertiliser plant is classified as a gas based fertiliser plant, when it uses _____ gas as a source of hydrogen for the manufacture of ammonia?

- A. Coke oven
- B. Producer
- C. Natural**
- D. Coal

The resistance offered by the filter used in a bag filter is proportional to (where, c = dust concentration, and s = particle size)?

- A. c/s**
- B. s/c
- C. $s \cdot c$
- D. $1/s \cdot c$

Low grade phosphate rock can be used in electrical furnace, because _____?

- A. Of the better CaO/SiO₂ balance for slag formation**
- B. CaO content is less
- C. It is cheap
- D. It produces low cost product

For any system, what is the minimum number of degrees of freedom ?

- A. 0**
- B. 1
- C. 2

D. 3

An abrupt and sudden fall in the reading of barometer is an indication of the _____?

- A. Storm
- B. Rain
- C. Clear weather
- D. Cold wave

Mercury manometer (U-tube type) exemplifies a _____ order system?

- A. Zero
- B. First
- C. Second
- D. Third

Which one contains the least percentage of carbon ?

- A. Wrought iron
- B. High speed steel
- C. Cast iron
- D. Pig iron

Filter aids like asbestos, kieselguhr, diatomaceous earth etc. are used to increase the porosity of the final filter cake & reducing the cake resistance during filtration. Filter aid is _____?

- A. Added to the feed slurry
- B. Pre-coated on the filter medium prior to filtration
- C. Separated from the cake by dissolving solids or by burning it off
- D. All A, B. & C.

_____ is undesirable in thermocouples used in industries ?

- A. Linear relation of emf to temperature

- B. Corrosion resistance
- C. Oxidation resistance
- D. Non-linear relation of emf to temperature**

Paper pulp produced by Kraft/sulphate process is _____ ?

- A. Bleached easily
- B. Dull white in color
- C. Strong fibrous**
- D. Dark colored

Bottom of basic open hearth furnace are constructed of _____ ?

- A. Dead burnt magnesite ramming mass**
- B. Porous fireclay bricks
- C. Semi-silica bricks
- D. Silicon carbide bricks

The equivalent diameter for pressure drop calculation for a fluid flowing through a rectangular cross-section channels having sides 'x' & 'y' is given by _____ ?

- A. $2xy/(x + y)$**
- B. $xy/(x + y)$
- C. $(x + y)/2xy$
- D. $(x + y)/xy$

Removal of hydrogen from coke oven gas _____ ?

- A. Increases its calorific value**
- B. Decreases its calorific value
- C. Does not alter its calorific value
- D. Is not possible on commercial scale

The ratio of actual discharge to theoretical discharge through an orifice is equal to _____ ?

- A. $C_c \cdot C_v$**

- B. Cc . Cd
- C. Cv . Cd
- D. Cd/Cv

Fireclay bricks are not used in the_____?

- A. Blast furnace
- B. Hot blast stove
- C. Cupola
- D. Wall of coke oven**

The following plot gives the saturated humidity (H_e) versus temperature (T). Line joining (H_1, T_1) and (H_2, T_2) is the constant enthalpy line. Choose the correct one from among the alternatives A, B, C and D_____?

- A. T1-Dew point temp; T2-Dry bulb temp; T3-Wet bulb temp
- B. T1-Dew point temp; T2-Wet bulb temp; T3-Dry bulb temp
- C. T1-Wet bulb temp; T2-Dry bulb temp; T3-Dew point temp
- D. T1-Dry bulb temp; T2-Wet bulb temp; T3-Dew point temp**

1000 kg of wet solids are to be dried from 60% to 20% moisture (by weight). The mass of moisture removed in kg is_____?

- A. 520
- B. 200
- C. 400**
- D. 500

Chemical engineering plant cost index is used for finding the present cost of a particular chemical plant, if the cost of similar plant at some time in the past is known. The present cost of the plant = original cost \times (index value at present / index value at time original cost was obtained). The most major component of this cost index is_____?

- A. Fabricated equipment and machinery**
- B. Process instruments and control

- C. Pumps and compressor
- D. Electrical equipments and material

Which of the following is not applicable to fluidised bed combustion of coal ?

- A. It cannot burn low grade coal**
- B. It achieves higher fuel combustion efficiency
- C. Less heat transfer surface area is required in boilers
- D. None of these

Electrical conductivities of semi-conductors are of the order of _____ ohm/cm ?

- A. 10^{-3}**
- B. 10^3
- C. 10^{-15}
- D. 10^{15}

In the allocated cap area, bubble caps are generally arranged on equilateral triangular pitch. Number of caps fixed on a plate is with a _____ ?

- A. Clearance of 25-75 mm
- B. Cap pitch of 1.3-2 times the cap diameter
- C. Either A. or B.**
- D. Neither A. nor B.

Lead exhausted in the atmosphere by automobiles using leaded petrol (i.e. tetraethyl lead for improving octane number) is a lethal air pollutant which causes _____ ?

- A. Paralysis of muscles & loss of appetite
- B. Nervous depression
- C. Gastritis and diarrhea
- D. All A., B. and C.**

Cold worked steel parts are normally subjected to _____?

- A. Normalising
- B. Hardening
- C. Annealing**
- D. Shot peening

Which is the most suitable conveyor for transportation of sticky material ?

- A. Apron conveyor
- B. Belt conveyor
- C. Screw conveyor**
- D. Pneumatic conveyor

Function of gear box is to _____?

- A. Reduce the speed
- B. Obtain variable speed**
- C. Increase the speed
- D. Produce high torque

Hot face insulating linings of high purity alumina fused mullite are used, where _____?

- A. Very high temperatures are involved
- B. Highly reducing conditions are involved
- C. Presence of iron or silica is harmful
- D. All A., B. and C.**

Which of the following polymers belong to the class of formaldehyde resin ?

- A. Melamine resins**
- B. Teflon
- C. Dacron
- D. None of these

Hydrogen percentage (by weight) in crude petroleum may be about _____?

- A. 5
- B. 15**
- C. 25
- D. 35

Isobaric process means a constant process ?

- A. Temperature
- B. Pressure**
- C. Volume
- D. Entropy

Photochemical reaction rate does not depend significantly on temperature, because _____?

- A. It is a reversible reaction
- B. It is an exothermic reaction
- C. The energy of reacting molecules exceeds the activation energy by absorption of light**
- D. None of these

Vulcanisation of rubber does not increase its _____?

- A. Elasticity
- B. Plasticity**
- C. Ductility
- D. None of these

For the production of very high vacuum, a _____ pump is normally used?

- A. Diffusion**
- B. Centrifugal
- C. Jet ejector
- D. Piston

Powdery materials can be guarded against caking tendency on storage by _____?

- A. Providing irregular grain size
- B. Providing minimum percentage of voids
- C. Having maximum possible points of contact
- D. None of these**

A typical yield of diesel in straight run distillation of crude oil may be about _____ percent?

- A. 8**
- B. 18
- C. 28
- D. 35

Pick out the wrong statement pertaining to the decomposition of PCl_5 represented by, $\text{PCl}_5 \rightleftharpoons \text{PCl}_3 + \text{Cl}_2$. Degree of dissociation of PCl_5 will _____?

- A. Decrease on addition of Cl_2
- B. Increase on addition of an inert gas at constant pressure
- C. Decrease on increasing the pressure of the system
- D. None of these**

Pick out the correct statement ?

- A. Oxygen content decreases from lignite to bituminous coal as the coalification increases
- B. The less the oxygen content, better is the coal, as it reduces the calorific value
- C. With increase in oxygen content, moisture holding capacity of coal increases and the caking power decreases
- D. All A., B. and C.**

Linde process of gas liquefaction employs _____?

- A. Exchange of heat with colder stream
- B. Adiabatic expansion through a throttle valve (Joule-Thomson expansion)**
- C. Adiabatic expansion against a piston or in a turbine
- D. Merely compressing the gas beyond its critical pressure

Which one is the radioactive isotope of hydrogen ?

- A. Deuterium
- B. Ortho-hydrogen
- C. Tritium**
- D. None of these

_____ closure is the weakest enclosure for cylindrical vessels?

- A. Hemispherical
- B. Torispherical
- C. Conical or flat plate**
- D. Elliptical

Working principle of radiation pyrometer is based on the

_____?

- A. Wien's law
- B. Kirchoff's law
- C. Stefan Boltzmann law**
- D. Seebeck effect

Smoke point of a test sample of kerosene is found to be 15 mm. On removal of

_____ from it, the smoke point rises to 25 mm?

- A. n-paraffins
- B. Olefins
- C. Aromatics**
- D. None of these

In continuous fluidisation _____?

- A. Solids are completely entrained**
- B. The pressure drop is less than that for batch fluidisation
- C. There is no entrainment of solids
- D. Velocity of the fluid is very small

Photographic plates are coated with _____?

- A. Silver nitrate
- B. Silver halide**
- C. Calcium silicate
- D. Metallic silver

At a given temperature, K_1 , K_2 and K_3 are equilibrium constants for the following reactions 1, 2, 3 respectively. $\text{CH}_4(\text{g}) + \text{H}_2\text{O}(\text{g}) \rightleftharpoons \text{CO}(\text{g}) + 3\text{H}_2(\text{g})$, $\text{CO}(\text{g}) + \text{H}_2\text{O}(\text{g}) \rightleftharpoons \text{CO}_2(\text{g}) + \text{H}_2(\text{g})$ $\text{CH}_4(\text{g}) + 2\text{H}_2\text{O}(\text{g}) \rightleftharpoons \text{CO}_2(\text{g}) + 4\text{H}_2(\text{g})$ Then K_1 , K_2 and K_3 are related as ?

- A. $K_3 = K_1.K_2$**
- B. $K_3 = (K_1.K_2)^{0.5}$
- C. $K_3(K_1+K_2)/2$
- D. $K_3 = (K_1.K_2)^2$

Steam economy is defined as the amount of evaporation per unit amount of steam used, while the capacity is the total evaporation obtained per hour. Use of multiple effects in evaporation ?

- A. Increases capacity
- B. Increases economy
- C. Does not affect the capacity
- D. Both B. & C.**

A suspension of glass beads in ethylene glycol has a hindered settling velocity of 1.7 mm/s, while the terminal settling velocity of a single glass bead in ethylene glycol is 17 mm/s. If the Richardson-Zaki hindered settling index is 4.5, the volume fraction of solids in the suspension is _____?

- A. 0.1
- B. 0.4
- C. 0.6**
- D. None of these

Bomb calorimeter is used for the determination of calorific value of the

_____ fuels?

- A. Gaseous
- B. Solid
- C. Liquid
- D. Both B. and C.**

Optimum economic pipe diameter for fluid flow is determined by the _____?

- A. Viscosity of the fluid
- B. Density of the fluid
- C. Total cost considerations (pumping cost plus fixed cost of the pipe)**
- D. None of these

Pour point of a petrofuel is _____?

- A. Multiple of 3°F
- B. Multiple of 5°F
- C. 5°C below the temperature at which oil ceases to flow**
- D. None of these

Which of the following is not a by-product fuel ?

- A. Pitch
- B. Blast furnace gas
- C. Petrol**
- D. Refinery gas

$\text{CaH}_4(\text{PO}_4)_2$ is the chemical formula of _____?

- A. Superphosphate
- B. Triple superphosphate**
- C. Calcium phosphate
- D. Meta phosphoric acid

Vulcanisation of rubber does not increase its _____?

- A. Softness**

- B. Oxidation resistance
- C. Weight & strength
- D. Elasticity & water solubility

Resistance to fusion of the refractory under a steady rising temperature condition is called _____ ?

- A. Spalling
- B. Refractoriness**
- C. Both A. & B.
- D. Neither A. nor B.

To obtain integrated form of Clausius-Clapeyron equation, $\ln (P_2/P_1) = (\Delta H_V/R) (1/T_1 - 1/T_2)$ from the exact Clapeyron equation, it is assumed that the _____ ?

- A. Volume of the liquid phase is negligible compared to that of vapour phase
- B. Vapour phase behaves as an ideal gas
- C. Heat of vaporisation is independent of temperature
- D. All A , B. & C.**

The osmotic pressure of a solution increases, if its _____ is decreased?

- A. Volume
- B. Solute concentration
- C. Temperature
- D. None of these**

Which of the following is a widely used refrigerant in vapour compression refrigeration system (using large centrifugal compressor) ?

- A. Freon**
- B. Liquid sulphur dioxide
- C. Methyl chloride
- D. Ammonia

Which of the following parameters of the fluid is not very important, while deciding its route in a shell and tube heat exchanger ?

- A. Corrosiveness & fouling characteristics
- B. Pressure
- C. Viscosity
- D. Density**

_____ is a natural fiber?

- A. Cellulose**
- B. Dacron
- C. Nylon-6
- D. None of these

Thermal conductivity measurement is used for the determination of _____?

- A. O₂ percentage in the flue gas
- B. Specific gravity of petrofuels
- C. Composition of an alloy
- D. CO₂ percentage in the flue gas**

If radius of a batch basket centrifuge is halved & the r.p.m. is doubled, then the _____?

- A. Linear speed of the basket is doubled
- B. Linear speed of the basket is halved
- C. Centrifugal force is doubled**
- D. Capacity of centrifuge is increased

Thermosetting resins are those polymers, which _____?

- A. Do not increase in plasticity with rise in temperature**
- B. Allow slip to occur between molecules
- C. Do not take on a permanent set
- D. None of these

Which of the following isotopes is not present in natural uranium?

- A. U-238
- B. U-234
- C. U-235
- D. U-232**

The value of „L/mG’ ratio for economical absorption operation ranges from _____?

- A. 0.5 to 0.8
- B. 0.8 to 1.2
- C. 1.25 to 2.0**
- D. 2.5 to 3.5

Essential oils are usually obtained using _____?

- A. Steam distillation
- B. Extractive distillation
- C. Solvent extraction
- D. Leaching**

The decay product of tritium (a beta emitter) is _____?

- A. Lithium
- B. Helium**
- C. Deuterium
- D. Hydrogen

Shatter index of the coke is a measure of its _____?

- A. Strength**
- B. Bulk density
- C. Reactivity

The reactions of high molecularity are rare, because _____?

- A. Of very large activation energy of many bodies
- B. Of low probability of many body collisions**

- C. Many body collisions are not favoured energetically
- D. Of requirement of very large concentration for such reactions

Energy to be supplied to the radioactive nucleus for the emission of a neutron is _____ MeV?

- A. 0.8**
- B. 7.8
- C. 200
- D. 10000

Which of the following bricks should not be used, if the furnace is to be used intermittently ?

- A. Firebricks
- B. Silica bricks**
- C. Silicon carbide bricks
- D. Sillimanite

Flexible foam (for mattresses) is usually made of _____ ?

- A. PVC
- B. Silicone
- C. Polyurethanes**
- D. Polyamides

_____ is produced by the dehydrogenation of ethyl benzene ?

- A. Styrene**
- B. Ethyl alcohol
- C. Cumene
- D. Phenol

Combustion of fuel in a furnace with oxygen enriched air results in higher _____ ?

- A. Flue gas volume
- B. Flame temperature**

- C. Fuel consumption
- D. Stack loss

Which of the following is not responsible for causing permanent hardness of water ?

- A. $\text{Ca}(\text{HCO}_3)_2$**
- B. CaCl_2
- C. MgCl_2
- D. None of these

Reset rate is the another term used for _____ time?

- A. Dead
- B. Integral**
- C. Derivative
- D. None of these

Disappearance of snow in subzero weather exemplifies the process of _____?

- A. Evaporation
- B. Sublimation**
- C. Vaporisation
- D. Melting

What is the order of a chemical reaction whose rate is determined by the variation of one concentration term only ?

- A. Zero
- B. First**
- C. Second
- D. Third

Basicity [$\% \text{CaO} + \% \text{MgO} + \% \text{SiO}_2$] of the slag in Indian blast furnace is in the range of _____?

- A. 0.7-1.0
- B. 1.1-1.4**
- C. 1.5 – 1.8
- D. 2.0 – 2.5

Which of the following is an undesirable dynamic characteristic of an instrument ?

- A. Reproducibility
- B. Dead zone
- C. Time lag**
- D. Static error

Mild steel is used for making _____ ?

- A. Fish plates
- B. Die block
- C. Channels**
- D. Drop forging

Dehydration of ammonium carbamate produces _____ ?

- A. Urea**
- B. Biuret
- C. Ammonia water
- D. None of these

Nuclear reactors are provided with shield to guard against the emission of mainly _____ rays?

- A. X
- B. α and β
- C. Neutrons & gamma**
- D. Infrared

Optical activity of a solution can be determined using a _____ ?

- A. Polarimeter**

- B. Polarograph
- C. Dilatometer
- D. Refractometer

Generally, no corrosion allowance in wall thickness of a part is required, if the thickness is more than _____ mm?

- A. 10
- B. 20
- C. 30**
- D. 5

The following half life data are available for the irreversible liquid phase reaction

$A \rightarrow \text{products}$. The overall order of reaction is _____?

- A. 0.5
- B. 1
- C. 1.5**
- D. 2

For laminar flow through a closed conduit _____?

- A. $V_{\max} = 2V_{\text{av}}$**
- B. $V_{\max} = V_{\text{av}}$
- C. $V_{\max} = 1.5V_{\text{av}}$
- D. $V_{\max} = 0.5V_{\text{av}}$

Pick out the wrong statement about routing of fluids in a shell and tube heat exchanger ?

- A. The corrosive and fouling fluid should be preferably routed through the tubes
- B. The viscous fluid should be routed through the shell side
- C. Lower flow rate fluid should be routed through the shell side
- D. Higher pressure fluid stream should be routed through the shell side**

Exothermic condensation reaction of monochlorobenzene with chloral in

presence of 20% oleum as catalyst produces DDT. The reaction temperature is maintained at _____ °C ?

- A. 15-30
- B. 90-100
- C. 250-300
- D. < 0

Dolomite bricks have good resistance to attack by _____ ?

- A. Molten steel
- B. Iron oxide
- C. Lime slag
- D. None of these

Pick out the endothermic reaction out of the following ?

- A. $C + \frac{1}{2}O_2 = CO$
- B. $CO + 3H_2 = CH_4 + H_2O$
- C. **$CaCO_3 = CaO + CO_2$**
- D. $CO + \frac{1}{2}O_2 = CO_2$

High porosity refractory bricks have _____ ?

- A. Poor resistance to the penetration of molten slag, metal & flue gases
- B. Poor heat conductivity & low strength
- C. Better thermal spalling resistance
- D. **All A., B. and C.**

Cooling water fouling factors vary in the range of 0.001 to 0.003 _____ ?

- A. **$(BTU/hr.ft^2. ^\circ F)^{-1}$**
- B. $(kcal/hr.m^2.^{\circ}C)^{-1}$
- C. $(W/m^2.^{\circ}K)^{-1}$
- D. $(kcal/hr. m. ^{\circ}C)^{-1}$

White flue gas (resembling steam) coming out of the chimney of a thermal

power plant indicates that the fuel used in the boiler furnace is _____?

- A. Tar
- B. Sulphide Coke
- C. Coke Oven Gas**
- D. Pulverised coke

Graphite or carbon refractories _____?

- A. Exhibit wetting characteristics
- B. Should be used in neutral or reducing atmosphere**
- C. Exhibit high shrinkage on thermal treatment
- D. Are not resistant to corrosion by slag

Upto the critical radius of insulation, added insulation, will _____?

- A. Increase the heat loss
- B. Decrease heat loss and will have no effect beyond that**
- C. Decrease heat flux
- D. Reduce convection heat loss compared to conduction heat loss

Which of the following is a batch sedimentation equipment ?

- A. Dust catcher
- B. Filter thickener**
- C. Dry cyclone separator
- D. Rotary sprayer scrubber

Atmospheric pressure corresponds to a hydrostatic head of _____?

- A. 13.6 cms of Hg
- B. 34 ft of H₂O**
- C. 1 metre of H₂O
- D. 13.6 metres of Hg

Overall heat transfer co-efficient of a particular tube is U₁. If the same tube with

some dirt deposited on either side has coefficient U_2 ,
then _____?

- A. $U_1 = U_2$
- B. $U_2 > U_1$
- C. $U_1 > U_2$
- D. $U_1 = \text{dirt factor} - U_2$

_____ of a material results, when its strength is increased & ductility is decreased by heating at a relatively lower temperature after cold working?

- A. Solid solution hardening
- B. Screw dislocation
- C. **Strain ageing**
- D. Twinning

Low temperature oxidation of coal during storage does not decrease its _____?

- A. Oxygen content
- B. Caking power
- C. Calorific value
- D. **None of these**

The type of liquor circulation system to be ' employed in evaporators (viz. natural or forced circulation) is determined mainly by the _____ of the liquid?

- A. **Viscosity**
- B. Density
- C. Thermal conductivity
- D. Corrosive nature

In distillation columns, bubble caps are held in place over trays by _____?

- A. Rivets

- B. A hold down bar
- C. Bolts
- D. Both B. and C.**

Thermistors which have a very high temperature co-efficient of resistivity belong to the class of solid called _____?

- A. Dielectrics
- B. Insulators
- C. Semi conductors**
- D. Conductors

Undercharging of coal in the by-product coke ovens results in _____?

- A. Decrease in the c.v. of coke oven gas**
- B. Increase in its throughput
- C. Increase in the c.v. of coke oven gas
- D. No change in the c.v. of coke oven gas

High aniline point of diesel indicates that, it _____?

- A. Is highly aromatic
- B. Has a large ignition delay
- C. Is highly paraffinic**
- D. Has a low diesel index

Work done may be calculated by the expression $\int p \, dA$ for _____ processes ?

- A. Non-flow reversible
- B. Adiabatic
- C. Both A. and B**
- D. Neither A. nor B

Which one occupies the lowermost position in the electromotive series of

metals ?

- A. Aluminium
- B. Noble metals (Ag, Pt, Au)**
- C. Zinc
- D. Alkali metals (K, Na, Li)

Maximum carbon content in cast iron is _____ percent?

- A. 3.8
- B. 5.2
- C. 4.8
- D. 4.3**

_____ iron is produced, when molten pig iron is chilled suddenly?

- A. White cast**
- B. Grey cast
- C. Wrought
- D. None of these

The thickness of oxide film is y at time t . If K_1 , K_2 and K_3 are the temperature dependent constants, the parabolic law of oxidation is given by

_____?

- A. $y^2 = 2k_1t + k_2$**
- B. $y = k_1 \ln(k_2t + k_3)$
- C. $y = k_1 t + k_2$
- D. $y = k_1t^3 + k_2$

Reaction of phosphate rock with 98% H_2SO_4 produces

_____?

- A. Ortho-phosphoric acid**
- B. Superphosphate
- C. White phosphorous
- D. None of these

_____ baffles are provided in ball mills ?

- A. Horizontal**
- B. No
- C. Only two
- D. None of these

Which is the best and the most effective method for the removal of organic contaminant present in the polluted water in very small quantity (say < 200 mg/litre) ?

- A. Lagooning
- B. Activated carbon adsorption**
- C. Biological oxidation pond
- D. Chemical coagulation

A gaseous fuel in order to develop luminosity on burning, must contain _____ ?

- A. Carbon monoxide
- B. Hydrocarbons**
- C. Hydrogen
- D. Oxygen

The schedule number of a pipe is an indication of its _____ ?

- A. Size
- B. Roughness
- C. Material density
- D. Wall thickness**

Measurement of pressure in ammonia reactor is done by _____ ?

- A. Bourdon gauge**
- B. U-tube manometer
- C. Inclined tube manometer

D. Pirani gauge

Which of the following is not the function of a volute casing provided in a centrifugal pump ?

A. To reduce the head loss in discharge

B. To increase the pump efficiency

C. To collect liquid from the periphery of the impeller and to transmit it to the delivery pipe at constant velocity

D. To increase the pump discharge rate

Most of the storage vessels/tanks are made cylindrical, because of the fact that a cylinder _____?

A. Has greater structural strength

B. Is easy to fabricate

C. Both A. and B.

D. Neither A. nor B.

Liquid diffusivity is of the order of _____ cm² /second?

A. 0.01

B. 0.1

C. 10⁻⁵ to 10⁻⁶

D. > 1

The hardest material just prior to diamond in Moh's scale is _____?

A. Topaz

B. Carborundum

C. Corundum

D. Calcite

What is the value of maximum COP in case of absorption refrigeration, if

refrigeration provided is at temperature, T_R (where, T_1 and T_2 are source & surrounding temperatures respectively.) ?

- A. $T_R/(T_2 - T_R) \times (T_1 - T_2)/T_1$
- B. $T_R/(T_2 - T_R) \times T_1/(T_1 - T_2)$
- C. $T_R/(T_1 - T_R) \times (T_1 - T_2)/T_1$
- D. None of these

Which of the following is not endothermic ?

- A. Cracking
- B. Reforming
- C. Gasification
- D. Partial oxidation**

The number of kg vaporised per kg of steam fed to the evaporator is defined as _____?

- A. Capacity
- B. Rate of evaporation
- C. Economy**
- D. Rate of vaporisation

Laboratory determination of the diffusivity of vapor is done by _____ method?

- A. Wetted wall column
- B. Gilliland's
- C. Winkelmann's**
- D. Wike's

In distillation where q is defined as the moles of liquid flow in the stripping section per mole of feed introduced, for saturated liquid feed _____?

- A. $q > 1$
- B. $q < 1$

C. $q = 1$

D. $q = 0$

A liquid decomposes by irreversible first order kinetics and the half life period of this reaction is 8 minutes. The time required for 75% conversion of the liquid will be _____ minutes?

A. 4

B. 8

C. 12

D. 16

An amplitude ratio of 0.1 corresponds to _____ decibels?

A. 20

B. -20

C. 10

D. -10

Presence of carbonaceous matter in the sewage _____?

A. Causes reduction in its dissolved oxygen content thereby endangering the life of aquatic creatures

B. Reduces sulphate ions to sulphides causing obnoxious smell

C. Increases the quantity of chlorine used for its purification

D. All A, B. and C.

In case of laminar flow of fluid through a circular pipe, the _____?

A. Shear stress over the cross-section is proportional to the distance from the surface of the pipe

B. Surface of velocity distribution is a paraboloid of revolution, whose volume equals half the

volume of circumscribing cylinder

C. Velocity profile varies hyperbolically and the shear stress remains constant over the crosssection

D. Average flow occurs at a radial distance of $0.5 r$ from the centre of the pipe (r = pipe radius)

Cobalt – 60 is used as a source of _____ in medical therapy & industrial radiography?

- A. X-rays
- B. γ -rays**
- C. α -rays
- D. β -rays

A travelling grate stoker is meant for the efficient burning of _____ coal?

- A. Caking
- B. Pulverised
- C. Non-caking**
- D. High ash

Thermosetting polymers as compared to thermoplastic polymers _____?

- A. Are formed by addition polymerisation
- B. Have three dimensional structure**
- C. Have linear structure
- D. None of these

Brackish water which contains mostly dissolved salt, can be purified by the _____ process?

- A. Reverse osmosis**
- B. Sand filter
- C. Lime soda
- D. Permutit

Fresh domestic sewage is _____ in color?

- A. Grey
- B. Dark brown
- C. Red
- D. Black

Yield of coke oven gas in low temperature carbonisation of coal is about _____ Nm³ /ton of dry coal?

- A. 60
- B. 160**
- C. 500
- D. 750

The process of removal of scale formed during hot rolling of steel is termed as _____?

- A. Descaling
- B. Shot blasting
- C. Pickling**
- D. Skimming

TLV of ammonia, nitrogen dioxide and phenol vapor in air is _____ ppm ?

- A. 5**
- B. 100
- C. 1000
- D. 2000

Pick out the wrong statement ?

- A. High early strength cement are made from materials having high silica to lime ratio**
- B. The function of gypsum in cement is to enhance its initial setting rate
- C. Acid resistant cements are known as silicate cement
- D. Major component of greyish Portland cement is tricalcium silicate

In case of a solution (not of a solid in a liquid), whose total volume is more than

the sum of volumes of its components in their pure states, solubility is _____?

- A. Independent of the temperature
- B. Increased with the increase in pressure
- C. Decreased with the increase in pressure**
- D. Unchanged by the pressure change

In nylon-66, the first and second numbers (i.e., 6) respectively designate the number of carbon atoms present in the _____?

- A. Hexamethylene diamine and the ring
- B. Hexamethylene diamine and the adipic acid**
- C. Adipic acid and the ring
- D. None of these

In vapour compression refrigeration system, if the evaporator temperature and the condenser temperatures are -13°C and 37°C respectively, the Carnot COP will be _____?

- A. 5.2**
- B. 6.2
- C. 0.168
- D. Data insufficient, can't be found out

What is the geometric mean of two heat transfer areas A_1 and A_2 ?

- A. $\sqrt{A_1 \cdot A_2}$**
- B. $\sqrt{A_1 + A_2}$
- C. $\frac{1}{2} \sqrt{A_1 \cdot A_2}$
- D. $2 \sqrt{A_1 \cdot A_2}$

Crude petroleum oil is a _____ fuel?

- A. Primary
- B. Fossil
- C. Both A. & B.**

D. Secondary

The main feature of Carnot refrigeration cycle is that, it _____?

- A. Does not need the addition of external work for its functioning
- B. Transfers heat from high temperature to low temperature
- C. Accomplishes the reverse effect of the heat engine**
- D. None of these

Pick out the correct statement?

- A. Positron is the antiparticle of electron**
- B. In α -decay, the ratio of neutron to proton decreases
- C. Ionising power of β -rays is higher than that of α -rays
- D. Speed of α -rays is more than that of γ -rays

Which of the following has the least calorific value (kcal/Nm³) ?

- A. Blast furnace gas**
- B. Coke oven gas
- C. Sewage gas
- D. Natural gas

If average heat transfer co-efficient is h_a and the local coefficient at the end of the plate is h_l then in case of heat transfer to a fluid flowing over a flat plate, heated over its entire length _____?

- A. $h_a = h_l$
- B. $h_a = 2h_l$**
- C. $h_a = 0.5 h_l$
- D. $h_a = 0.75 h_l$

For a reciprocating pump, the indicator diagram is the graph between the _____?

- A. Discharge and overall efficiency

- B. Volume swept by piston for one complete revolution and the pressure in the cylinder**
C. Angle swept by the crank pin at any instant and the discharge
D. None of these

Acrylonitrile is mainly used in the _____ industry?

- A. Polymer**
B. Printing
C. Dyeing
D. Photographic

Heat transfer efficiency leading of energy conservation in a heat exchanger can be achieved by _____?

- A. Keeping the heat transfer surface clean**
B. Enhancing the fluid pumping rate
C. Increasing the tube length
D. None of these

Sodium carbonate (soda ash) is not used in the manufacture of _____?

- A. Fire extinguishers
B. Sugar
C. Baking powder
D. Detergents

Pick out the wrong statement?

- A. A refrigeration cycle violates the second law of thermodynamics**
B. Refrigeration cycle is normally represented by a temperature vs. entropy plot
C. In a refrigerator, work required decreases as the temperature of the refrigerator and the temperature at which heat is rejected increases
D. One ton of refrigeration is equivalent to the rate of heat absorption equal to 3.53 kW

In bag filters, filter fabrics are never made of _____?

- A. Metallic wire woven mesh**

- B. Polyester fibres
- C. Cotton fibres
- D. Nylon fibres

Which of the following categories of gasoline has the highest lead susceptibility ?

- A. Straight run gasoline**
- B. Platinum reformed gasoline
- C. Catalytical cracked gasoline
- D. Polymer gasoline

The main component of Pyrex glass is _____?

- A. Zinc
- B. Lead**
- C. Boron
- D. Selenium

Self-priming centrifugal pump can be used for _____?

- A. Booster service
- B. Pumping liquid fertilisers (e.g. liquid NH₃)
- C. Pumping industrial wastes
- D. All A., B. and C.**

The percentage slip in a reciprocating pump set is given by the % of (where, Q₁ = actual discharge Q₂ = theoretical discharge) ?

- A. Q₁/Q₂
- B. Q₂/Q₁
- C. (Q₂ – Q₁)/Q₁
- D. (Q₂ – Q₁)/Q₂**

Ferromagnetic ceramic material is not used in the _____?

- A. Thermal insulation**
- B. Transformers

- C. Magnetic switches
- D. Television sets

In case of gases, the binary diffusivity is proportional to (where, P = pressure) ?

- A. P
- B. 1/P**
- C. 1/√P
- D. √P

Desalination of water _____ ?

- A. Makes it potable**
- B. Makes it non-potable
- C. Means distillation of water
- D. None of these

A bed of spherical particles (specific gravity 2.5) of uniform size 1500 μm is 0.5 m in diameter and 0.5 m high. In packed bed state, the porosity may be taken as 0.4. Ergun's equation for the above fluid-particle system (in SI units) is given below : $\Delta P/L = 375 \times 10^3 V_{OM} + 10.94 \times 10^6 V_{OM}^2$ (SI units) If water is to be used as the fluidising medium, the minimum fluidisation velocity, V_{OM} is _____ ?

- A. 12 mm/s
- B. 16 mm/s**
- C. 24 mm/s
- D. 28 mm/s

Integral method for analysing the kinetic data is used _____ ?

- A. When the data are scattered
- B. For testing specific mechanisms with simple rate expressions
- C. Both A. and B.**
- D. None of these

Width and speed of a conveyor belt depends upon the _____ of the material?

- A. Lump size
- B. Bulk density
- C. Both A. & B.**
- D. Neither A. nor B.

Glyptal used in the manufacture of paints & lacquers is a _____ polymer?

- A. Polyamide
- B. Polystyrene
- C. Polyester**
- D. Polyacrylonitrile

Photoelectric pyrometers are suitable in the temperature range of _____ °C?

- A. 400-1600
- B. 800-1600**
- C. 800-2500
- D. 400-1000

For achieving rapid drying rate in a spray dryer, the diameter of the particles in the feed should be in the range of _____ microns (1 mm = 1000 microns)?

- A. 1-5
- B. 10-60**
- C. 200-300
- D. > 500

In case of centrifugal fan or blower, the gas capacity varies as _____?

- A. Speed**

- B. (Speed)²
- C. (Speed)³
- D. (Speed)^{0.5}

High noise levels produced during operation of fans and compressors can be reduced by using _____?

A. Mufflers (silencers)

- B. Acoustic absorbent
- C. Lagging of noisy duct
- D. None of these

Dry air requirement for burning 1 Nm³ of CO to CO₂ may be around _____ Nm³ ?

- A. 2.4**
- B. 1.75
- C. 0.87
- D. 11.4

Flapper nozzle is used in a/an _____ controller?

- A. Electronic
- B. Hydraulic
- C. Pneumatic**
- D. None of these

Nickel is not used as a catalyst in the _____ reaction ?

A. Shift conversion

- B. Oil hydrogenation
- C. Steaming reforming of naphtha
- D. Ammonia cracking/dissociation

Ball bearings are normally made of _____ steel?

- A. High speed
- B. High carbon

C. Chrome

D. Silicon

Normalising of a casting does not _____?

A. Induce stresses in it

B. Refine its grain structure

C. Reduce segregation

D. Improve its mechanical properties

Which of the following is the most widely used heat insulating material for pipelines carrying steam ?

A. Tar dolomite bricks followed by asbestos

B. Fireclay refractory followed by aluminium sheet

C. Cotton followed by aluminium foil

D. 85% magnesia cement and glass wool

According to thermodynamic Fahrenheit scale, the fundamental interval between ice point to steam point is _____?

A. 180°

B. 212°

C. 32°

D. 273°

Temperature and pressure in ammonia converter is _____?

A. 200 atm, 1000°C

B. 450 atm, 200°C

C. 450 atm, 550°C

D. 450 atm, 1000°C

Refractoriness/fusion points of 'Superduty' refractories is _____ °C?

A. 1520-1630

B. 1630-1670

C. > 1730

D. > 2000

Most efficient and suitable dust removal equipment for removal of fly-ash from flue gas in a thermal power plant is the _____?

- A. Gravity settling chamber
- B. Cyclone separator
- C. Electrostatic precipitator**
- D. Bag filter

The purpose of tanning in leather industry is to _____?

- A. Stiffen the leather**
- B. Smoothen the leather
- C. Make it flexible
- D. Impart water resistance

The actual temperature drop across the heating surface of an evaporator depends on the _____?

- A. Liquid depth over the heating surface
- B. Solution being evaporated
- C. Pressure difference between the steam chest and the vapor space above the boiling liquid
- D. All A., B. and C.**

Starting material for the production of SBR is _____?

- A. Ethyl alcohol
- B. Ethylene
- C. Both A. & B.**
- D. Neither A. nor B.

All of the following alloying elements of steel increases hardness but sacrifice ductility, except _____?

- A. Nickel**
- B. Vanadium

- C. Molybdenum
- D. Chromium

Which of the following is the most suitable for cleaning of fine coal dust (<0.5 mm) ?

- A. Trough washer
- B. Baum jig washer
- C. Spiral separator
- D. Froth floatation**

Pressure required to increase the density of water by about 1% is _____ atmosphere?

- A. 10
- B. 50
- C. 200**
- D. 1000

The crystal structure of most of the common metals is _____?

- A. Orthorhombic
- B. Cubic**
- C. Hexagonal
- D. None of these

The catalyst in a first order chemical reaction changes the _____?

- A. Equilibrium constant
- B. Activation energy**
- C. Heat of formation of the product
- D. Heat of reaction

Shape factor for a cylinder whose length equals its diameter is _____?

- A. 1.5
- B. 0.5
- C. 1.0
- D. 2.0

The normal range of velocity of water in pipes is _____ m/sec?

- A. 0.1-0.5
- B. 1-2**
- C. 10-50
- D. 15-30

In solutizer sweetening process, solutizer solution used is _____?

- A. Methanol in Unisol process
- B. Naphthenic acid in Mercapsol process
- C. Both A. and B.**
- D. Neither A. nor B.

For all positive reaction orders for a particular duty ?

- A. Mixed reactor is always larger than the plug-flow reactor**
- B. Ratio of the volume of the mixed reactor to that of the plug-flow reactor decreases with order
- C. Reactor size is independent of the type of flow
- D. Density variation during reaction affects design

Liquid redistribution should be done in a packed tower packed with raschig rings every 6 metres or _____ times the column diameter, whichever is lower?

- A. 2.5-3.0**
- B. 5-7.5
- C. 10-12.5
- D. 15-20

Pick out the wrong statement pertaining to the rotary dryer ?

- A. Flights (located in the inside shell of rotary dryer) lift the material being dried and shower it down through the current of hot air/gases. It extends from the wall to a distance which is about 8-12% of the inside diameter of shell
- B. Hold up of a rotary drier is defined as the fraction of the dryer volume occupied by the solid at any instant. The best performance for rotary drier is obtained, when the hold up is in the range of 0.05 to 0.15
- C. Rotary dryer is suitable for drying sticky material**
- D. Recommended peripheral speed of a rotary drier is in the range of 10 to 30 metres/minute

Reaction of calcium Fluorapatite with sulphuric acid produces

_____?

- A. Ortho-phosphoric acid
- B. Simple superphosphate**
- C. Triple superphosphate
- D. Red phosphorous

On addition of solute in the solvent, the _____ of the solution decreases ?

- A. Boiling point
- B. Freezing point
- C. Vapour pressure
- D. Both B. and C.**

Direct reaction of unsaturated hydrocarbons with either NO or NO₂ produces an eye irritating pollutant compound known as _____?

- A. Photochemical smog
- B. Peroxyacetyl nitrate (PAN) or methyl nitrite**
- C. Benzopyrene

D. Polyacrylonitrile

Which of the following mechanical conveyors does not come under the division „carriers“ ?

- A. Belt conveyor
- B. Bucket elevator
- C. Screw conveyor**
- D. Apron conveyor

As per Kirchhoff s equation, the heat of reaction is affected by the _____ ?

- A. Pressure
- B. Volume
- C. Temperature**
- D. Molecularity

When a system is in equilibrium for all possible processes, the differential or finite change of entropy is _____ ?

- A. < 0**
- B. > 0
- C. $= 0$
- D. None of these

Carbon bricks are not used in the lining of the _____ ?

- A. Combustion chamber of blast furnace stoves**
- B. Electric furnaces
- C. Highly chemical resistant equipments
- D. Blast furnace hearth

The _____ of a double acting reciprocating pump as compared to the single acting pump will be almost double ?

- A. Flow output**

- B. Head developed
- C. Overall efficiency
- D. Weight

If mass diffusivity in a mixture is equal to the thermal diffusivity, then the Lewis number is _____

- A. 0
- B. 1**
- C. 1

Diaphragm electrolytic cell as compared to mercury electrolytic cell _____?

- A. Produces 70% NaOH solution
- B. Requires less specific power consumption for the production of chlorine
- C. Requires lesser investment for similar capacity**
- D. All A , B. and C

The temperature at the eutectic point of the system is the _____ temperature that can be attained in the system?

- A. Lowest**
- B. Highest
- C. Average
- D. None of these

With increase in temperature, the leaching rate increases because of the _____?

- A. Increased diffusivity
- B. Decreased viscosity of liquid
- C. Both A. and B.**
- D. Neither A. nor B.

The critical mass of a fissionable material can be reduced

by _____?

- A. Heating it
- B. Cooling it
- C. Surrounding it by neutron reflecting material**
- D. Surrounding it by neutron absorbing material

Heat exchanger tubes are never made of _____?

- A. Plain carbon steel
- B. Stainless steel
- C. Lead**
- D. Copper

Strain hardening effect in a metal subjected to cold working is due to the _____ mechanism?

- A. Fracture
- B. Dislocation
- C. Slip**
- D. Twinning

At _____ point, all the three phases (i.e. solid, liquid and gas) co-exist?

- A. Eutectic
- B. Triple**
- C. Plait
- D. Critical

A globe valve is the most suitable for applications, in which _____?

- A. Fluid flow control is required**
- B. Fluid contains dispersed solid particles
- C. Valve is required to be either fully open or fully closed
- D. One way flow is required

Thermistors are used in _____ devices?

- A. Voltage measuring
- B. Temperature measuring
- C. Temperature compensating
- D. Both B. & C.**

Nylon-66 is a polyamide of _____ ?

- A. Hexamethylene diamine and adipic acid**
- B. Adipic acid and methyl amine
- C. Vinyl chloride and formaldehyde
- D. None of these

Triple superphosphate is manufactured by reacting _____ ?

- A. Phosphate rock with phosphoric acid**
- B. Phosphate rock with sulphuric acid
- C. Phosphate rock with nitric acid
- D. Ammonium phosphate with phosphoric acid

The adiabatic throttling process of a perfect gas is one of constant enthalpy _____ ?

- A. In which there is a temperature drop
- B. Which is exemplified by a non-steady flow expansion
- C. Which can be performed in a pipe with a constriction**
- D. In which there is an increase in temperature

Catalytic oxidation of naphthalene produces ?

- A. Styrene
- B. Phenol
- C. Phthalic anhydride**
- D. None of these

The number of water molecules present in a drop of water weighing 0.018 gm is $6.023 \times$ _____ ?

- A. 1026

- B. 1023
- C. 1020**
- D. 1019

The safe distance of habitation from a hazardous chemical plant (TLV of its product < 1000 ppm) should be about _____ kms?

- A. 1
- B. 5
- C. 15
- D. 25**

Swenson-Walker crystalliser is a _____ unit ?

- A. Continuous**
- B. Batch
- C. Semi-batch
- D. Cooling (adiabatic)-cum-evaporation

The mechanism which changes the value of manipulated variable in response to the output signal from the control unit is called the _____?

- A. Final control element**
- B. On-off control
- C. Floating control action
- D. None of these

Cetane number of high speed diesel must be \geq _____?

- A. 30
- B. 45**
- C. 75
- D. 95

Sucrose is a _____?

- A. Monosaccharide
- B. Disaccharide**

- C. Polysaccharide
- D. None of these

Molten sodium is used as a coolant in a fast breeder reactor, because of its _____?

- A. Excellent moderating properties
- B. Neutron breeding capability
- C. Faster heat removal capability from the core**
- D. Capability to increase the reaction rate in the core

Addition of lead, sulphur and phosphorus to low carbon steel helps in improving its _____?

- A. Corrosion resistance
- B. Tensile strength
- C. Machinability**
- D. Compressive strength

In case of turbulent flow of fluid through a circular pipe, the _____?

- A. Mean flow velocity is about 0.5 times the maximum velocity
- B. Velocity profile becomes flatter and flatter with increasing Reynolds number
- C. Point of maximum instability exists at a distance of $2r/3$ from the pipe wall (r = pipe radius)
- D. Skin friction drag, shear stresses, random orientation of fluid particles and slope of velocity profile at the wall are more**

In a pressurised water reactor (PWR), the _____?

- A. Fuel is natural uranium and heavy water acts both as moderator & coolant
- B. Coolant water boils in the core of the reactor
- C. Coolant water is pressurised to prevent bulk boiling of water in the core**
- D. Use of moderator is not required

Which of the following does not produce a change in the value of rate constant of a reaction ?

- A. Pressure
- B. Temperature
- C. Concentration and catalyst**
- D. None of these

In which of the following body shapes, the pressure drag is large compared to the friction drag ?

- A. Stream line body
- B. Two dimensional body
- C. Bluff body**
- D. None of these

In a single effect evaporator, the economy is _____?

- A. 1
- B. < 1**
- C. > 1
- D. None of these

The unit of specific cake resistance is _____?

- A. gm/cm²**
- B. cm/gm
- C. cm/gm²
- D. gm/gm

Heat transfer by conduction results due to the transfer of free electrons, kinetic energy & vibrational energy from one molecule to another. Conduction heat transfer cannot take place _____?

- A. Between two bodies in physical contact with each other
- B. Between two bodies not in physical contact with each other**
- C. From one part of a body to the another part of the same body

D. Both B & C

Work index is defined as the _____?

A. Gross energy (kWh/ton of feed) needed to reduce very large feed to such a size that 80% of

the product passes through a 100 micron screen

B. Energy needed to crush one tonne of feed to 200 microns

C. Energy (kWh/ton of feed) needed to crush small feed to such a size that 80% of the product

passes a 200 mesh screen

D. Energy needed to crush one ton of feed to 100 microns

Higher efficiency in the combustion of solid fuel cannot be achieved by _____?

A. Proper fuel preparation

B. Keeping the flue gas exhaust temperature very high

C. Adopting efficient-fuel firing technique & equipment

D. Supplying correct quantity of combustion air

A _____ mixer resembles a ball mill without balls?

A. Banbury

B. Pug mill

C. Tumbling

D. Pan

In the reversible reaction of the type, $A + B \rightleftharpoons AB$, in general _____?

A. Both forward and backward reactions will be exothermic

B. Neither of the reactions will be endothermic

C. The combination reaction will be exothermic, while the dissociation reaction will be endothermic

D. The combination reaction will be endothermic, while the dissociation reaction will be exothermic

Fischer-Tropsch method aims at the _____?

- A. Gasification of coal
- B. Synthesis of gasoline (from water gas)**
- C. Hydrogenation of coal to produce gasoline
- D. None of these

Gibbs free energy (G) is represented by, $G = H - TS$, whereas Helmholtz free energy, A. is given by, $A = E - TS$. Which of the following is the Gibbs-Helmholtz equation ?

- A. $[\partial(G/T)/\partial T] = - (H/T^2)$
- B. $[\partial(A/T)/\partial T]_V = - E/T^2$
- C. Both A. and B.**
- D. Neither A. nor B.

In a distillation column, bubble caps are located on trays with a pitch of _____ times the outside diameter of the caps?

- A. 1.3 to 2**
- B. 1.6 to 2
- C. 2.5
- D. 1.5 to 3

Other parameters remaining same, the recrystallisation temperature of an alloy is lowered, when _____?

- A. Strain rate is increased**
- B. Grain size is increased
- C. Prior cold deformation is increased
- D. Not affected by any of the above parameters

Laser welding is widely employed in the _____ industries ?

- A. Electronic**
- B. Structural

- C. Process
- D. Heavy

Addition of a non-volatile solute to a solvent produces a _____ in its solvent?

- A. Freezing point elevation
- B. Boiling point depression
- C. Vapor pressure lowering**
- D. All A., B. & C.

Which of the following is not an acidic refractory?

- A. Silica bricks
- B. Fireclay bricks
- C. Bauxite bricks
- D. Magnesia bricks**

_____ polymer is produced by the copolymerisation of vinyl chloride-vinyl acetate?

- A. Fibrous
- B. Leathery**
- C. Rubbery
- D. Hard

The phenomenon of radioactivity was discovered by _____?

- A. Madam Curie
- B. Becquerel**
- C. Roentgen
- D. J.J. Thomson

For organic compounds, group contribution method can be used for the estimation of _____?

- A. Critical properties**
- B. Specific gravity

- C. Specific volume
- D. Thermal conductivity

Which of the following is an undesirable property for an absorbing solvent ?

- A. Low vapour pressure
- B. Low velocity
- C. Low freezing point
- D. None of these**

Presence of _____ hardness is responsible for the temporary hardness in water?

- A. Carbonate
- B. Calcium**
- C. Chloride
- D. Sulphate

Replenishment of dissolved oxygen in water stream polluted with industrial waste occurs by _____?

- A. Natural aeration of water stream
- B. Photosynthetic action of algae
- C. Both A. & B.**
- D. Neither A. nor B.

Zirconia probe is used for the measurement of _____?

- A. Humidity of air
- B. % CO₂ in flue gas
- C. % O₂ in flue gas**
- D. Speed of a submarine

Pick out the correct statement ?

- A. Removal of iron from ceramic material is necessitated (by magnetic separation method) so as to avoid discolouration of ceramic products**

- B. The operating cost of shaking screen is more than that of a vibrating screen
- C. Screen capacity does not depend upon the specific gravity of the minerals
- D. Asphalt is best crushed using toothed roll crusher

Reaction of nitric acid and sulphuric acid with phosphate rock produces _____?

- A. Nitrophosphate**
- B. Diammonium phosphate
- C. Tricresyl phosphate
- D. Tributyl phosphate

Powder metallurgy process does not make metal powder by _____?

- A. Atomisation
- B. Grinding/milling
- C. Hammering**
- D. Electrolytic deposition

Air vessel of a reciprocating pump is initially filled with _____?

- A. Atmospheric air
- B. Compressed air**
- C. Water
- D. None of these

At what percentage (by volume) of alcohol composition, it forms an azeotrope with water ?

- A. 90
- B. 91.5
- C. 95**
- D. 99

The delivery pressure of boiler feed water pump compared to the boiler steam

pressure is _____?

- A. Same
- B. Slightly less
- C. Slightly more**
- D. Much more

Radioactive decay of a material involves a _____ order reaction?

- A. Third
- B. Second
- C. First**
- D. Zero

Heat balance of furnace provides means of determining the _____?

- A. Thermal efficiency of the process
- B. Sources of heat losses
- C. Scope of reduction of heat losses
- D. All A., B. and C.**

The catalyst used in the manufacture of DDT (from chloral and chlorobenzene) is _____?

- A. Dilute H₂SO₄
- B. Oleum**
- C. Ultraviolet light
- D. None of these

The equivalent diameter for flow through a rectangular duct of width B and height H is _____?

- A. $\frac{HB}{2(H+B)}$
- B. $\frac{HB}{(H+B)}$
- C. $\frac{2HB}{(H+B)}$**
- D. $\frac{4HB}{(H+B)}$

increasing the capacity of a screen _____ the screen effectiveness?

- A. **Decreases**
- B. Increases
- C. Does not effect
- D. None of these

_____ pipe is the most suitable for carrying sanitary drainage?

- A. Stainless steel
- B. Reinforced cement concrete
- C. **Cast iron**
- D. Asbestos cement

The taper provided on pattern for its easy & clean withdrawal from the mould is termed as the _____ allowance ?

- A. Casting
- B. Pattern
- C. **Draft**
- D. Distortion

“Critical mass” is the minimum mass of nuclear fissile material required for the _____ ?

- A. **Sustainment of chain reaction**
- B. Power generation on commercial scale
- C. Economic power generation
- D. None of these

With increase in the temperature, viscosity of a liquid _____ ?

- A. Increases
- B. **Decreases**
- C. Remain constant
- D. May increase or decrease; depends on the liquid

A distillation column with N plates is being operated under normal conditions.

At some point of time, the operation is shifted to total reflux condition (i.e., no product and residue are being withdrawn and feed to the column is stopped). At the new steady state ?

- A. Composition of vapors and that of liquid do not vary throughout the column
- B. Reboiler load and condenser load are minimum
- C. The top and bottom compositions are unchanged with and without total reflux
- D. The top and bottom compositions correspond to the maximum enrichment available**

Pick out the wrong statement?

- A. Mass transfer co-efficient does not account for gas-liquid diffusion**
- B. Diffusion co-efficient and mass transfer co-efficient are not same in any mass transfer operation
- C. Contacting cold vapor-gas mixture with hot liquid exemplifies humidification process
- D. Contacting cold liquid with warm vapor-gas mixture exemplifies dehumidification process

The maximum delivery pressure of a reciprocating compressor may be about _____ kg/cm²?

- A. 1000
- B. 2000
- C. 3000
- D. 4000**

Which is not constant for an ideal gas ?

- A. $(\partial P/\partial V)T$**
- B. $(\partial V/\partial T)P$
- C. $(\partial P/\partial V)V$
- D. All (A), B. & (C)

Rate constant for a first order reaction does not depend upon reaction time, extent of reaction and the initial concentration of reactants; but it is a function of reaction temperature. In a chemical reaction, the time required to reduce the

concentration of reactant from 100 gm moles/litre to 50 gm moles/litre is same as that required to reduce it from 2 gm moles/litre to 1 gm mole/litre in the same volume. Then the order of this reaction is ?

- A. 0
- B. 1**
- C. 2
- D. 3

A mixed flow centrifugal pump _____ ?

- A. Employs such an impeller, through which the flow is a combination of radial & axial flow**
- B. Mixes the two fluids before pumping them
- C. Pumps the two fluids separately and then mixes them
- D. Employs impellers in both the radial & axial directions

Continuous measurement of specific gravity of a liquid is done by _____ ?

- A. Hydrometer
- B. Contact-type electric indicators
- C. Displacement meter
- D. Both A. and C.**

The heat flux in the nucleate boiling regimes is proportional to (where, $\Delta T =$ excess temperature) ?

- A. $(\Delta T)^2$
- B. $(\Delta T)^4$
- C. $(\Delta T)^3$**
- D. $\sqrt{\Delta T}$

Smoke is an example of _____ ?

- A. Solid dispersed in liquid
- B. Solid dispersed in gas**

- C. Liquid dispersed in gas
- D. Gas dispersed in liquid

A fluid is flowing inside the inner tube of a double pipe heat exchanger with diameter 'd'. For a fixed mass flow rate, the tube side heat transfer co-efficient for turbulent flow conditions is proportional to _____?

- A. $d^{0.8}$
- B. $d^{-0.2}$**
- C. d^{-1}
- D. $d^{-1.8}$

In cold working of metal as compared to its hot working _____?

- A. Cracks and blow holes are eliminated
- B. Ductility and impact strength improves
- C. Appreciable strain hardening is produced**
- D. Yield stress, hardness and fatigue strength is not at all affected

Diameter of raschig rings used in packed tower in industry is normally around _____ inches?

- A. 2**
- B. 8
- C. 12
- D. 18

Separation of a suspension or slurry into a supernatant clear liquid (free from particles) and a thick sludge containing a high concentration of solid is called _____?

- A. Classification
- B. Sedimentation**
- C. Clarification
- D. Decantation

Catalyst used in Fischer-Tropsch process is _____?

- A. Nickel**
- B. Zinc oxide
- C. Alumina
- D. Thorium oxide

Enthalpy of a gas depends upon its _____?

- A. Temperature**
- B. Mass
- C. Volume
- D. Pressure

H₃PO₄ is the chemical formula of _____ phosphoric acid?

- A. Pyro
- B. Ortho**
- C. Meta
- D. None of these

The thickness of condensate layer in filmwise condensation depends on the _____?

- A. Condensation rate
- B. Surface configuration
- C. Liquid flow rate from the surface
- D. All A., B. and C.**

During its calorific value determination by bomb calorimeter, coal is combusted by _____?

- A. Air
- B. Oxygen**
- C. Oxygen enriched air
- D. None of these

With increase in temperature, the surface tension of water

_____?

- A. Increases
- B. Decreases**
- C. Remain constant
- D. Increases linearly

Gradually varying fluid flow is an example of _____ flow?

- A. Non-steady uniform**
- B. Non-steady non-uniform
- C. Steady uniform
- D. Steady non-uniform

Flow rate of those fluids which are insensitive to changes in their density, viscosity or flow velocity profile can be best measured by a _____?

- A. Magnetic flowmeter**
- B. Pitot tube
- C. Flow nozzle type flowmeter
- D. Turbine flowmeter

Fertiliser plants get their N₂ requirements _____?

- A. By fractionation of liquefied air**
- B. By dissociating oxides of nitrogen
- C. From coal gas (coke oven gas)
- D. From producer gas

The rate of material _____ is zero in case of a steady state system?

- A. Accumulation**
- B. Production
- C. Input
- D. Generation

Radiation pyrometers as compared to thermocouples _____?

- A. Has a slower speed of response
- B. Can measure higher temperature**
- C. Can't measure the temperature of moving objects
- D. Is more affected by corrosive atmosphere

The exit age distribution of fluid leaving a vessel is used to know the _____?

- A. Activation energies of a reaction
- B. Reaction mechanism
- C. Extent of non-ideal flow in the vessel**
- D. None of these

Fick's law relates to _____?

- A. Energy consumption**
- B. Final particle size
- C. Feed size
- D. None of these

The normal range of velocity of steam in pipes is _____ m/sec?

- A. 0.1-0.5
- B. 1-5
- C. 10-20
- D. 80-100**

Which of the following is not a non-ferrous alloy ?

- A. Meehanite**
- B. Magnalium
- C. Gun metal
- D. Muntz metal

A closed system is cooled reversibly from 100°C to 50°C. If no work is done on the system _____?

- A. its internal energy (U) decreases and its entropy (S) increases
- B. U and S both decreases**
- C. U decreases but S is constant
- D. U is constant but S decreases

The temperature at which the magnetic property of iron disappears (i.e., it becomes nonmagnetic) and its electrical conductivity & specific heat also changes, is called the 'Curie point', which is _____ °C ?

- A. 768**
- B. 908
- C. 1400
- D. 1539

"Law of corresponding states" says that _____ ?

- A. Two different gases behave similarly, if their reduced properties (i.e. P, V and T) are same**
- B. The surface of separation (i. e. the meniscus) between liquid and vapour phase disappears at the critical temperature
- C. No gas can be liquefied above the critical temperature, howsoever high the pressure may be.
- D. The molar heat of energy of gas at constant volume should be nearly constant (about 3 calories)

1 BTU/hr.ft.°F is equal to _____ kcal/hr. m.°C?

- A. 1.49**
- B. 1
- C. 4.88
- D. None of these

_____ is a copolymer?

- A. Styrene butadiene rubber (SBR)**
- B. Neoprene

- C. PVC
- D. None of these

Viscous & heat sensitive liquids are concentrated in _____ evaporators?

- A. Open pan
- B. Long tube
- C. Agitated film**
- D. None of these

The burnout heat flux in the nucleate boiling regime is not a function of the _____?

- A. Liquid density
- B. Vapour density**
- C. Temperature difference
- D. Heat of evaporation

In an ideal mixed reactor (at steady state), the _____?

- A. Space time is equivalent to holding time for constant density systems
- B. Composition throughout the reactor remains same
- C. Exit stream has the same composition as the fluid within the reactor
- D. All A., B. and C.**

Requisites of a reversible process is that the _____?

- A. System and surroundings pressure be equal
- B. Friction in the system should be absent**
- C. System and surroundings temperature be equal
- D. None of these

Heat of neutralisation of a strong acid and strong base is always a constant value, i.e., 57 KJ/Kg mole. This is because _____?

- A. The strong base and strong acid reacts completely
- B. The salt formed does not hydrolyse

C. Only OH⁻ and H⁺ ions react in every case

D. The strong base and strong acid reacts in aqueous solution

Transition length for turbulent flow in smooth pipe is equal to _____ times the pipe diameter?

A. 0.5

B. 5

C. 50

D. 500

Three plug flow reactors (PFR's) of 4, 5 & 6 m³ volumes are arranged in two branches as shown below in the figure. If the total feed rate is 300 tons/hr, then for the same conversion in each branch, the feed rate through branch II should be _____ tons/hr ?

A. 100

B. 150

C. 200

D. 225

Which of the following relationships between co-efficient of friction (μ) between rock & roll and α (half of the angle of nip) of the particle to be crushed is correct ?

A. $\mu > \tan \alpha$

B. $\mu \geq \tan \alpha$

C. $\mu > \tan 2\alpha$

D. $\mu \leq \tan \alpha$

Which of the following is the easiest to crack ?

A. Paraffins

B. Olefins

C. Naphthenes

D. Aromatics

Which of the following methods of depreciation calculations results in book values greater than those obtained with straight line method ?

- A. Multiple straight line method
- B. Sinking fund method**
- C. Declining balance method
- D. Sum of the years digit method

In case of an unsaturated mixture of gas and vapor, the percentage saturation is _____ its relative saturation?

- A. Lower than**
- B. Higher than
- C. Equal to
- D. Either A. or B., depends on the mixture composition

In a multipass shell and tube heat exchanger, tube side return pressure loss is equal to _____ the velocity head?

- A. Twice
- B. Four times**
- C. Square root of
- D. Square of

Slugging in a fluidised bed can be avoided by using _____ ?

- A. Tall narrow vessel
- B. Deep bed of solids
- C. Shallow beds of solids and proper choice of particle size**
- D. Very large particles

Baking soda is chemically represented by _____ ?

- A. Na_2CO_3
- B. NaHCO_3**
- C. $\text{Na}_2\text{CO}_3 \cdot \text{H}_2\text{O}$
- D. $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$

_____ is a thermosetting plastic?

- A. Polyvinyl chloride
- B. Polythene
- C. Bakelite**
- D. Teflon

What is the slope of the operating line in the rectifying section of a distillation column ?

- A. 0
- B. ∞
- C. > 1
- D. < 1**

Potable water means the water used for _____ ?

- A. Fire-fighting
- B. Cooling
- C. Drinking**
- D. Evaporation to produce steam

Differential method for analysing the kinetic data is used _____ ?

- A. For testing complicated mechanisms**
- B. When the data are scattered
- C. When rate expressions are very simple
- D. None of these

Pick out the correct statement?

- A. Reactions with high activation energies are very temperature sensitive**
- B. Chemical equilibrium is a static state
- C. A photochemical reaction is catalysed by light
- D. A chemical reaction occurs when the energy of the reacting molecule is less than the activation energy of the reaction

Blast furnace slag is mainly molten _____?

- A. Sand
- B. Magnesium silicate
- C. Calcium silicate**
- D. Iron pyrite

While the bin cards are used in the effective stores management, the queuing theory is associated with the _____ time ?

- A. Waiting**
- B. Idle
- C. Inspection
- D. Tool replacement

The main purpose of control rod in a nuclear reactor is to control the _____?

- A. Chain reaction and hence the power output by regulating the number of secondary neutrons causing fission**
- B. Emission of hazardous radiation
- C. Conversion of fissile material into fertile material
- D. Velocity of the secondary neutrons

The pressure head of a flow meter remains constant for _____?

- A. Venturimeter
- B. Orificemeter
- C. Rotameter**
- D. Pitot tube

What is the value of 'n' if the reaction rate of the chemical reaction $A \rightarrow B$, is proportional to CA^n and it is found that the reaction rate triples, when the concentration of 'A' is increased 9 times ?

- A. 1/2
- B. 1/3
- C. 1/9
- D. 3

Which of the following is a natural polyamide fiber?

- A. Wool
- B. Silk
- C. Cotton
- D. None of these

Two wires of the same radius & material having length in the ratio of 1 : 2 are stretched by the same force. The strain produced in the two wires will be in the ratio of _____?

- A. 1 : 1
- B. 1 : 2
- C. 2 : 1
- D. 1 : 4

Pick out the correct statement?

- A. The available energy in an isolated system for all irreversible (real) processes decreases
- B. The efficiency of a Carnot engine increases, if the sink temperature is decreased
- C. The reversible work for compression in non-flow process under isothermal condition is the change in Helmholtz free energy
- D. All A, B. and C

The underground well of a bio gas plant is called the _____?

- A. Septic tank
- B. Oxidation well
- C. Digestor
- D. Lagoon

Sucrose content in cane sugar may be around _____ percent ?

- A. 50
- B. 70
- C. 95**
- D. 80

Main constituent of limestone is _____ ?

- A. CaCO₃**
- B. MgCO₃
- C. Na₂CO₃
- D. CaSO₄

Which of the following is used for primary crushing of very hard lumpy materials ?

- A. Toothed roll crusher
- B. Gyratory crusher**
- C. Ball mill
- D. Tube mill

Slugging occurs in a fluidised bed, if the bed is _____ ?

- A. Narrow
- B. Deep
- C. Both A. & B.**
- D. Neither A. nor B.

Which of the following lengths of heat exchanger tubes are normally not used in practice ?

- A. 2.5 metres
- B. 6 metres
- C. 10 metres**
- D. 0.5 metre

Overall mass transfer co-efficient in case of absorption of _____ in water is based on the gas film co-efficient only, as the mass transfer process is gas film (phase) controlling ?

- A. CO₂
- B. SO₂
- C. NH₃**
- D. None of these

A liquid is in equilibrium with its vapor at its boiling point. On an average, the molecules in the liquid and gaseous phases have equal _____?

- A. Kinetic energy**
- B. Intermolecular forces of attraction
- C. Potential energy
- D. Total energy

Out of all the elastomers, natural rubber has the longest elongation range & flexibility of the order of _____ percent?

- A. 1-1000**
- B. 1000-1500
- C. 1500-2000
- D. 2000-2500

For pipe flows, head is proportional to _____ at constant capacity (where, D = pipe diameter) ?

- A. $1/D$
- B. $1/D^2$
- C. $1/D^5$**
- D. D^2

Pick out the wrong statement?

- A. Use of different catalysts in a reversible catalytic chemical reaction does not change the equilibrium composition

- B. Alumina is added as a promoter to iron catalyst in ammonia synthesis reaction
- C. Activation energy for a reaction is obtained from the intercept of the Arrhenius plot**
- D. Presence of inerts affects the equilibrium conversion of

Which of the following is not a differential pressure flow meter ?

- A. Rotameter**
- B. Flow nozzle
- C. Orificemeter
- D. Venturimeter

In jet refrigerators, the refrigerating fluid is practically always _____?

- A. Water**
- B. Ammonia
- C. Freon
- D. Brine

The temperature of water cooled in cooling tower is always _____ temperature of entering air?

- A. More than the wet bulb**
- B. Less than the wet bulb
- C. Equal to the wet bulb
- D. Equal to the dry bulb

Routing in production, planning & control is concerned with the _____?

- A. Sequence of operation to be performed**
- B. Progress of work performed
- C. Authorisation of work to be performed
- D. Balancing of load on machines

Out of the following the refractive index is the highest

for _____?

- A. Glass
- B. Diamond**
- C. Brine
- D. Kerosene

_____ tubes are good substitute for human blood vessels on heart by-pass operation?

- A. PVC
- B. Polythene
- C. Teflon/Dacron**
- D. Polystyrene

Bush bearings are made of _____?

- A. Mild steel
- B. Phosphorous bronze**
- C. White metal alloys
- D. None of these

A bolometer is _____?

- A. Used for the measurement of thermal radiation
- B. An element which senses optical input and delivers thermal output
- C. Both A. & B.**
- D. Neither A. nor B.

The rate constant of a chemical reaction decreases by decreasing the _____?

- A. Pressure
- B. Concentration of reactants
- C. Temperature**
- D. Duration of reaction

For infinite parallel planes having emissivities ϵ_1 & ϵ_2 , the interchange factor for

radiation from surface 1 to surface 2 is given by _____?

- A. $(\epsilon_1 + \epsilon_2)/\epsilon_1.\epsilon_2$
- B. $\epsilon_1.\epsilon_2/(\epsilon_1 + \epsilon_2 - \epsilon_1.\epsilon_2)$**
- C. $\epsilon_1.\epsilon_2$
- D. $\epsilon_1 + \epsilon_2$

Lower part of hot metal mixer are lined with _____ bricks?

- A. Superduty fireclay
- B. High alumina
- C. Silica
- D. Carborundum**

Blowdown in a cooling tower _____?

- A. Means discarding a small fraction of circulating water to prevent and limit the concentration of salt and impurities**
- B. Increases the scale forming tendencies of water
- C. Is undesirable
- D. All A., B. & C.

Sometimes water is sprayed during coal charging in the coke oven, which helps in _____?

- A. Prevention of clinker formation in the oven
- B. Controlling the dust nuisance while charging the coal
- C. Reducing the cracking of hydrocarbons in the gas and increasing the percentage of CO & H₂ in the gas (due to the endothermic reaction represented by $C + H_2O = CO + H_2$)
- D. All A., B. and C.**

TLV of lead for public sewer/waste water is about _____ ppm?

- A. 1**
- B. 25
- C. 150
- D. 650

A wall has two layers of materials A and B; each made of a different material. Both the layers have the same thickness. The thermal conductivity of material A is twice that of B. Under the equilibrium, the temperature difference across the wall is 36°C . The temperature difference across the layer A is _____
 $^{\circ}\text{C}$?

- A. 6
- B. 12**
- C. 18
- D. 24

Activators are those chemicals which help buoying up one mineral in preference to the other in the froth floatation process. Which of the following is an activator ?

- A. Cresylic acid
- B. Copper sulphate**
- C. Calcium carbonate
- D. Sodium carbonate

_____ number determines whether the fluid flow in an open channel is super-critical, critical or sub-critical ?

- A. Mach
- B. Reynolds
- C. Froude**
- D. Weber

All enzymes are made of _____ ?

- A. Fats
- B. Carbohydrates
- C. Proteins**
- D. Amino acids

During agitation of liquids, power consumption during laminar flow is not proportional to the _____?

- A. Density of the liquid
- B. Viscosity of the liquid
- C. Cube of impeller diameters
- D. Square of rotational speed

Minimum baffle spacing recommended in a shell and tube heat exchanger is equal to _____?

- A. 5 cms
- B. 40% of the I.D. of the shell
- C. 25 cms
- D. I.D. of the shell

Cast iron is _____?

- A. Used for making shock resisting parts
- B. Manufactured in cupola and is brittle
- C. Having compressive strength more than its tensile strength
- D. All A., B. & C.

Cake resistance is _____?

- A. Important in the beginning of filtration
- B. Decreased with the time of filtration
- C. Independent of pressure drop
- D. None of these

Which of the following has the highest heat of combustion ?

- A. H₂
- B. CO
- C. CH₄
- D. C₂H₆

A minimum boiling azeotrope is exemplified by _____?

- A. Toluene-benzene
- B. Acetone-carbon disulphide**
- C. Water-isobutyl alcohol
- D. None of these

Pick out the wrong statement?

- A. Packed towers are preferred for vacuum operation, because the pressure drop through the packing is less and they (packings) also lessen the possibility of tower wall collapse
- B. Packed towers are preferred over plate towers for handling corrosive and foamy liquids
- C. Diameter of randomly packed tower is normally more than 1.2 metres**
- D. Due to uneven supply and improper distribution of liquid, problem of channelling, loading & flooding is generally encountered in packed towers

Adipic acid is an intermediate in the manufacture of _____?

- A. Perspex
- B. Nylon-66**
- C. Polystyrene
- D. Bakelite

Medium viscosity lubricating oil can be most ideally pumped by a _____ pump?

- A. Vane**
- B. Piston
- C. Centrifugal
- D. Plunger

Commercially ethylene is produced from naphtha by _____?

- A. Catalytic cracking
- B. Catalytic dehydrogenation
- C. Pyrolysis

D. Hydrocracking

Which of the following has the smallest least effect on the solubility of a solute into the solvent ?

- A. Nature of the solute
- B. Nature of the solvent
- C. Temperature

D. Pressure

Vertical vessels are not supported by _____ ?

- A. Brackets
- B. Skirts
- C. Columns

D. Saddles

Fluid resistance to shear depends upon its _____ ?

- A. Rate of transfer of molecular momentum
- B. Cohesion
- C. Both A. and B.
- D. Neither A. nor B.

Atoms of the same element, but of different masses are called _____ ?

- A. Isobars
- B. Isotones
- C. Isotopes
- D. None of these

Low purity oxygen is used for _____ ?

- A. L.D. steel making
- B. Cutting and welding of metals
- C. Medicinal purposes
- D. Chemical oxidation processes

Production rate _____ with increased fineness, with a given energy input to the size reduction machine?

- A. Decreases
- B. Increases
- C. Remains unchanged
- D. May increase or decrease; depends on the machine

Pick out the correct statement?

- A. Noise from ball mills can be dealt with by fibre glass lined enclosures
- B. Noise from vibrating chutes can be reduced by lining the metallic chute with rubber
- C. Noise of conveyor belt system is reduced by using urethane coated cloth conveyor belts and rubber/plastic covered metallic rollers
- D. All A., B. & C.

Overall distillation column efficiency for most of the refinery columns can be given by (for $\mu = 0.07 - 1.4$ cp and relative volatility < 4) (where ϵ = overall column efficiency, % μ = molal average viscosity of feed at average column temperature and pressure, cp Δp = pressure drop per tray, psi) ?

- A. $\eta = 17 - 61.1 \log \mu$
- B. $\eta = 24.6 (\Delta p/\mu)$
- C. $\eta = 1.66 - 0.25 \log \mu$
- D. $\eta = 0.25 \log \mu - 1.67$

If the discharge of a centrifugal pump is throttled, then its suction lift _____ ?

- A. Increases
- B. Decreases
- C. Remains unchanged
- D. Data insufficient to predict

Chrome tanning and vegetable tanning are done for _____?

- A. Light & heavy leather respectively
- B. Heavy & light leather respectively
- C. Both light & heavy leather
- D. Neither light nor heavy leather

Alkylbenzene sulfonate (ABS) is a _____?

- A. Detergent
- B. Rubber
- C. Pesticide
- D. Polyester

Steam economy in case of a triple effect evaporator will be _____?

- A. 1
- B. < 1
- C. > 1
- D. Between 0 and 1

Adsorption is a unit operation which generally involves _____ systems?

- A. Liquid-solid
- B. Gas-solid
- C. Fluid-solid
- D. Solid-solid

Maximum heat dissipation occurs from a steel wire ($k = 0.5 \text{ W/m} \cdot \text{k}$) of 15 mm diameter exposed to air ($h = 20 \text{ W/m}^2 \cdot \text{k}$), when the insulation thickness is _____ mm?

- A. 15
- B. 25
- C. 10

D. 30

In a fully turbulent flow ($Re > 105$) in a pipe of diameter 'd', for a constant pressure gradient, the dependence of volumetric flow rate of an incompressible fluid is _____?

- A. d
- B. d^2
- C. $d^{2.5}$**
- D. d^4

Joule-Thomson experiment is _____?

- A. Isobaric
- B. Adiabatic
- C. Isenthalpic
- D. Both B. & C.**

Which of the following is not a characteristic observed in material failure by fatigue fracture ?

- A. Plastic deformation of material does not occur
- B. Initiation of crack from below the surface does not occur**
- C. Initiation of crack occurs on the surface of the machine part
- D. Presence of both rough & smooth zone with conchoidal markings in smooth zone of the

Which of the following fuel gases is heavier than air ?

- A. Blast furnace gas**
- B. Coke oven gas
- C. Natural gas
- D. Water gas

Purity of coke means that, it is high in carbon and low in _____?

- A. Volatiles**
- B. Ash
- C. Iron

D. Moisture

'Duhring's plot' is of use in _____?

A. Extractive distillation

B. Evaporation

C. Leaching

D. Absorption

In the desorption of highly soluble gas from the liquid, the main resistance will be in the _____ phase?

A. Gas

B. Liquid

C. Both A. & B.

D. Neither A. nor B.

Heavy water is preferred over ordinary water as a coolant, because it?

A. Acts both as an efficient coolant as well as a moderator

B. Can be heated to a higher temperature without pressurizing

C. Is less prone to radiation damage

D. All A., B. and C.

During adiabatic expansion of gas _____?

A. Pressure remains constant

B. Pressure is increased

C. Temperature remains constant

D. None of these

Trouton's ratio of _____ liquids is calculated using Kistyakowsky equation?

A. Polar

B. Non-polar

C. Both A. & B

D. Neither A. nor B

A coal gasifier operating at 20 atm. (e.g. Lurgi gasifier) as compared to one operating at atmospheric pressure (e.g. Kopper-Totzek or Winkler gasifier) will produce a gas having _____?

- A. Higher methane content and thus higher calorific value**
- B. Higher carbon monoxide content
- C. Lower carbon dioxide content
- D. None of these

A fire tube boiler is limited to a maximum steam pressure of about _____ kg/cm² ?

- A. 6
- B. 18**
- C. 38
- D. 52

Which of the following is a heat treatment furnace ?

- A. Muffle furnace
- B. Annealing furnace**
- C. Reheating furnace
- D. Rotary kiln

The cathode in an electrochemical cell always carries _____?

- A. Negative charge**
- B. Positive charge
- C. Zero charge
- D. Positive or negative charge depending upon the nature of the cell

General mechanism of size reduction in intermediate and fine grinder is by _____?

- A. Cutting action
- B. Compression

C. Compression and tearing

D. Impact and attrition

Backmixing is most predominant in _____?

A. A well stirred batch reactor

B. A plug-flow reactor

C. A single CSTR

D. CSTR's connected in series

Flash distillation is suitable for separating the constituents of a binary system, which _____?

A. Form minimum boiling azeotrope

B. Have very wide boiling points

C. Have very close boiling points

D. Form constant boiling azeotrope

Polarisation of light forms the working principle of a _____?

A. Polarimeter

B. Polarograph

C. Chromatograph

D. Spectrometer

The atomic weight and atomic number of an element are A and Z respectively.

What is the number of neutrons in the atom of that element ?

A. $A + Z$

B. $A - Z$

C. A

D. Z

Insufficient washing of sand grains in a rapid sand filter causes _____?

A. Air binding

B. Shrinkage of filtering media

C. Mud balls

D. Expansion of filtering media

Thorium can be converted into U-233 in a _____ reactor?

A. Liquid metal cooled

B. Fast breeder

C. Thermal

D. Swimming pool

In a distillation column, minimum clearance to be maintained between the overflow weir and the last row of the bubble caps is _____ cms?

A. 2.5

B. 7.5

C. 15

D. 20

The vapor pressures of benzene and toluene are 3 and $4\frac{1}{3}$ atmospheres respectively. A liquid feed of 0.4 moles of benzene and 0.6 moles of toluene is vaporised. Assuming that the products are in equilibrium, the vapor phase mole fraction of benzene is _____?

A. 0.4

B. 0.6

C. 0.8

D. 0.2

Alloying elements present in Haynes stellite, which has superior performance than high speed steel, are _____?

A. Nickel, cobalt & chromium

B. Tungsten, chromium & cobalt

C. Manganese, chromium & cobalt

D. Tungsten, molybdenum & nickel

KOH solution used in Orsat apparatus absorbs _____?

- A. CO₂
- B. SO₂
- C. Both A. & B.**
- D. Neither A. nor B.

The efficiency of a Carnot heat engine operating between absolute temperatures T₁ and T₂ (when, T₁ > T₂) is given by $(T_1 - T_2)/T_1$. The co-efficient of performance (CO.P.) of a Carnot heat pump operating between T₁ and T₂ is given by _____?

- A. T₁/(T₁-T₂)
- B. T₂/(T₁-T₂)**
- C. T₁/T₂
- D. T₂/T₁

The most popular and common detergent i.e., alkyl benzene sulfonate (ABS) is a/an _____ detergent ?

- A. Cationic
- B. Anionic**
- C. Amphoteric
- D. Semi polar

Which of the following industries discharge mercury as a pollutant ?

- A. Chloro-alkali industry**
- B. Tanneries
- C. Beverage plant
- D. Phosphoric acid plant

'Wind loss' resulting from unscientific storage of coal may be the order of about _____ percent?

- A. 2.5**
- B. 7.5

- C. 10.5
- D. 14.5

Glycol added to petrol acts as a/an _____ agent ?

- A. Anti-knocking
- B. Anti-icing**
- C. Anti-gum forming
- D. Dewaxing

The maximum permissible noise level to which a man working in a chemical plant can be exposed for eight hours per day is about _____ decibels?

- A. 60
- B. 90**
- C. 105
- D. 120

Powder metallurgy is used to produce _____ ?

- A. High precision components with complex cavities and sharp features
- B. Components of large size
- C. Porosity free components**
- D. Components of such alloys whose constituents do not form alloys readily

Yield of charcoal in high temperature carbonisation of wood is about _____ percent?

- A. 10
- B. 25**
- C. 50
- D. 75

Hole diameter of the sieve trays in the distillation column ranges from _____ mm?

- A. 1 to 3
- B. 4 to 8**

C. 3 to 12.5

D. 12.5 to 18.5

Fugacity of a component in an ideal gas mixture is equal to the partial pressure of that component in the mixture. The fugacity of each component in a stable homogeneous solution at constant pressure and temperature _____ as its mole fraction increases?

A. Decreases

B. Decreases exponentially

C. Increases

D. Remain constant

In osmosis through a semi-permeable membrane, diffusion of the _____?

A. Solvent is from low concentration to high concentration region

B. Solvent is from high concentration to low concentration region

C. Solute takes place

D. None of these

Which of the following pollutants, if present in atmosphere is detectable by its odour ?

A. CO

B. SO₂

C. NO₂

D. CO₂

For every 10% increase in the excess air; the fuel consumption increases by _____ percent?

A. 0.1

B. 0.2

C. 0.5

D. 1.0

Which of the following fluid flow measuring devices can measure the largest flow rate ?

- A. V-notch
- B. Rotameter
- C. Orificemeter
- D. Weir**

In case of steady flow compression polytropic process ($PV^n = \text{constant}$), the work done on air is the lowest, when _____?

- A. $n = \gamma = 1.4$
- B. $n = 0$
- C. $n = 1$**
- D. $n = 1.66$

A typical yield of kerosene in straight run distillation of crude oil may be about _____ percent?

- A. 4
- B. 10**
- C. 18
- D. 26

The equipment used in the extraction of highly corrosive radioactive liquids is _____?

- A. Pulse column**
- B. Spray column
- C. Mixer settler
- D. Baffle tower

_____ fluid force is not considered in the Navier-Stokes equation?

- A. Turbulent**

- B. Viscous
- C. Gravity
- D. Pressure

Rosin soap is added during paper manufacture to _____?

- A. Impart adhesive properties
- B. Improve opacity
- C. Impart resistance to penetration by liquids**
- D. None of these

The equation, $(NSt \times N2/3 Pr) = f/2$, is the _____ analogy ?

- A. Colburn**
- B. Reynolds
- C. Prandtl
- D. None of these

Olefins are _____?

- A. Saturated hydrocarbons
- B. Unsaturated cyclic compounds (hydrocarbons)
- C. Present in substantially good quantity in crude petroleum
- D. None of these**

HETP is numerically equal to HTU, only when the operating line

_____?

- A. Lies below the equilibrium line
- B. Lies above the equilibrium line
- C. And equilibrium lines are parallel**
- D. Is far from the equilibrium line

A tube mill compared to a ball mill _____?

- A. Has a higher length/diameter ratio**
- B. Produces a coarser product
- C. Has a higher diameter/length ratio

D. Uses much larger balls

Uranium Corporation of India Limited (UCIL) engaged in the mining & concentration of uranium ore is located at _____?

A. Always (in Kerala)

B. Jadugoda (in Jharkhand)

C. Kalpakkam (in Tamilnadu)

D. Gopalpur coast (in Orissa)

With decrease in porosity, the _____ of the refractories decreases?

A. Strength

B. Thermal conductivity

C. Spalling resistance

D. None of these

Which of the following increases during evaporative cooling process with recirculated water supply ?

A. Wet bulb temperature

B. Relative humidity

C. Partial pressure of vapour

D. Both B. and C.

A Rotameter works on the principle of _____ pressure drop?

A. Constant

B. Variable

C. Both A. & B.

D. Neither A. nor B.

Dimension of mass diffusivity is the same as that of _____ ?

A. Kinematic viscosity

B. Dynamic viscosity

C. Surface tension

D. Pressure

_____ practically possess no elasticity?

- A. Vulcanite or ebonite
- B. Spandex fibre
- C. Polysulphide rubber
- D. Epoxy resin

Which law of the thermodynamics provides basis for measuring the thermodynamic property ?

- A. First law
- B. Zeroth law
- C. Third law
- D. Second law

Which of the following is stretched into fibers ?

- A. Saturated polyester
- B. Unsaturated polyester
- C. Isoprene
- D. Bakelite

The resistance of water to the passage of light through it is a measure of the _____?

- A. Turbidity
- B. Color
- C. Hardness
- D. Dissolved gases

Pick out the wrong statement ?

- A. Low intensity explosives are also called propellants, whereas high intensity explosive are called detonators
- B. Gun powder comprises of 75% salt petre, 15% charcoal and 10% sulphur
- C. Lead azide is a popular military explosive
- D. TNT is a hygroscopic explosive having very high melting point and is non-toxic to

human
being

Which thermocouple can be used to measure a temperature of around 1400°C ?

- A. Copper-constantan
- B. Aluminium-Chromel
- C. Platinum-platinum + rhodium**
- D. None of these

The main ore of uranium is _____ ?

- A. Pitchblende**
- B. Monazite sand
- C. Cassiterite
- D. Chalcopyrite

For a gaseous phase reaction, rate of reaction is equal to $K \cdot C_A \cdot C_B$. If the volume of the reactor is suddenly reduced to 1/4th of its initial volume, then the rate of reaction compared to the original rate will be _____ times?

- A. 8
- B. 16**
- C. 1/8
- D. 1/16

_____ possesses viscoelastic properties?

- A. Cork
- B. Glass
- C. Graphite
- D. Rubber**

Epoxy resins (i.e., epoxide polymers) ?

- A. Are made by addition polymerisation reaction only
- B. Contain an epoxy group (fig below) at the ends of the polymer**
- C. Are cross-linked polymers only

D. Use emulsion polymerisation methods

Air-petrol ratio for maximum power generation in spark ignition engine is about _____?

- A. 6 : 1
- B. 12 : 1**
- C. 18 : 1
- D. 24 : 1

Tip of the match stick contains a mixture of _____?

- A. K + S
- B. K + S + $K_2Cr_2O_7$
- C. S + $K_2Cr_2O_7$ + White P**
- D. None of these

Acrylonitrile is mainly used in the _____ industry?

- A. Polymer
- B. Printing
- C. Dyeing**
- D. Photographic

When incomplete combustion loss is high, the flue gas analysis shows large amount of _____?

- A. CO_2
- B. CO**
- C. O_2
- D. C

Which of the following alloy steels is the most suitable for making gun barrels and projectiles ?

- A. Tungsten steel
- B. Molybdenum steel
- C. Nickel-chrome steel**

D. Cobalt steel

In practice, the compression ratio of compression-ignition (CI) engine ranges from _____?

- A. 15 to 25
- B. 5 to 10
- C. 40 to 55
- D. 60 to 70

Presence of even very minute amount (say 0.1%) of _____ in copper, reduces its electrical conductivity very seriously?

- A. Bismuth
- B. Arsenic
- C. Antimony
- D. Both B. and C.

Calorific value of _____ are almost same?

- A. Lignite & anthracite coal
- B. Lignite & coal gas
- C. Petrol & diesel
- D. Coal gas & natural gas

Vanillin is a type of _____?

- A. Anti-pyretic drug
- B. Food preservative
- C. Flavour
- D. Dye

Which of the following gives the correct sequence of flow of the flue gases through the above mentioned boiler accessories ?

- A. A, C, B, D
- B. D, B, C, A
- C. D, C, B, A

D. D, A, B, C

Which of the following valves will incur maximum pressure drop for the same discharge of water ?

- A. Globe valve
- B. Gate valve
- C. Needle valve**
- D. Butterfly valve

What is the ratio of displacement thickness to nominal thickness for a linear distribution of velocity in the boundary layer on a flat plate ?

- A. 0.5**
- B. 1
- C. 1.5
- D. 2

A sample of well water contains 140 gm/m^3 Ca^{2+} ions and 345 gm/m^3 Na^+ ions. The hardness of the sample of water, expressed in terms of equivalent CaCO_3 in gm/m^3 is (assuming atomic masses of Ca :40, Na : 23, C : 12, O : 16) ?

- A. 350**
- B. 485
- C. 140
- D. 345

The reduction ratio for grinders is defined as (where, D_f and D_p are average diameters of feed and product respectively) ?

- A. D_f/D_p**
- B. D_p/D_f
- C. $D_f - D_p$
- D. None of these

The slope of operating line in the rectifying section of a distillation column is

unity, if the reflux ratio is _____?

- A. 0
- B. ∞**
- C. 1
- D. Minimum

Atmospheric corrosion of metals result from their _____?

- A. Slow oxidation**
- B. Fast oxidation
- C. Fast hydration
- D. Slow dehydration

White metal is an alloy of _____?

- A. Lead, tin and cadmium
- B. Copper, tin and zinc
- C. Copper and lead
- D. None of these**

In turbulent flow, a rough pipe has the same friction factor as a smooth pipe _____?

- A. In the zone of complete turbulence
- B. When the roughness projections are much smaller than the thickness of the laminar film**
- C. Everywhere in the transition zone
- D. When the friction factor is independent of the Reynold's number

_____ is not used as a material of construction in thermocouples?

- A. Alumel
- B. Rhodium
- C. Constantan
- D. Duralumin**

Steady state temperature reached by a small amount of liquid evaporating into a large amount of unsaturated vapour-gas mixture is called the _____ temperature?

- A. Dry-bulb
- B. Wet-bulb**
- C. Dew point
- D. Adiabatic saturation

_____ is defined as the geometric mean of the relative rejections and the relative recoveries of two minerals?

- A. Separation efficiency
- B. Selectivity index**
- C. Concentration ratio
- D. None of these

For an ideal gas, the enthalpy _____?

- A. Increases with rise in pressure
- B. Decreases with rise in pressure
- C. Is independent of pressure**
- D. Is a path function

To improve the machinability of steel, it is generally subjected to _____?

- A. Spheroidising**
- B. Tempering
- C. Normalising
- D. Annealing

In case of physical adsorption, the difference between heat of adsorption and heat of normal condensation is _____?

- A. Equal to the heat of formation of surface compound
- B. Equal to the heat of wetting**

- C. Zero
- D. Called integral heat of adsorption

Specific heat of a gas for a reversible adiabatic process is _____?

- A. Negative
- B. Zero**
- C. Infinity
- D. None of these

The line of action of the buoyant force passes through the centre of gravity of the _____?

- A. Submerged body
- B. Displaced volume of the fluid**
- C. Volume of fluid vertically above the body
- D. Horizontal projection of the body

For small temperature difference, the heat transfer rate as per Newton's law of cooling is proportional to (where, Δt = excess temperature) ?

- A. Δt**
- B. Δt^2
- C. Δt^3
- D. $\sqrt{\Delta t}$

Solidification time of a molten metal in a casting is proportional to (where, V = volume of metal & A = its surface area; in the casting) ?

- A. V/A
- B. V/A^2
- C. V^2/A
- D. V^2/A^2**

The total number of atoms in 8.5 gm of NH_3 is _____ $\times 10^{23}$?

- A. 9.03**
- B. 3.01

- C. 1.204
- D. 6.02

Which of the following paper does not require a filler during manufacture ?

- A. Bond paper
- B. Writing paper
- C. Blotting paper**
- D. Coloured paper

Boundary layer exists in flow _____ ?

- A. Of real fluids**
- B. Over flat surfaces only
- C. In pipes only
- D. Of ideal fluids only

Percentage of nitrogen in blast furnace gas may be around _____ ?

- A. 5
- B. 25
- C. 55**
- D. 80

The McCabe ΔL law states that the _____ ?

- A. Molar heats of vaporisation of components are nearly equal
- B. Linear crystal growth rate depends on the degree of super-saturation
- C. Linear crystal growth rate does not depend on the crystal size**
- D. Linear crystal growth rate depends on the crystal size

Vessels made of _____ can be used to store dry chlorine?

- A. Thermoplastic materials
- B. Nickel
- C. Steel or iron**
- D. None of these

Which of the following can be used to create a flow of gas, where no significant compression is required ?

- A. Reciprocating compressor
- B. Blower**
- C. Axial flow compressor
- D. Centrifugal compressor

Temperature of the product during ultrafine grinding _____?

- A. Increases**
- B. Decreases
- C. Remain constant
- D. May increase or decrease; depends on the material being ground

Maximum permissible turbidity in potable water is _____ ppm?

- A. 1
- B. 10**
- C. 250
- D. 1000

The lowest temperature, at which a solid fuel produces enough vapors to support continuous combustion, is called ?

- A. Fire point
- B. Smoke point
- C. Burning temperature**
- D. Kindling temperature

In case of _____ boiling, the liquid temperature is below the saturation temperature and the boiling takes place in the vicinity of the heated surface?

- A. Nucleate
- B. Local**

- C. Pool
- D. Saturated

Evaporation by thermo compression results in the

_____?

- A. Saving of steam
- B. Realisation of multiple effect economy in a single effect
- C. Both A. and B.**
- D. None of these

Mass number of an atom is the sum of the numbers of _____?

- A. Neutrons and protons
- B. Protons and electrons
- C. Neutrons and electrons
- D. Both A. & B.**

Polymerisation _____?

- A. Produces i-octane from cracked gases containing i-butane and butene
- B. Causes olefins to combine with each other**
- C. Causes aromatics to combine with each other
- D. Is aimed at producing lubricating oil

With a constant diameter impeller of a centrifugal pump

_____?

- A. Its capacity varies directly as the square of speed
- B. Head varies as the square of speed**
- C. Horsepower input varies as the square of speed
- D. Head varies as the speed

What is the order of chemical reaction as shown in the bellow figure, if it is found that the reaction rate doubles on doubling the concentration of B and also the reaction rate doubles when the concentrations of both A & B were

doubled and quadrupled when the concentrations of both B & C were doubled ?

- A. 1
- B. 2**
- C. 3
- D. 4

Material of construction of the electrode used in the electric resistance welding is _____?

- A. Stainless steel
- B. Graphite
- C. Copper**
- D. Steel

Which of the following is a constituent of coffee ?

- A. Caffeine**
- B. Nicotine
- C. Calgon
- D. Lignin

_____ has the widest inflammability limit (explosion limit) of all the gases?

- A. Hydrogen
- B. Carbon monoxide
- C. Acetylene**
- D. Methane

The 'transition temperature' for ductile to brittle behavior of steel increases with increase in the _____ content in steel?

- A. Carbon**
- B. Manganese
- C. Both A nor B
- D. Neither A nor B

In the production of soda ash by Solvay process, the by-product is _____?

- A. CaCl_2
- B. NH_4Cl
- C. NH_3
- D. NaOH

Pick out the wrong statement ?

- A. Minimum number of degree of freedom of a system is zero
- B. Degree of freedom of a system containing a gaseous mixture of helium, carbon dioxide and hydrogen is 4
- C. For a two phase system in equilibrium made up of four non-reacting chemical species, the number of degrees of freedom is 4
- D. Enthalpy and internal energy change is zero during phase change processes like melting, vaporisation and sublimation**

Pulverised fuel fired furnaces employ _____ fuel firing?

- A. Horizontal
- B. Vertical
- C. Tangential
- D. All A., B. and C.**

_____ polymer is used for making unbreakable crockery?

- A. Thermoplastic
- B. Melamine**
- C. Addition
- D. None of these

Fuel for a nuclear reactor (thermal) is _____?

- A. Uranium**

- B. Plutonium
- C. Radium
- D. None of these

Steady state equimolar counter diffusion is encountered in _____?

A. Separation of a binary mixture by distillation

- B. Absorption of NH₃ from air by water
- C. All liquid-liquid diffusion systems
- D. All liquid-solid diffusion systems

Maximum permissible residual chlorine in treated water should be _____ mg/litre?

- A. 0.001 to 0.01
- B. 0.2 to 0.3**
- C. 2 to 3
- D. 5 to 10

The main charge in blast furnace is usually _____?

- A. Iron ore & coke
- B. Iron ore, coke & air
- C. Limestone, coke & iron ore**
- D. Limestone, sand & iron ore

Inversion of sucrose produces _____?

- A. Fructose
- B. Glucose**
- C. Both A. & B.
- D. Neither A. nor B.

Hydrogenation of oil does not _____?

- A. Remove double bonds
- B. Raise its melting point

C. Improve its resistance to oxidation

D. None of these

Transformation range for ferrous material is the temperature interval during which _____ is formed during its heating?

A. Cementite

B. Austenite

C. Martensite

D. Pearlite

Can the efficiency of a plate in the distillation tower be greater than 100% ?

A. Yes

B. Normally not; but is possible if infinite number of plates are put

C. Never

D. Yes; if the reflux ratio is maximum

Mach number is important in a fluid flow problem, when the inertia and _____ forces predominate?

A. Elastic

B. Viscous

C. Gravity

D. None of these

A good quality coal should have _____ ?

A. Low fusion point of ash

B. High ash content

C. High sulphur

D. None of these

Zirconia refractories are not used in _____ ?

A. Making sheaths for thermocouple

B. Lining high temperature ceramic kilns

C. Furnaces subjected to fluctuating temperature

D. High frequency induction furnaces in the form of inductors

_____ heat exchanger is used for chilling oil to be dewaxed?

- A. U-tube
- B. Double pipe**
- C. Fixed tube
- D. Floating head

When the liquid over a plate is of uniform concentration, then

_____?

- A. Murphree efficiency > point efficiency
- B. Murphree efficiency < point efficiency
- C. Murphree efficiency = point efficiency**
- D. Murphree efficiency \neq point efficiency

Ammonium nitrate (a fertiliser) is coated with limestone powder to

_____?

- A. Increase its nitrogen content
- B. Cut down its production cost
- C. Avoid the risk of explosion**
- D. Add extra nutrient as fertiliser

An investment of Rs. 100 lakhs is to be made for construction of a plant, which will take two years to start production. The annual profit from the operation of the plant is Rs. 20 lakhs. What will be the payback time ?

- A. 5 years
- B. 7 years**
- C. 12 years
- D. 10 years

Accumulated sum at the end of 5 years, if Rs. 10000 is invested now at 10% interest per annum on a compound basis is Rs ?

- A. 15000
- B. 16105**
- C. 18105
- D. 12500

For efficient grinding, ball mills must be operated _____ ?

- A. At a speed less than the critical speed**
- B. At a speed more than the critical speed
- C. At a speed equal to the critical speed
- D. With minimum possible small balls

Galvanising is not a zinc diffusion process. A zinc diffusion process is termed as _____ ?

- A. Sherardizing**
- B. Parkerising
- C. Anodising
- D. None of these

The energy radiated from a surface Q at absolute temperature T is related as _____ ?

- A. $Q \propto T^2$
- B. $Q \propto T^4$**
- C. $Q \propto T^3$
- D. None of these

Gobar gas is produced by the _____ of cow dung?

- A. Fermentation**
- B. Oxidation
- C. Hydrogenation
- D. None of these

Which of the following is an explosive ?

- A. Nitro-glycerine

- B. Trinitrotoluene (TNT)
- C. Cellulose nitrate
- D. All A , B., and C.**

Sillimanite is a _____ refractory?

- A. Basic
- B. Neutral
- C. High alumina**
- D. Insulating

The ratio of momentum diffusivity to thermal diffusivity is the _____ number?

- A. Prandtl**
- B. Nusselt
- C. Stanton
- D. Grashoff

A measure of the extent to which viscous heating is important relative to the heat flow resulting from the impressed temperature difference is represented by the _____ number?

- A. Condensation
- B. Grashoff
- C. Stanton
- D. Brinkman**

_____ is the hardest oxide and is hence used where high wear resistance at high temperature is required?

- A. Beryllium
- B. Zirconia
- C. Alumina**
- D. Magnesite

At what value of Prandtl number, the hydrodynamic and thermal boundary layers of a fluid flowing over a heated plate will be identical ?

- A. 1
- B. 1
- D. None of these

Spark plugs are made of _____ ?

- A. High alumina ceramic
- B. Metallic carbides
- C. Corundum
- D. Carborundum

The maximum percentage of chromium that can be added to steel is about _____ ?

- A. 12
- B. 18
- C. 24
- D. 30

Which of the following ideal gas laws are not applicable to mixture of gases ?

- A. Amagat's law
- B. Dalton's law
- C. Boyle's law & Charle's Law
- D. None of these

At equilibrium condition, the chemical potential of a material in different phases in contact with each other is equal. The chemical potential for a real gas (μ) is given by (where, μ° = standard chemical potential at unit fugacity ($f^\circ = 1$ atm.) and the gas behaves ideally.) ?

- A. $\mu^\circ + RT \ln f$
- B. $\mu^\circ + R \ln f$
- C. $\mu^\circ + T \ln f$

D. $\mu^\circ + R/T \ln f$

Asymptotic conditions is reached, when for a fluid flowing in laminar flow through a long tube_____?

- A. Exit-fluid temperature > wall temperature
- B. Exit fluid temperature < wall temperature
- C. Exit fluid temperature = wall temperature**
- D. Graetz number > 100

If d_p is the equivalent diameter of a non-spherical particle, V_p its volume and s_p its surface area, then its sphericity is ϕ_s is defined by_____?

- A. $\phi_s = 6 V_p/d_p s_p$**
- B. $\phi_s = V_p/d_p s_p$
- C. $\phi_s = 6 d_p s_p/V_p$
- D. $\phi_s = d_p s_p/V_p$

Tri-sodium phosphate is used in boiler water treatment to reduce_____?

- A. Turbidity
- B. Caustic embrittlement**
- C. Suspended silica
- D. Dissolved oxygen

Which of the following is a yellow pigment ?

- A. Titanium dioxide
- B. Ferrous sulphate
- C. Lead chromates**
- D. Zinc sulphides

Quinoline is a/an _____ compound ?

- A. Sulphur
- B. Nitrogen**
- C. Oxygen

D. None of these

Which of the following cannot measure a temperature of 1600°C ?

A. Platinum resistance thermometer

B. Thermocouple

C. Photo-electric pyrometer

D. Radiation pyrometer

Presence of carbon monoxide in atmosphere produced by decomposition of chlorophyll and haemoglobin breakdown of some animals, beyond TLV (>50 ppm) ?

A. Acts as a green house gas thereby raising earth's temperature

B. Causes asphyxia

C. Causes increase in sea level

D. Enhances the green house effect

The sphericity of a solid particle of cubical shape is _____ ?

A. π

B. $(\pi/6)^{1/3}$

C. $(\pi/6)^{1/2}$

D. $\pi/3$

The rate at which a chemical substance reacts is proportional to its _____ ?

A. Active mass

B. Equivalent weight

C. Molecular weight

D. None of these

Trommels employ _____ for screening of materials?

A. Fibrous cloth

B. Woven wire screen

C. Punched plate

D. None of these

In an eutectic system, two elements are completely _____?

- A. Soluble in solid state
- B. Insoluble in liquid state
- C. Insoluble in both solid & liquid state
- D. Soluble in liquid state**

Permanent pressure loss in a well designed Venturimeter is about _____ percent of the venturi differential?

- A. 1
- B. 10**
- C. 30
- D. 50

Which of the following is a light alloy ?

- A. Monel metal
- B. Dow metal**
- C. German silver
- D. Babbitt metal

Centrifugal pumps as compared to reciprocating pumps _____?

- A. Run at a lower speed for the same discharge
- B. Do not need priming
- C. Deliver fluid with pulsating/fluctuating discharge
- D. Can be run with discharge line valve closed for a short interval**

To increase the absorption factor, (where, G = gas flow rate, S = solvent flow rate) _____?

- A. Increase both 'G' and 'S'
- B. Decrease both 'G' and 'S'
- C. Increase 'S' and decrease 'G'**
- D. Increase 'G' and decrease 'S'

Emf generated in a thermocouple depends on the temperature

_____?

- A. Of cold junction only
- B. Of hot junction only
- C. Difference between hot and cold junctions**
- D. Difference between cold junction and atmospheric temperature

In isotropic turbulence, the _____ are equal to each other?

- A. Temporal velocity components
- B. Mean square of velocity fluctuations in the three co-ordinate directions**
- C. Root mean square of velocity fluctuations in the three co-ordinate directions
- D. None of these

If fuel and air are mixed ahead of the burner, it is called a/an _____ burner?

- A. Premix**
- B. Outside mixing type
- C. Rotary
- D. Diffusion

Phase lag of the sinusoidal response of a first order system is

_____?

- A. 120°
- B. 30°
- C. 180°
- D. 90°**

High temperature of around 2000°C of incandescent gas mantles is measured by a/an _____?

- A. Specially designed thermocouple
- B. Optical pyrometer**

C. Radiation pyrometer

D. None of these

Siderosis is a disease caused by the inhalation of _____ dust?

A. Coal

B. Silica

C. Iron

D. None of these

Fenske equation for determining the minimum number of theoretical stages in distillation column holds good, when the _____?

A. Relative volatility is reasonably constant

B. Mixture (to be separated) shows negative deviation from ideality

C. Mixture (to be separated) shows positive deviation from ideality

D. Multi-component distillation is involved

Naphthalene is removed from coke oven gas by _____?

A. Scrubbing with wash oil (a petroleum product)

B. Adsorbing on bog iron bed

C. Absorbing in vetro-coke solution

D. None of these

The testing pressure of storage tanks and pressure vessels designed as per Indian standard codes should be about _____ times the design pressure?

A. 1.5 to 2

B. 3 to 4

C. 4 to 5

D. > 5

Which of the following is a boiler accessory i.e., not a boiler mounting ?

A. Blow off cock

B. Feed check valve

C. Feed water pump

D. Stop valve

Ceramic coating material for furnace refractory, which increases its emissivity and thus the radiation heat transfer rate in the furnace, comprises of _____?

A. Graphite powder

B. Thoria

C. Zircon powder

D. Beryllium

Production of one ton of cement requires about _____ tons of limestone ?

A. 0.6

B. 1.2

C. 2.2

D. 3.8

Ore concentration by jigging is based on the difference in the _____ of the particles?

A. Specific gravities

B. Wettability

C. Shape

D. None of these

Which of the following two quantities when same, makes one pipe system equivalent to another pipe system ?

A. Head & discharge

B. Length & discharge

C. Length & diameter

D. Friction factor & diameter

With increase in temperature, the mutual solubility of two liquids _____?

- A. Increases
- B. Decreases
- C. Remains unchanged
- D. Decreases exponentially

Enzymes are destroyed, when the _____?

- A. Temperature is very high
- B. Reactant's concentration is very high
- C. Reactant's concentration is very low
- D. Reaction rate is independent of the reactant's concentration

Flash distillation is _____?

- A. Same as differential distillation
- B. Used for multi-component systems like crude refining
- C. Same as simple distillation
- D. Most useful for handling binary systems

The gravimetric (i.e., by weight) composition of a vapor saturated gas is independent of the _____?

- A. Nature of both the gas & the liquid
- B. Temperature
- C. Total pressure
- D. None of these

C_p/C_v is termed as _____?

- A. Adiabatic constant
- B. Mach number
- C. Weber number
- D. Prandtl number

Grindability index of a coal is 100. It implies that the _____?

- A. Coal can be pulverised with great difficulty
- B. Coal can't be pulverised
- C. Coal can be easily pulverised**
- D. Power consumption in grinding the coal will be very high

A substance produced by a living organism and capable of anti-microbial activity is called a/an _____?

- A. Antibiotic
- B. Antiseptic
- C. Disinfectant
- D. None of these

Balls for ball mills are never made of _____?

- A. Forged/cast steel
- B. Lead**
- C. Cast iron
- D. Alloy steel

The actual temperature drop across the heating surface in an evaporator depends on the _____?

- A. Feed
- B. Depth of liquid over heating surface
- C. Pressure difference between steam chest and vapour space
- D. All A., B. and C.**

Chemical engineering thermodynamics is concerned with the _____ in/of chemical processes?

- A. Reaction mechanism
- B. Calculation of rates
- C. Energy transformation from one form to another**
- D. None of these

Resistance to slag attack of a refractory _____?

- A. Depends on the nature of slag & refractory
- B. Decreases at higher temperature
- C. Decreases, if defective joints & cracks exist in the refractory
- D. All A., B. and C.**

Gun metal is an alloy of _____?

- A. Nickel, tin and copper
- B. Copper, tin and zinc**
- C. Copper, phosphorus and nickel
- D. Manganese, phosphorus and nickel

The friction factor for the turbulent fluid flow in a rough pipe does not depend upon the _____?

- A. Pipe roughness & pipe diameter
- B. Fluid velocity
- C. Type of flowing fluid
- D. Both B. & C.**

When a high liquid hold up is required in a reactor for gas liquid reaction, use _____ column?

- A. Packed
- B. Spray
- C. Tray
- D. Bubble**

Which of the following is a single stage, fixed bed high pressure coal gasification process ?

- A. Winkler process
- B. Kopper-Totzek process
- C. Lurgi Process**
- D. None of these

Use of excess of combustion air in the combustion of fuels results

in _____ ?

- A. Heat losses
- B. Long flame
- C. Condensation of water vapour from the fuel gas
- D. None of these

What is the value of 'q' for saturated liquid feed to a distillation column ?

- A. 0
- B. <1
- C. 1
- D. >1

Nickel base alloys with _____ are known as monel metal?

- A. Zinc
- B. Tin
- C. Copper
- D. Molybdenum

In an interphase mass transfer process, the lesser the solubility of a given solute in a liquid, the higher are the chances that the transfer process will be _____ ?

- A. Liquid phase resistance-controlled
- B. Gas phase resistance controlled
- C. Impossible
- D. Driven by a non-linear driving force

Pick out the wrong statement?

- A. Surface tension of a substance vanishes at critical point, as there is no distinction between liquid and vapour phases at its critical point
- B. Entropy of a system decreases with the evolution of heat
- C. Change of internal energy is negative for exothermic reactions
- D. The eccentric factor for all materials is always more than one

Platinum is a versatile catalyst for many processes in chemical industries. It is highly prone to be poisoned by the presence of _____?

- A. Carbon
- B. Arsenic**
- C. Lead
- D. Sulphur

Alkylation _____?

- A. Causes olefins to combine with each other
- B. Causes olefins to combine with iso-paraffins**
- C. Converts iso-paraffin into olefin
- D. Converts olefin into paraffin

Phenol formaldehyde resin is used as an adhesive in making _____?

- A. Laminates**
- B. Card boxes
- C. Furniture
- D. Books

The equivalent diameter for pressure drop calculation for a duct of square cross-section is given by (where, x = each side of the square duct) ?

- A. x**
- B. $\sqrt{\pi x}$
- C. $\sqrt{2x}$
- D. $\sqrt{x/2}$

Acetone is to be removed from air in an isothermal dilute absorber using pure water as solvent. The incoming air contains 5 mole% of acetone ($y_{in} = 0.05$). The design equation to be used for obtaining the number of trays (N) of the absorber is, $N+2 = 6 \log (y_{in}/y_{out})$. For 98% recovery of acetone, the number of

trays required is/are ?

- A. 4
- B. 8
- C. 9**
- D. 10

TLV of aldrin in public water supply system is about _____ $\mu\text{g/litre}$?

- A. 0.5
- B. 17**
- C. 357
- D. 1097

In Newton's law range, the terminal velocity of a solid spherical particle falling through a stationary fluid mass varies as the _____ of its diameter?

- A. Inverse
- B. Square root**
- C. Second power
- D. First power

The ability of tool steel to resist softening at high temperatures is termed as _____ hardness?

- A. Red
- B. Extended
- C. Super**
- D. Extreme

Manometers measure the _____ pressure?

- A. Vacuum as well as the atmospheric
- B. Difference in**
- C. Absolute
- D. Gage

At the following point for a given packing and set of fluids, the pressure drop

per metre of packed height, with variation in fluid rates and operating pressure _____?

- A. Increases
- B. Decreases
- C. Remain same**
- D. May increase or decrease depending upon the solubility of the gas in the liquid

Pitch creosote mixture (PCM) as compared to furnace oil is a better fuel, because its _____?

- A. Emissivity factor is higher
- B. Sulphur content is lower
- C. Flue gas has lower dew point thereby facilitating more waste heat recovery
- D. All A., B. and C.**

Which of the following is used as a coagulant in water treatment ?

- A. Chloramine
- B. Chlorine
- C. Ferrous sulphate**
- D. Hydrogen peroxide

The first order gas phase reaction as shown in the bellow figure is conducted isothermally in batch mode. The rate of change of conversion with time is given by _____?

- A. $dX_A/dt = k_1 (1 - X_A)^2 (1 + 2X_A)$
- B. $dX_A/dt = k_1 (1 - X_A) (1 + 0.5X_A)$
- C. $dX_A/dt = k_1 (1 - X_A)$**
- D. $dX_A/dt = k_1 (1 - X_A)/(1 + X_A)$

Heat evolved/absorbed during conversion of a substance from one allotropic form to another is termed as the heat of _____?

- A. Fusion
- B. Vaporisation

C. Transition

D. None of these

With increases in carbonisation temperature _____?

A. Coke even gas yield increases

B. Tar yield increases

C. Hydrogen percentage in the coke oven gas decreases

D. Methane percentage in the coke oven gas increases

C/H ratio is the minimum in case of _____?

A. Furnace oil

B. Natural gas

C. Coal

D. Naphtha

Concentration of hydrogen peroxide is done by _____?

A. Crystallisation

B. Vacuum crystallisation

C. Atmospheric distillation

D. Dehydration

The second order system with the transfer function $4/(s^2 + 2s + 4)$ has a damping ratio of _____?

A. 2.0

B. 0.5

C. 1.0

D. 4.0

The amount of combustible escaping unconsumed from the furnace, depends upon the _____?

A. Air supplied and furnace temperature

B. Burner design (thoroughness of mixing versus stratification)

C. Air preheat and the flow of gases in the furnace (mixing by induction, by acceleration or

by
change of direction)

D. All A., B. and C.

The minimum baffle height should be _____?

A. Equal to the impeller diameter

B. Twice the impeller diameter

C. Twice the tank diameter

D. 3/4 of the tank height

Limestone is normally crushed in a _____?

A. Roll crusher

B. Hammer crusher

C. Ball mill

D. Tube mill

Out of 100 kcal/second of incident radiant energy on the surface of a thermally transparent body, 300 kcal/second is reflected back. If the transmissivity of the body is 0.25, the emissivity of the surface will be _____?

A. 0.35

B. 0.45

C. 0.55

D. 0.85

Which of the following gases cause global warming ?

A. Carbon monoxide

B. Carbon dioxide

C. Nitrogen

D. Ozone

A spring material should have low _____?

A. Elastic limit

B. Deflection value

C. Fatigue resistance

D. None of these

Mastication of rubber means _____?

A. Its softening

B. A treatment to retard its deterioration due to oxidation

C. Improving its curing rate

D. Depression of its freezing point

According to Raoult's law, "The vapor pressure exerted by component in a solution is proportional to the mole fraction of that component." Raoult's law is not applicable under the following assumption/condition?

A. No component is concentrated at the surface of the solution

B. The component molecules are non polar and are of almost equal size

C. In the formation of solution, chemical combination/molecular association between unlike molecules takes place

D. The attractive forces between like and unlike molecules are almost equal

The Carnot co-efficient of performance (COP) of a domestic air conditioner compared to a household refrigerator is _____?

A. Less

B. More

C. Same

D. Dependent on climatic conditions

The variation of thermal conductivity of a metal with temperature is often correlated using an expression of the form $K = K_0 + at$, where, K is the thermal conductivity and T is the temperature (in °K). The units of 'a' in SI system will be _____?

A. W/m.k

B. W/m

C. W/m.k2

D. None, 'a' is just a number

Air/fuel ratio by weight for combustion of methane with theoretical quantity of air will be about _____?

A. 9 : 1

B. 17 : 1

C. 23 : 1

D. 29 : 1

Sulphuric acid pickling tanks are lined with _____?

A. Nickel

B. Rubber

C. Aluminium

D. Glass

At the critical point of a substance _____?

A. The surface tension vanishes

B. Liquid and vapour have the same density

C. There is no distinction between liquid and vapour phases

D. All A, B. and C

In the reaction; $N_2 + O_2 \rightleftharpoons 2NO$, increasing the pressure will result in _____?

A. Shifting the equilibrium towards right

B. Shifting the equilibrium towards left

C. No change in equilibrium condition

D. None of these

The expression for entropy change given by, $\Delta S = nR \ln (V_2/V_1) + nC_v \ln (T_2/T_1)$ is valid for _____?

A. Reversible isothermal volume change

B. Heating of a substance

C. Cooling of a substance

D. Simultaneous heating and expansion of an ideal gas

The ratio for the rate of washing to the final rate of filtration in a washing type of plate and frame filter is _____?

A. 0.25

B. 0.50

C. 0.75

D. 1.25

Cold working of a material results in increase in hardness, which is termed as the _____ hardening ?

A. Cold

B. Work

C. Age

D. Induction

If the internal energy of an ideal gas decreases by the same amount as the work done by the system, then the _____?

A. Process must be isobaric

B. Temperature must decrease

C. Process must be adiabatic

D. Both B. and C.

The mass diffusivity, the thermal diffusivity and the eddy momentum diffusivity are same for, $N_{Pr} = N_{Sc} =$ _____?

A. 1

B. 0.5

C. 10

D. 0

Aniline point is the _____?

- A. Characteristic property of diesel & lubricating oils
- B. Measure of aromatic content of oil
- C. Both A. and B.**
- D. Neither A. nor B.

Which of the following screens has the maximum capacity ?

- A. Grizzlies
- B. Trommels
- C. Shaking screen
- D. Vibrating screen**

An indication of degree of firing in silica brick is its _____ ?

- A. Specific gravity**
- B. Fusion point
- C. RUL
- D. None of these

In low temperature carbonisation (as compared to high temperature carbonisation) of coal _____ ?

- A. Ammonia yield is more
- B. Aliphatic tar is produced**
- C. Free carbon in tar is more
- D. All A., B. and C.

Bakelite is a/an _____ ?

- A. Addition polymer
- B. Elastomer
- C. Thermoplastic
- D. None of these**

Pick out the wrong statement ?

- A. High concentration of oxygen in flue gas means high stack loss
- B. Gaseous fuels require the least % excess air for complete combustion

- C. The ratio of fixed carbon to volatile matter percentage in coal is called its 'fuel ratio'
- D. Calorific value of natural gas is more than that of LPG**

Specific surface area is the surface area of a unit _____ of materials?

- A. Weight
B. Volume
C. Either A. or B.
D. Neither A. nor B.

The standard state of a gas (at a given temperature) is the state in which fugacity is equal to _____?

- A. Unity
B. Activity
C. Both A. & B
D. Neither A. nor B

Among the tin containing alloys, _____ consumes the maximum amount of tin?

- A. Solder**
B. White metal
C. Pewter metal
D. Bronzes

Fugacity and pressure are numerically equal, when the gas is _____?

- A. In standard state
B. At high pressure
C. At low temperature
D. In ideal state

Propulsion of rocket follows from the _____?

- A. Newton's second law of motion
- B. Newton's third law of motion**
- C. Law of projectiles
- D. Archimedes principle

Creeping flow around a sphere is defined, when particle Reynolds number is _____?

- A. < 2100
- B. < 0.1**
- C. > 2.5
- D. < 500

LMTD correction factor which is to be applied for a cross-flow heat exchanger increases with increase in the number of shell passes. Its value for a single pass cross flow heat exchanger is _____?

- A. 0
- B. 1
- C. > 1
- D. < 1**

Liquid ammonia and 60% nitric acid reaction (which produces ammonium nitrate) is _____?

- A. Exothermic**
- B. Endothermic
- C. Autocatalytic
- D. None of these

Pick out the wrong statement ?

- A. Cellulose acetate membranes are used in dialysis process
- B. Elutriation process refers to when the soluble material is largely concentrated on the surface of an insoluble solid and is simply washed off by the solvent
- C. 'Cascade' means a group of stages interconnected so that various streams flow from one

to
another

D. Zirconia probe is used for the humidity measurement

In case of 1.5" heat exchanger tubes, the inside flow area _____ with decrease in BWG?

- A. Increases
- B. Decreases**
- C. Remains same
- D. None of these

Hydrofining is the most recent and effective method for the _____ ?

- A. Removal of sulphur**
- B. Improvement of smoke point
- C. Reduction of breathing loss
- D. Improvement of viscosity index

Compressibility factor-reduced pressure plot on reduced co-ordinates facilitates _____ ?

- A. Use of only one graph for all gases**
- B. Covering of wide range
- C. Easier plotting
- D. More accurate plotting

Rivets are generally specified by the _____ ?

- A. Head diameter
- B. Shank diameter**
- C. Overall length
- D. None of these

Which is the most desirable component of a good quality kerosene ?

- A. i-paraffins

- B. Aromatics
- C. n-paraffins**
- D. Naphthenes

For a constant volume process_____?

- A. $dE = C_p dT$
- B. $dE = C_v dT$**
- C. $dQ = dE + p dV$
- D. $dW = p dV$

Check valves are used_____?

- A. At high pressure
- B. In bends
- C. For controlling water flow
- D. For unidirectional flow**

For very low pressure and high discharge rate, the compressor used is a/an _____ compressor?

- A. Axial
- B. Reciprocating
- C. Rotary**
- D. None of these

In condenser, the cooling water is passed in the tube side in a pass arrangement, because_____?

- A. It reduces heat transfer area**
- B. More thinner tubes can be used
- C. Pressure drop is reduced
- D. It makes condenser compact

For a given mass of a gas at constant temperature, if the volume 'V' becomes three times, then the pressure 'P' will become_____?

- A. P/3**

- B. 3P
- C. 9P2
- D. 9P

Sulphur in metallurgical coal_____?

- A. Contributes to its heating value
- B. Affects the quality of steel produced as cracks develop on the surface while rolling the steel
- C. Both A. and B.**
- D. Neither A. nor B.

Coal washing waste water containing about 3% suspended solids (comprising of clay, slate, stone etc.) is treated for solid particles removal ?

- A. By chemical coagulation
- B. In sedimentation tanks equipped with mechanical scrapper**
- C. In vacuum filter
- D. In clarifiers

The main purpose of providing fins on heat transfer surface is to increase the_____?

- A. Temperature gradient
- B. Mechanical strength of the equipment
- C. Heat transfer area**
- D. Heat transfer co-efficient

Economics of 'Solvay Process' depends upon the efficiency of _____?

- A. Carbonating tower
- B. Ammonia recovery
- C. Ammonia recovery and size of the plant**
- D. Ammoniation of salt solution

In flow reactors, the performance equations interrelate the rate of reaction to

the _____ ?

- A. Feed rate
- B. Reactor volume
- C. Extent of reaction
- D. All A., B. and C.**

In case of bubble cap distillation column of diameter greater than 1.2 metres, the cap diameter is roughly about _____ cms?

- A. 10**
- B. 20
- C. 30
- D. 35

The operating speed of a ball mill should be _____ the critical speed?

- A. Less than**
- B. Much more than
- C. At least equal to
- D. Slightly more than

Free alkali in a toilet soap is _____ that in a laundry shop ?

- A. Less than**
- B. More than
- C. Same
- D. None of these

If the thermal conductivity of a wall material is independent of temperature, the steady state temperature distribution in the very large thin plane wall having steady, uniform surface temperature follows _____ law?

- A. Parabolic**
- B. Hyperbolic
- C. Linear
- D. Logarithmic

Which of the following gravity scales is used exclusively for liquids heavier than water ?

- A. Baume scale
- B. Twaddell scale**
- C. API scale
- D. None of these

_____ dished head is the strongest of all?

- A. Hemispherical**
- B. Elliptical
- C. Torispherical
- D. None of these

Boiling of liquid is accompanied with increase in the _____?

- A. Vapor pressure**
- B. Specific Gibbs free energy
- C. Specific entropy
- D. All (A), B. and (C)

Pressure drop in a fluidised bed reactor is _____ that in a similar packed bed reactor?

- A. Less than
- B. Greater than**
- C. Same as
- D. None of these

Chalcopyrite is the main ore of _____?

- A. Copper**
- B. Lead
- C. Tin
- D. Iron

To remove very small amount of tiny solid impurities from liquid, we use

a _____ ?

- A. Pressure filter
- B. Vacuum filter
- C. Centrifugal filter
- D. Coagulant**

The actual velocity at vena-contracta for flow through an orifice from a reservoir is given by _____ ?

- A. $C_v \cdot \sqrt{2gH}$**
- B. $C_c \cdot \sqrt{2gH}$
- C. $C_d \cdot \sqrt{2gH}$
- D. $C_v \cdot V_a$

A single pass air heater is connected to a two pass unit. For the air flow rate and other conditions remaining the same, the film heat transfer co-efficient for air will vary in the ratio of _____ ?

- A. 2
- B. 20.8**
- C. 20.2
- D. 20.5

A spherical porous catalyst particle of radius R is subjected to reactant A which reacts to form B by a zero order surface reaction $A \rightarrow B$. Film mass transfer resistance is negligible and pore diffusion of A is rate controlling. The effectiveness factor of the catalyst is reported as $7/8$. Which of the following statement is true?

- A. Inner catalyst core of radius $R/8$ does not participate in reaction**
- B. Inner catalyst core of radius $R/2$ does not participate in reaction
- C. Inner catalyst core of radius $7R/8$ does not participate in reaction
- D. Effectiveness factor for a zero order reaction cannot be $7/8$ as it must always be 1

A reaction in which one of the products of reaction acts as a catalyst is called

a/an _____ reaction?

- A. Catalytic
- B. Autocatalytic**
- C. Photochemical
- D. None of these

In case of an unsaturated vapor-gas mixture, the humid volume increases with increase in the _____?

- A. Total pressure
- B. Absolute humidity at a given temperature
- C. Both A. and B.**
- D. Neither A. nor B.

Glass is _____?

- A. Mainly CaO
- B. Subjected to galvanising
- C. A super cooled liquid**
- D. All A , B. and C.

The heat treatment process to which castings and the steel balls produced by cold heading are subjected is _____?

- A. Tempering
- B. Normalising**
- C. Annealing
- D. None of these

A minimum clearance of about _____ mm is maintained between the distillation column wall and the bubble cap?

- A. 19
- B. 38**
- C. 67
- D. 95

Pressure-enthalpy chart is useful in refrigeration. The change in internal energy of an ideal fluid used in ideal refrigeration cycle is _____?

- A. Positive
- B. Negative
- C. Zero**
- D. Infinity

Which of the following must be stored in silos and not in open yard ?

- A. Coke breeze
- B. High V.M. bituminous coal**
- C. Sand
- D. None of these

Wood charcoal is used for decolouration of sugar, because it _____ the coloured materials?

- A. Adsorbs**
- B. Oxidises
- C. Reduces
- D. Converts

The equation, $N_{st} = f/2$, is the _____ analogy?

- A. Colburn
- B. Reynolds**
- C. Prandtl
- D. None of these

Isotopes of an element have different _____?

- A. Mass number**
- B. Electronic configuration
- C. Nuclear charge
- D. Chemical properties

The drag co-efficient for a bacterium moving in water at 1 mm/s, will be of the

following order of magnitude (assume size of the bacterium to be 1 micron and kinematic viscosity of water to be $10^{-6} \text{m}^2/\text{s}$) ?

- A. 24000
- B. 24
- C. 0.24
- D. 0.44**

Fibrous fracture is normally encountered in the _____ materials?

- A. Hard
- B. Elastic
- C. Ductile**
- D. Brittle

Which of the following contains maximum percentage of carbon ?

- A. Boiler plate steel
- B. Rail steel
- C. Saws for cutting steel**
- D. Railway spring steel

The film co-efficient between condensing vapour and metal wall increases with _____ ?

- A. Increasing temperature of the vapour**
- B. Decreasing temperature of the vapour
- C. Increasing viscosity of the film of condensate
- D. Increasing temperature drop

The minimum and the maximum number of members required to form a Private Limited Joint Stock Company are respectively _____ ?

- A. 7 and 30
- B. 10 and 50
- C. 2 and 50**

D. 13 and 55

Poisson's ratio of a material is the ratio of unit lateral strain to the unit axial elongation within its elastic limit. The value of Poisson's ratio for structural and pressure vessel steel may be taken as _____?

- A. 0.01
- B. 0.3**
- C. 0.75
- D. 0.95

Acid proof stoneware _____?

- A. Has very low strength
- B. Cannot be heated
- C. Is broken by small temperature changes
- D. All A., B. and C.**

Hydraulic mean depth (D_m) for a circular pipe of diameter 'D' flowing full is 0.25

D. For a circular channel, at $D_m = 0.3 D$, gives the condition for the maximum ?

- A. Flow rate
- B. Mean velocity**
- C. Both 'a' & 'b'
- D. Neither 'a' nor 'b'

Kirchoff's law is applicable to _____?

- A. Monochromatic radiation only
- B. Total radiation only
- C. Both A. and B.**
- D. Only volumes and not to surfaces

Low temperature oxidation and spontaneous combustion of freshly mined coal is accentuated, if _____?

- A. It contains large amount of volatile matter

- B. It is stored in tall heaps
- C. Smaller fines are stored in large quantity
- D. All A., B. and C.**

Which of the following parameters remains almost constant during adiabatic saturation of unsaturated air ?

- A. Dry bulb temperature
- B. Dew point
- C. Wet bulb temperature**
- D. None of these

Calorific value of _____ ?

- A. Light paraffinic fuel oils is equal to that of equivalent olefins
- B. n-paraffin is lower than that of iso-paraffins of the same compounds
- C. Light paraffinic fuel oils is higher than that of equivalent olefins**
- D. Light paraffinic fuel oils is lower than that of equivalent olefins

Containers made of high silicon cast iron (14% Si) are not suitable for the storage of _____ ?

- A. Acetic acid
- B. Benzoic & boric acids
- C. Phosphoric acid (95%) & sulphuric acid (95%)
- D. Hydrochloric acid (concentrated)**

In the equation, $PV^n = \text{constant}$, if the value of $n = 1$, then it represents a reversible _____ process?

- A. Isothermal**
- B. Isobaric
- C. Polytropic
- D. Adiabatic

The ratio of working capital to total capital investment for most chemical plants

(except for non-seasonal based products) is in the range of _____ percent ?

- A. 0.1 to 1
- B. 1 to 2
- C. 10 to 20**
- D. 50 to 60

Which is the most efficient and best for measuring very small flow rate of gases ?

- A. Venturimeter
- B. Orificemeter
- C. Rotameter**
- D. Flow nozzle

Most suitable material of construction for the storage of concentrated nitric acid is _____ ?

- A. Cast iron
- B. Monel
- C. Karbate
- D. Aluminium or chromium alloys (Cr > 18% for cold acid)**

6 gms of magnesium (atomic weight = 24), reacts with excess of an acid, the amount of H₂ produced will be _____ gm?

- A. 0.5**
- B. 1
- C. 3
- D. 5

Rittinger's crushing law states that _____ ?

- A. Work required to form a particle of any size is proportional to the square of the surface to volume ratio of the product

B. Work required to form a particle of a particular size is proportional to the square root of the surface to volume ratio of the product

C. Work required in crushing is proportional to the new surface created

D. For a given machine and feed, crushing efficiency is dependent on the size of the feed & product

Pick out the wrong statement ?

A. Cokes of high reactivity are obtained from weakly coking coals

B. Cokes of high reactivity are obtained from strongly coking coals

C. Reactivity of coke is inversely proportional to its absolute density

D. Abrasion index of the coke is a measure of its hardness

Acrylonitrile-butadiene-styrene (ABS) copolymer, which is produced by blending styreneacrylonitrile copolymer with butadiene based elastomer, is a/an _____?

A. Rigid foam

B. Engineering plastic

C. Thermosetting polymer

D. Spongy rubber

In a zero order reaction, reactants concentration does not change with time and the _____?

A. Time for half change is half the time taken for completion of the reaction

B. Time for half change is independent of the initial concentration

C. Time for completion of the reaction is independent of the initial concentration

D. Reaction rate is trebled when the initial concentration is trebled

The density of a gas at N.T.P. is ' ρ '. Keeping the pressure constant (i.e. 760 mm Hg), the 3 density of the gas will become $\frac{3}{4} 0.75 \rho$ at a temperature of _____ °K?

A. 273°

- B. 300°
- C. 400°**
- D. 373°

Screws are specified by their _____ diameters?

- A. Minor
- B. Major**
- C. Pitch
- D. None of these

Actual flame temperature is always lower than the adiabatic flame temperature, because there is _____?

- A. No possibility of obtaining complete combustion at high temperature
- B. Always loss of heat from the flame
- C. Both A. and B.**
- D. Neither A. nor B.

Working principle of mercury in glass thermometer is _____?

- A. Volumetric expansion**
- B. Pressure rise with temperature
- C. Linear expansion
- D. None of these

NPK means a _____ fertiliser?

- A. Mixed**
- B. Potassic
- C. Liquid
- D. Solid

Steel & cast iron pipes are produced by _____ casting ?

- A. Slush
- B. Die
- C. Investment

D. True centrifugal

The reaction $A \rightarrow B$ is conducted in an adiabatic plug flow reactor (PFR). Pure A at a concentration of 2 kmol/m^3 is fed to the reactor at the rate of $0.01 \text{ m}^3/\text{s}$ and at a temperature of 500 K . If the exit conversion is 20% , then the exit temperature (in K) is (Data: Heat of reaction at $298 \text{ K} = -50000 \text{ kJ/kmole of A}$ reacted Heat capacities $C_{PA} = C_{PB} = 100 \text{ kJ/kmole. K}$ (may be assumed to be independent of temperature)) ?

- A. 400
- B. 500
- C. 600**
- D. 1000

In a feed-back control system G and H denote open loop and close loop transfer functions respectively. The output-input relationship is _____?

- A. $G/(1 + H)$
- B. $H/(1 + G)$**
- C. G/H
- D. H/G

The type of high refractive index glass used in optical instruments is _____ glass?

- A. Pyrex
- B. Flint**
- C. Crookes
- D. None of these

Weeping in a distillation column _____?

- A. Increases tray efficiency
- B. Provides large interfacial surface for mass transfer
- C. Results due to very high gas velocity
- D. Results due to very low gas velocity**

Corrosion resistance of steel is increased by the addition of _____?

- A. Phosphorous and tungsten
- B. Nickel and chromium**
- C. Lead and vanadium
- D. Molybdenum and tungsten

The difference between total carbon and fixed carbon of coal will be minimum in case of _____?

- A. Lignite
- B. Bituminous coal
- C. Anthracite
- D. High temperature coke (V.M < 0.5%)**

Electric process as compared to wet process (for the manufacture of phosphoric acid) ?

- A. Can use only high grade phosphate rock
- B. Is used less frequently**
- C. Produces a valuable by-product called gypsum
- D. Is weak acid process

Column support for the roof of cylindrical storage tank must be provided for _____?

- A. Small diameter tanks
- B. Large diameter tanks**
- C. Small diameter tall tanks
- D. All tanks irrespective of their heights and diameters

Reaction of dimethyl terephthalate (DMT) and ethylene glycol produces _____?

- A. Nylon-6

- B. Dacron**
- C. Polyester
- D. PVC

Principal alloying elements of cast tool alloys which have very high wear resistance & high temperature strength are ?

- A. Cobalt, chromium & tungsten**
- B. Cobalt, chromium & nickel
- C. Molybdenum, tungsten & chromium
- D. Cobalt, zirconium & molybdenum

Carcinogenic air pollutants cause _____ ?

- A. Bone decay
- B. Cancer**
- C. Asphyxiation (suffocation)
- D. Anemia

In the acid Bessemer process, the hot metal should have the following composition ?

- A. S < 0.05% and P < 0.05%**
- B. S < 0.05% and P < 1.5%
- C. S 1.5%
- D. S > 1.5% and P < 0.05%

P2O5 content in superphosphate is about _____ percent?

- A. 30-35
- B. 15-20**
- C. 65-70
- D. 85-90

500 c.c. each of hydrogen at 700 mm Hg pressure and oxygen at 600 mm Hg pressure are put together in a vessel of 1 litre capacity. The final pressure of the

gas mixture will be _____ mm Hg?

- A. 650
- B. 700
- C. 600
- D. 375

Polycaprolactam is _____ ?

- A. Nylon-6
- B. Nylon-66
- C. Dacron
- D. Rayon

The main pollutant in waste water discharged from a petroleum refinery is oil (both in free and emulsified form). Free oil is removed by _____ ?

- A. Biological oxygen pond
- B. Aerated lagoons
- C. Trickling filters
- D. Gravity separator having oil skimming devices

Rexine (also called artificial leather), which is used for making table cover, automobile seat cover, shoes etc. is made by coating thick cloth with molten _____ ?

- A. Teflon
- B. Bakelite
- C. SBR
- D. PVC

For the gaseous phase chemical reaction, $C_2H_4(g) + H_2O(g) \leftrightarrow C_2H_5OH(g)$, the equilibrium conversion does not depend on the _____ ?

- A. Steam to ethylene ratio
- B. Temperature
- C. Pressure

D. None of these

The equilibrium constant of a catalytic chemical reaction _____ due to the presence of catalyst.

A. Increases

B. Decreases

C. Remain unaffected

D. Unpredictable from the data

A homogeneous reactor is the one, in which the _____?

A. Fissile atoms are evenly distributed throughout the mass of nuclear reactor

B. Same substance (e.g. heavy water) is used as moderator & coolant

C. The fuel and the moderator is mixed to form a homogeneous material

D. All A., B. and C.

Stoke's equation is valid in the Reynolds number range _____?

A. 0.01 to 0.1

B. 0.1 to 2

C. 2 to 10

D. 10 to 100

A batch reactor is suitable for _____?

A. Achieving cent percent conversion of reactants into products

B. Large scale gaseous phase reactions

C. Liquid phase reactions

D. Obtaining uniform polymerisation products in highly exothermic reactions

Molecularity of an elementary reaction, $P + Q \rightarrow R + S$ is

_____?

A. 1

B. 2

C. 3

D. 4

Mollier diagram is a plot of _____?

- A. Temperature vs. enthalpy
- B. Temperature vs. enthalpy
- C. Entropy vs. enthalpy**
- D. Temperature vs. internal energy

Reaction of an alcohol with organic acid is called the _____ reaction?

- A. Saponification
- B. Esterification**
- C. Neutralisation
- D. Acidification

The terminal velocity of a solid spherical particle falling through a stationary fluid mass in the Stoke's law range is proportional to the _____?

- A. Inverse of fluid viscosity
- B. Square of particle size
- C. Difference in the densities of the particle & fluid
- D. All A., B. and C.**

Friction factor for a hydraulically smooth pipe at $NRe = 2100$ is f_1 . If the pipe is further smoothed (i.e., roughness is reduced), the friction factor at the same value of NRe , will _____?

- A. Increase**
- B. Decrease
- C. Remain unchanged
- D. Increase or decrease depending on the pipe material

Pure nickel is _____?

- A. Ferromagnetic above its curie point (i.e., 415°C)

- B. Having h.c.p. crystal lattice
- C. Ferromagnetic at room temperature**
- D. Not resistant to oxidation at high temperature

_____ converts n-paraffins to i-paraffins ?

- A. Alkylation
- B. Polymerisation
- C. Isomerisation**
- D. None of these

Quartz is _____ ?

- A. Stable form of silica upto 870°C
- B. Converted to Tridymite on firing between 870 to 1470°C
- C. Transformed to Cristobalite on heating above 1470°C
- D. All A., B. and C.**

Overfire burning in a furnace is a phenomenon characterised by _____ ?

- A. Supply of excess fuel
- B. Supply of excess air
- C. Burning carbon monoxide and other incombustible in upper zone of furnace by supplying more air**
- D. None of these

Which of the following has the highest calorific value (kcal/Nm³) ?

- A. Carburetted water gas
- B. Gobar gas
- C. Natural gas
- D. LPG**

Commercial fertilisers are available mostly in the form of _____ ?

- A. Powder

B. Granules

- C. Lumps
- D. Flakes

The unit step response of the transfer function $1/(s^2 + 2s + 3)$ _____?

A. Has a non-zero slope at the origin

B. Has a damped oscillatory characteristics

- C. Is overdamped
- D. Is unstable

Buckingham- π theorem states that in any physical problem including 'n' quantities having 'm' dimensions, the quantities can be arranged into _____ independent dimensionless parameters?

A. m

B. n

C. n-m

D. n/m

Mixer used for rubber compounding is _____?

A. mixer-extruder

B. Banbury internal mixer

- C. Muller mixer
- D. Pug mill

The phenomenon occurring during explosion of a hydrogen bomb is _____?

A. Nuclear fission

B. Nuclear fusion

C. A combination of both nuclear fission & fusion

D. None of these

Isotropic materials have the same _____ in all directions?

- A. Induced stresses
- B. Density
- C. Elastic properties**
- D. Thermal properties

N₂ content in a urea sample was found to be only 42%. What is the actual urea content of the sample? (Molecular weight of urea = 60) ?

- A. 80%
- B. 90%**
- C. 95%
- D. 98%

Pick out the wrong statement?

- A. The net change in entropy in any reversible cycle is always zero
- B. The entropy of the system as a whole in an irreversible process increases
- C. The entropy of the universe tends to a maximum
- D. The entropy of a substance does not remain constant during a reversible adiabatic change**

The critical radius of insulation for cylindrical pipe is (where, h_i = heat transfer coefficient at inside of the pipe) ?

- A. K/h_0**
- B. $2K/h_0$
- C. h_i/K
- D. $2h_i/K$

On application of pressure to the equilibrium system, $\text{ice} \rightleftharpoons \text{water}$; which of the following phenomenon will occur ?

- A. Water will evaporate
- B. Equilibrium will not be attained
- C. More ice will be formed
- D. More water will be formed**

A radioactive substance does not emit _____?

- A. α -ray
- B. Proton**
- C. Position
- D. β -ray

Heating of coke, sand & phosphate rock in an electric furnace is done for the manufacture of _____?

- A. Phosphoric acid
- B. Superphosphate
- C. Phosphorous**
- D. Triple superphosphate

A standard test for determination of hardness in water is termed as _____ test?

- A. EDTA**
- B. Electrometric
- C. Total count
- D. Presumptive

Chemisorption (chemical adsorption) is _____?

- A. Same as "Van der Waals" adsorption
- B. Characterised by adsorption of heat
- C. An irreversible phenomenon**
- D. A reversible phenomenon

The cake resistance increases steadily with the time of filtration in a plate and frame filter employing constant _____ filtration?

- A. Rate
- B. Pressure
- C. Both A. & B.**
- D. Neither A. nor B.

The most blister form of copper is _____?

- A. refined copper
- B. impure copper**
- C. processed copper
- D. none of these

The extent of a reaction is _____?

- A. Different for reactants and products
- B. Dimensionless
- C. Depends on the stoichiometric co-efficient
- D. All of the above**

Capacity & power requirement for an air compressor working at high altitude compared to sea-level will be _____?

- A. More
- B. Less**
- C. Same
- D. Either more or less; depends on the climatic conditions

$\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$ crystals are formed by cooling 100 Kg of 30% by weight aqueous solution of Na_2SO_4 . The final concentration of the solute in the solution is 10%. The weight of crystals is _____?

- A. 20
- B. 32.2
- C. 45.35
- D. 58.65**

The fermenter used for the production of ethyl alcohol from molasses is made of _____?

- A. Wood
- B. Concrete

C. Copper bearing steel

D. Porcelain

Minute depression of freezing point of a liquid solvent on addition of a solid solute can be best measured by a _____?

A. Beckman thermometer

B. Dilatometer

C. Mercury thermometer

D. Bimetallic thermometer

The inside heat transfer co-efficient in case of turbulent flow of liquid in the tube side in a 1-2 shell and tube heat exchanger is increased by _____ times, when the number of tube passes is increased to 8?

A. 20.8

B. 40.8

C. 40.4

D. 20.4

Number of particles in a crushed solid sample is given by (where, m = mass of particles in a sample, V_p = volume of one particle, ρ = density of particles) ?

A. $m/\rho \cdot V_p$

B. $m \cdot \rho/V_p$

C. $m \cdot V_p/\rho$

D. $V_p/m \cdot \rho$

In a manufacturing industry, breakeven point occurs, when the _____?

A. Total annual rate of production equals the assigned value

B. Total annual product cost equals the total annual sales

C. Annual profit equals the expected value

D. Annual sales equals the fixed cost

Leaching of uranium ore and gold ore is done in _____?

- A. Centrifugal extractor
- B. Pachuca tanks**
- C. Bollman extractor
- D. None of these

When iron is rusted, it is _____?

- A. Converted to a fine powder
- B. Reduced
- C. Oxidised**
- D. None of these

Continuous measurement of moisture content of paper in paper industry is done by measuring the _____?

- A. Thermal conductivity through the paper
- B. Electrical resistance through the paper**
- C. Magnetic susceptibility
- D. None of these

When acetone is added in a two layer mixture of methyl isobutyl ketone and water at 30°C, the acetone distributes between the two layers and the composition of the layer follows two solubility curves. For this system ?

- A. As the acetone concentration increases, the solubility curves approach each other
- B. Both the phases become identical at a particular common point on both the solubility curves called the plait point
- C. The distribution curve which is a plot between x (acetone concentration in one phase) and y (acetone concentration in other phase) is analogous to x-y curve used in distillation and absorption terminates on the $x = y$ diagonal at the concentration of the plait point
- D. All A., B. and C.**

Hypersorption refers to a _____ process?

- A. Fixed bed absorption
- B. Moving bed absorption
- C. Fixed bed adsorption
- D. Moving bed adsorption**

Which of the following undergoes fission reaction easily ?

- A. U-235**
- B. U-238
- C. Th-232
- D. None of these

Percentage saturation is _____ the relative saturation?

- A. Always smaller than**
- B. Always greater than
- C. Not related to
- D. None of these

Which of the following polymers shows the highest anti-tacking properties ?

- A. Melamine formaldehyde resin**
- B. Phenolic resin
- C. Epoxy resin
- D. Alkyd resin

In the reaction, represented by $\text{Na}_2\text{CO}_3 + \text{HCl} \rightarrow \text{NaHCO}_3 + \text{NaCl}$, the equivalent weight of Na_2CO_3 is _____?

- A. 53
- B. 5.3
- C. 106**
- D. 10.6

A particular coal is said to be free burning when it _____?

- A. Burns completely
- B. Gives smokeless burning

C. Shows little or no fusing action

D. None of these

Enrichment of uranium is done to increase the concentration of _____ in the natural uranium?

A. U-238

B. U-233

C. U-235

D. Pu-239

In the decomposition of PCl_5 represented by, $\text{PCl}_5 \rightleftharpoons \text{PCl}_3 + \text{Cl}_2$, decrease in the pressure of the system will _____ the degree of dissociation of PCl_5 ?

A. Increase

B. Decrease

C. Not alter

D. None of these

The conductivity of crude oil-water mixture depends on the _____?

A. pH value

B. Water percentage

C. Temperature

D. All A., B. and C.

Low specific speed of a pump implies that, it is a/an _____ pump?

A. Axial flow

B. Centrifugal

C. Mixed flow

D. None of these

In packed towers provided with pall rings liquid redistributors are positioned at heights of every 6 metres or 5-10 times the column diameter, whichever is less.

Maximum size of the pall rings should not exceed _____ of the column diameter?

- A. **1/10-1/15th**
- B. 1/5-1/10th
- C. 1/20-1/30th
- D. 1/2 to 1/4th

Harmonic mean temperature difference is given by _____?

- A. $\sqrt{(\Delta T_1 \cdot \Delta T_2)}$
- B. **$2 (\Delta T_1 \cdot \Delta T_2) / (\Delta T_1 + \Delta T_2)$**
- C. $2 (\Delta T_1 \cdot \Delta T_2) / (\Delta T_1 - \Delta T_2)$
- D. $(\Delta T_1 - \Delta T_2) / (\Delta T_1 \cdot \Delta T_2)$

The most important consideration, while designing the refrigeration system of an aircraft is that the refrigeration system _____?

- A. **Is as light as possible**
- B. Has very high C.O.P.
- C. Employs minimum quantity of refrigerant
- D. Consumer minimum horse power

The reaction, $C + CO_2 \leftrightarrow 2CO$, taking place during coal gasification is called the _____ reaction?

- A. Neumann reversal
- B. Shift conversion
- C. **Boudouard**
- D. Reduction

Pumping of a corrosive liquid is generally preferred to be done by a _____ pump, as it can be made of a variety of materials including plastics?

- A. Piston
- B. **Gear**

- C. Positive displacement
- D. Sump

Hydrocyanic acid (HCN) is used as an insecticide for _____?

- A. Controlling timber degradation by ants
- B. Controlling poultry lice
- C. Potato beetle
- D. Citrus fruits**

If two capillary tubes of dia 0.5 mm and 1 mm are dipped in a pot containing mercury, then the rise of mercury is _____?

- A. Same in both the tubes
- B. Greater in 1 mm dia tube
- C. Greater in 0.5 mm dia tube**
- D. Zero in both the tubes

In case of a hammer crusher ?

- A. Crushing takes place by impact breaking
- B. Maximum acceptable feed size is 30 cms
- C. Reduction ratio can be varied by adjusting the distance from cage to hammers
- D. All A., B. and C.**

Blue colour is imparted to glass by the addition of _____?

- A. FeSO₄
- B. PbO
- C. CaO**
- D. NaOH

Pick the WRONG design guideline for a reactor in which the reactions, $A \rightarrow R$ (desired) and $A \rightarrow S$ (undesired) are to take place. The ratio of the reaction rates is $r_R/r_S = (k_1/k_2) \cdot C_A^{a-b}$?

- A. Use high pressure and eliminate inerts, when $a > b$
- B. Avoid recycle, when $a > b$**

- C. Use batch reactor or plug flow reactor, when $a > b$
- D. Use CSTR with a high conversion, when $a > b$

An isentropic process is carried out at constant _____?

- A. Volume**
- B. Pressure
- C. Temperature
- D. All (A), B. and (C)

Ammonium sulphate fertiliser is _____?

- A. The highest concentration nitrogenous fertiliser
- B. The best fertiliser for paddy**
- C. A basic fertiliser
- D. A neutral fertiliser

For multiple reactions, the flow pattern within the vessel affects the _____?

- A. Size requirement
- B. Distribution of reaction products
- C. Both A. and B.**
- D. Neither A. nor B.

Regenerators compared to the recuperators for the same duty _____?

- A. Occupy more space**
- B. Are less costly
- C. Are of smaller size
- D. All A., B. and C.

Which of the following equations is valid for laminar flow of a fluid through packed bed ?

- A. Fanning equation
- B. Kozeny – Karman equation**

- C. Hagen-Poiseuille equation
- D. Blake-Plummer equation

With increase in the order of reaction (for all positive reaction orders), the ratio of the volume of mixed reactor to the volume of plug flow reactor (for identical feed composition, flow rate and conversion)?

- A. Increases**
- B. Decreases
- C. Remain same
- D. Increases linearly

Transfer function of transportation lag is _____?

- A. e^{-TS}
- B. e^{-TS}**
- C. $1/(Ts + 1)$
- D. None of these

Noise level in a quiet private business office is about _____ decibels?

- A. 25
- B. 50**
- C. 70
- D. 85

Separation of two volatile liquids by distillation makes use of their _____?

- A. Selectivity
- B. Relative volatility**
- C. Solubility
- D. Density difference

The advantage of firing pulverised coal in the furnace lies in the fact, that it _____?

- A. Permits the use of high ash content coal
- B. Permits the use of low fusion point ash coal
- C. Accelerates the burning rate and economises on fuel combustion**
- D. All A., B. and C.

Concrete tank can be used to store _____?

- A. Alum
- B. Ferrous sulphate
- C. Sulphuric acid
- D. Saturated brine**

Refrigeration cycle _____?

- A. Violates second law of thermodynamics
- B. Involves transfer of heat from low temperature to high temperature**
- C. Both A. and B
- D. Neither A. nor B

Zeolite removes both temporary as well as permanent hardness of water by precipitating calcium and magnesium present in water as insoluble zeolites.

Used zeolite is regenerated by flushing with the solution of _____?

- A. Calcium sulphate
- B. Sodium chloride**
- C. Sodium sulphate
- D. Magnesium chloride

With increase in temperature, the mutual solubility of two liquids _____?

- A. Increases**
- B. Decreases
- C. Remains unchanged
- D. Decreases exponentially

Neutral atmosphere is maintained in a/an _____ furnace?

- A. Cold rolled steel coil annealing
- B. Open hearth
- C. Soaking pit
- D. Walking beam reheating

Nitric acid is not used in the manufacture of _____ ?

- A. Detergents
- B. Fertilisers
- C. Aqua regia
- D. Explosives

Pick out the wrong statement?

- A. Complete unity of command exists in a line organisation
- B. Line organisation is not suitable for expansion and growth of an industry
- C. In line and staff organisation, "line" executes and "staff directs"
- D. None of these

Gross heating value of coal is _____ the net heating value?

- A. Higher than
- B. Lower than
- C. Same as
- D. Either A. or B.; depends on the type of coal

Vacuum is generally maintained in the vapour space of an evaporator mainly to _____ ?

- A. Get economical temperature difference by using moderate pressure steam
- B. Facilitate forward feeding in multiple effect evaporation
- C. Concentrate heat sensitive materials
- D. Achieve very high concentration of the final product

With increase in temperature, the rate of extraction in leaching (solid-liquid extraction system) ?

- A. Increases**
- B. Decreases
- C. Remain unaffected
- D. Increases Linearly

Thermal spalling mainly occurs during _____ of furnaces?

- A. Cooling down
- B. Warming up
- C. Both A. & B.**
- D. Neither A. nor B.

Steel is welded using the _____ flame ?

- A. Carburising
- B. Neutral**
- C. Oxidising
- D. All A, B. & C

The main product of high temperature carbonisation of coal is _____?

- A. Coke**
- B. Ammonia
- C. Tar
- D. Phenol

Electrical desalting of crude oil removes the _____ impurities?

- A. Oleophilic
- B. Oleophobic**
- C. Both A. and B.
- D. Neither A. nor B.

_____ is the determining factor for the number of bubble caps to be used per tray?

- A. Permissible slot velocity**

- B. Tray diameter
- C. Liquid load
- D. Vapor load

In a turbine, the fluid expands almost_____?

- A. Isothermally
- B. Isobarically
- C. Adiabatically**
- D. None of these

Which of the following is most prone to pulsating discharge flow ?

- A. Centrifugal pump
- B. Reciprocating pump
- C. Gear pump**
- D. Axial flow pump

The velocity of thermal (slow) neutrons triggering nuclear fission reaction (having energy equal to 0.025 eV) is about _____ metres/second?

- A. 1100
- B. 2200**
- C. 3300
- D. 4400

Pressure & temperature maintained in catalytic cracking is about_____?

- A. 2 atm & 500°C**
- B. 10 atm & 500°C
- C. 30 atm & 200°C
- D. 50 atm & 750°C

Fuel for a fast breeder reactor is_____?

- A. Plutonium**
- B. Uranium

- C. Radium
- D. Neptunium

A gas which is collected over water becomes moistened due to water vapor, exerts its own partial pressure at the gas temperature, which is termed as its _____?

- A. Aqueous tension**
- B. Saturated humidity
- C. Vapor pressure
- D. Absolute humidity

When a fluid flows over a solid surface, the _____?

- A. Velocity is uniform at any cross-section
- B. Velocity gradient is zero at the solid surface**
- C. Resistance between the surface & the fluid is lesser as compared to that between the fluid layers themselves
- D. Velocity is not zero at the solid surface

Which of the following relationships is correct for relating the three elastic constants of an isotropic elastic material (where, E = Young's modulus, G = Modulus of rigidity or shear modulus ν = Poisson's ratio) ?

- A. $E = 2G(1 + \nu)$**
- B. $E = G(1 + \nu)$
- C. $E = G(1 + \nu)/2$
- D. $E = 2G(1 + 2\nu)$

75% of a radioactive element decays in 6 hours. Its half life period is _____ hours?

- A. 3/4
- B. 1/6
- C. 3**

D. 4

Which one of the following is used as a nitrogenous fertiliser, as a weed killer in the onion fields and for correcting acidic soils ?

- A. Urea
- B. CAN
- C. Ammonium sulphate
- D. Calcium cyanamide**

Fusion of bauxite and _____ produces high alumina cement?

- A. Alum
- B. Limestone**
- C. Coke
- D. Quartz

Maximum heat transfer rate is obtained in _____ flow?

- A. Laminar
- B. Turbulent**
- C. Creeping
- D. Transition region

The film thickness for laminar film condensation on vertical surface _____ from top to bottom?

- A. Cumulatively increases**
- B. Cumulatively decreases
- C. Remain constant
- D. And the surface conductance increase

Condenser tubes are not made of _____ ?

- A. Cartridge brass
- B. Muntz brass
- C. Wood metal**
- D. Aluminium brass alloy

Unit of mass velocity is _____?

- A. kg/hr
- B. kg/m². hr**
- C. kg/m²
- D. kg/m³. hr

The head loss due to sudden contraction is proportional to _____?

- A. Velocity
- B. Velocity head**
- C. Turbulence
- D. None of these

Drift in a cooling tower is _____?

- A. The water entrained by the circulating air**
- B. Dependent on the water lost by evaporation
- C. Desirable
- D. All A., B. & C.

Na₂CO₃ is called _____?

- A. Washing soda
- B. Soda ash**
- C. Plaster of Paris
- D. Calcite

Polyurethane cannot be used for making _____?

- A. Mattresses & foam
- B. Coating material
- C. Adhesives
- D. Bottles**

Tank filter (e.g., Nutsche filter) is _____?

- A. A high pressure filter
- B. A continuous filter
- C. Used for small scale filtration work**
- D. A leaf filter

Compositional analysis of _____ is done using mass spectrometer?

- A. An isotope**
- B. Natural gas
- C. A solid
- D. An alloy

The chemical potential of any constituent of an ideal solution depends on the _____ of the solution?

- A. Temperature
- B. Pressure
- C. Composition
- D. All (A), B. and (C)**

If ΔG (free energy change) for a chemical reaction is very large and negative, then the reaction is _____?

- A. Not feasible
- B. Just feasible
- C. Very much feasible**
- D. Unpredictable as ΔG is no measure of feasibility of a reaction

Vertical transportation of materials can be done by a/an _____?

- A. Apron conveyor
- B. Pneumatic conveyor
- C. Bucket elevator
- D. Both B. & C.**

Oxidation of ortho-xylene in presence of _____ catalyst is done to produce phthalic anhydride on commercial scale ?

- A. Nickel
- B. Vanadium**
- C. Alumina
- D. Iron

Steam consumption in kg/hr in case of an evaporator is given by (where, C & E are capacity the economy of the evaporator respectively) ?

- A. C/E**
- B. E/C
- C. CE
- D. 1/CE

Pick out the wrong statement about coating/electroplating of metals ?

- A. Phosphate coating is used as an excellent base for paints & enamels
- B. Phosphate coating is less corrosion resistant than chromate coating
- C. The base metal to be electroplated is normally made the cathode of the electrolytic cell and coating metal is made the anode
- D. Calorising is the process of coating steel with chromium**

A bearing metal should not have _____?

- A. Enough plasticity
- B. Low thermal conductivity**
- C. Low co-efficient of friction
- D. High toughness

Froude number is the ratio of _____?

- A. Shear stress to gravitational stress
- B. Drag stress to shear stress
- C. Inertial stress to shear stress
- D. Inertial stress to gravitational stress**

In primitive days, _____ was being manufactured by Leblanc Process ?

- A. Alum
- B. Washing soda
- C. Soda ash**
- D. Calcium carbide

Which one is a filter aid ?

- A. Canvas fabric
- B. Diatomaceous earth**
- C. Calcined lime
- D. None of these

If the head over the triangular notch is doubled, the discharge will increase by _____ times?

- A. 2
- B. 2.828
- C. 5.657**
- D. 4

The impure iron (pig iron) that is tapped out from blast furnace contains about _____ percent carbon?

- A. 0.2
- B. 2
- C. 4**
- D. 8

Which of the following is a fine crusher ?

- A. Blake jaw crusher
- B. Gyratory crusher
- C. Toothed roll crusher**
- D. Dodge jaw crusher

Oxygen is separated by distillation from air after its liquefaction. The boiling point of oxygen is about _____ °C ?

- A. -83
- B. -183**
- C. -196
- D. -218

For laminar flow of a fluid through a packed bed of spheres of diameter d , the pressure drop per unit length of bed depends upon the sphere diameter as _____?

- A. d
- B. d^2
- C. d^4
- D. \bar{d}^2**

Sulphuric acid completely saturated with sulphur trioxide is called _____?

- A. Concentrated sulphuric acid**
- B. Oleum
- C. Sulphurous acid
- D. Dilute sulphuric acid

Adiabatic compression of a saturated water vapour makes it _____?

- A. Supersaturated
- B. Superheated**
- C. Both A. and B
- D. Neither A. nor B

Which of the following is an unconventional source of energy ?

- A. Thermal power
- B. Hydroelectric power
- C. Nuclear-fusion power
- D. Solar power**

Third law of thermodynamics is helpful in _____?

- A. Prediction of the extent of a chemical reaction
- B. Calculating absolute entropies of substances at different temperature
- C. Evaluating entropy changes of chemical reaction
- D. Both B. and C.**

(Le/D) for fully open globe value may be around _____?

- A. 10
- B. 25
- C. 75
- D. 300**

In the Bayer's process, bauxite is digested under pressure using _____?

- A. H₂SO₄
- B. NaOH**
- C. NH₃
- D. HCl

Pure A in gas phase enters a reactor 50% of this A is converted to B through the reaction, $A \rightarrow 3B$. Mole fraction of A in the exit stream is _____?

- A. 1/2
- B. 1/3**
- C. 1/4
- D. 1/5

The conversion for a second order, irreversible reaction (constant volume) as shown in the bellow figure, in batch mode is given by _____?

- A. $1/(1 + k_2 \cdot CA_0 \cdot t)$
- B. $(k_2 \cdot CA_0 \cdot t) / (1 + k_2 \cdot CA_0 \cdot t)$**
- C. $(k_2 \cdot CA_0 \cdot t)^2 / (1 + k_2 \cdot CA_0 \cdot t)$

D. $(k_2 \cdot CA_0 \cdot t) / (1 + k_2 \cdot CA_0 \cdot t)^2$

With lapse of time, the overhead composition of light component in case of batch distillation with constant reflux _____?

- A. Increases
- B. Decreases**
- C. Remain same
- D. May increase or decrease; depends on system

Dew point temperature always gives an indication of the _____ of the moist air ?

- A. Dryness
- B. Moisture content**
- C. Coolness
- D. Latent heat

Thermal conductivity measurement comprises the working principle of a _____?

- A. CO₂ analyser**
- B. Polarimeter
- C. Spectrometer
- D. Chromatograph

Which of the following emissions in the exhaust gas of an I.C. engine causes the formation of photochemical smog ?

- A. Nitrogen oxides
- B. Hydrocarbons
- C. Both A. & B.**
- D. Carbon monoxide

Which is the most commonly used molten metal for cooling of nuclear reactors ?

- A. Calcium
- B. Sodium**
- C. Mercury
- D. Zinc

In declining balance method of depreciation calculation, the _____?

- A. Value of the asset decreases linearly with time
- B. Annual cost of depreciation is same every year
- C. Annual depreciation is the fixed percentage of the property value at the beginning of the particular year**
- D. None of these

Pick out the wrong statement?

- A. The eddy viscosity is a function of the type of turbulence involved
- B. The eddy viscosity is a fluid property**
- C. The viscosity of gas increases with increase in temperature
- D. The viscosity of a liquid increases with decrease in temperature

Pick out the system with minimum boiling azeotrope at 1 atm ?

- A. Benzene-toluene
- B. Ethyl alcohol-water**
- C. Hydrochloric acid-water
- D. All A., B. and C.

DLS stands For _____?

- A. Drill line system
- B. Dogleg severity**
- C. Drill line stream
- D. All of Above

In a homogeneous nuclear reactor, the _____ are mixed together?

- A. Fuel & coolant
- B. Fuel & moderator**
- C. Coolant & moderator
- D. None of these

Operating range of a temperature measuring instrument is 800 to 1600°C. It could be a/an _____ pyrometer?

- A. Radiation
- B. Optical
- C. Photoelectric**
- D. None of these

For identical flow rate, feed composition and for elementary first order reactions, 'N' equal sized mixed reactors in series with a total volume 'V' gives the same conversion as a single plug flow reactor of volume 'V' for constant density systems. This is true, when the value of 'N' is _____?

- A. 1
- B. > 1
- C. ∞**
- D. ≥ 1

A compressor that takes suction at a pressure below atmospheric and discharge against atmospheric pressure is called a _____ pump?

- A. Sump
- B. Volute
- C. Vacuum**
- D. Submerged

In producer gas making furnace, steam is added along with air to mainly control the _____?

- A. Fusion of coal ash & clinker formation**
- B. C. V. of producer gas

- C. Temperature of producer gas
- D. Tar content in producer gas

Ammonium nitrate is _____?

- A. Having about 40% N₂
- B. Not hygroscopic
- C. Not prone to explosive thermal decomposition
- D. Mixed with limestone powder to reduce its explosive nature before using it as a fertilizer**

Centrifugal pump is normally classified on the basis of the _____?

- A. rpm
- B. Type of casing**
- C. Impeller blade angle
- D. Number of blades in impeller

The main function of primary air in pulverised coal fired burner is to _____?

- A. Burn CO to CO₂
- B. Dry and transport the coal**
- C. Have proper combustion by supplying it around the burner
- D. Preheat the tertiary air used for complete combustion of CO to CO₂

Tarapur (INDIA) atomic power station _____?

- A. Has two boiling water reactors of American design
- B. Has an installed capacity of 400 MW
- C. Is the first power reactor in India, which became critical in 1969
- D. All A., B. and C.**

Nitrogen is an essential component of _____?

- A. Mineral salts
- B. Carbohydrates
- C. Fats

D. Proteins

Speisses is a mixture of the following ?

A. Arsenides of heavy metals

B. Antimonides of heavy metals

C. Arsenides & antimonides of heavy metals

D. Iron, cobalt and nickel

Large diameter reinforced cement concrete (RCC) pipes are generally joined by _____ joint ?

A. Flanged iron

B. Collar

C. Flexible

D. Expansion

Blow off cock is provided in steam boiler to _____ ?

A. Guard the boiler in case of abnormal rise in steam pressure

B. Drain out water and sludge during its repair

C. Regulate the supply of water in boiler

D. Put out the fire in the furnace when the water level in the boiler falls to unsafe limit

As pressure approaches zero, the ratio of fugacity to pressure (f/P) for a gas approaches _____ ?

A. Zero

B. Unity

C. Infinity

D. An indeterminate value

For a first order chemical reaction in a porous catalyst, the Thiele modulus is 10. The effectiveness factor is approximately equal to _____ ?

A. 0

B. 1

C. 0.1

D. 0.5

Thermistors are made of _____?

- A. Ultra pure metals
- B. Metal oxides**
- C. Iron-copper alloys
- D. Nickel-chromium alloys

Economy of an evaporator is influenced by the _____?

- A. Steam pressure
- B. Feed temperature
- C. Number of effect
- D. Both B. & C.**

For a real gas, the chemical potential is given by _____?

- A. $RT \ln P$
- B. $RT \ln f$**
- C. $R \ln f$
- D. None of these

In which of the following evaporators, steam is fed inside the tube while the liquor is outside the tube ?

- A. Long tube vertical evaporator
- B. Short tube vertical evaporator
- C. Horizontal tube evaporator**
- D. None of these

Cation exchange resins (0.3 to 1 mm size) used in water treatment is prepared from _____ resins?

- A. Epoxy
- B. Phenol formaldehyde
- C. Urea formaldehyde**
- D. Melamine formaldehyde

Cavitation can be prevented by _____?

- A. Suitably designing the pump
- B. Maintaining the suction head sufficiently greater than the vapour pressure**
- C. Maintaining suction head = developed head
- D. Maintaining suction head lower than the vapour pressure

During washing of filter at the end of constant pressure filtration, the rate of washing equals the rate of filtration _____?

- A. At time zero
- B. At the end of filtration**
- C. When half the filtrate has been obtained
- D. At the end of filtration, but decreases with time subsequently

Reverse osmosis is also called _____?

- A. Dialysis
- B. Electrodialysis
- C. Diffusion
- D. Ultra-filtration**

The function of moderators in nuclear reactor is to _____?

- A. Slow down the secondary neutrons**
- B. Absorb the secondary neutrons
- C. Control the chain reaction
- D. None of these

Chemical name of 'alum' is _____?

- A. Barium sulphate
- B. Aluminium sulphate**
- C. Aluminium chloride
- D. Calcium sulphate

Bleaching powder (chemically known as calcium chloro hypochlorite) is

commercially produced by the action of chlorine on _____?

- A. Slaked lime**
- B. Soda lime
- C. Calcium perchlorate
- D. None of these

Unit of power is _____?

- A. Joule
- B. Watt
- C. Joule/Second
- D. Both B. & C.**

With increase in carbide/graphite ratio in cast iron, its _____?

- A. Hardness & brittleness increases
- B. Ductility decreases
- C. Both A. and B.**
- D. Neither A. nor B.

Leaching of uranium ore and gold ore is done in _____?

- A. Centrifugal extractor
- B. Pachuca tanks**
- C. Bollman extractor
- D. None of these

Polymerisation of poly functional monomers produces polymers having _____?

- A. Good mechanical strength**
- B. Low viscosity
- C. Low melting point
- D. None of these

Paraffin base crude oil as compared to asphalt base crude gives _____?

A. Higher yield of straight run gasoline

B. Higher octane number gasoline

C. Lower viscosity index lube oil

D. Poorer yield of lube oil

Energy consumption in a crusher decreases with increase in the _____?

A. Size of the product (at constant feed size)

B. Capacity of the crushing machine

C. Size of feed (at constant reduction ratio)

D. All A., B. & C.

Which of the following has the highest calorific value ?

A. Lignite

B. Sub-bituminous coal

C. Anthracite

D. Peat

Baffles provided on the shell side of a shell and tube heat exchanger are meant for _____?

A. Providing support for the tubes

B. Improving heat transfer

C. Both A & B

D. Preventing the fouling of tubes & stagnation of shell side fluid

In any spontaneous process, the _____ free energy decreases ?

A. Helmholtz

B. Gibbs

C. Both A. & B.

D. Neither A. nor B.

Gobar gas constitutes mainly of _____?

A. CH₄ & CO₂

- B. CO & CO₂
- C. CH₄ & N₂
- D. CO & N₂

Radioactive decay follows _____ order kinetics?

- A. First**
- B. Second
- C. Third
- D. Zero

As the equilibrium moisture content of the coal increases, its _____?

- A. Calorific value increases
- B. Swelling number decreases**
- C. Swelling number increases
- D. Bulk density decreases

'Synthesis gas' meant for the synthesis of organic compound is a variable mixture of _____?

- A. N₂ & H₂
- B. CO₂ & H₂
- C. CO & H₂**
- D. C & H₂

_____ controller has the maximum stabilising time?

- A. P
- B. PD
- C. PI**
- D. PID

Molybdenum steels containing 0.15 to 0.40% molybdenum _____?

- A. Are prone to temper brittleness

- B. Are used for automobile parts like gears, axle, shaft, bearings etc.**
- C. Have very poor fatigue resistance
- D. Do not contain nickel or chromium or both

In a _____ riveted joint, the rivets in the various rows are opposite to each other?

- A. Zig-zag
- B. Chain**
- C. Diamond
- D. None of these

Presence of a certain minimum quantity of fluorine is desirable in potable water to prevent _____?

- A. Dental cavities**
- B. Scale formation
- C. Water-borne disease
- D. Corrosion

In natural gas, the C/H ratio (by weight) varies in the range of _____?

- A. 3-4**
- B. 8-10
- C. 15-17
- D. 20-25

Percentage saturation of a vapor bearing gas is always _____ the relative saturation?

- A. Higher than
- B. Smaller than**
- C. Equal to
- D. Either A. or B.; depends on the system

Hot water ($0.01 \text{ m}^3/\text{min}$) enters the tube side of a counter current shell and tube heat exchanger at 80°C and leaves at 50°C . Cold oil ($0.05 \text{ m}^3/\text{min}$) of density 800 kg/m^3 and specific heat of 2 kJ/kg.K enters at 20°C . The log mean temperature difference in $^\circ\text{C}$ is approximately ?

- A. 32
- B. 37
- C. 45
- D. 50

Starting temperature of optical radiation pyrometer is _____ $^\circ\text{C}$?

- A. 800
- B. 400
- C. 1200
- D. 1500

Claude gas liquefaction process employs cooling _____ ?

- A. At constant pressure
- B. By throttling
- C. **By expansion in an engine**
- D. None of these

Mixing of light fine powder such as insecticides is done by _____ ?

- A. Banbury mixer
- B. Pug mill
- C. **Impact wheels**
- D. Kneader

In which type of fluid flow, the velocity of flow of fluid changes from point to point in the fluid at any instant ?

- A. Rotational
- B. Unsteady

C. Turbulent

D. Non-uniform

Minimum tube pitch recommended for shell and tube heat exchangers is about _____ times the outside diameter of the tube?

A. 1.25

B. 1.75

C. 2.5

D. 3.5

Fuel economy in furnaces can be achieved by _____?

A. Using oxygen enriched combustion air

B. Preheating the combustion air

C. Reducing the heat loss through furnace openings & doors

D. All A., B. and C.

Molecular sieves are regenerated by heating to _____ °C?

A. < 150

B. 200-330

C. > 500

D. > 1000

The ratio of the wall drag to the form drag in the Stoke's law range (for motion of spherical particles in a stationary fluid) is _____?

A. 0.5

B. 1

C. 2

D. 0.33

P.T.F.E. (Poly tetra fluoro ethylene) is commercially known as _____?

A. Bakelite

B. Neoprene

C. Teflon

D. Nylon-66

What is the maximum possible value of FR(mole/sec.) ?

A. 1/3

B. 1/2

C. 2/3

D. 2

With decrease in temperature, the equilibrium conversion of a reversible endothermic reaction _____?

A. Decreases

B. Increases

C. Remain unaffected

D. Increases linearly with temperature

Flushing liquor used for cooling coke oven gas constitutes of _____?

A. Ammoniacal liquor

B. K_2CO_3 solution

C. Dilute H_2SO_4

D. Dilute HCl

The closed loop pole of a stable second order system could be _____?

A. Both real and positive

B. Complex conjugate with positive real parts

C. Both real and negative

D. One real positive and the other real negative

Which of the following is not a pyrite ore ?

A. Celestite

B. Galena

C. Gypsum

D. Siderite

At normal boiling point, molar entropy of vaporisation is _____
Joule/K°.mole?

A. 72

B. 92

C. 142

D. 192

A material in which the atoms are arranged regularly in some directions but not in others, is termed as 'mesomorphous material'; an example of which is _____?

A. Lead

B. Glass

C. Mica

D. Silver

The heat released by cooling one mole of copper from 400 K to room temperature (300 K) is (assume : Cp of copper is 23 J K-1mole-1) ?

A. 2300 J

B. 4600 J

C. 230 J

D. 2.3×10^6 J

Kg of liquid evaporated per hour in an evaporator is defined as its _____?

A. Capacity

B. Economy

C. Steam load

D. None of these

Pick out the wrong statement?

- A. Recycled coarse material to the grinder by a classifier is termed as circulating load
- B. Wear and tear in wet crushing is more than that in dry crushing of materials
- C. Size enlargement (opposite of size reduction) is not a mechanical operation**
- D. A 'dust catcher' is simply an enlargement in a pipeline which permits the solids to settle down due to reduction in velocity of the dust laden gas

Which of the following is a directly fired intermittent furnace ?

- A. Walking beam reheating furnace
- B. Reverberatory furnace**
- C. Tower furnace
- D. Tunnel kiln

The circumferential (hoop) stress in a thin walled cylindrical vessel under internal pressure is _____?

- A. $pd/2t$**
- B. $pd/4t$
- C. pd/t
- D. $pd/3t$

In case of Venturimeter, friction losses are about _____ percent of maximum velocity head?

- A. 2**
- B. 8
- C. 12
- D. 20

The surface tension of a liquid, at critical temperature is _____?

- A. Indeterminate
- B. Zero**
- C. Infinity

D. Same as that at any other temperature

Percentage of methane in coke oven gas may be around _____?

- A. 5
- B. 15
- C. 25**
- D. 50

Physical absorption is _____?

- A. An irreversible phenomenon
- B. A reversible phenomenon
- C. Accompanied by evolution of heat
- D. Both B. and C.**

Rotary lime kiln is an example of a/an _____ system?

- A. Closed
- B. Open**
- C. Isolated
- D. Non-thermodynamic

Uniform ramming of sand in green sand moulding process leads to _____?

- A. Reduced chance of gas porosity
- B. Greater dimensional stability of the casting**
- C. Uniform flow of molten metal into the mould cavity
- D. Less sand expansion type of casting defect

In case of heat transfer by conduction in a hollow cylinder, _____ mean area is used to calculate the heat transfer rate?

- A. Geometric
- B. Arithmetic
- C. Logarithmic**

D. Either A., B. or C.

Promoter _____ ?

- A. Initiates a chemical reaction and is a catalyst by itself
- B. Alters the position of equilibrium in a reversible reaction
- C. Increases the number of active centres by increasing the unevenness of catalyst surface and by creating discontinuities in the crystals**
- D. All A., B. and C.

Range of compressibility co-efficient of the commercial compressible cake obtained in filtration operation is _____ ?

- A. 0.01 to 0.1
- B. 0.1 to 0.3
- C. 0.2 to 0.8**
- D. 0.2 to 0.4

Rittinger's number designates the new surface created per unit mechanical energy absorbed by the material being crushed. Larger value of Rittinger's number of a material indicates its _____ ?

- A. Easier grindability**
- B. Poor grindability
- C. High power consumption in grinding
- D. None of these

The conversion for a first order liquid phase reaction. $A \rightarrow B$ in a CSTR is 50%. If another CSTR of the same volume is connected in series, then the % conversion at the exit of the second reactor will be _____ ?

- A. 60
- B. 75**
- C. 90
- D. 100

Pick out the correct statement pertaining to transition/ entrance length in fluid flow ?

- A. The length of entrance region of pipe, in which full development of fluid flow takes place such that velocity profile does not change downstream, is called the transition length
- B. Transition length for laminar flow of Newtonian fluids in a pipe of diameter 'd' is equal to $0.05 \cdot D \cdot NRe$
- C. Transition length for turbulent flow of Newtonian fluids in a smooth pipe of diameter 'd' is equal to $50 D$
- D. All A., B. and C.**

Maximum differential pressure in liquid manometer is _____ psi?

- A. 20
- B. 30**
- C. 40
- D. 50

Which of the following is not an elastomer ?

- A. Polyisoprene
- B. Neoprene
- C. Nitrile-butadiene
- D. None of these**

If 'n' is the order of reaction, then unit of rate constant is _____?

- A. $1/(\text{time})(\text{concentration})^{n-1}$**
- B. $(\text{Time})^{-1} (\text{concentration})^{n-1}$
- C. $(\text{Time})^{n-1} (\text{concentration})$
- D. None of these

_____ is used as an 'entrainer' for the separation of acetic acid-water mixture by distillation?

- A. Furfural

- B. Benzol
- C. Butyl acetate**
- D. Hexane

Gibbs free energy at constant pressure and temperature under equilibrium conditions is _____?

- A. ∞
- B. 0
- C. Maximum
- D. Minimum**

Mild steel is a/an _____ steel?

- A. Low carbon**
- B. Medium carbon
- C. High carbon
- D. High alloy

Real gases approach ideal behaviour at _____?

- A. High pressure & high temperature
- B. Low pressure & high temperature**
- C. High pressure & low temperature
- D. Low pressure & low temperature

If a_1 and a_2 are the relative volatilities when the pressure in the distillation column is 1 and 2 atm respectively. Pick out the correct statement ?

- A. $a_1 = a_2$
- B. $a_1 = 2a_2$
- C. $a_1 = 0.5 a_2$
- D. None of these**

Salt content in sea water is about _____ percent?

- A. 0.5
- B. 1

C. 3.5

D. 9.05

Head developed by a centrifugal pump depends on its _____?

A. Speed

B. Impeller diameter

C. Both A. and B.

D. Neither A. nor B.

A reversible liquid phase endothermic reaction is to be carried out in a plug flow reactor. For minimum reactor volume, it should be operated such that the temperature along the length ?

A. Decreases

B. Increases

C. Is at the highest allowable temperature throughout

D. First increases and then decreases

Lead is poured into the joint between two _____ pipes?

A. Mild steel

B. Concrete

C. Cast iron

D. Asbestos cement

At what value of crank angle (roughly), no flow of water from or into the air vessel takes place in case of a double acting reciprocating pump ?

A. 40° and 140°

B. 45° and 60°

C. 90° and 80°

D. 20° and 120°

In a multiple effect evaporator system having 'n' effects, the amount of water evaporated per unit surface area is approximately equal to _____

times that in a single effect?

- A. nth
- B. (1/n)th**
- C. 0.5 nth
- D. 1.5 nth

Butadiene is a/an _____?

- A. Di-olefin**
- B. Naphthene
- C. Aromatic
- D. Olefin

Out of the following, TLV of _____ is maximum (about 500 ppm)?

- A. Carbon dioxide**
- B. Toluene
- C. Carbon disulphide
- D. Acetaldehyde

For an ideal gas, $C_p - C_v$ is _____?

- A. R**
- B. -R
- C. 0
- D. (3/2) R

The bolt is subjected to _____ when the nut is tightened by putting the washer beneath it?

- A. Tension**
- B. Shear
- C. Compression
- D. Bending & tension

Grinding efficiency of a ball mill is of the order of _____ percent?

- A. 1-5**

- B. 40-50
- C. 75-80
- D. 90-95

Bronze is an alloy of copper and _____?

- A. Lead
- B. Tin**
- C. Nickel
- D. Zinc

Cp equals Cv at _____?

- A. 0°C
- B. 0°K**
- C. 0°F
- D. 0°R

Non sulphonated hard bakelites are not used for making _____?

- A. Ion-exchange resins**
- B. Fountain pen barrels
- C. Formica table tops
- D. Combs

The units of Young's modulus of elasticity and _____ are the same?

- A. Strain
- B. Stress**
- C. Modular ratio
- D. None of these

Which is used as a coolant in nuclear reactor due to its high capture cross-section ?

- A. H2**

- B. N₂
- C. He
- D. CO₂

During filtration operation, the filtrate encounters the resistance of the _____?

- A. Filter medium
- B. Cake
- C. Channel carrying the slurry to the upstream side of the cake and filtrate away from the filter medium
- D. All A., B. and C.**

Automobile steering wheels are normally made of _____?

- A. Cellulose acetate**
- B. Cellulose nitrate
- C. PVC
- D. High density polythene

The quantity of heat required to evaporate 1 kg of a saturated liquid is called _____?

- A. Specific heat
- B. 1 Kcal
- C. Sensible heat
- D. Latent heat**

A belt conveyor used for the transportation of materials can _____?

- A. Run upto 1 km
- B. Travel at a speed upto 300 metres/minute
- C. Handle materials upto 5000 tons/hr
- D. All A., B. and C.**

1 ata is equivalent to _____?

- A. 1 atm
- B. 10 torr
- C. 0.98 Pascal
- D. 1 kgf/cm²**

A pebble mill _____?

- A. Is a ball mill
- B. Employs flints or ceramic pebbles as the grinding medium
- C. Is a tube mill lined with ceramic or other non-metallic liner
- D. Both B. and C.**

A body is called grey if the monochromatic emissivity of the body is _____?

- A. Zero
- B. Unity
- C. Same for all wavelengths**
- D. Different for all wavelengths

Positioning controllers are used for _____?

- A. Low loads
- B. Temperature changes
- C. High loads**
- D. Flow rate changes

Pick out the wrong statement about nucleate boiling ?

- A. Bubble generation is by expansion of entrapped gas/vapour at small cavities in the surface
- B. Surface temperature is greater than the saturation temperature of the liquid
- C. Heat transfer from the surface of the liquid is less than that in film boiling
- D. The temperature is less than that of film boiling**

NPK fertiliser is a _____ fertiliser?

- A. Complex
- B. Mixed**
- C. Nitrogenous
- D. Phosphatic

At absolute zero temperature, the _____ of the gas is zero?

- A. Pressure
- B. Volume**
- C. Mass
- D. None of these

Mercury cells for caustic soda manufacture, compared to diaphragm cells _____?

- A. Require lower initial investment
- B. Require more power
- C. Produce lower concentration NaOH
- D. None of these**

Which of the following heat treatment processes is usually applied to castings ?

- A. Tempering
- B. Annealing
- C. Normalising
- D. Carburising**

Bitterns is a/an _____?

- A. Unsaturated fat
- B. Starting material for the production of iodine
- C. By-product of chlor-alkali industry
- D. None of these**

Waxy crudes are treated with chemical additives mainly to _____?

- A. Depress its pour point**

- B. Dissolve wax
- C. Precipitate wax
- D. Remove wax

Triple superphosphate is chemically represented as _____ ?

- A. $\text{CaF}_2 \cdot 3\text{Ca}_3(\text{PO}_4)_2$**
- B. $3\text{Ca}_3(\text{PO}_4)_2$
- C. $\text{Ca}(\text{PO}_3)_2$
- D. $\text{Ca}(\text{H}_2\text{PO}_4)_2$

Tumbling is the process of improving the _____ of the materials/parts ?

- A. Surface finish
- B. Fatigue limit
- C. Creep limit
- D. Surface cleanliness**

At a temperature of 0°K , the molecules of a gas have only _____ energy?

- A. Rotational
- B. Vibrational
- C. Translational**
- D. None of these

Methyl isocyanate (MIC) gas (TLV <1 ppm), which caused Bhopal gas tragedy in 1984 falls under the category of _____ toxic gas?

- A. Moderately
- B. Highly
- C. Extremely
- D. Very extremely**

Cold work tool steel should have _____ ?

- A. High toughness

- B. Poor hardenability
- C. High wear resistance**
- D. All A., B. & C.

During the carbonisation of coal_____?

- A. All tar is evolved at 700°C
- C. Hard semi-coke starts shrinking at 600°C
- D. All A., B. and C.**

Which of the following alloying elements is present in maximum percentage in high speed steel ?

- A. Molybdenum**
- B. Chromium
- C. Tungsten
- D. Vanadium

Which of the following is a pressure filter ?

- A. Leaf filter (Moore filter)
- B. Plate and flame filter**
- C. Rotary drum filter
- D. Sand filter

Which is not a high alumina refractory ?

- A. Mullite
- B. Corundum
- C. Bauxite
- D. Dolomite**

Chemical formula of biuret is_____?

- A. $\text{NH}_2\cdot\text{CO}\cdot\text{NH}_2$
- B. $\text{NH}_3\cdot\text{COO}\cdot\text{NH}_3$
- C. $\text{NH}_2\text{CONHCONH}_2$**
- D. $\text{NH}_4\text{COONH}_2$

Angled baffles are preferred in the agitation tank to control the swirling action; if the viscosity of the liquid to be mixed is about 200 poise. However, the baffle may be completely eliminated for mixing liquids having viscosity above _____ poise?

- A. 300
- B. 600**
- C. 1000
- D. 1500

Shaft furnaces are used for _____?

- A. Smelting
- B. Calcining
- C. Roasting
- D. All A., B. and C.**

Fractional conversion _____ for an exothermic reversible chemical reaction, when the temperature is maximum?

- A. Increases
- B. Remains unchanged
- C. Decreases**
- D. Unpredictable from the data

In reactions involving solids and liquids (where change in volume is negligible), the heat of reaction at constant pressure as compared to that at constant volume is _____?

- A. More
- B. Less
- C. Same**
- D. Unpredictable; depends on the particular reaction

A non-linear system will have _____ steady state values?

- A. One
- B. More than one**
- C. Two
- D. Three

A centrifugal filtration unit operating at a rotational speed of w has inner surface of the liquid (density ρ_L) located at a radial distance R from the axis of rotation. The thickness of the liquid film is δ and no cake is formed. The initial pressure drop during filtration is _____?

- A. $\frac{1}{2}w^2 \cdot R^2 \cdot \rho_L$
- B. $\frac{1}{2}w^2 \cdot \delta^2 \cdot \rho_L$
- C. $\frac{1}{2}w^2 \cdot \delta\rho_L (2R + \delta)$**
- D. $\frac{1}{2}w^2 \cdot R \cdot \rho_L(R + 2\delta)$

Practical dividing line between a ductile and brittle materials is suggested, when the ultimate elongation is about 5%. Generally, larger the knuckle radius, stronger is the corner torus section of a head. The knuckle radius provided should be less than _____ of the head?

- A. 6% of I.D.
- B. 3 times the thickness
- C. Either A. or B., whichever is larger**
- D. Either A. or B., whichever is smaller

The main raw material for manufacture of silicon carbide refractories is _____?

- A. Corundum
- B. Carborundum**
- C. Bauxite
- D. Periclase

Make up water is supplied during cooling tower operation to compensate for water losses due to _____?

- A. Evaporation
- B. Blowdown
- C. Entrainment
- D. All A., B. & C.**

Which of the following is the best tube material from thermal conductivity point of view alone ?

- A. Aluminium
- B. Stainless steel
- C. Copper**
- D. Carbon steel

A phosphatic fertiliser contains 16% P₂O₅. It could be _____?

- A. Dicalcium phosphate
- B. Superphosphate**
- C. Triple superphosphate
- D. None of these

With increase in the space time of an irreversible isothermal reaction being carried out in a P.F. reactor, the conversion will _____?

- A. Increase**
- B. Decrease
- C. Remain same
- D. Data is insufficient; can't be predicted

Size reduction of ice and gypsum can be accomplished suitably by a _____ crusher?

- A. Blake jaw
- B. Toothed roll**
- C. Gyratory
- D. None of these

Caking coal is desirable for _____?

- A. Burning on travelling grate
- B. Coke making**
- C. Burning on firebars
- D. All A., B. and C.

Urea autoclave is made of _____?

- A. Cast iron
- B. Refractory blocks
- C. Stainless steel**
- D. Lead lined steel

If an amount R is paid at the end of every year for 'n' years, then the net present value of the annuity at an interest rate of i is _____?

- A. $R \left[\frac{(1+i)^n - 1}{i} \right]$
- B. $R \left[\frac{(1+i)^n - 1}{i (1+i)^n} \right]$**
- C. $R(1+i)^n$
- D. $R/(1+i)^n$

If two gases have same reduced temperature and reduced pressure, then they will have the same _____?

- A. Volume
- B. Mass
- C. Critical temperature
- D. None of these**

RUL of refractories depends on the _____?

- A. Chemical composition
- B. Physical structure
- C. Presence of impurities like iron & alkali
- D. All A., B. and C.**

What is the value of $\ln \gamma$ (where γ = activity co-efficient) for ideal gases ?

- A. Zero**

- B. Unity
- C. Infinity
- D. Negative

The ratio of velocity head to tube side return loss in case of a multipass shell and tube heat exchanger is _____?

- A. 2
- B. 1/2
- C. 4
- D. **1/4**

Steel produced from phosphatic iron is _____ in nature?

- A. Malleable
- B. Ductile
- C. **Brittle**
- D. Tough

Epoxy resin is a polymer containing two or more groups of the bellow fig. is called epoxide group or ethoxyline group. It is a _____?

- A. Polyamide & an elastomer
- B. Good adhesive
- C. Surface coating agent
- D. **Both B. and C.**

Participation of _____ is involved in the occurrence of a chemical reaction?

- A. Protons
- B. Neutrons
- C. **Electrons**
- D. None of these

Pick out the wrong statement pertaining to solvent extraction of oil. Rate of

extraction _____?

- A. Decreases with decrease of thickness of the flakes
- B. Increases with the increasing flake size keeping the flake thickness constant
- C. Increases considerably with the rise of temperature
- D. Decreases as the moisture content of flakes increases**

Which of the following is not an advantage of fluidisation from transfer operation point of view ?

- A. Intimate contact of the fluid with all parts of the solid particles
- B. Lower fluid pumping power requirement**
- C. Minimisation of temperature variation
- D. Prevention of particle segregation

Potassic fertiliser is graded based on its _____ content?

- A. KCl
- B. K₂O**
- C. KNO₃
- D. K₂SO₄

The equilibrium data of component A in the two phases B and C are given below. The estimate of Y for X = 4 by fitting a quadratic expression of a form $Y = mX^2$ for the above data is _____?

- A. 15.5
- B. 16
- C. 16.5**
- D. 17

Heat transfer co-efficient for a horizontal condenser as compared to a vertical condenser operating under similar conditions is _____?

- A. Same
- B. Less
- C. About 3 times**

D. About 0.33 times

The maximum adiabatic flame temperature in air as compared to that in pure oxygen is _____?

- A. **Much lower**
- B. Much higher
- C. Same
- D. Either lower or higher, depends on the type of fuel

Pick out the correct statement ?

- A. A substance existing above its critical temperature is called a saturated vapor
- B. A mixture of vapor gas is called saturated, if the equilibrium vapor pressure of the liquid is more than the partial pressure of the vapor at the same temperature
- C. Heat added to or given up by a substance at constant temperature is called the sensible heat
- D. **The end points of a vapor-pressure vs. temperature curve are critical and triple points**

Antioxidants are added in petrol to _____?

- A. Impart colour to it, for easy identification
- B. **Minimise the gum formation**
- C. Prevent icing of the carburettor
- D. Prevent the lead build up in engines

Which of the following is a constituent of vinegar ?

- A. Around 10% alcohol
- B. Around 1% acetic acid
- C. **Both A. and B.**
- D. Neither A. nor B.

Globular form of cementite is formed during the _____ process ?

- A. Spheroidising
- B. **Hardening**

- C. Annealing
- D. Normalising

Raoult's law is obeyed by a _____ solution?

- A. Saturated
- B. Molar
- C. Normal
- D. None of these**

Gibbs free energy of a pure fluid approaches _____ as the pressure tends to zero at constant temperature?

- A. Infinity
- B. Minus infinity**
- C. Zero
- D. None of these

The velocity, concentration and temperature boundary, for the boundary layer development on a flat plate during convective mass transfer will be same, if _____?

- A. $N_{Sc} = 1$
- B. $N_{Sc} = N_{Pr} = N_{Le}$**
- C. $N_{Pr} = N_{Le}$
- D. $N_{Sc} = N_{Le}$

A mixture of phosphate rock _____ is heated in an electric furnace to produce phosphorous?

- A. Salt & coke
- B. Sand & coke**
- C. And coke
- D. And sand

Reverse reaction in a chemical equilibrium is favoured by

the _____ ?

- A. Removal of one of the products regularly
- B. Increase in the concentration of one of the products**
- C. Increase in the concentration of one of the reactants
- D. None of these

Which of the following is not an antibiotic ?

- A. Penicillin
- B. Streptomycin
- C. Tetracycline
- D. Quinine**

What is the order of a chemical reaction in which doubling the initial concentration of the reactants doubles the half life time of the reaction ?

- A. 0**
- B. 1
- C. 2
- D. 3

Nominal size of a pipe is an indication of its _____ diameter?

- A. Inner
- B. Outer
- C. Approximate**
- D. None of these

Schedule number of a pipe, which is a measure of its wall thickness, is given by _____ ?

- A. 1000 P'/S**
- B. 100 P'/S
- C. 1000 S/P'
- D. 10000 P'/S

Conversion of SO₂ to SO₃ in Monsanto 4-pass converter is about

_____ percent?

- A. 80
- B. 90
- C. 98**
- D. 100

A material capable of undergoing large permanent deformation, when subjected to compression is termed as _____?

- A. Malleable**
- B. Ductile
- C. Brittle
- D. None of these

Styrene is produced from ethyl benzene by the process of _____?

- A. Dehydrogenation**
- B. Oxidation
- C. Alkylation
- D. Dehydration

A centrifugal pump is used to pump water through a horizontal distance of 150 m, and then raised to an overhead tank 10 m above. The pipe is smooth with an I.D of 50 mm. What head (m of water) must the pump generate at its exit E. to deliver water at a flow rate of 0.001 m³/s? The Fanning friction factor, f is 0.0062 ?

- A. 10 m
- B. 11 m**
- C. 11.8 m
- D. 30 m

Screw conveyors are _____?

- A. Run at very high rpm

B. Suitable for sticky materials

- C. Suitable for highly abrasive materials
- D. All A., B. and C.

Gun powder uses _____?

- A. Sulphur
- B. Charcoal
- C. Potassium nitrate
- D. All A , B, & C.**

Corrosion allowance in the design of pressure vessel/chemical equipment is not necessary, if _____?

- A. Plain carbon steel and cast iron parts are used
- B. Wall thickness is > 30 mm
- C. Material of construction is high alloy steel
- D. Both B. & C.**

The ratio of mass of a neutron to that of an electron is about 1839. What is the ratio of the mass of a proton to that of an electron?

- A. 159
- B. 1837**
- C. 2537
- D. 10000

Preheating of combustion air is done to _____?

- A. Increase the adiabatic flame temperature**
- B. Increase the calorific value of the fuel
- C. Complete the combustion of fuel
- D. Reduce its requirement for effecting the complete combustion

The relative volatility for separation of a non-ideal binary mixture by distillation should be _____?

- A. 0

- B. 1
- C. > 1**
- D. < 1

Prilling tower is found in the flowsheet for the manufacture of _____?

- A. Ammonia
- B. Urea**
- C. Superphosphate
- D. Triple superphosphate

An Azeotropic solution of two liquids has boiling point lower than either of them, when it _____?

- A. Is saturated
- B. Is unsaturated
- C. Shows negative deviation from Raoult's law
- D. Shows positive deviation from Raoult's law**

If the rate of a chemical reaction becomes slower at a given temperature, then the _____?

- A. Initial concentration of the reactants remains constant
- B. Free energy of activation is lower
- C. Entropy changes
- D. Free energy of activation is higher**

'Pneumoconiosis' is a disease caused by the inhalation of _____ dust?

- A. Coal**
- B. Uranium ore
- C. Iron ore
- D. Lime

The best lubricants for a machine working at high temperature & load is _____?

- A. Grease
- B. Solid lubricant**
- C. Animal oils
- D. Mineral oils

In the fluid catalytic cracker (FCC), the cracking reaction is _____ (i) and the regeneration is _____ (ii) _____?

- A. (i) exothermic (ii) endothermic
- B. (i) exothermic (ii) exothermic
- C. (i) endothermic (ii) endothermic
- D. (i) endothermic (ii) exothermic**

Induced draft fans provided in large thermal power plant boilers have _____ blades?

- A. Forward curved
- B. Backward curved**
- C. Double curved
- D. Radial or straight

In a forced draft cooling tower, water is cooled from 95 to 80°F by exposure to air with a wet bulb temperature of 70°F. In this case, the _____?

- A. Range is 15°F
- B. Approach is 10°F
- C. Both A. & B.**
- D. Neither A. nor B.

A Newtonian liquid (ρ = density, μ = viscosity) is flowing with velocity „v“ in a tube of diameter ‘D’. Let Δp be the pressure drop across the length ‘L’. For a laminar flow, Δp is proportional to _____?

- A. $L\rho v^2/D$**

- B. $L\mu V/D^2$
- C. Dpv^2/L
- D. $\mu V/L$

_____ temperature remains constant during adiabatic saturation process of unsaturated air ?

- A. Dew point
- B. Dry bulb
- C. Wet bulb**
- D. None of these

Plastic articles are normally produced by _____ moulding?

- A. Green sand
- B. Injection**
- C. Shell
- D. Dry sand

A steam carrying pipeline is insulated with two layers of insulating materials with the inferior insulation material forming the inner part. If the two insulating layers are interchanged, the heat conducted will _____?

- A. Increase
- B. Decrease
- C. Remain unaffected**
- D. May increase or decrease; depends on the thickness of each layer

Absorptivity and reflectivity of a perfect black body are respectively _____?

- A. 1 and 0**
- B. 0 and 1
- C. 1 and ∞
- D. 0 and 0.5

Which of the following is present in iron ore, enhances its value ?

- A. Alumina
- B. Alkali oxide
- C. Lime & Magnesia**
- D. None of these

_____ are mixed using ribbon blenders ?

- A. Lumpy solids and low viscosity liquids
- B. Dry powders**
- C. High viscosity liquids
- D. Thick pastes

Which of the following is not an intensive property ?

- A. Molar heat capacity
- B. Internal energy**
- C. Viscosity
- D. None of these

Which of the following has the lowest electrical resistivity ?

- A. Graphite**
- B. Fireclay
- C. Alumina
- D. Zircon

Under conditions of equal reduced pressure and equal reduced temperature, substances are said to be in the 'corresponding states'. At equal reduced conditions i.e., at the corresponding state, the _____ of different gases are nearly the same?

- A. Compressibility**
- B. Molecular weight
- C. Humidity
- D. None of these

With increase in temperature, the thermal conductivity of steel _____?

- A. Increases
- B. Decreases**
- C. Remains unchanged
- D. Increases exponentially

Measurement of the amount of dry gas collected over water from volume of moist gas is based on the _____?

- A. Charle's law
- B. Dalton's law of partial pressures**
- C. Avogadro's hypothesis
- D. Boyle's law

Which of the following advantages is not associated with the use of preheated air for combustion of a fuel in the furnace ?

- A. Increase in calorific value of the fuel**
- B. Increase in flame temperature
- C. Reduction in scale losses
- D. Saving in fuel consumption

In Fourier's law, the proportionality constant is called the _____?

- A. Heat transfer co-efficient
- B. Thermal diffusivity
- C. Thermal conductivity**
- D. Stefan-Boltzmann constant

Ionic reactions occur in _____?

- A. Solid state only
- B. Liquid state only
- C. Solutions**

D. Any state

Percentage of glycerine present in the spent lye obtained during soap manufacture is about _____?

- A. 0.5
- B. 5**
- C. 20
- D. 35

If a solid-gas non-catalytic reaction occurs at very high temperature, the rate controlling step is the _____ diffusion?

- A. Film**
- B. Ash layer
- C. Pore
- D. None of these

Preheating temperature of medium viscosity furnace oil for better atomisation through burner is about _____ °C?

- A. 50
- B. 70
- C. 90**
- D. 140

Gratings is associated with the measurement of _____?

- A. Linear displacement**
- B. Concavity/convexity
- C. Surface texture
- D. Flatness

Pick out the wrong statement pertaining to the soap manufacture?

- A. Transparent soaps are made by cold process**
- B. Organic pigments are used as colouring materials in the soap manufacture
- C. Both laundry as well as toilet soaps are manufactured by hot process

D. Colourless rosin is used in the manufacture of laundry soaps

Fireclay bricks are not used in the _____?

- A. Beehive coke oven
- B. By-product coke oven walls**
- C. Combustion chamber of B.F. stoves
- D. Coke oven regenerators

Carbon supply in pack carburising process is in the form of _____?

- A. Charcoal**
- B. Calcium carbide
- C. Hydrocarbon oil
- D. Graphite

“A control system is unstable, if the open loop frequency response exhibits an amplitude ratio exceeding unity at the crossover frequency.” This is _____ criterion?

- A. Bode stability**
- B. Nyquist
- C. Routh stability
- D. None of these

Zinc is highly _____ at room temperature?

- A. Ductile
- B. Resistant to atmospheric corrosion**
- C. Malleable
- D. Brittle

Inhalation of silica dust by human being causes _____?

- A. Asphyxiation
- B. Shortness of breath
- C. Tuberculosis

D. Both B. & C.

H/C ratio (by weight) for the same number of carbon atoms is the highest in case of _____?

- A. Aromatics
- B. Paraffins
- C. Olefins

D. Naphthenes

Caustic soda is transported in _____ lined containers ?

- A. Glass
- B. Nickel
- C. Neoprene

D. Either B. or C.

The phenomenon of nuclear fission is opposite to that of _____?

- A. Radioactive decay
- B. Thermionic emission
- C. Nuclear fusion**
- D. Combustion

The theoretical minimum work required to separate one mole of a liquid mixture at 1 atm, containing 50 mole % each of n- heptane and n- octane into pure compounds each at 1 atm is _____?

- A. $-2 RT \ln 0.5$
- B. $-RT \ln 0.5$**
- C. $0.5 RT$
- D. $2 RT$

If 1 Nm^3 of O_2 contains 'N' number of molecules, then number of molecules in 2 Nm^3 of SO_2 will be _____?

A. N

- B. N/2
- C. 2N**
- D. 4N

Reforming converts _____?

- A. Olefins into paraffins
- B. Naphthenes into aromatics**
- C. Naphthenes into olefins
- D. Naphthenes into paraffin

Pick out the correct statement ?

- A. A catalyst does not change AH of the reaction**
- B. A catalyst changes the equilibrium point
- C. Law of mass action was suggested by Le-Chatelier
- D. The difference between the energy of reactants and that of the products is the activation energy

_____ is the measure of the strength of refractory under the combined effect of temperature & load ?

- A. Porosity
- B. RUL**
- C. Specific gravity
- D. Thermal conductivity

A gaseous reactant is introduced in a mixed reactor of 3 litres volume at the rate of 1 litre/second. The space time is _____ seconds?

- A. 1
- B. 3**
- C. 1/3
- D. 32

The function of gypsum addition during cement making is

to _____?

- A. Increase the density of cement
- B. Decrease the cement setting rate**
- C. Both A. and B.
- D. Neither A. nor B.

The expected efficiency of a single riveted lap joint is of the order of 50%. If the thickness of the plate is increased four times, then the rivet diameter will have to be increased _____ times ?

- A. Two**
- B. Four
- C. Six
- D. Eight

The relative volatility of a binary mixture at the Azeotropic composition is _____?

- A. 1**
- B. > 1
- C. 0
- D. ∞

For _____ drying, the effects of velocity, temperature and humidity of the gas and the thickness of the solid are the same?

- A. Unsaturated surface
- B. Constant rate
- C. Both A. and B.**
- D. Neither A. nor B.

A coal with high ash content _____?

- A. Has higher calorific value
- B. Is harder and stronger**
- C. Is not subjected to washing

D. Has low quantity of mineral matter

A cylinder contains 640 gm of liquid oxygen. The volume occupied (in litres) by the oxygen, when it is released and brought to standard conditions (0°C , 760 mm Hg) will be _____ litres?

- A. 448
- B. 224
- C. 22.4
- D. Data insufficient; can't be computed

Decarburisation of steel _____?

- A. Is the removal of carbon from iron carbide (Fe_3C)
- B. Affects its crystalline structure
- C. Is favoured by CO_2
- D. All A., B. and C.

The fuel ratio of a coal is _____?

- A. The ratio of its percentage of fixed carbon to that of volatile matter
- B. Helpful in estimation of its rank
- C. Both A. and B.
- D. Neither A. nor B.

Refractories subjected to alternate cycles of heating & cooling are liable to loose their resistance to _____?

- A. Thermal spalling
- B. Slag attack
- C. Fusion under load
- D. CO attack

Pick out the correct statement about catalytic polymerisation ?

- A. H_2SO_4 polymerisation process gives gasoline rich in unsaturates
- B. In H_2SO_4 polymerisation, H_3PO_4 is always used with 2% steam to prevent meta & ortho

H₃PO₄ formation, which are inactive

- C. Both A. and B.
- D. Neither A. nor B.

Ionisation potential employed in the industrial electrostatic precipitator is of the order of _____?

- A. 30 to 70 kV DC**
- B. 30 to 70 kV AC
- C. 230 V AC
- D. 230 V DC

Road grade bitumen is produced from vacuum residue by its _____?

- A. Aeration
- B. Pyrolysis
- C. Hydrogenation
- D. Steam reforming**

Design calculation for multiple component distillation is done by _____?

- A. Ponchon-Savarit method
- B. McCabe-Thiele method
- C. Enthalpy concentration method
- D. Tray to tray calculations**

Which of the following is generally considered as opaque surface towards radiations ?

- A. Gases
- B. Solids
- C. Liquids
- D. Both B. and C.**

Silico-manganese steels (containing 0.7% Mn, 0.5% C and 2% Si) _____?

- A. Do not require heat treatment for any of its applications
- B. Are used for leaf and coiled springs**
- C. Do not have good resilience properties
- D. Is tempered at 850°C

Which of the following processes in oil refinery does not employ „cracking“?

- A. Coking
- B. Visbreaking
- C. Pyrolysis
- D. None of these**

The expression, $y(1 - x)/x(1 - y)$ is for _____?

- A. Absorption factor
- B. Relative volatility**
- C. Selectivity
- D. Murphree efficiency

_____ thermometer cannot measure sub-zero ($< 0^{\circ} \text{C}$) temperature?

- A. Mercury in glass
- B. Bimetallic**
- C. Vapor pressure
- D. Resistance

Lug support is meant for supporting _____ vessels?

- A. Large horizontal cylindrical
- B. Tall but empty
- C. Small**
- D. Thick walled tall

Often earing defects are found during deep drawing operation, because the

_____?

- A. Surface finish of the sheet is poor
- B. Sheet material has been given substantial spring back
- C. Starting sheet has planer anisotropy due to its texture**
- D. Starting sheet has normal anisotropy due to its texture

Fixed capital investment of a chemical plant is the total amount of money needed to supply the necessary plant and manufacturing facilities plus the working capital for operation of the facilities. Which of the following components of fixed capital investment requires minimum percentage of it ?

- A. Electrical installation cost
- B. Equipment installation cost
- C. Cost for piping
- D. Equipment insulation cost**

'Semi steel' is _____?

- A. Produced by adding 10-20% steel to the cupola charge
- B. Stronger than cast iron
- C. Both A. and B.**
- D. Neither A. nor B.

Tyres are made by _____?

- A. Injection moulding
- B. Extrusion
- C. Rotational moulding**
- D. Compression moulding

_____ of SBR is adversely affected, if more quantity of styrene is added to butadiene during its co-polymerisation to produce SBR?

- A. Percent elongation
- B. Resilience**
- C. Freezing point

D. Strength

High refractoriness of refractory bricks means, that it has a _____?

- A. High spalling resistance
- B. Low spalling resistance
- C. High resistance to fusion**
- D. Low porosity

First law of thermodynamics deals with the _____?

- A. Direction of energy transfer**
- B. Reversible processes only
- C. Irreversible processes only
- D. None of these

Which of the following may be viewed as a catalyst in the manufacture of soda ash by Solvay process ?

- A. NH₃**
- B. NaCl
- C. CaO
- D. Coke

The importance of diffusion in a catalyst are increased by _____?

- A. Large catalyst particle size
- B. An active surface of the catalyst
- C. Small pore diameter
- D. All A., B. and C.**

Pick out the wrong statement pertaining to the cooling towers ?

- A. In case of induced draft cooling tower, the fan is placed at the top of the tower
- B. Effectiveness of forced draft cooling tower is reduced by the recirculation of the humid and hot discharged air

C. A natural draft cooling tower is recommended to be used, when the air humidity is low and air temperature is also low

D. Effectiveness of a mechanical draft cooling tower is reduced with increase in air wet-bulb temperature

Lead pencil contains _____ ?

- A. Graphite**
- B. Lead sulphide
- C. Lead
- D. Both B. & C.

Which of the following minerals is not subjected to magnetic separation method ?

- A. Rutile
- B. Galena**
- C. Chromite
- D. Siderite

Washability curve based on float and sink test enables an assessment to be made of the possibility of cleaning a coal fraction based on the _____ ?

- A. Density separation**
- B. Differential wettability
- C. Size
- D. Volatile matter content

Austempering of steel requires it to be heated to 875°C followed by sudden cooling to 250- 525°C, thereby changing austenite to _____ ?

- A. Sorbite
- B. Bainite**
- C. Martensite

D. Troostite

Potassic fertilisers do not promote the development of

_____?

A. Stems & leaves during early stage of plant growth

B. Starches of potatoes & grains

C. Sugar of fruits & vegetables

D. Fibrous materials of plants

Thermofor catalytic cracking process is a _____ process?

A. Fixed bed

B. Moving bed

C. Fluidised bed

D. Non-catalytic

Leaching of coarse solid lumps is also termed as _____?

A. Decoction

B. Dissolution

C. Percolation

D. Agitation and settling

Which of the following may prove unsuitable for filtering volatile liquids ?

A. Pressure filter

B. Gravity filter

C. Centrifugal filter

D. Vacuum filter

Half life period of a first order irreversible reaction $A \rightarrow B$ is

_____?

A. $k/2$

B. $\ln k/2$

C. $\ln 2/k$

D. $\ln 0.5/k$

Nitric acid is produced on commercial scale in a fertiliser plant by _____?

- A. Oxidation of ammonia
- B. $\text{CaNO}_3 + \text{H}_2\text{SO}_4$ reaction
- C. Passing air through high voltage electric arc
- D. None of these

In case of unsaturated air _____?

- A. Dew point < wet bulb temperature
- B. Wet bulb temperature < dry bulb temperature
- C. Both A. and B.
- D. Neither A. nor B.

What is the slope of the operating line in the stripping section of a distillation column ?

- A. 0
- B. ∞
- C. > 1
- D. < 1

Which of the following is called “blue gas”?

- A. Coke oven gas
- B. Water gas
- C. Natural gas
- D. Producer gas

Cement Kiln is a _____?

- A. Rotary Kiln
- B. Tunnel Kiln
- C. Natural draft furnace
- D. Batch furnace

A material subjected _____ must have high resilience?

A. Shock loading

B. Vibration

C. Fatigue

D. Tension

For a constant pressure reversible process, the enthalpy change (ΔH) of the system is _____?

A. $C_v.dT$

B. $C_p.dT$

C. $\int C_p.dT$

D. $\int C_v.dT$

In liquid-liquid extraction, the number of phases at plait point is

_____?

A. 1

B. 2

C. 3

D. 4

Air at a temperature of 20°C and 750 mm Hg pressure has a relative humidity of 80%. What is its percentage humidity? Vapour pressure of water at 20°C is 17.5 mm Hg?

A. 80.38

B. 80

C. 79.62

D. 78.51

Catalyst used in the oxidation of ammonia is _____?

A. Platinum-beryllium

B. Platinum-rhodium

C. Cobalt-molybdenum

D. Platinum-molybdenum

The relative volatility of a binary mixture at constant temperature _____ the total pressure?

- A. **Decreases with increase in**
- B. Increases with increase in
- C. Is independent of
- D. None of these

Phenol formaldehyde _____?

- A. Employs addition polymerisation
- B. **Employs condensation polymerisation**
- C. Is a monomer
- D. Is an abrasive material

Main constituents of purified Lurgi gas are _____?

- A. H₂, C_mH_n & CO₂
- B. **CO, H₂ & CH₄**
- C. CO₂, O₂ & CO
- D. N₂, H₂ & CO₂

Multiple blade paddle agitator is used for mixing high viscosity liquids/paste in which the paddle diameter is commonly 0.8 times the tank diameter. However, the width of the blade is in the range of _____ times the paddle diameter?

- A. **0.1 to 0.25**
- B. 0.3 to 0.5
- C. 0.5 to 0.6
- D. 0.65 to 0.80

Which of the following is not an explosive ?

- A. TNT

- B. CMC
- C. RDX
- D. Lead azide

Unsaturated air (with dry bulb and wet bulb temperatures being 45°C and 25°C respectively) is passed through a water spray chamber maintained at 23°C. The air will be cooled and _____?

- A. Humidified with wet bulb temperature decreasing
- B. Humidified at constant wet bulb temperature
- C. Dehumidified
- D. None of these

Pick out the correct statement?

- A. The slope of the stripping line is always less than unity
- B. For a given separation in a binary distillation column, with increase in reflux ratio (above the minimum reflux ratio), the fixed cost of the distillation column first increases and then decreases
- C. In Ponchon-Savarit method of no. of theoretical plate determination, the stripping and rectifying operating lines are vertical at total reflux
- D. Kremser-Brown-Souder's equation is used to calculate the efficiency of a plate tower

Which of the following impurities in feed water for high pressure boiler is the most detrimental ?

- A. Silica
- B. Dissolved oxygen
- C. Suspended salt
- D. Dissolved salt

At constant pressure, with increase of temperature, the dew point will _____?

- A. Increase
- B. Decrease

- C. Remain unchanged
- D. Increase/decrease; depends on the temperature

Dropwise condensation occurs on _____ surfaces?

- A. Clean and dirt free
- B. Smooth clean
- C. Contaminated cooling**
- D. Polished

A common disinfectant used in village wells for disinfection of water is _____?

- A. Free chlorine
- B. Bromine
- C. Iodine
- D. Potassium permanganate**

Pick out the wrong statement about the smoking tendency of various hydrocarbon constituents of kerosene ?

- A. Smoking tendency of hydrocarbons increases in the order: paraffins → isoparaffins → naphthenes → aromatics
- B. Smoking tendency of paraffins increases with decrease in its molecular weight**
- C. Smoking tendency of naphthenes decreases with its increasing molecular weight & also on addition of double bond
- D. Smoking tendency of aromatics decreases with increase in its molecular weight

_____ does not contain copper as an alloying element?

- A. Nichrome**
- B. Manganin
- C. Perminvar
- D. Monel metal

The gasification reaction represented by, $C + H_2O = CO + H_2$, is a/an

_____ reaction?

- A. Exothermic
- B. Endothermic**
- C. Catalytic
- D. Autocatalytic

Separation of fresh water from sea water can be done by the _____ operation ?

- A. Osmosis
- B. Reverse osmosis**
- C. Absorption
- D. Adsorption

Which of the following coal gasification processes will produce gas having maximum methane content ?

- A. Winkler process
- B. Lurgi process**
- C. Kopper-Totzek process
- D. All can produce same methane content

For turbulent flow in a tube, the heat transfer co-efficient is obtained from the Dittus- Boelter correlation. If the tube diameter is halved and the flow rate is doubled, then the heat transfer co-efficient will change by a factor of _____?

- A. 1
- B. 1.74
- C. 6.1**
- D. 37

Sulphur dioxide present in the industrial chimney exhaust gases causes _____?

- A. Respiratory & lung disease

- B. Reduction in plant's productivity owing to acid rain
- C. Corrosion of building materials
- D. All A., B. and C.**

Solvent used in extractive distillation _____?

- A. Changes the relative volatility of the original components**
- B. Should be of high volatility
- C. Should form azeotropes with the original components
- D. All A., B. and C.

Carbon refractory blocks _____?

- A. Are wetted by molten iron
- B. Are used in the hearth of blast furnace**
- C. Are acidic in nature
- D. All A., B. and C.

In continuous distillation, the internal reflux ratio (R_i) and the external reflux ratio (R_e) are related as _____?

- A. $R_i = R_e / (1 - R_e)$
- B. $R_i = (1 - R_e) / R_e$
- C. $R_i = R_e$
- D. $R_i = R_e / (1 + R_e)$**

Composition of natural gas is determined by the _____?

- A. Haldane apparatus
- B. Mass spectrometer
- C. Chromatograph
- D. Both B. and C.**

Pick out the wrong unit conversion ?

- A. $1 \text{ kgf} = 9.8 \text{ Newton}$
- B. $1 \text{ stoke} = 1 \text{ m}^2/\text{second}$**
- C. $1 \text{ Pascal second} = 10 \text{ poise}$

D. $1 \text{ ppm} = 1 \text{ ml/m}^3 = 1 \text{ mg/kg}$

Calorific value of a typical dry anthracite coal may be around _____ Kcal/kg?

- A. 1000
- B. 4000
- C. 8000**
- D. 15000

Limiting reactant in a chemical reaction decides the _____?

- A. Rate constant
- B. Conversion**
- C. Reaction speed
- D. Equilibrium constant

The elastic strain in copper is due to the _____?

- A. Motion of dislocations**
- B. Stretching of atomic bonds
- C. Breakage of atomic bonds
- D. None of the above

For the non catalytic reaction of particles with surrounding fluid, the same needed to achieve the same fractional conversion for particles of different unchanging sizes is proportional to the particle diameter, when the _____ is the controlling resistance?

- A. Film diffusion
- B. Diffusion through ash layer
- C. Chemical reaction**
- D. Either A., B. or C.

Pick out the wrong statement?

- A. Sand & coke is the main raw material for the manufacture of silicon carbide

B. Carbon refractories cannot be used in the furnaces operating under reducing conditions

- C. Mullite can be obtained by the heating of alusite, kyanite or sillimanite
- D. Silica occurs in nature in all cellular, amorphous or crystalline form

For existence of aquatic life in water, the dissolved oxygen content in it, should not be less than _____ ppm?

- A. 10000
- B. 5**
- C. 500
- D. 1000

Flooding in a vapor-liquid contacting equipment occurs in a tray, when the pressure drop through a tray is _____ the liquid head available in the downcomer?

- A. Less than
- B. More than**
- C. Same as
- D. Very much less

Tin based white metals are used, where bearings are subjected to _____?

- A. High pressure & load**
- B. Low pressure & load
- C. High temperature
- D. Large surface wear

Synthetic polymer produced by using terephthalic acid and ethylene glycol is _____?

- A. Terylene**
- B. Nylon-66
- C. PVC

D. Polystyrene

_____ decreases during adiabatic throttling of a perfect gas?

- A. Entropy
- B. Temperature
- C. Enthalpy
- D. Pressure**

Diesel used in naval applications has a minimum cetane number of

_____?

- A. 25
- B. 35
- C. 45**
- D. 65

Pick out the correct statement?

A. In catalytic reactions, the catalyst reacts with the reactants

- B. A catalyst initiates a chemical reaction
- C. A catalyst lowers the activation energy of the reacting molecules
- D. A catalyst cannot be recovered chemically unchanged at the end of the chemical reaction

Pick out the wrong statement pertaining to fluid flow ?

A. The ratio of average velocity to the maximum velocity for turbulent flow of Newtonian fluid

in circular pipes is 0.5

- B. The Newtonian fluid velocity in a circular pipe flow is maximum at the centre of the pipe
- C. Navier-Stokes equation is applicable to the analysis of viscous flows
- D. Hagen-Poiseuille equation is applicable to the laminar flow of Newtonian fluids

_____ is an ore concentrating metallurgical process involving a chemical change?

- A. Electromagnetic separation

- B. Froth floatation
- C. Roasting**
- D. None of these

With increase in the carbon percentage in the steel, its_____?

- A. Hardness increases
- B. Ductility reduces
- C. Tensile strength increases
- D. All A., B. and C.**

Which parameter is used for the grading of paraffin waxes ?

- A. Specific gravity
- B. Melting point
- C. Viscosity**
- D. Penetration number

Which of the following factors determine the amount of entrainment in a distillation column ?

- A. Plate spacing
- B. Depth of liquid above the bubble cap slots
- C. Vapour velocity in the volume between the plates
- D. All A., B. and C.**

Pick out the wrong statement?

- A. All the nitrogenous fertilisers are not soluble in water**
- B. A straight fertiliser contains only one nutrient
- C. Calcium cyanamide is used as weed killer in onion fields
- D. The phosphorous nutrient makes the plant stem stronger and increases its branches

Stefan-Boltzmann law which describes the radiation heat transfer states that, it is proportional to (where, t = temperature in $^{\circ}\text{C}$ T = absolute temperature in $^{\circ}\text{K}$) ?

- A. t^4

B. T4

C. 1/t4

D. 1/T4

Grog_____?

A. Contains both alumina and silica

B. Is crushed firebrick

C. Is a non-plastic material

D. All A., B. and C.

64-132) rank coal (ASTM) means a coal with 64%_____?

A. Fixed carbon and having a heating value around 13, 200 BTU/1b

B. Ash and heating value around 13, 200 BTU/1b

C. Fixed carbon and heating value around 132 BTU/1b

D. None of these

Resilience of a bolt can be increased by increasing its _____?

A. Length

B. Shank diameter

C. Head diameter

D. None of these

Main constituents of natural rubber is _____?

A. Polystyrene

B. Polyisoprene

C. Polybutadiene

D. Polychlorophrene

Manufacturing cost in a chemical company does not include the _____?

A. Fixed charges

B. Plant overheads

C. Direct products cost

D. Administrative expenses

Machine moulding of dry mixture of refractories requires a pressure of the order of _____ kg/cm²?

- A. 10
- B. 100
- C. 500
- D. 1000**

An example of recuperative furnace is the _____?

- A. Soaking pit**
- B. Open hearth furnace
- C. Coke ovens
- D. None of these

What is the reduction ratio in a fine crushing operation having following feed and product sizes ?

- A. 0.5
- B. 2**
- C. 5
- D. 10

Which of the following can be made into briquettes without the use of a binder ?

- A. Lignite**
- B. Bituminous coal
- C. Anthracite coal
- D. None of these

Which of the following is a vacuum filter ?

- A. Filter press
- B. Rotary disc filter**
- C. Batch basket centrifuge

D. Tank filter (Nutsche filter)

Which of the following is the most detrimental for water used in high pressure boiler ?

- A. Silica
- B. Turbidity
- C. Phenol
- D. Dissolved oxygen

C_d , C_c and C_v are related (for flow through an orifice) as (where, C_d = discharge co-efficient, C_c = co-efficient of contraction = (area of jet at vena-contracta/area of opening), C_v = co-efficient of velocity = (actual velocity at vena-contracta/theoretical velocity)?

- A. $C_d = C_c/C_v$
- B. **$C_d = C_c.C_v$**
- C. $C_d = C_v/ C_c$
- D. None of these

Which of the following is not a natural source of air pollution ?

- A. Volcanic eruptions and lightening discharges
- B. Biological decay of vegetable matter
- C. Photochemical oxidation of organic matter
- D. **None of these**

Normal mercury thermometer can be used to measure a temperature of about 300°C . However, its maximum temperature measurement range can be increased upto about 500°C by_____?

- A. **Filling nitrogen under pressure in the stem**
- B. Increasing the diameter of the tube
- C. Using steel tube in place of glass tube
- D. Accounting for the tube expansion

Pick out the wrong unit conversion of temperature?

- A. $^{\circ}\text{R} = 273 + ^{\circ}\text{F}$
- B. Temperature difference of $1^{\circ}\text{K} = 1^{\circ}\text{C} = 9/5^{\circ}\text{F}$
- C. $^{\circ}\text{C} = (\text{F} - 32) \times 0.555$
- D. $^{\circ}\text{F} = (^{\circ}\text{C} + 17.778) \times 1.8$

Which of the following is not a practical method of low level radioactive waste disposal ?

- A. Dilution with inert material
- B. Discharging to atmosphere through tall stacks after dilution
- C. Disposing off in rivers & oceans
- D. Filling in steel crates and shooting it off out of earth's gravity**

Natural silica _____ ?

- A. Mainly contains quartz
- B. Is not stable at high temperature
- C. Transforms to other allotropic forms i.e. Tridymite and Cristobalite involving very high volume changes
- D. All A., B. and C.**

A system is said to be isopiestic, if there is no _____ change?

- A. Temperature
- B. Pressure**
- C. Volume
- D. None of these

Which of the following consumes the maximum tonnage of refractories annually in an integrated steel plant ?

- A. Soaking pits
- B. Reheating furnace
- C. L.D. converter**
- D. Rotary lime kiln

Viscosity of 1 centipoise is equal to 1 Centistoke in case of _____?

- A. Water
- B. Mercury
- C. Carbon tetrachloride
- D. None of these

A tube mill as compared to a ball mill _____?

- A. Employs smaller balls
- B. Gives finer size reduction but consumes more power
- C. Has larger length/diameter ratio (>2 as compared to 1 for ball mill)
- D. All A., B. and C.

Clay treatment is used to remove _____?

- A. Salt from the crude oil
- B. Colour & dissolved gases from cracked gasoline
- C. Wax from lube oil
- D. None of these

Graphite is used in nuclear reactor as _____?

- A. Insulation lining of the reactor
- B. Fuel
- C. Lubricant
- D. Retarder of neutron velocity

Temperature and gage pressure maintained during the manufacture of cold SBR (styrene butadiene rubber) are _____?

- A. 5°C and 1 kgf/cm²
- B. - 20°C and 1 kgf/cm²
- C. 0°C and 1 kgf/cm²
- D. 0°C and 3 kgf/cm²

Which is the most widely used coagulant for the treatment of turbid water?

- A. Alum (aluminium sulphate)

- B. Lime
- C. Ferric chloride
- D. Sodium aluminate

A fluid is the one, which _____?

- A. Cannot remain at rest under the action of shear force**
- B. Continuously expands till it fills any container
- C. Is incompressible
- D. Permanently resists distortion

The half life period of a radioactive element depends upon the _____?

- A. Temperature
- B. Pressure
- C. Amount of element present
- D. None of these**

What is Nusselt number ?

- A. $CP \cdot \mu/k$
- B. hD/k**
- C. $h \cdot CP/\mu$
- D. $CP \cdot \mu/h$

In case of wet spinning of polymers, the polymer solution is forced through spinnerates into, a coagulating bath to give a filament form. Wet spinning is not used in case of the _____ fibres?

- A. Viscose rayon
- B. Acrylic
- C. Polyvinyl acetate
- D. Saturated polyester**

Poly Tetrafluoroethylene (P.T.F.E.) is known as _____?

- A. Bakelite

- B. Teflon**
- C. Celluloid
- D. Dacron

Which of the following parameters remains constant during chemical dehumidification ?

- A. Dry bulb temperature**
- B. Partial pressure of vapour
- C. Wet bulb temperature
- D. None of these

What happens in a reversible adiabatic expansion process ?

- A. Heating takes place
- B. Cooling takes place**
- C. Pressure is constant
- D. Temperature is constant

When steam is passed over coal resulting in the endothermic reaction represented by, $C + H_2O = CO + H_2$, it is called the _____ of coal?

- A. Carbonisation
- B. Oxidation
- C. Coalification
- D. Gasification**

If we increase the pressure on a substance (which is at its triple point), then the triple point _____?

- A. Increases
- B. Decreases
- C. Remains unchanged**
- D. May increase or decrease; depends on the substance

_____ is used for measuring the static pressure exerted on the wall by a

fluid flowing parallel to the wall in a pipeline?

- A. Venturimeter
- B. Pressure gauge
- C. Pitot tube**
- D. Orificemeter

Molecular weight of polymers are in the range of _____?

- A. 10 to 103
- B. 102-107**
- C. 107-109
- D. 109-1011

Molecular distillation is _____?

- A. High temperature distillation
- B. For heat-sensitive materials
- C. Very low pressure distillation
- D. Both B. and C.**

Effective and nominal interest rates are equal, when the interest is compounded _____?

- A. Annually**
- B. Fortnightly
- C. Monthly
- D. Half-yearly

What is the unit of the rate constant in a chemical reaction in which 10% of the reactant decomposes in one hour, 20% in two hours, 30% in three hours and so on ?

- A. Litre/mole.second**
- B. Moles/litre.second
- C. Litre/mole
- D. Litre/second

A stream line is _____?

- A. Fixed in space in steady flow**
- B. Always the path of particle
- C. Drawn normal to the velocity vector at every point
- D. A line connecting the mid points of flow cross-section

Cold heading or upsetting is categorised as the _____ process ?

- A. Extrusion
- B. Bending
- C. Rolling
- D. Forging**

Octane number of n-heptane is assumed to be _____?

- A. 100
- B. 0**
- C. 70
- D. ∞

Purity of oxygen used for blowing in steel making L.D. converter is 99.5%. The boiling point of oxygen is about _____ °C ?

- A. -53
- B. -103
- C. -183**
- D. -196

The experimental response of the controlled variable $y(t)$ for a step change of magnitude 'P' in the manipulated variable $x(t)$ is shown below: The appropriate transfer function of the process is _____?

- A. $(Q/P) e^{-(Q/R)S}/(TdS + 1)$
- B. $(Q/R) e^{-TdS}/(Q/P) (S + 1)$
- C. $(Q/P) e^{-TdS}/(Q/R) (S + 1)$**
- D. $(Q/R) e^{-(P/Q)S}/(TdS + 1)$

The Stefan-Boltzmann constant depends on the _____?

- A. Medium
- B. Temperature
- C. Surface
- D. None of these**

A solution with reasonably permanent pH is called a/an _____ solution?

- A. Ideal
- B. Non-ideal
- C. Buffer**
- D. Colloidal

The value of Trouton's ratio (λ_b/T_b) for a number of substances is 21 (where, λ_b = molal that of vaporisation of a substance at its normal boiling point, KCal/kg. mole and T_b = normal boiling point, °K). The Kistyakowsky equation is used for calculation of Trouton's ratio of _____ liquids?

- A. Polar
- B. Non-polar
- C. Both A. & B.**
- D. Neither A. nor B.

Commonly used glass is known as the _____ glass?

- A. Flint
- B. Hard
- C. Pyrex
- D. Soda**

Existence of boundary layer in fluid flow is because of the _____?

- A. Surface tension
- B. Fluid density
- C. Fluid viscosity**

D. Gravity forces

The largest consumer of refractories is the _____ industry?

A. Cement

B. Metallurgical

C. Fertiliser

D. Power

Isomerisation converts the _____ tot-paraffins?

A. Paraffins

B. Olefins

C. Naphthenes

D. None of these

For what value of Prandtl number, $St = f/2$?

A. 1.5

B. 1

C. > 1

D. < 1

Emission of dense white smoke out of the chimney of a thermal power plant is an indication of the use of _____?

A. Less air for combustion

B. Correct amount of air for combustion

C. Too much air for combustion

D. Pulverised coal in boilers

Concentrated HCl at 30°C can be stored in a vessel made of _____?

A. PTFE and porcelain

B. Cast iron and aluminium

C. Stainless steel and high silicon cast iron

D. None of these

Rate constant 'k' and absolute temperature 'T' are related by collision theory (for bimolecular) as _____?

- A. $k \propto T^{1.5}$
- B. $k \propto \exp(-E/RT)$
- C. $k \propto \sqrt{T}$**
- D. $k \propto T$

Duhring's rule is important in solving problems on _____?

- A. Distillation
- B. Crystallisation
- C. Evaporation**
- D. Humidification

As per Kirchoff's law, the ratio of the total radiating power to the absorptivity of a body depends on the _____?

- A. Temperature of the body only**
- B. Wavelength of monochromatic radiation
- C. Both A. and B.
- D. Nature of material of body

The film co-efficient is decreased due to the presence of non-condensing gases in the vapors. The film co-efficient of superheated vapor as compared to that of saturated vapor is _____?

- A. More
- B. Less
- C. Some**
- D. Either more or less; depends on the nature of vapor

Lowering of condenser temperature (keeping the evaporator temperature constant) in case of vapour compression refrigeration system results in _____?

A. Increased COP

B. Same COP

C. Decreased COP

D. Increased or decreased COP; depending upon the type of refrigerant

Zinc is not used _____?

A. For producing zinc base die casting alloys

B. In its oxide form as pigments

C. As anode for corrosion prevention in boiler

D. As an alloying element in various bronzes

Normalising does not _____ of a metal?

A. Improve machinability & tensile strength

B. Remove internal stresses

C. Refine the structure

D. Remove strains caused by cold working

1 kg/cm² is equal to _____?

A. 760 torr

B. 1 KPa

C. 10 metres of water column

D. 1 metre of water column

Principal alloying element in Elinvar (used for making hair springs for watches)

is _____?

A. Copper

B. Aluminium

C. Nickel

D. Zinc

High pressure fluid in a shell and tube heat exchanger should preferably be routed through the _____?

A. Tubes to avoid the expansion of high pressure shell construction

- B. Shell side for smaller total pressure drop
- C. Shell side, if the flow is counter-current and tube side if the flow is co-current
- D. Shell side for large overall heat transfer co-efficient

Fossil fuels mean _____?

- A. Solid fuels
- B. Liquid fuels
- C. Those fuels which are found in the crust of earth**
- D. Premature fuels with low calorific value

Mercury thermometer is commonly used for low temperature measurement.

The freezing point and boiling point of mercury are respectively _____ °C?

- A. – 39 and 350**
- B. – 51 and 439
- C. – 79 and 395
- D. – 10 and 425

Heat transfer rate per unit area is called _____?

- A. Thermal conductivity
- B. Heat flux**
- C. Heat transfer co-efficient
- D. Thermal diffusivity

Cetane number of alpha methyl naphthalene is assumed to be _____?

- A. 0**
- B. 100
- C. 50
- D. ∞

The temperature at which plastic layer formation takes place during

carbonisation of coal varies from _____ °C ?

- A. 100 to 150
- B. 350 to 450**
- C. 550 to 650
- D. 700 to 850

Glycerine is not used in the _____ ?

- A. Manufacture of explosive
- B. Conditioning and humidification of tobacco
- C. Manufacture of pharmaceuticals
- D. None of these**

Which of the following factors control the deactivation of a porous catalyst pellet?

- A. Decay reactions
- B. Pore diffusion
- C. Form of surface attack by poison
- D. All A., B. and C.**

Pressure difference between two points in vessels, pipelines or in two different pipelines can be measured by a differential manometer. The pressure difference measured as the mm of water column in case of mercury-water, differential manometer is equal to (where, H = difference in height of mercury column in mm)?

- A. H
- B. 12.6 H**
- C. 13.6 H
- D. 14.6 H

The vapor pressure of a substance, at its melting point, is _____ in the solid state as compared to that in the liquid state?

- A. Less

- B. More
- C. Same**
- D. Either A. or B.; depends on the nature of the substance

Aniline point is a property of the_____?

- A. Diesel
- B. LPG
- C. Naphtha**
- D. Gasoline

Equal masses of CH₄ and H₂ are mixed in an empty container. The partial pressure of hydrogen in this container expressed as the fraction of total pressure is_____?

- A. 1/9
- B. 8/9**
- C. 1/2
- D. 5/9

Oils are partially hydrogenated (not fully) to manufacture Vanaspati, because fully saturated solidified oils_____?

- A. Cause cholesterol build up and blood clotting**
- B. Are prone to rancid oxidation
- C. Always contain some amount of nickel (as their complete removal is very difficult)
- D. Have affinity to retain harmful sulphur compounds

Temperature of molten pig iron (1450°C) and molten slag (1500°C) flowing out of a blast furnace is measured by a/an_____?

- A. Chromel-alumel thermocouple
- B. Optical pyrometer
- C. Radiation pyrometer
- D. Either B. or C.**

What is the normal percentage of rhodium in platinum + rhodium element used in the thermocouple ?

- A. 0.1
- B. 3
- C. 13**
- D. 29

Bernoulli's equation is dependent on the _____?

- A. First law of thermodynamics
- B. Third law of thermodynamics
- C. Law of conservation of momentum
- D. None of these**

A mercury barometer measures the _____ pressure?

- A. Atmospheric**
- B. Gauge
- C. Vacuum
- D. Absolute

Yield of blast furnace gas is about _____ Nm³ /ton of pig iron?

- A. 300
- B. 2000**
- C. 5000
- D. 10000

Beryllia (which is used in making crucibles for melting uranium & thorium) is superior to alumina in all respects for high temperature (> 1900°C) use, except ?

- A. Cost**
- B. Electrical conductivity
- C. Thermal conductivity
- D. Fusion point

The Hatta number is important in _____?

- A. Multi-component distillation
- B. Binary distillation
- C. Gas absorption without chemical reaction
- D. Gas absorption with chemical reaction**

With increase in temperature, the electrical conductivity of semiconductors _____?

- A. Increases**
- B. Decreases
- C. Remain constant
- D. Either A. or B. depends on the type of semi-conductor

Removal of _____ exemplifies an adsorption unit operation?

- A. Uranium from its ore
- B. Water from petrol**
- C. Ammonia from coke oven gas
- D. Mustard oil from mustard seed

Longitudinal stress induced in a thin walled cylindrical storage vessel is _____?

- A. $pD/2t$
- B. $pD/4t$**
- C. $pD/3t$
- D. $pD/6t$

Filtration of water in a paper mill is done by a/an _____ filter?

- A. Open sand**
- B. Plate and frame
- C. Vacuum leaf
- D. Sparkler

Which of the following parts of a jaw crusher is subjected to maximum wear and

tear during its operation ?

- A. Check plates
- B. Jaw plates**
- C. Toggles
- D. Crush shaft

In a rotary drier, the average retention time of solid is (where Z = length of the drier, metres ρ = apparent solid density, kg/m^3 L = flow rate of dry solids, kg/see. m^2 drier crosssection H = hold up of solid.) ?

- A. $Z.H.\rho/L$**
- B. $L/Z.H.\rho$
- C. $H.\rho/L$
- D. $Z.H/\rho L$

A hardened steel essentially contains _____ ?

- A. Sorbite
- B. Troostite
- C. Martensite**
- D. None of these

When a gas is subjected to adiabatic expansion, it gets cooled due to _____ ?

- A. Decrease in velocity
- B. Decrease in temperature
- C. Decrease in kinetic energy
- D. Energy spent in doing work**

Steam condensate is recovered by steam traps and recycled for use as boiler feed water, because of its low _____ ?

- A. Hardness
- B. Dissolved solids content
- C. Suspended solids content

D. All A., B. and C.

At high Reynolds number _____?

- A. Inertial forces control and viscous forces are unimportant**
- B. Viscous forces predominate
- C. Inertial forces are unimportant and viscous forces control
- D. None of these

Which of the following is an alloy of nickel and copper ?

- A. Hastelloy
- B. Duriron
- C. Monel**
- D. Inconel

Which of the following can be used for the direct measurement of volumetric flow rate of slurry ?

- A. Venturimeter
- B. Orificemeter
- C. Rotameter**
- D. Pitot tube

Avogadro's number is equal to _____?

- A. 6.023×10^{23} molecules/kg.mole
- B. 6.023×10^{23} molecules/gm.mole**
- C. 6.023×10^{16} molecules/kg.mole
- D. 6.023×10^{26} molecules/gm.mole

Priming of a centrifugal pump is done to _____?

- A. Increase the mass flow rate of fluid
- B. Develop effective pressure rise by the pump
- C. Avoid chances of separation inside the impeller**
- D. None of these

Straight run naphtha is converted into high octane number petrol (gasoline) by catalytic _____?

- A. Cracking
- B. Polymerisation
- C. Reforming**
- D. Isomerisation

Which of the, following is not associated with the functioning of a petrol engine ?

- A. Compression ignition system**
- B. Spark plug
- C. Carburettor
- D. Otto cycle

The buckling tendency of compression members is always in the direction of the _____?

- A. Least radius of gyration**
- B. Axis of the load
- C. Perpendicular to the axis of the load
- D. None of these

At constant temperature and pressure, for one mole of a pure substance, the ratio of the free energy to the chemical potential is _____?

- A. Zero
- B. One**
- C. Infinity
- D. Negative

Which of the following is the most suitable for very high pressure gas phase reaction ?

- A. Batch reactor
- B. Tubular flow reactor**

- C. Stirred tank reactor
- D. Fluidised bed reactor

Viscose rayon is _____?

- A. Cellulose nitrate
- B. Regenerated cellulose nitrate
- C. Regenerated cellulose acetate
- D. None of these**

In magnetic flow meters, voltage generation is _____?

- A. Due to the motion of conducting fluid through an externally generated uniform field
- B. Proportional to the fluid velocity
- C. Both A. and B.**
- D. Neither A. nor B.

Freundlich equation applies to the adsorption of solute from _____?

- A. Dilute solutions, over a small concentration range**
- B. Gaseous solutions at high pressure
- C. Concentrated solutions
- D. None of these

High speed cutting tool steels contain about _____ percent of tungsten?

- A. 6-8
- B. 18-20**
- C. 30-35
- D. 50-55

Permeability of bricks is a measure of the _____?

- A. Refractoriness
- B. Melting point
- C. Rate at which a fluid will pass through the pores**

D. Expansion during heating

Satellite is a _____ material?

- A. Ferrous
- B. Ceramic
- C. Cemented carbide
- D. Non-ferrous cast alloy cutting tool**

Width of the coke oven towards coke side is slightly more than that on pusher side to _____?

- A. Facilitate easy discharging of coke as it swells during carbonisation**
- B. Facilitate uniform heating of the oven
- C. Increase the output of the coke
- D. None of these

1 Pascal (unit of pressure) is equal to _____ N/m² ?

- A. 10
- B. 1**
- C. 0.1
- D. 1000

Electrical resistor bars are made of _____?

- A. Silicon carbide**
- B. Alumina
- C. Zirconia
- D. Graphite

A refrigeration cycle is a reversed heat engine. Which of the following has the maximum value of the co-efficient of performance (COP) for a given refrigeration effect ?

- A. Vapor compression cycle using expansion valve
- B. Air refrigeration cycle
- C. Vapor compression cycle using expansion engine

D. Carnot refrigeration cycle

Which of the following has the highest flash point of all ?

- A. Diesel
- B. Kerosene
- C. Petrol
- D. Furnace oil**

Which of the following is the costliest material of construction used in pressure vessel construction ?

- A. Low alloy steel
- B. Lead
- C. Titanium**
- D. High alloy steel

Removal of _____ heat is involved in the condensation of a vapor under saturated conditions?

- A. Super
- B. Sensible**
- C. Latent
- D. Both B. & C.

If „f’ is defined as above, then which of the following applies to a feed at dew point ?

- A. $f = 1$**
- B. $f > 1$
- D. $0 < f < 1$

The value of ‘angle of nip’ is generally about _____?

- A. 16°
- B. 32°**
- C. 52°
- D. 64°

Which of the following is not used as the ceramic material in „cermets“?

- A. Silicides
- B. Oxides
- C. Carbides
- D. Nitrides**

Tube wall thickness depends on the corrosiveness of the fluids and their operating pressure & temperature and is specified by Birmingham wire gauge (B.W.G)-a number which varies from 8 to 18 with the numbers 14 and 16 being more commonly used. Outside diameter of tubes varies from about 15 to 50 mm; however a tube of less than _____ mm outside diameter is generally not recommended for fouling fluids ?

- A. 16
- B. 19**
- C. 28
- D. 38

In case of surface condensers, a straight line is obtained on plotting $1/U$ vs. _____ on an ordinary graph paper?

- A. $1/\bar{V} - 0.8$**
- B. $\bar{V} - 0.8$
- C. $\bar{V} - 2$
- D. $1/\bar{V} - 2$

Pick out the wrong statement?

- A. If sufficient residence time (around 8 seconds) is not provided to the downcoming liquid in the downcomer, it may entrain some vapour
- B. The liquid head in the downcomer should not be greater than one half the plate spacing to avoid flooding

C. The discharge end of the downcomer must project far enough into the tray liquid so that no gas bubbles can enter the open end and by pass the bubble caps

D. None of these

Seamless pipe is made _____?

A. From rolled strips formed into cylinders and seam-welded

B. By extrusion & casting into static and centrifugal molds

C. By forging a solid round, piercing it by simultaneously rotating & forcing it over a piercer point and further reducing it by rolling gas drawing

D. Both B. and C.

Blast furnace gas is a very poisonous gas because of its predominantly high _____ content?

A. H₂O

B. CO₂

C. CO

D. CH₄

Builders are added in soap to act as _____?

A. Cleaning power booster

B. Anti-redeposition agent

C. Corrosion inhibitor

D. Fabric brightener

Power requirement of fans having constant wheel diameter varies _____ fan speed?

A. As square of

B. Directly as

C. As cube of

D. None of these

Use of 'grinding aids' is done in _____ grinding?

- A. Dry
- B. Wet
- C. Ultrafine
- D. Intermediate

In parallel pipe problems, the _____?

- A. Head loss is the same through each pipe**
- B. Discharge is the same through all the pipes
- C. Total head loss is equal to the sum of the head losses through each pipe
- D. None of these

Spherical shape of mercury droplets is due to its _____?

- A. High viscosity
- B. Low surface tension
- C. High density
- D. High surface tension**

In a drilling process, the metal is removed by both shearing & extrusion. General purpose drills are made of _____?

- A. Stainless steel
- B. Mild steel
- C. High speed steel**
- D. High carbon steel

Cermets are used for making _____?

- A. Cutting tools
- B. Abrasives
- C. Both A. & B.**
- D. Neither A. nor B

Pick out the Hagen-Poiseuille's equation ?

- A. $\Delta p/\rho = 4f (L/D) (V^2/2gc)$
- B. $\Delta p = 32 (\mu LV/gc. D^2)$**

- C. $\Delta p/L = 150 [(1 - \epsilon)/\epsilon^3] \cdot (\mu \cdot V_0 / g^2 c_D)$
D. $\Delta p/L = 1.75 [(1 - \epsilon)/\epsilon^3] \cdot (\rho V_0 / g c_{Dp})$

The most prominent single cause of corrosion in boiler-tubes, drums, economisers and steam superheaters in a thermal power plant boiler is the _____?

- A. Water alkalinity & leakage
B. Hydrazine addition during feed water treatment
C. Release of non-condensable gas from water in the boiler
D. Scale formation

Out of the following flow measuring devices, which one incurs the maximum installation cost as well as pressure loss ?

- A. Flow nozzle
B. Venturimeter
C. Rotameter
D. Orificemeter

Recycling back of outlet stream to the reactor from an ideal CSTR carrying out a first order liquid phase reaction will result in _____ in conversion?

- A. Decrease
B. Increase
C. No change
D. Either A. or B., depends on the type of reaction

Which of the following is used to produce draught in the locomotive boilers ?

- A. Chimney
B. Induced draught fan
C. Forced draught fan
D. Steam jet arrangement

Effective diffusivity (D_E) in a catalyst pellet is related to molecular diffusivity (D_N) and Knudsen diffusivity (D_K) as _____?

- A. $D_E = D_N + D_K$
- B. $1/D_E = 1/D_N + 1/D_K$**
- C. $D_E = D_N \cdot D_K$
- D. $D_E = D_N/D_K$

Which of the following is not a theory of homogeneous reaction ?

- A. Collision theory and activated complex theory
- B. Chain reaction theory
- C. Radiation hypothesis
- D. None of these**

Increasing the liquor level in the evaporator results in the _____?

- A. Decreased capacity**
- B. Increase in liquor film co-efficient
- C. Decreased effect of hydrostatic head
- D. Increased true temperature drop

_____ Centrifuge is normally used in sugar mills?

- A. Tubular bowl
- B. Disc-bowl
- C. Suspended batch basket**
- D. Perforated horizontal basket continuous

Triple superphosphate is made by reacting phosphate rock with _____ acid?

- A. Phosphoric**
- B. Nitric
- C. Sulphuric
- D. Hydrochloric

Which is the controlling factor for a drum drier ?

- A. Diffusion
- B. Heat transfer**
- C. Both A. and B.
- D. Neither A. nor B.

Screen capacity is expressed in terms of _____?

- A. tons/hr
- B. tons/ft²
- C. Both A. & B.
- D. tons/hr-ft²**

When the momentum of one fluid is used for moving another fluid, such a device is called a/an _____?

- A. Jet pump**
- B. Blower
- C. Acid egg
- D. None of these

Check in a centrifugal pump is _____?

- A. Provided in the discharge line
- B. Generally a globe valve
- C. Provided to prevent liquid from backing up through the pump when the pump is turned off or accidentally stops running
- D. All A., B. and C.**

In a shell and tube heat exchanger having triangular pitch, the shell side equivalent diameter is given by _____?

- A. $4(0.86P^2 - \pi d^2/4)/\pi d$**
- B. $(P^2 - \pi d^2/4)/\pi d$
- C. $4(0.86P^2 - \pi d^2)/\pi d$
- D. $(4P^2 + \pi d^2/4)/\pi d$

With increase in the density of silica refractories, its _____?

- A. Resistance to slag attack increases
- B. Spalling resistance reduces
- C. Both A. and B.**
- D. Neither A. nor B.

Ion exchange resins are made of _____?

- A. Lucite
- B. Sulphonated Bakelite**
- C. Polystyrene
- D. Teflon

Which of the following is an adsorbent used for the removal of SO₂ from gas/air ?

- A. Bog iron
- B. Limestone powder or alkalised alumina**
- C. Silica gel
- D. Active carbon

Pure ethanol vapor is fed to a reactor packed with alumina catalyst, at the rate of 100 kmole / hr. The reactor products comprise: ethylene: 95 kmole / hr, water vapour: 97.5 k mole / hr and diethyl ether: 2.5 kmole/hr. The reactions occurring can be represented by: $C_2H_5OH \rightarrow C_2H_4 + H_2O$ $2C_2H_5OH \rightarrow C_2H_5 - O - C_2H_5 + H_2O$ The percent conversion of ethanol in the reactor is _____?

- A. 100**
- B. 97.5
- C. 95
- D. 2.5

Which of the following is the most prone to atmospheric corrosion ?

- A. Silver

B. Iron

C. Tin

D. Copper

Which of the following is the softest material ?

A. Talc

B. Feldspar

C. Corundum

D. Calcite

Fillers such as zinc oxide and carbon black are added to the crude natural rubber before vulcanisation in order to improve its _____?

A. Elasticity

B. Strength

C. Plasticity

D. Weathering characteristics

Pick out the wrong statement ?

A. A catalyst does not alter the final position of equilibrium in a reversible reaction

B. A catalyst initiates a reaction

C. A catalyst is specific in reaction

D. A catalyst remains unchanged in chemical composition at the end the reaction

Pebble mills are tumbling mills widely used for grinding in the manufacture of paints & pigments and cosmetic industries, where iron contamination in the product is highly objectionable. Pebbles used in pebble mill are made of _____?

A. Bronze

B. Stainless steel

C. Flint or porcelain

D. Concrete

(Le/D) for couplings and unions would be _____?

- A. 60
- B. 200
- C. 350
- D. Negligible**

At very high concentration of enzymes, the rate of fermentation chemical reaction is _____ the concentration of reactants?

- A. Independent of**
- B. Directly proportional to
- C. Inversely proportional to
- D. Proportional to the square of

Out of the following processes of paper pulp manufacture, the maximum corrosion problem in digestion & handling equipments is encountered in the _____ process?

- A. Mechanical
- B. Sulphate/Kraft
- C. Sulphite
- D. Neutral sulphite semi-chemical**

An isolated system can exchange _____ with its surroundings?

- A. Matter
- B. Energy
- C. Neither matter nor energy**
- D. Both matter and energy

Compressibility factor of a gas is _____?

- A. Not a function of its pressure**
- B. Not a function of its nature
- C. Not a function of its temperature
- D. Unity, if it follows $PV = nRT$

The damage/deterioration of metals by the _____ action of fluids is called 'erosion'?

- A. Abrasive
- B. Corrosive
- C. Both A. & B.
- D. Neither A. nor B.

In case of a _____ reactor, the composition in the reactor and at the exit of the reactor is the same ?

- A. Semi-batch
- B. Tubular
- C. Batch
- D. Back-mix

Nickel (76%) and chromium (15%) alloys are termed as _____ ?

- A. Inconel
- B. Monel
- C. Aluminium bronzes
- D. Brass

Presence of sulphur in gasoline _____ ?

- A. Leads to corrosion
- B. Increases lead susceptibility
- C. Decreases gum formation
- D. Helps during stabilisation

The Killer gas which caused Bhopal gas tragedy in 1984 was _____ ?

- A. Phosgene
- B. Methyl isocyanate (MIC)
- C. Carbon monoxide
- D. Sulphur dioxide

LVDT used for displacement measurement is a/an _____
Transducer?

- A. **Passive**
- B. Active
- C. Capacitive
- D. None of these

Shell side heat transfer co-efficient in case of square pitch as compared to the triangular pitch under similar condition of fluid flow and tube size is _____?

- A. More
- B. Same
- C. **Less**
- D. Twice

The internal energy of a gas obeying $P(V - b) = RT$ (where, b is a positive constant and has a constant C_v), depends upon its _____?

- A. Pressure
- B. Volume
- C. **Temperature**
- D. All A, B. & C

Absorption of SO_3 in 97% H_2SO_4 is _____?

- A. **Exothermic**
- B. Endothermic
- C. Not possible
- D. None of these

For spheres, the surface shape factor is given by (where, A = area, V = volume, and D = diameter) ?

- A. **$\pi = (A/D^2)$**
- B. $\pi/6 = (V/D^3)$

- C. AD/V
- D. None of these

The minimum shell thickness for tank ≤ 15 metres diameter is limited to _____ mm, for reasons of elastic stability?

- A. 2
- B. 5**
- C. 10
- D. 15

_____ atmosphere is maintained inside an iron blast furnace?

- A. Oxidising
- B. Reducing**
- C. Inert
- D. Decarburising

Which of the following nitrogenous fertilisers has the highest percentage of nitrogen ?

- A. Calcium nitrate
- B. Calcium ammonium nitrate (CAN)
- C. Urea**
- D. Ammonium sulphate

jH factor for heat transfer depends upon the _____ number?

- A. Biot
- B. Nusselt
- C. Reynolds**
- D. Prandtl

Pore size of the molecular sieve 5A is _____ mm ?

- A. 5
- B. 0.5**
- C. 0.05

D. 50

Pitch (a product of coal tar distillation) is always mixed with creosote oil, when it is to be burnt in a burner, because _____?

- A. Its calorific value is very less
- B. Tar neutralises the residual acids present in pitch
- C. It reduces viscosity and imparts fluidity for its transportation through pipelines at economic pressure drop**
- D. All A, B. and C.

Ethylene oxide is produced by oxidation of ethylene in presence of AgO catalyst at _____?

- A. 1 atm & 100°C
- B. 5 atm & 275°C**
- C. 100 atm & 500°C
- D. 50 atm & 1000°C

Higher viscosity of lubricating oil usually signifies _____?

- A. Lower Reid vapour pressure
- B. Higher acid number
- C. Higher flash point and fire point**
- D. Lower flash point and fire point

The reaction $A \rightarrow B$ is conducted in an isothermal batch reactor. If the conversion of A increases linearly with holding time, then the order of the reaction is _____?

- A. 0**
- B. 1
- C. 1.5
- D. 2

The half life period of a first order reaction is given by (where, K = rate constant) ?

- A. $1.5 K$
- B. $2.5 K$
- C. $0.693/K$**
- D. $6.93 K$

Transition from laminar flow to turbulent flow is aided by the _____?

- A. Surface roughness and curvature (i.e. sharp corners)
- B. Vibration
- C. Pressure gradient and the compressibility of the flowing medium
- D. All A., B. & C.**

Which of the following crystal structures characterises the austenitic stainless steel ?

- A. Simple hexagonal
- B. Body centred cubic
- C. Face centred cubic**
- D. None of these

The reaction between oxygen and organic material is a/an _____ reaction?

- A. Exothermic**
- B. Endothermic
- C. Biochemical
- D. Photochemical

Dittus-Boelter equation cannot be used for molten metals mainly due to its very low _____?

- A. Prandtl number**
- B. Grashoff number

- C. Thermal conductivity
- D. Viscosity

Silicon carbide refractories have very low _____?

- A. Refractoriness (< 1700°C)
- B. Thermal conductivity
- C. Resistance to thermal shock
- D. None of these**

Water flow in the river during flood can be categorized as the _____ flow ?

- A. Unsteady uniform
- B. Unsteady non-uniform**
- C. Steady uniform
- D. Steady non-uniform

The process involved in converting rubber into a thin sheet or coating it on fabric is called _____?

- A. Extrusion
- B. Mastication
- C. Calendaring**
- D. Vulcanisation

Lower wall courses of soaking pits are made of _____ bricks to avoid the action of molten slag & scale?

- A. Chrome or magnesite**
- B. Silicon carbide
- C. Silica
- D. Low duty fireclay

Boundary layer separation occurs when the _____?

- A. Pressure reaches a minimum
- B. Cross-section of the channel is reduced**

- C. Valve is closed in a pipeline
- D. Velocity of sound is reached

If all the conditions and dimensions are same, then the ratio of velocity through the tubes of a double pass heat exchanger to that through the single pass heat exchanger is _____?

- A. 1
- B. 2**
- C. 1/2
- D. 4

The most serious manufacturing defect from fracture toughness point of view is _____?

- A. Surface roughness
- B. Pores
- C. Spherical inclusion
- D. Crack**

In extraction, as the temperature increases, the area of heterogeneity (area covered by binodal curve) _____?

- A. Decreases**
- B. Increases
- C. Remains unchanged
- D. None of these

Neoprene is rendered non-inflammable, because of _____?

- A. Its cross-linked structure
- B. Its linear chain structure
- C. The presence of chlorine atoms in its monomer**
- D. The absence of chlorine atoms in its monomer

Elastomers are _____?

- A. Thermosetting material
- B. Exemplified by protein derivatives
- C. Having high flexural strength**
- D. Having very high tensile strength and heat resistance

Internal energy of a substance comprises of the _____ energy?

- A. Vibrational
- B. Rotational
- C. Translational
- D. All A., B. & C.**

Henry's law states that the _____?

- A. Partial pressure of a component over a solution is proportional to its mole fraction in the liquid**
- B. Partial pressure of a component over a solution is proportional to the mole fraction in the vapour
- C. Vapour pressure is equal to the product of the mole fraction and total pressure
- D. Partial pressure is equal to the product of the mole fraction and total pressure

One face of a furnace wall is at 1030°C and the other face is exposed to room temperature (30°C). If the thermal conductivity of furnace wall is $3 \text{ W. m}^{-1} \cdot \text{k}^{-1}$ and the wall thickness is 0.3 m , the maximum heat loss (in W/m) is _____?

- A. 100
- B. 900
- C. 9000
- D. 10000**

Stereospecific agents are exemplified by _____?

- A. Radiation
- B. Supported metal oxide catalysts

C. Ziegler catalysts

D. All A , B. & C

The capacity of an accumulator is the maximum _____?

A. Energy which it can store

B. Discharge which it can deliver

C. Liquid which it can store

D. None of these

Maximum permissible limit of mercury in human blood is _____ micrograms/100 c.c?

A. 1

B. 7

C. 19

D. 82

The effect of increase in carbon dioxide level of the atmosphere and its profound effect on our climate is called the _____?

A. Catalytic conversion

B. Green house effect

C. Global warming

D. Both B. and C.

For a given design of bubble cap, the number of bubble caps to be used per tray is set by the _____?

A. Allowable gas velocity through the slots

B. Plate spacing

C. Diameter of the column

D. All A., B. and C.

Which of the following is the most suitable feed for platforming process (reforming) ?

A. Olefinic hydrocarbon

B. Naphtha

C. Fuel oil

D. Atmospheric residue

For a multi-component system, the term chemical potential is equivalent to the _____?

A. Molal concentration difference

B. Molar free energy

C. Partial molar free energy

D. Molar free energy change

Scale formation in boiler is controlled by _____?

A. Preheating of feed water

B. Reduction in hardness, silica & alumina in feed water

C. Keeping the pH value of feed water just below 7

D. Eliminating H₂S in feed water

_____ of grey cast iron produces white cast iron?

A. Tempering

B. Rapid heating

C. Rapid cooling

D. Slow cooling

Molecular diffusivity of a liquid _____?

A. Increases with temperature

B. Decreases with temperature

C. May increase or decrease with temperature

D. Is independent of temperature

_____ calorimeter is normally used for measuring the dryness fraction of steam, when it is very low?

A. Bucket

- B. Throttling
- C. Separating
- D. A combination of separating & throttling**

PCE value (Segar cone) of Superduty refractories is more than 33, which is equivalent to a temperature of _____ °C?

- A. 1520
- B. 1630
- C. 1670
- D. 1730**

Absolute viscosity of a fluid is a function of the _____ of the fluid?

- A. Motion
- B. Pressure & temperature
- C. Shearing stress
- D. Both B. & C.**

The discharge co-efficient for an orifice meter does not depend upon the _____?

- A. Pipe length**
- B. Ratio of pipe diameter to orifice diameter
- C. Type of orifice & the Reynolds number
- D. Pipe diameter

Reaction of ortho-phosphoric acid with phosphate rock produces _____?

- A. Superphosphate
- B. Triple superphosphate**
- C. Meta-phosphoric acid
- D. Monoammonium phosphate

The temperature at which a real gas obeys Boyle's law is termed as

the _____?

- A. Triple point
- B. Boyle's temperature**
- C. Eutectic point
- D. Inversion temperature

The maximum linear expansion of silica bricks during firing is about _____ percent?

- A. 0.5
- B. 1
- C. 2
- D. 3.5**

Wall thickness of schedule 40 pipe as compared to that of schedule 80 pipe is _____?

- A. More
- B. Less**
- C. Same
- D. Either A. or B.; depends upon the I.D. of the pipe

Pick out the wrong statement pertaining to nitric acid ?

- A. About 90% of nitric acid is manufactured by Ostwald's process
- B. It is a strong mono basic acid which reacts with almost all the metals except noble metals
- C. Yellow color of impure nitric acid is because of dissolved oxides of nitrogen (mainly NO₂)
- D. Arc process of nitric acid manufacture is economical as compared to Ostwald's process**

Refractory bricks having high thermal conductivity is desirable, when it is to be used in the _____?

- A. L.D. converter
- B. Blast furnace
- C. Rotary kiln
- D. Recuperator**

Thermoplastic resins are those polymers, which _____?

- A. Has decreased plasticity at increasing temperature
- B. Cannot be moulded
- C. Easily deform under pressure at high temperature**
- D. None of these

During size reduction by a jaw crusher, the energy consumed decreases with the _____?

- A. Decreasing size of product at constant size of feed
- B. Decreasing machine capacity
- C. Increasing size of feed at constant reduction ratio**
- D. None of these

In a homogeneous solution, the fugacity of a component depends upon the _____?

- A. Pressure
- B. Composition
- C. Temperature
- D. All (A), B. and (C)**

The porosity of a compressible cake is _____?

- A. Minimum at the filter medium**
- B. Minimum at the upstream face
- C. Maximum at the filter medium
- D. Same throughout the thickness of cake

During sensible cooling process _____?

- A. Relative humidity decreases
- B. Relative humidity increases
- C. Wet bulb temperature decreases
- D. Both B. and C.**

The thermal stress in a metallic bar does not depend upon

the _____?

- A. Changes in temperature
- B. Cross-sectional area**
- C. Both A. and B.
- D. Neither A. nor B.

_____ is a non volatile film forming constituent of a paint ?

- A. Thinner
- B. Dryer
- C. Drying oil**
- D. None of these

In a cylindrical vessel subjected to internal pressure, the longitudinal stress ζ_L and the circumferential stress, ζ_h are related by _____?

- A. $\zeta_h = 2 \zeta_L$**
- B. $\zeta_h = \zeta_L$
- C. $\zeta_h = \zeta_L/2$
- D. No relation exists

Kopper-Totzek coal gasifier _____?

- A. Can give ammonia synthesis gas ($H_2 + N_2$)**
- B. Is a moving bed reactor
- C. Cannot use coking coal
- D. Operate at very high pressure

Main product in calcium carbide-water reaction is _____?

- A. $Ca(OH)_2$
- B. C_2H_2**
- C. CO_2
- D. $CaCO_3$

Heat of reaction is not influenced by _____?

- A. The route/method through which final products are obtained**

- B. The physical state (e.g., solid, liquid or gaseous) of reactants and products
- C. Whether the reaction is carried out at constant temperature or constant pressure
- D. None of these

Acceleration head in a reciprocating pump _____?

- A. Increases the work done during delivery stroke
- B. Decreases the work done during suction stroke
- C. Does not change the work requirement of the pump**
- D. Increases the work done during suction stroke

Out of the following, the lowest packing of atoms exists in _____ crystal lattice structure?

- A. Hexagonal close, packed (hcp)
- B. Face centred cubic (fcc)
- C. Body centred cubic (bcc)
- D. Simple cubic**

Faster rate of drying of moulded refractories results in high _____ of refractories?

- A. Green strength
- B. Voids
- C. Shrinkage
- D. Both B. and C.**

The type of bacteria which is active in trickling filter during biological treatment of sewage is the _____ bacteria?

- A. Anaerobic
- B. Saprophytic
- C. Aerobic**
- D. Parasitic

The thermal efficiency of a steel slab reheating furnace (walking beam type)

may be about _____ percent?

- A. 15
- B. 40**
- C. 70
- D. 85

Presence of _____ in water stream are deleterious to aquatic life?

- A. Soluble and toxic organics
- B. Suspended solids
- C. Heavy metals and cyanides
- D. All A., B. & C.**

Which of the following comprises of hydrocarbons ?

- A. Mica flakes
- B. Glass
- C. Rubber**
- D. None of these

The difficulty of liquid distribution in packed towers is accentuated, when the ratio of tower diameter to packing diameter is _____?

- A. < 30
- B. < 7**
- C. > 7 $20 < 50$

The friction factor for turbulent flow in a hydraulically smooth pipe _____?

- A. Depends only on Reynolds number**
- B. Does not depend on Reynolds number
- C. Depends on the roughness
- D. None of these

Degree of freedom for leaching and solvent extraction process

is _____?

- A. 0
- B. 1
- C. 2
- D. 3**

1st law of thermodynamics is nothing but the law of conservation of _____?

- A. Momentum
- B. Mass
- C. Energy**
- D. None of these

_____ moulding process cannot be used for thermoplastic plastics?

- A. Compression
- B. Extrusion
- C. Injection**
- D. None of these

High pressure coal gasification is employed in _____ process?

- A. Lurgi**
- B. Kopper-Totzek
- C. Winkler
- D. None of these

Gibbs free energy per mole for a pure substance is equal to the _____?

- A. Latent heat of vaporisation
- B. Chemical potential**
- C. Molal boiling point
- D. Heat capacity

Fanning friction factor equation applies to the _____ fluid flow?

- A. Non-isothermal condition of
- B. Compressible
- C. Both A. and B.
- D. Neither A. nor B.**

The cooling effect in a cooling tower cannot be increased by _____?

- A. Increasing the air velocity over the wet surfaces
- B. Reducing the humidity of entering air
- C. Lowering the barometric pressure
- D. None of these**

For a tubular flow reactor with uniform concentration and temperature, the independent variable is _____?

- A. Time
- B. Length**
- C. Diameter
- D. None of these

S.T.P. corresponds to _____?

- A. 1 atm. absolute pressure & 15.5°C**
- B. 760 mm Hg gauge pressure & 15.5°C
- C. 760 torr & 0°C
- D. 101.325 kPa gauge pressure & 15.5°C

During manufacture of H_2SO_4 , the oxidation of SO_2 to SO_3 by oxygen is an endothermic reaction. The yield of SO_3 will be maximised, if the _____?

- A. Temperature is increased
- B. Pressure is reduced
- C. Temperature is increased and pressure is reduced
- D. Temperature is reduced and pressure is increased**

Wind load consideration in the design of a support can be neglected, when the vessel is _____?

- A. Tall (say 30 metres), but is full of liquid
- B. Tall but empty
- C. Short (< 2 m) and housed indoor**
- D. None of these

The starting material used for the manufacture of caprolactam is _____?

- A. Ethyl benzene
- B. Cyclohexane**
- C. Ethylene glycol
- D. DMT

An improved and fuel efficient version of the pusher type reheating furnace is the _____ furnace?

- A. Walking beam**
- B. Shaft
- C. Tunnel
- D. Rotary hearth

Caprolactam (a raw material for nylon-6 manufacture) is produced from _____?

- A. Phenol
- B. Naphthalene
- C. Benzene**
- D. Pyridine

Work done in case of free expansion is _____?

- A. Indeterminate
- B. Zero**
- C. Negative

D. None of these

Maximum consumption of zinc is in _____?

- A. Alloying
- B. Galvanising**
- C. Utensil manufacture
- D. Electrical industry

Pick out the wrong statement?

- A. Orifice baffles are never used in a shell and tube heat exchanger**
- B. Pressure drop on the shell side of a heat exchanger depends upon tube pitch also
- C. In a horizontal tube evaporator, surface blanketing by air is avoided
- D. Split ring type and pull through type floating heads are two commonly used floating heads is heat exchangers

Isotopes are atoms having the same _____?

- A. Mass number
- B. Number of neutrons
- C. Atomic mass
- D. None of these**

Babbitt metal (used for making bearings) comprises of _____?

- A. Mainly tin (85%) and lead**
- B. Saw dust and iron dust mixture
- C. Zinc and aluminium
- D. Copper and aluminium

Which of the following is the most widely used insulating material for steam carrying pipelines ?

- A. Ceramic fibre blanket
- B. Glass wool and 85% magnesia**
- C. Vermiculite

D. Slag wool

Silicone is a/an _____?

- A. Thermoplastic
- B. Inorganic polymer**
- C. Monomer
- D. None of these

Lessing ring is formed by the addition of a partition across the centre of a raschig ring, which results in an area increase of about _____ percent?

- A. 5
- B. 20**
- C. 35
- D. 55

Which of the following stainless steels is non-magnetic ?

- A. Ferritic
- B. Martenistic
- C. Austenitic**
- D. None of these

Paper industry employs _____ driers ?

- A. Cylinder**
- B. Rotary
- C. Spray
- D. Fluidised bed

Drying operation under vacuum is carried out to _____?

- A. Dry those materials which have very high unbound moisture content
- B. Reduce drying temperature**
- C. Increase drying temperature
- D. Dry materials having high bound moisture content

Ceramic materials fabrication cannot be done by _____?

- A. **Welding**
- B. Slip casting
- C. Extrusion
- D. Plastic pressing

_____ the exhaust gas is an indication of the incomplete combustion of fuel?

- A. Low temperature of
- B. High temperature of
- C. **High % of CO in**
- D. High % of CO₂ in

Pick out the correct statement?

- A. Like internal energy and enthalpy, the absolute value of standard entropy for elementary substances is zero
- B. Melting of ice involves increase in enthalpy and a decrease in randomness
- C. The internal energy of an ideal gas depends only on its pressure
- D. **Maximum work is done under reversible conditions**

Galvanising (i.e., zinc coating) of steel sheets is done to _____?

- A. Prevent its rusting by contact with corrosive atmosphere
- B. Protect the base metal by cathodic protection
- C. **Both A. & B.**
- D. Neither A. nor B.

For a first order chemical reaction, the rate constant _____?

- A. Changes on changing the concentration units
- B. Is not a function of the unit of time
- C. **Has unit of time⁻¹**
- D. None of these

“Break-even point” is the point of intersection of _____?

- A. Fixed cost and total cost
- B. Total cost and sales revenue**
- C. Fixed cost and sales revenue
- D. None of these

Electric bulbs are made of _____ glass ?

- A. Jena
- B. Flint**
- C. Crookes
- D. Pyrex

In an extended surface heat exchanger, fluid having lower co-efficient _____?

- A. Flows through the tube
- B. Flows outside the tubes**
- C. Can flow either inside or outside the tubes
- D. Should not be used as it gives very high pressure drop

Favourable conditions for the liquefaction of gases in general are _____?

- A. High pressure & low temperature**
- B. Low pressure & high temperature
- C. High pressure & high temperature
- D. Low pressure & low temperature

B.E.T. method of finding out surface area of a catalyst, uses the extension of _____ isotherm?

- A. Langmuir**
- B. Freundlich
- C. Tempkin
- D. None of these

If n = overall order of a chemical reaction. a = initial concentration of reactant. t = time required to complete a definite fraction of the reaction. Then pick out the correct relationship ?

- A. $t \propto 1/an$
- B. $t \propto 1/an - 1$**
- C. $t \propto 1/an + 1$
- D. $t \propto an$

The feed to fractionating column is changed from saturated vapour to saturated liquid. If the separation and reflux ratio remains unchanged, the number of ideal stages will _____ ?

- A. Increase**
- B. Decrease
- C. Remain same
- D. Depend on saturated boiling point; may increase or decrease

Pick out the undesirable property for a good refrigerant ?

- A. High thermal conductivity
- B. Low freezing point
- C. Large latent heat of vaporisation
- D. High viscosity**

A/an _____ is used for changing the direction of a pipeline?

- A. Elbow**
- B. Union
- C. Flange
- D. Disc compensator

L.D. (Linz-Donawitz) converter is used in the production of _____ ?

- A. Copper

B. Steel

C. Zinc

D. Aluminium

Consider an ideal solution of components A and B. The entropy of mixing per mole of an alloy containing 50% B is _____?

A. $R \ln 2$

B. $-R \ln 2$

C. $3 R \ln 2$

D. $-3R \ln 2$

For an ideal solution, the value of activity co-efficient is _____?

A. 0

B. 1

C. 1

The function of an economiser in a boiler is to preheat the _____?

A. Feedwater

B. Combustion air

C. Pulverised coal

D. Furnace oil

Which of the following is followed by an ideal solution ?

A. Boyle's law

B. Amagat's law

C. Raoult's law

D. Trouton's rule

B.E.T. method can be used to determine the _____ of a porous catalyst?

- A. Solid density
- B. Pore volume
- C. Surface area**
- D. All A., B. and C.

The conversion in a mixed reactor/accomplishing a reaction $A \rightarrow 3R$ is 50% when gaseous reactant 'A' is introduced at the rate of 1 litre/second and the leaving flow rate is 2 litres/second. The holding time for this operation is

_____ second?

- A. 0.5**
- B. 1
- C. 2
- D. 3

_____ joint is mostly used for joining pipes carrying water at low pressure ?

- A. Nipple
- B. Socket**
- C. Union
- D. Bell and spigot

A present sum of Rs. 100 at the end of one year, with half yearly rate of interest at 10%, will be Rs ?

- A. 121**
- B. 110
- C. 97
- D. 91

Trinitro-toluene (TNT) is _____ ?

- A. Used in glycerine manufacture
- B. An explosive**
- C. Used in dye manufacture

D. None of these

Size reduction mechanism used in Jaw crushers is _____?

A. Attrition

B. Compression

C. Cutting

D. Impact

Remote control valve is a _____ valve?

A. Gate

B. Butterfly

C. Needle

D. Globe

Fine grained steels have _____?

A. High brittleness

B. Higher tendency to distort

C. High ductility

D. None of these

For a stable equilibrium of a submerged body (where, G and B are centres of gravity & buoyancy respectively) ?

A. G is above B

B. B is above G

C. B & G coincide

D. None of these

Any substance above its critical temperature exists as _____?

A. Saturated vapour

B. Solid

C. Gas

D. Liquid

Humidity chart is useful for the solution of problems concerning condensation, vaporisation and air conditioning. At a given dry bulb temperature, value of humidity obtained from the humidity chart directly, is in terms of _____ humidity?

- A. Molal
- B. Relative
- C. Percentage
- D. None of these

Fireclay bricks are used in the _____?

- A. Coke ovens regenerator
- B. Outer lining of L.D. converter
- C. Hearth bottom of blast furnace
- D. Coke oven walls

Overall heat transfer co-efficient for cooling of hydrocarbons by water is about _____?

- A. 50 -100 Kcal/hr.m².°C
- B. 50 -100 W/m².°K
- C. 50 -100 BTU/hr. ft.²F
- D. 1000 – 1500 BTU/hr. ft.²F

Trommels separate a mixture of particles depending on their _____?

- A. Size
- B. Density
- C. Wettability
- D. Electrical & magnetic properties

H₂S is being absorbed in a gas absorber unit. The height of the transfer unit based on the overall mass transfer coefficient on the gas side is 0.4 m. The

equilibrium data is given by, $y = 1.5x$. The bulk concentration of H_2S has to be reduced from 0.05 to 0.001 mole fraction in the gas side. The height of the tower (in meters) corresponding to an operating line given by, $y = 5x + 0.001$ is _____?

- A. 2.0
- B. 1.56
- C. 1.0
- D. 0.56

Grizzlies are used for separating _____ solids?

- A. Coarse
- B. Fine
- C. Any size
- D. None of these

To avoid the tearing off the plate of an edge, the margin (i.e., the minimum distance from the centre of the rivet hole to the nearest edge of the plate) should be equal to _____?

- A. 0.5 d
- B. d
- C. 1.5 d
- D. 2.5 d

Which is the correct relationship for a centrifugal pump? (Where, D = Impeller diameter, inches H = Head developed, ft of liquid pumped N = Speed of pump, rpm) ?

- A. $D = 1840 H^{0.5}/N$
- B. $D = 1840 N/H^{0.5}$
- C. $H = 1840 D^{0.5}/N$
- D. $D = 1840 H/N$

Which of the following is used to set the diameter of the distillation column ?

- A. Number of theoretical plates
- B. Static submergence
- C. Allowable vapour velocity**
- D. Length of straight rectangular weir on cross-flow tray

If the pore diffusion controls in a catalytic reaction, the apparent activation energy E_a is equal to _____?

- A. The intrinsic activation energy E
- B. $(E + E_D)$ where E_D is activation due to diffusion
- C. $(E + E_D)/2$
- D. $E_D/2$**

Vacuum filter is most suitable for the _____?

- A. Removal of fines from liquid
- B. Liquids having high vapour pressure
- C. Liquids of very high viscosity
- D. None of these**

_____ liquor is best handled in a long tube vertical evaporator?

- A. Foamy**
- B. Scaling
- C. Viscous
- D. Salting

Liners of a ball mill are never made of _____?

- A. Lead**
- B. Alloy steel
- C. Rubber or ceramic material
- D. Cast iron

One mole feed of a binary mixture of a given composition is flash vaporised at a fixed P and T . If Raoult's law is obeyed, then changing the feed composition would effect ?

- A. The product composition but not the fraction vaporised
- B. The product composition as well as the fraction vaporised
- C. The fraction vaporised but not the product composition**
- D. Neither the product composition nor the fraction vaporised

The variation of heat of reaction with temperature at constant pressure is given by the _____ law?

- A. Kelvin's
- B. Antoine's
- C. Kirchoff's**
- D. None of these

Pick out the wrong statement ?

- A. Pasteurisation of milk involves moderate heating followed by cooling
- B. Bakeries and breweries make use of yeasts
- C. Enzyme is a complex nitrogenous compound
- D. Oils and fats are alkaloids**

As per Gilliland's equation, the diffusivity is _____?

- A. Directly proportional to 'T^{1.5}'
- B. Inversely proportional to 'P'
- C. Dependent on the molecular volume & molecular weight of components
- D. All A , B. & C.**

The distance between the top of the slots and the liquid surface when the static liquid is just ready to flow over the overflow weir is called _____?

- A. Downcomer liquid seal
- B. Static submergence**
- C. Skirt clearance
- D. None of these

Thermosetting plastic materials _____?

- A. Can be repeatedly melted
- B. Is useful for melt casting
- C. Cannot be melted after forming**
- D. Is useful for spinning

The gas law ($PV = RT$) is true for an _____ change?

- A. Isothermal
- B. Adiabatic
- C. Both A. & B**
- D. Neither A. nor B

A multiple effect evaporator has a capacity to process 4000 kg of solid caustic soda per day, when it is concentrating from 10% to 25% solids. The water evaporated in kg per day is _____?

- A. 6000
- B. 24000**
- C. 60000
- D. 48000

Which of the following parameters is not responsible for the heat loss from a hot steam carrying bare pipe surface located in a room without fans ?

- A. Emissivity of pipe surface
- B. Diameter & length of the pipe
- C. Temperature of hot pipe surface & that of air in the room
- D. None of these**

Which of the following has the lowest cetane number ?

- A. Aromatics**
- B. i-paraffins
- C. Naphthene
- D. Olefins

Bulk of the convective heat transfer resistance from a hot tube surface to the

fluid flowing in it, is _____?

- A. In the central core of the fluid
- B. Uniformly distributed throughout the fluid
- C. Mainly confined to a thin film of fluid near the surface**
- D. None of these

Mercury is transported in metal containers made of _____?

- A. Aluminium
- B. Iron**
- C. Lead
- D. Nickel

Which of the following combustibles is absent in blast furnace gas ?

- A. H₂
- B. CH₄**
- C. CO
- D. None of these

Viscose rayon is chemically _____?

- A. Cellulose nitrate
- B. Regenerated cellulose nitrate
- C. Cellulose acetate
- D. Regenerated cellulose acetate**

Acidity or alkalinity of a solution is expressed by its pH value, which is defined as (where, [H⁺] = hydrogen ion concentration in the solution) ?

- A. $\log (1/H^+)$**
- B. $-\log (1/H^+)$
- C. $1/\log H^+$
- D. None of these

Air vessel provided in a reciprocating pump _____?

- A. Smoothens the flow by avoiding pulsations

- B. Increases the volumetric efficiency of the pump
- C. Saves the pump from the danger of cavitation
- D. None of these**

Anodic material used for the cathodic protection of underground buried steel pipeline is _____?

- A. Nickel or copper
- B. Zinc or magnesium**
- C. Bronze
- D. Brass

Which equation is not an equation of state ?

- A. $PV = RT + B/V + \gamma/V^2 + \dots$
- B. $(P + a/V^2)(V-b) = RT$
- C. $\log_e (p/p_0) = (\lambda/R) (1/T_0 - 1/T)$**
- D. $p = [RT/(V - b)] - (a/TV^2)$

When the solvent dissolves very little of solute, then _____?

- A. Solvent of low latent heat of vaporisation should be used
- B. Solvent of low freezing point should be used
- C. Large quantity of solvent is required to extract the solute**
- D. Very small quantity of solvent is required

In McCabe-Thiele method, at infinite reflux ratio _____?

- A. The overhead product is minimum**
- B. Both the operating lines coincide with diagonal
- C. Both A. and B.
- D. Neither A. nor B.

Caustic soda is produced in a mercury cell having anode and cathode made respectively of moving mercury and _____?

- A. Moving mercury and graphite

B. Graphite and moving mercury

- C. Moving mercury and carbon
- D. Moving mercury and crimped steel wire

Magnesite bricks are used in those parts of furnaces, which are _____?

- A. Subjected to temperature fluctuation
- B. Required to resist corrosive basic slag**
- C. Subjected to high load
- D. None of these

Pick out the correct statement ?

- A. Heat of solution is always positive
- B. At equilibrium, ΔG is zero**
- C. For the reaction, $\text{PCl}_5 \rightleftharpoons \text{PCl}_3 + \text{Cl}_2$, ΔG is less than ΔE
- D. The heating of water in a beaker is an example of an isolated system

In case of _____ boiling, the bubbles formed on a submerged hot surface get absorbed in the mass of the liquid?

- A. Nucleate
- B. Pool**
- C. Low pressure
- D. None of these

pH value of H_2SO_4 (5% concentration) is _____?

- A. 5
- B. 7
- C. > 7
- D. < 7**

Choke crushing (in case of a Jaw crusher) compared to free crushing _____?

- A. Results in increased capacity

- B. Consumes less power
- C. Consumes more power**
- D. Both A. and C.

Discharge from a 24 inch pipe of water at 10 ft/sec will be _____
ft³/sec?

- A. 7.65
- B. 32.36
- C. 48.22
- D. 125.6**

To remove all the moisture from a wet solid it requires exposure to
_____ air?

- A. Perfectly dry**
- B. Highly humid
- C. High temperature
- D. None of these

Which of the following polymers is used for making a non stick coating on frying
pans ?

- A. Bakelite
- B. Teflon**
- C. Perspex
- D. PVC

In case of a revolving mill, wet grinding compared to dry
grinding _____?

- A. Requires more energy
- B. Has less capacity
- C. Complicates handling & classification of the product
- D. None of these**

Heat transfer takes place through a liquid medium surrounding the submerged material under heating, in case of a/an _____?

- A. Blast furnace
- B. Steam boiler
- C. Salt bath furnace**
- D. Annealing furnace

In an operating distillation column, the _____?

- A. Vapors and liquids are at their dew point and bubble point respectively
- B. Driving force for the liquid flow is its specific weight
- C. Driving force for the vapor flow is the pressure drop, as the pressure decreases gradually from the bottom to the top of the column**
- D. Highest temperature is encountered at the top of the column

A shell may be termed as thin if its thickness to diameter ratio is less than 0.1. The factor which can be neglected in the calculation of membrane stresses is _____?

- A. Bending**
- B. Deformation
- C. Shear
- D. Elongation

A rigid vessel containing three moles of nitrogen gas at 30°C is heated to 250°C . Assume the average capacities of nitrogen to be $C_p = 29.1 \text{ J/mole}^{\circ}\text{C}$ and, $C_v = 20.8 \text{ J/mole}^{\circ}\text{C}$. The heat required, neglecting the heat capacity of the vessel, is _____?

- A. 13728 J
- B. 19206 J**
- C. 4576 J
- D. 12712 J

Pick out the wrong statement pertaining to the cooling towers ?

- A. In case of induced draft cooling tower, the fan is placed at the top of the tower
- B. Effectiveness of forced draft cooling tower is reduced by the recirculation of the humid and hot discharged air
- C. A natural draft cooling tower is recommended to be used, when the air humidity is low and air temperature is also low
- D. Effectiveness of a mechanical draft cooling tower is reduced with increase in air wet-bulb temperature**

The wet and 'dry bulb temperature for a vapour-gas mixture are 25°C and 30°C respectively. If the mixture is heated to 45°C at constant pressure, the wet bulb temperature will be _____ $^{\circ}\text{C}$?

- A. 25
- B. > 25**
- C. < 25
- D. - 25

Ammonia present in the coke oven gas is removed by washing with _____ ?

- A. Caustic solution
- B. Dilute ammoniacal liquor**
- C. Dilute HCl
- D. Ethanolamine

The kinetic energy of gas molecule is zero at _____ ?

- A. 0°C
- B. 273°C
- C. 100°C
- D. -273°C**

Compressive strength of wood is usually more along the grains. The tensile strength of wood as compared to that of steel is about _____?

- A. Half
- B. One third
- C. One fifth**
- D. One twelfth

Which brick undergoes maximum shrinkage on drying ?

- A. Tar bonded dolomite bricks
- B. Fireclay bricks**
- C. Magnesite bricks
- D. Chromite bricks

The combustion reaction, $C + O_2 = CO_2$, is _____?

- A. Exothermic**
- B. Endothermic
- C. Autocatalytic
- D. None of these

Zircon refractories have _____?

- A. Low co-efficient of expansion
- B. High RUL (1600°C) and refractoriness (> 2000°C)
- C. High spalling resistance
- D. All A., B. and C.**

Which of the following equipments is used for liquid dispersion ?

- A. Packed column
- B. Venturi scrubber**
- C. Bubble cap plate column
- D. Wetted wall column

The critical speed of a trommel (N) is related to its dia D. as _____?

- A. $N \propto 1/\sqrt{D}$
- B. $N \propto \sqrt{D}$
- C. $N \propto D$
- D. $N \propto 1/D$

Maximum permissible sulphur content in steel is _____ percent?

- A. 0.015
- B. 0.055**
- C. 0.505
- D. 0.805

The terminal velocity of a particle moving through a fluid varies as dp^n . What is the value of n for Newton's law regime ?

- A. 0.5**
- B. 1
- C. 1.5
- D. 3

Pick out the wrong statement ?

- A. The condensing film co-efficient is about 3 times lower for vertical condenser as compared to the equivalent horizontal condenser for identical situation
- B. Film co-efficient for vaporisation decreases as a result of vapor binding
- C. In industrial practice, sub-cooling of condensate is required, when the condensate is a volatile liquid and is to be transferred for storage
- D. Overall heat transfer co-efficient in a heat exchanger is controlled by the value of the film coefficient, which is higher**

Smaller sized packings are generally dumped to the packed columns, and the large ones of size greater than _____ mm are stacked individually, which provides better control over bed porosity and offers lower gas pressure drop?

- A. 25
- B. 50
- C. 75**
- D. 150

When pressure is applied on the system, ice \leftrightarrow water, then _____?

- A. Equilibrium cannot be established
- B. More ice will be formed
- C. More water will be formed**
- D. Evaporation of water will take place

The solvent used in Barisol dewaxing process is _____?

- A. Hexane
- B. Furfural
- C. Benzol and ethylene dichloride**
- D. Methyl ethyl ketone (MEK)

With increase in impurities in metals, their corrosion resistances _____?

- A. Increase
- B. Decrease**
- C. Remain same
- D. May increase or decrease; depending on the type of metal

Biological oxidation ponds remove organic matters present in the polluted water by _____?

- A. Using the activities of bacteria and other micro organisms
- B. Aerobic oxidation
- C. Both A. & B.**
- D. Neither A. nor B.

-10-5 fertilisers mean that they contain _____?

A. 5, 10, 5% respectively of N₂, P₂O₅ and K₂O

B. Only 5 to 10% active fertiliser constituents

At triple point (for one component system), vapour pressure of solid as compared to that of liquid will be _____?

A. More

B. Less

C. Same

D. More or less; depending on the system

_____ determination is not a very significant and important test for gasoline?

A. Gum & sulphur content

B. Viscosity

C. Octane number

D. Reid vapor pressure

Gun powder, which is an explosive comprises of charcoal, sulphur and _____?

A. Glycerine

B. Salt petre

C. Nitro glycerine

D. Dynamite

Nusselt number is a function of Prandtl number and _____ number of fluid in natural convection heat transfer?

A. Grashoff

B. Biot

C. Stanton

D. Reynolds

An investment of Rs. 1000 is carrying an interest of 10% compounded quarterly.

The value of the investment at the end of five years will be _____?

- A. **1000 (1 + 0.1/4)²⁰**
- B. 1000 (1 + 0.1)²⁰
- C. 1000 (1 + 0.1/4)⁵
- D. 1000 (1 + 0.1/2)⁵

For a packed bed reactor; the presence of a long tail in the residence time distribution curve is an indication of ?

- A. Ideal plug flow
- B. Bypass
- C. **Dead zone**
- D. Channelling

The best method of determining sulphur in crude oil is by the _____ method?

- A. Kjeldahl
- B. Dumas
- C. **Bomb calorimeter**
- D. Junkers calorimeter

With increase in temperature, the rate constant obeying Arrhenius equation _____?

- A. Increases
- B. Decreases
- C. **Decreases exponentially**
- D. Can either increase or decrease; depends on the frequency factor

Amino resins are used in paper treatment to improve its _____?

- A. Wet tear and bursting strength
- B. Folding endurance
- C. Wet rub resistance
- D. **All A., B. & C.**

When the _____ the relative humidity of air decreases, despite an increase in the absolute humidity?

- A. Temperature rises
- B. Pressure rises
- C. Temperature falls
- D. Pressure falls

Translational kinetic energy of molecules of an ideal gas is proportional to (where, T = absolute temperature of the gas) _____?

- A. T
- B. \sqrt{T}
- C. T^2
- D. $1/\sqrt{T}$

Which of the following ratios defines the recycle ratio in a chemical process ?

- A. Gross feed stream/recycle feed stream
- B. **Recycle stream/fresh feed stream**
- C. Recycle stream/gross feed stream
- D. None of these

Zirconia probe is used for the continuous measurement of _____ flue gases going out of the furnace?

- A. **Oxygen in**
- B. Carbon dioxide in
- C. Carbon monoxide in
- D. Temperature of

Which of the following quantities are computed by using the hydraulic radius for noncircular ducts ?

- A. Velocity and relative roughness
- B. Head loss and velocity
- C. **Reynold number, relative roughness and head loss**

D. Reynolds number and friction factor

Mesh indicates the number of holes per _____?

- A. Square inch
- B. Linear inch**
- C. Square foot
- D. Linear foot

With increase in temperature drop (in a shell and tube heat exchanger), the LMTD correction factor, FT _____?

- A. Decreases very rapidly**
- B. Increases very rapidly
- C. Remains constant
- D. Increases linearly

Which one is the rate controlling step in a solid-gas non-catalytic reaction occurring at very high temperature ?

- A. Pore diffusion
- B. Film diffusion**
- C. Ash layer diffusion
- D. Chemical reaction

Which of the following resistances is not involved in a gas phase catalytic (gas-solid) reaction ?

- A. Ash resistance**
- B. Gas film and pore surface diffusion resistances for reactants
- C. Surface phenomenon resistance
- D. Gas film and pore surface diffusion resistances for products

In low temperature carbonisation of coal, the _____?

- A. Yield of coke oven gas is 290 Nm³ /ton dry coal
- B. Volatile matter in coke is zero
- C. Temperature maintained is 700°C**

D. Yield of tar is about 3% of dry coal

The stress at which extension of the material takes place more rapidly as compared to the increase in load is termed as the _____ point of the material?

- A. Elastic
- B. Ultimate
- C. Yielding**
- D. Breaking

The distance between the centres of a rivet hole to the nearest edge of the plate is called _____?

- A. Pitch
- B. Margin**
- C. Back pitch
- D. None of these

Alkyd resin e.g., glyptal resin formed by Phthalic anhydride and glycerine is not used _____?

- A. For surface coating of automobiles & air crafts
- B. For fibre making**
- C. As plasticiser for PVC & nitrocellulose
- D. For film forming materials

Wood charcoal is obtained by the destructive distillation of wood. It is used in the production of activated carbon, which is not used for the _____?

- A. Decolourisation of sugar
- B. Solvent recovery from air and gases
- C. Absorption of gases and vapor
- D. Electrode manufacture**

In case of absorption, both the operating and equilibrium lines will be straight for _____?

- A. Isothermal operation
- B. Dilute solutions
- C. Dilute solutions and isothermal operation**
- D. None of these

In actual operation of a bubble cap distillation tower, the _____ at the bottom of the tower is more than that at the top of the tower?

- A. Molal flow rate of vapour
- B. Vapour molecular weight
- C. Pressure and temperature
- D. All A., B. and C.**

Lower temperature and large excess of ammonia in urea melt _____?

- A. Increases biuret formation
- B. Decreases biuret formation**
- C. Is undesirable
- D. Does not effect biuret formation

Which of the following is the most controlling factor for the rate of bubble detachment from the hot solid surface ?

- A. Liquid density
- B. Liquid viscosity
- C. Hot surface temperature
- D. Interfacial tension**

Oxygen required for theoretically complete combustion of 1 Nm³ methane is _____ Nm³?

- A. 2**
- B. 4

- C. 6
- D. 1

If the time required to change the concentration of reactant to half its original value is independent of the initial concentration, the order of reaction is _____?

- A. Zero
- B. One**
- C. Two
- D. Three

Friction factor for turbulent flow in a new pipe is given by _____?

- A. $f = 16/NRe$
- B. $f = 0.04/(NRe)^{0.16}$**
- C. $f = 0.22 NRe^{0.5}$
- D. $f = 25/NRe$

Which of the following has the highest gum forming tendency in gasoline ?

- A. Paraffins
- B. Diolefins**
- C. Aromatics
- D. Naphthenes

A solution which resists change in its pH value on addition of acid/alkali is called the _____ solution?

- A. Neutral
- B. Ideal
- C. Buffer**
- D. Zero pH

Mass transfer co-efficient is directly proportional to DAB according to the _____ theory?

- A. Film
- B. Penetration
- C. Surface-renewal
- D. None of these

A Catalyst _____?

- A. Increases the equilibrium concentration of the product
- B. Changes the equilibrium constant of the reaction
- C. Shortens the time to reach the equilibrium
- D. None of these

In a co-polymer, the repeating units contain two different monomers. Which of the following is a copolymer ?

- A. PTFE
- B. Buna-S
- C. PMMA
- D. Polycaprolactam

With increases in pressure, the conversion of Ammonium carbamate into urea _____?

- A. Increases
- B. Decreases
- C. Remains unaltered
- D. Can either increase or decrease depends on biuret content

Plate efficiency in a distillation column is reduced due to the _____ of liquid?

- A. Entrainment
- B. Foaming
- C. Weeping & dumping

D. All A., B. & C.

The ratio of shear stress to shear strain is called _____?

- A. Bulk modulus
- B. Shear modulus**
- C. Modulus of rigidity
- D. Modulus of elasticity

The main constituent of carborundum is _____ carbide?

- A. Calcium
- B. Silicon**
- C. Boron
- D. Aluminium

The maximum percentage of CO₂ in a flue gas (from a carbonaceous fuel) can be _____?

- A. 21**
- B. 77
- C. 79
- D. 29

A metal having a Poisson's ratio = 0.3 is elastically deformed under uniaxial tension. If the longitudinal strain = 0.8, then the magnitude of thickness strain is _____?

- A. -0.8
- B. 0.8
- C. +0.08
- D. -0.24**

Property responsible for the talcum powder to cling to the skin is the _____?

- A. Capillary action

B. Adhesion

- C. Cohesion
- D. Surface tension

The practical representative values of HETP for a number of commercial operations lies within a range of _____ metre?

- A. 0.1-0.2
- B. 0.2-0.5
- C. 0.4-0.9**
- D. 1.2-1.5

Pick out the wrong statement pertaining to the comparative evaluation of performance of the packed tower and the plate tower ?

- A. Plate tower is preferred, if interstage cooling is required to remove heats of reaction or solution
- B. Plate tower is preferred over packed tower, if the operation involves liquids containing dispersed solids
- C. The total weight of a dry plate tower is usually much more than that of a dry packed tower designed for the same duty**
- D. In operations involving large temperature changes. (e.g. distillation), plate towers are preferred over packed towers as the packing may be crushed due to large temperature changes

Hydrolysis of sugar is called _____ ?

- A. Hydration
- B. Inversion**
- C. Esterification
- D. None of these

A solute distributes itself between two non-miscible solvents in contact with each other in such a way that, at a constant temperature, the ratio of its concentrations in two layers is constant, irrespective of its total amount". This

is _____ ?

- A. The distribution law**
- B. Followed from Margules equation
- C. A corollary of Henry's law
- D. None of these

Maintenance cost of a _____ pump for a particular duty is the least?

- A. Centrifugal**
- B. Reciprocating
- C. Volute
- D. Gear

The temperature of a gas in a closed container is 27°C . If the temperature of the gas is increased to 300°C , then the pressure exerted

is _____ ?

- A. Doubled
- B. Halved
- C. Trebled
- D. Unpredictable**

In case of a shell and tube heat exchanger, the minimum and maximum baffle spacing is respectively (where, D = inside diameter of the shell) ?

- A. $D/5$ and D**
- B. $D/2$ and $2D$
- C. $D/4$ and $2D$
- D. D and $2D$

Which of the following is not an important property of fuel oil/furnace oil ?

- A. Sulphur content
- B. Viscosity
- C. Aniline point**
- D. Flash point

In case of a super-cooled solution, which is on the verge of crystallisation, the free energy of the solution as compared to that of the solid is _____?

- A. More
- B. Less
- C. Same
- D. More or less; depends on the nature of solution

Larger length & diameter water pipes are made by _____?

- A. Electrical resistance welding
- B. Die casting
- C. Semi-centrifugal casting
- D. Continuous casting

Refractory bricks having lower porosity have _____?

- A. High insulating properties
- B. Low heat capacity
- C. Low thermal conductivity
- D. Greater strength

In the gaseous phase ammonia formation reaction ($N_2 + 3H_2 \rightleftharpoons 2NH_3$), the value of the equilibrium constant depends on the _____?

- A. Total pressure of the system
- B. Volume of the reactor
- C. Temperature
- D. Initial concentration of N_2 and H_2

In inventory control theory, the economic order quantity (EOQ) is the _____?

- A. Lot size corresponding to break even analysis
- B. Average level of inventory
- C. Optimum lot size

D. None of these

The dust collection efficiency of a cyclone separator _____?

- A. Decreases with increase in gas flow rate
- B. Is inversely proportional to the mass of the dust particle
- C. Is directly proportional to the radius of the dust particle path
- D. None of these**

Main constituent of dolomite is _____?

- A. CaCO_3
- B. MgCO_3**
- C. K_2CO_3
- D. Na_2CO_3

Volute of a centrifugal pump should be designed in a fashion, such that the _____?

- A. Kinetic head gets converted into static head**
- B. Moving stream gradually reduces velocity
- C. Mean velocity remains constant
- D. None of these

Which of the following has a very high carbide forming tendency in steels ?

- A. Silicon
- B. Chromium
- C. Nickel
- D. Vanadium**

Silver point temperature is _____ °C?

- A. 760.5
- B. 860.5
- C. 960.5**
- D. 1060.5

Specific gravity of a petroleum product gives an indication of its _____?

- A. Degree of refinement
- B. Hydrocarbon content type (aromatic or paraffinic)**
- C. Ease of atomisation
- D. Sulphur content

Generally, as the length of the liquid path on a tray is increased beyond 5 ft, the overall column efficiency _____?

- A. Increases**
- B. Decreases
- C. Remain same
- D. May increase or decrease depending upon the plate spacing

Incomplete combustion of fuel in the furnace is judged by high _____ of the flue gases?

- A. CO content**
- B. Dew point
- C. CO₂ content
- D. O₂ content

Minimum porosity for fluidisation is _____?

- A. That corresponding to static bed
- B. That corresponding to completely fluidised bed
- C. The porosity of the bed when true fluidisation begins**
- D. Less than that of the static bed

In a multipass shell and tube heat exchanger, the shell side cross flow area does not depend upon _____?

- A. Baffle spacing
- B. Clearance
- C. Pitch

D. None of these

Which law is followed by the velocity distribution in the turbulent boundary layer ?

- A. Parabolic law
- B. Linear law
- C. Logarithmic law**
- D. None of these

For a cylindrical internally pressurised vessel, which of the following closure types would withstand highest pressure, if each closure is of the same material and thickness ?

- A. Hemispherical
- B. Ellipsoidal (2 : 1)**
- C. Conical
- D. Flat plate

Cooking liquor in case of sulphite process is _____ ?

- A. Sodium sulphite and sodium bisulphite**
- B. Magnesium sulphite and free SO₂ in acid medium
- C. Magnesium sulphate and magnesium bicarbonate
- D. None of these

The operation involved when the soluble material is largely on the surface of an insoluble solid and is merely washed off by the solvent is called _____ ?

- A. Decoction
- B. Percolation
- C. Elutriation or elution**
- D. None of these

An element having large number of _____ is most easily subjected to

nuclear fission?

- A. Protons
- B. Electrons
- C. Neutrons
- D. Nucleons**

In a chemical process, the recycle stream is purged for _____?

- A. Increasing the product yield
- B. Enriching the product
- C. Limiting the inerts**
- D. Heat conservation

Phthalic anhydride is produced by the oxidation of _____?

- A. Naphthalene
- B. Benzene**
- C. Toluene
- D. Aniline

At higher temperature, molal heat capacities of most of the gases (at constant pressure) _____ with increase in temperature?

- A. Increases**
- B. Decreases
- C. Remains unchanged
- D. Increases linearly

Stage efficiency for packed tower varies with the _____?

- A. Type & size of packing
- B. Fluid rates and fluid properties
- C. Operating pressure and column diameter
- D. All A., B. and C.**

Free energy _____?

- A. Decreases in all spontaneous (or irreversible) processes
- B. Change during a spontaneous process has a negative value
- C. Remains unchanged in reversible processes carried at constant temperature and pressure
- D. All A, B. and C**

About _____ ton of coke is required in a cupola to produce one ton of casting ?

- A. 0.03
- B. 0.3**
- C. 0.8
- D. 1.5

Total reflux in a distillation operation requires minimum _____ ?

- A. Reboiler load
- B. Number of plates**
- C. Condenser load
- D. All A., B. and C.

Pure oxide refractories are generally monocrystalline in nature and are self bonded _____ bricks are generally used as moderator in nuclear reactors?

- A. Beryllia**
- B. Carborundum
- C. Corundum
- D. Thoria

Plants produce carbohydrates from the CO₂ present in the atmosphere by _____ ?

- A. Polymerisation
- B. Photochemical reaction**

- C. Oxidation
- D. None of these

90% of the caprolactam is converted to nylon-6 on its condensation polymerisation in the reactor maintained at a temperature of _____ °C?

- A. -5
- B. 10-30
- C. 250-280**
- D. 500-600

Window panes of aeroplanes are normally made of _____ ?

- A. Perspex (PMMA)**
- B. Teflon (PTFE)
- C. Bakelite (phenol formaldehyde)
- D. Polystyrene

Pick out the wrong statement?

- A. Cp of monatomic gases such as metallic vapor is about 5 kcal/kg.atom
- B. The heat capacity of solid inorganic substance is exactly equal to the heat capacity of the substance in the molten state**
- C. There is an increase in entropy, when a spontaneous change occurs in an isolated system
- D. At absolute zero temperature, the heat capacity for many pure crystalline substances is zero

The ratio of total radiating power to the absorptivity of the body depends upon the _____ as per Kirchoff's law?

- A. Wavelength of radiation
- B. Nature of the body
- C. Temperature of the body**
- D. None of these

The speed of a rotary drum vacuum filter may be about _____ rpm?

- A. 1
- B. 50
- C. 100
- D. 500

Hydrogen has _____ isotopes?

- A. No
- B. One
- C. Two
- D. Three**

Safety valves are provided in chemical equipments to guard against excessive _____?

- A. Temperature
- B. Pressure/pressure fluctuation**
- C. Turbulence
- D. Noise

Biological shield in a nuclear reactor is generally provided to protect against the _____?

- A. α -rays
- B. β -rays
- C. Gamma rays & neutrons**
- D. Electrons

Frame thickness in the plate and frame filter press is normally in the range of _____ inches?

- A. 0.25 to 4
- B. 0.25 to 8**
- C. 1 to 5
- D. 1 to 12

Carbonaceous particles having size less than $1\ \mu\text{m}$ are called _____?

- A. Grit
- B. Aggregates
- C. Aerosols
- D. Smoke**

Theoretically calculated diameter of the stripping section of the continuous rectification column is _____ that of the enriching section?

- A. Less than
- B. More than**
- C. Same as
- D. Either more or less (depending upon relative volatility)

Coarse grained steels have _____?

- A. Low toughness
- B. No tendency to distort**
- C. High density
- D. Very high toughness

Presence of H_2S in raw water (to be chlorinated) results in the _____?

- A. Reduced softening capacity of zeolite
- B. Increased dosage of chlorine to provide a disinfecting residual in the water**
- C. Easy removal of its hardness
- D. None of these

In large thermal power stations very fine particulates present in flue gas are removed by _____?

- A. Wet scrubber
- B. Bag filter
- C. Electrostatic precipitators**

D. Dust catcher

The cuprous chloride used in orsat apparatus can absorb _____?

- A. Only CO
- B. Both CO and CO₂
- C. Both CO and O₂
- D. All CO, CO₂, and O₂**

Smoke volatility index is equal to smoke point plus _____?

- A. $0.42 \times (\% \text{ distilled at } 204^\circ\text{C})$**
- B. 5 mm
- C. $0.84 \times (\% \text{ distilled at } 204^\circ\text{C})$
- D. 10 mm approximately

Minimum reflux ratio in a distillation column results in _____?

- A. Optimum number of trays
- B. Minimum reboiler size
- C. Maximum condenser size**
- D. Minimum number of trays

Ethyl mercaptan is a/an _____ compound?

- A. Sulphur**
- B. Nitrogen
- C. Oxygen
- D. None of these

Addition of zircon to silica refractory brick improves its _____?

- A. Crushing strength
- B. Resistance to slag attack**
- C. Both A. and B.
- D. Neither A. nor B.

Buna-S is also called _____?

- A. Polyurethane
- B. SBR**
- C. Teflon
- D. Bakelite

The thickness of segmental baffles (25 -35% cut truncated plates usually) is generally _____ the tube wall thickness?

- A. Equal to
- B. Twice**
- C. Four times
- D. Half

Ideal refrigeration cycle is _____?

- A. Same as Carnot cycle
- B. Same as reverse Carnot cycle**
- C. Dependent on the refrigerant's properties
- D. The least efficient of all refrigeration processes

In case of a P.F.R., there _____?

- A. May be lateral mixing of fluid
- B. Should not be any mixing along the flow path
- C. Both A. and B.**
- D. Neither A. nor B.

Ceramic materials are _____?

- A. Organic in nature
- B. Stronger in compression than in tension**
- C. Always amorphous in nature
- D. Always bad heat conductors

The electric power generation cost in nuclear power plant is less than that in a

coal based thermal power plant, mainly because the _____?

- A. Fuel cost per unit power generated is less
- B. Thermal efficiency of the former is higher
- C. Maintenance cost of the former is less
- D. None of these

For absorbing a sparingly soluble gas in a liquid _____?

- A. Gas side mass transfer co-efficient should be increased
- B. Liquid side mass transfer co-efficient should be increased**
- C. Liquid side mass transfer co-efficient should be decreased
- D. Mass transfer co-efficient must be kept constant

Fruit juice (a heat sensitive material) can be concentrated in a _____ evaporator?

- A. Long tube
- B. Falling film**
- C. High pressure
- D. None of these

Method of maintaining fires in furnace during standby periods without undue consumption of fuel is called _____?

- A. Back draughting
- B. Banking**
- C. Under pressurising
- D. None of these

Main constituent of natural rubber is _____?

- A. Polystyrene
- B. Polyisoprene**
- C. Polybutadiene
- D. Poly chloroprene

Tar is a better fuel than furnace oil, because of its _____?

- A. Higher calorific value
- B. Lower sulphur content
- C. Higher emissivity (0.8-0.9) resulting in higher radiation heat transfer rate
- D. Both A. and B.**

Molarity is defined as the number of gm moles of solute per _____ of solvent?

- A. Litre**
- B. kg
- C. gm
- D. c.c

Maximum viscosity of tar/PCM/fuel oil for easy and efficient atomisation in conventional burner is _____ centistokes (or 100 Redwood I seconds) ?

- A. 5
- B. 25**
- C. 50
- D. 100

'Hypersil' is a _____ steel?

- A. High speed
- B. Silicon**
- C. Molybdenum
- D. Tungsten

SBR is produced by the copolymerisation of butadiene & styrene by employing emulsion polymerisation. The weight ratio of styrene and butadiene is maintained at _____ ?

- A. 1: 3**
- B. 3 : 1
- C. 1 : 2

D. 2 : 1

Which of the following thermocouples can measure the maximum temperature ?

- A. Platinum-rhodium
- B. Tungsten-molybdenum**
- C. Chromel-alumel
- D. Iron-constantan

Normally, the plate thickness of the bottoms and roofs of vertically cylindrical storage vessels as compared to that of the cylindrical shell is _____ ?

- A. More
- B. Less**
- C. Same
- D. More or less depending upon the pressure & temperature inside the vessel and the nature of the fluid contained therein

Which of the following is not a food additive ?

- A. Citric acid
- B. Invertase
- C. Benzoyl peroxide
- D. Ammonium chloride**

Fluid flow in a real packed bed can be approximated as _____ model?

- A. Plug flow
- B. Dispersion**
- C. Mixed flow
- D. Tank in series

Metal shots used in shot blasting are made of _____ ?

- A. Stellite

- B. Steel**
- C. Bronze
- D. Lead

Fresh sewage is _____ in nature?

- A. Acidic
- B. Neutral
- C. Alkaline**
- D. Highly acidic

Maximum permissible air velocity in pipelines is about _____ metre/second ?

- A. 5
- B. 10**
- C. 20
- D. 40

Lung cancer & DNA breakage are the major ill effects of excessive ozone exposure to human beings. Ozone layer depletion in the atmosphere is mainly caused by the presence of _____ ?

- A. CO₂
- B. SO₂
- C. Hydrocarbons
- D. CFC (chloro fluoro carbon)**

Cumene (isopropyl benzene) is made by _____ ?

- A. Oxidation of naphthalene
- B. Propylene alkylation of benzene**
- C. Polymerisation of a mixture of benzene & propylene
- D. None of these

Which of the following is the most common pump for pumping either raw

sewage or sludge ?

- A. Electromagnetic pump
- B. Centrifugal pump
- C. Reciprocating pump**
- D. Gear pump

On addition of 1 c.c. of dilute hydrochloric acid (1% concentration) to 80 c.c. of a buffer solution of pH = 4, the pH of the solution becomes _____?

- A. 1
- B. 8
- C. 4**
- D. 2

Percentage of hydrogen in coke oven gas may be around

_____?

- A. 10
- B. 25
- C. 45
- D. 60**

During a reversible isothermal expansion of an ideal gas, the entropy change is _____?

- A. +ve**
- B. 0
- C. -ve
- D. ∞

Even though heat transfer co-efficient in boiling liquids is large, use of fins is advantageous, when the entire surface is exposed to _____ boiling ?

- A. Film**
- B. Nucleate

- C. Transition
- D. All modes of

Use of grinding aids results in the _____?

- A. Enhanced production rate
- B. Finer products
- C. Both A. & B.
- D. Neither A. nor B.**

Mild steel is _____?

- A. A low carbon steel (0.05 to 0.3% carbon)**
- B. Highly resistant to corrosion (as much as stainless steel)
- C. A high carbon steel (0.5 to 1.5% carbon)
- D. Very poor in strength & ductility

Which of the following is the dynamic characteristics of an instrument ?

- A. Reproducibility
- B. Sensitivity
- C. Dead zone
- D. Fidelity**

Pick out the wrong statement?

- A. Refractories used in muffle furnace should have low thermal conductivity**
- B. The electrical resistivity of refractories drops rapidly with rise in temperature
- C. For reducing spalling tendency, the refractory should be well fired and its porosity should be more
- D. Refractoriness under load (RUL) of a refractory is always less than its refractoriness

Tar dolomite bricks are used in the _____?

- A. Basic Bessemer converter
- B. Basic open hearth furnace
- C. Electric furnaces
- D. All A., B. and C.**

Steam reforming of naphtha produces ammonia synthesis gas. This is a/an _____ process?

- A. Autocatalytic
- B. Endothermic**
- C. Exothermic
- D. Non-catalytic

Which of the following is not an abrasive material ?

- A. Bakelite**
- B. Pumice
- C. Corundum
- D. Carborundum

Which of the following is not a directly fired furnace ?

- A. By-product coke oven**
- B. Calcination kiln
- C. Sintering furnace
- D. Open hearth furnace

Pick out the wrong unit conversion of thermal conductivity ?

- A. $1 \text{ BTU/ft}^2 \cdot \text{hr} \cdot ^\circ\text{F/ft} = 1.488 \text{ kcal/m}^2 \cdot \text{hr} \cdot ^\circ\text{C/m}$
- B. $1 \text{ BTU/ft}^2 \cdot \text{hr} \cdot ^\circ\text{F/inch} = 1.488 \text{ kcal/m}^2 \cdot \text{hr} \cdot ^\circ\text{C/m}$**
- C. $1 \text{ kcal/m} \cdot \text{hr} \cdot ^\circ\text{C} = 0.672 \text{ BTU/ft} \cdot \text{hr} \cdot ^\circ\text{F} = 1.163 \text{ W/m} \cdot ^\circ\text{K}$
- D. $1 \text{ W/cm} \cdot ^\circ\text{C} = 85.985 \text{ kcal/m} \cdot \text{hr} \cdot ^\circ\text{C} = 57.779 \text{ BTU/ft} \cdot \text{hr} \cdot ^\circ\text{F}$

Enthalpy of formation of NH_3 is -46 kJ/kg mole . The enthalpy change for the gaseous reaction, $2\text{NH}_3 \rightarrow \text{N}_2 + 3\text{H}_2$, is equal to _____ kJ/kg. mole ?

- A. 46
- B. 92**
- C. -23
- D. -92

Sphericity of raschig ring (whose length and diameter are equal)

is _____?

- A. > 1
- B. < 1
- C. 1**
- D. 2

Coal is heated in absence of air for 7 minutes at a temperature of about _____ °C, during its volatile matter determination for proximate analysis?

- A. 550
- B. 750
- C. 950**
- D. 1150

Salt is added in the kettle during soap manufacture to separate

_____?

- A. Soap from lye**
- B. Glycerine from lye
- C. The metallic soap
- D. The unsaponified fat from soap

The co-ordination number in simple cubic structure is _____?

- A. 4
- B. 6**
- C. 8
- D. 12

C_v for an ideal gas _____?

- A. Does not depend upon temperature
- B. Is independent of pressure only
- C. Is independent of volume only

D. Is independent of both pressure and volume

The capacity of a classifier in 'tons of solid/hr' is given by (where, A = cross-sectional area in m^2 , V = rising velocity of fluid in m/sec, S = percentage of solids in the suspension by volume, ρ = density of solids in kg/m^3)_____?

A. $3.6 AVS.\rho$ B. $3.6 A.V.\rho$ C. $3.6 A.S. \rho$ D. $3.6 AVS/\rho$

Answer: Option

Viscose rayon is_____?

A. Cellulose nitrate

B. Regenerated cellulose nitrate

C. Regenerated cellulose acetate

D. None of these

Pick out the correct statement?

A. Stainless steel is nothing but chromium coated steel

B. Hardening of a soft metal can be done by alloying it with another metal or non-metal

C. Plastic deformation of a material is its temporary distortion under the action of applied stress

D. Rusting of iron is not electrochemical in nature

Wet sieving is employed, when the product contains _____ materials?

A. Abrasive

B. Large quantity of very fine

C. Coarse

D. Non-sticky

_____ metal is used as a bearing liner material?

- A. Pewter
- B. White
- C. Babbitt**
- D. Gun

Brass tubes are used in the manufacture of tubes of evaporators used in sugar and salt industries, mainly because of its _____?

- A. High co-efficient of thermal expansion
- B. Low thermal conductivity
- C. High corrosion resistance**
- D. All A., B. and C.

With increase in the discounted cash flow rate of return, the ratio of the total present value to the initial investment of a given project ?

- A. Decreases**
- B. Increases
- C. Increases linearly
- D. Remain constant

Rate of a gaseous phase reaction is given by the reaction shown in the bellow figure. The unit of rate constant is _____?

- A. (atm)⁻¹
- B. (hr)⁻¹
- C. (atm)⁻¹.(hr)⁻¹**
- D. atm.(hr)⁻¹

Thermometer bulb & capillary in case of mercury filled pressure spring expansion thermometer is normally made of _____ as mercury does not amalgamate with it?

- A. Copper
- B. Copper alloys

C. Stainless steel

D. Monel

A vapor whose partial pressure is less than its equilibrium vapor pressure is called a _____ vapor?

A. Saturated

B. Supersaturated

C. Superheated

D. None of these

_____ chloride present in crude petroleum as impurity is the most prolific producer of HCl during distillation?

A. Magnesium

B. Potassium

C. Calcium

D. Sodium

Vapour which is at a pressure smaller than the saturation pressure for the temperature involved is called a _____ vapour?

A. Superheated

B. Desuperheated

C. Non-condensable

D. None of these

Which of the following gaseous fuels has the lowest calorific value ?

A. Gobar gas

B. Refinery gas

C. Converter gas

D. Blast furnace gas

Use of transverse baffles in a shell and tube heat exchanger is done to increase the _____?

- A. Rate of heat transfer
- B. Flow velocity
- C. Turbulence of shell side fluid
- D. All A., B. and C.**

Turndown ratio of a gas burner is equal to the _____ ?

- A. Maximum to minimum heat input ratio
- B. Maximum to minimum permissible gas flow rate
- C. Both A. & B.**
- D. Minimum to maximum heat input ratio

Commercial production of polypropylene employs _____ polymerisation?

- A. Emulsion
- B. Suspension
- C. Solution**
- D. Bulk

A mercury (specific gravity = 13.6) manometer connected across an orificemeter fitted in a pipe shows a manometer reading of 2 cms. If the manometer liquid is changed to carbon tetrachloride (specific gravity = 1.6), then for the same flow rate of water the new manometer reading will be _____ cms?

- A. 17**
- B. 42
- C. 84
- D. 1.8

Clausius-Clapeyron Equation gives accurate result, when the _____ ?

- A. Vapour pressure is relatively low and the temperature does not vary over wide limits
- B. Vapour obeys the ideal gas law and the latent heat of vaporisation is constant
- C. Volume in the liquid state is negligible compared with that in the vapour state

D. All A, B. and C

On being hit with a hammer, _____ will readily fracture?

- A. Brass
- B. Mild steel
- C. Cast iron**
- D. Lead

Silicon percentage in acid resistant cast iron is about _____?

- A. 4
- B. 8
- C. 14**
- D. 20

Porosity is induced in insulating refractories by adding _____?

- A. Powdered naphthalene
- B. Ammonium chloride/sulphate
- C. Calcium phosphate
- D. All A., B. and C.**

Steady uniform flow is represented by flow through a/an _____?

- A. Long pipe at constant rate**
- B. Long pipe at decreasing rate
- C. Expanding tube at constant rate
- D. None of these

Re/NFr is called the _____ number?

- A. Brinkman
- B. Galileo**
- C. Archimedes
- D. Euler

Basic bricks are not made of _____?

- A. Fireclay
- B. Magnesite
- C. Forsterite
- D. Chromite

Sooty and sulphurous smog formed due to combustion of fossil fuels particularly in winter, continues throughout the day and night. When the moist atmospheric air's water vapor condenses on the solid particles of smoke thereby forming smog (smoke + fog), it causes _____?

- A. Poor visibility due to sky darkening
- B. Irritation in eyes
- C. Respiratory trouble
- D. All A., B. and C.

Absorption/evolution of heat during conversion of a substance from one allotropic form to another is termed as the heat of _____?

- A. Sublimation
- B. Fusion
- C. Transition
- D. Vaporisation

For concentrating an aqueous solution of a material like anhydrous Na_2SO_4 , whose solubility decreases with rise in temperature, the most suitable evaporator is a _____ evaporator?

- A. High pressure
- B. Vacuum
- C. Backward feed
- D. None of these

If CA is the quantity of reactants initially present, the quantity left after 'n' half periods will be equal to _____?

- A. $(CA/2)^n$
- B. $(\frac{1}{2})^n CA$**
- C. $(CA/2)^{1/n}$
- D. $(CA)^{1/2n}$

Antioxidants are added to rubber to protect it from the attack of light, heat & atmospheric ozone. Which of the following is an antioxidant used in rubber ?

- A. Carbon
- B. Alkylated diphenyl amine**
- C. Thiokol
- D. Magnesium

Out of the following, the most malleable material is _____ ?

- A. Copper
- B. Aluminium
- C. Wrought iron
- D. Lead**

A widely used size reduction equipment for _____ is Bradford breaker?

- A. Talc
- B. Coal**
- C. Iron core
- D. Wheat

The proper arrangement of the petroleum fractions in order of their boiling points is _____ ?

- A. Lubricating oil > diesel > petrol > LPG**
- B. Lubricating oil > petrol > diesel > LPG
- C. Petrol > lubricating oil > diesel > LPG
- D. Petrol > diesel > LPG > lubricating oil

The payback method for the measurement of return on

investment _____ ?

- A. Gives a correct picture of profitability
- B. Underemphasises liquidity
- C. Does not measure the discounted rate of return**
- D. Takes into account the cash inflows after the recovery of investments

Which is not a natural insulating material ?

- A. Diatomaceous earth/kieselgur
- B. Asbestos
- C. Vermiculite
- D. None of these**

Vibrating screens have capacity in the range of _____ tons/ft² .mm mesh size?

- A. 0.2 to 0.8**
- B. 5 to 25
- C. 50 to 100
- D. 100 to 250

Addition of stabiliser during PVC manufacture is done to _____ ?

- A. Improve its impact strength
- B. Improve its elasticity
- C. Reduce the melt viscosity & glass transition temperature
- D. Prevent its thermal degradation**

_____ are analysed using a Polarograph?

- A. Isotonic solutions
- B. Solids**
- C. Liquids
- D. Gases

Solution made by dissolving equimolar amounts of different solutes in the same amount of a given solvent will have the _____ ?

- A. Same elevation in boiling point**
B. Different elevation in boiling point
C. Elevation in boiling point in the ratio of their molecular weights
D. None of these

Heat waves _____ ?

- A. Cannot pass through vacuum
B. Travel in straight line
C. Can be reflected by a mirror
D. Both B. and C.

Mannheim furnace is used in the manufacture of _____ ?

- A. Hydrochloric acid**
B. H₂SO₄ by Chamber process
C. Calcium carbide
D. Corundum

When vaporisation takes place through a blanketting film of gas, the phenomenon is termed as _____ boiling?

- A. Pool
B. Nucleate
C. Transition
D. Film

The frictional resistance in laminar flow does not depend on the _____ ?

- A. Area of surface in contact**
B. Flow velocity
C. Fluid temperature
D. Pressure of flow

ombustion of pulverised coal compared to the lumpy coal _____ ?

- A. Provides better control of furnace temperature
- B. Facilitates combustion with lower excess air
- C. Provides higher thermal efficiency & flame temperature
- D. All A., B. & C.**

High carbon steel contains more than _____ percent carbon?

- A. 0.5**
- B. 2.2
- C. 2.5
- D. 2.8

Test piece for determination of RUL of a refractory is heated in a/an _____?

- A. Oxidising atmosphere
- B. Reducing atmosphere
- C. Electric furnace**
- D. Neutral atmosphere

Si percentage in silica refractories used in the walls of coke oven is about _____?

- A. 45
- B. 60
- C. 80
- D. 95**

The most commonly used chemical coagulant in water treatment is _____?

- A. Ferrous sulphate
- B. Alum**
- C. Lime
- D. Hydrazine

_____ is the process of coating the surface of steel with aluminium

oxide, thereby imparting it increased resistance to corrosion & oxidation upto a temperature of 700°C ?

- A. Veneering
- B. Galvanising
- C. Electroplating
- D. Calorising**

Nylon-6 as compared to nylon-66 is _____?

- A. Harder
- B. More abrasion resistant
- C. Having higher melting point
- D. None of these**

A gaseous mixture contains 14 kg of N_2 , 16 kg of O_2 and 17 kg of NH_3 . The mole fraction of oxygen is _____?

- A. 0.16
- B. 0.33**
- C. 0.66
- D. 0.47

The main purpose of galvanising iron sheets is to _____?

- A. Harden the surface
- B. Increase its glossiness and lustre
- C. Prevent the action of water**
- D. Prevent the action of oxygen

L.D. converter is used in the production of _____?

- A. Pig iron
- B. Steel**
- C. Copper
- D. Zinc

Power required for mixing Newtonian fluids is a function of the

_____?

- A. Speed of impeller, diameter of impeller & viscosity
- B. Density & viscosity of fluid only
- C. Density of fluid, viscosity of fluid & impeller dia only
- D. None of these**

Dacron (or Terylene) fibres as compared to nylon fibres have _____?

- A. Better heat & acid resistant properties
- B. Poorer resistance to alkalis
- C. Poorer dyeability
- D. All A., B. and C.**

Walls of a cubical oven are of thickness l , and they are made of material of thermal conductivity k . The temperature inside the oven is 100°C and the inside heat transfer coefficient is $3k/l$. If the wall temperature on the outside is held at 25°C , what is the inside wall temperature in degree centigrade ?

- A. 35.5
- B. 43.75
- C. 81.25**
- D. 48.25

Which of the following remains constant during evaporative cooling process with recirculated water supply ?

- A. Relative humidity
- B. Partial pressure of vapour
- C. Wet bulb temperature**
- D. None of these

What is the shear rate at the pipe wall, in case of laminar flow of Newtonian fluids in a pipe of diameter 'D' & length 'L' incurring a pressure drop ' Δp ' with average velocity ' V_{avg} ' ?

- A. $D \Delta p / 8L$
- B. $D \Delta p / 4L$
- C. $8 V_{avg} / D$**
- D. $4 V_{avg} / D$

The wetted wall tower is used to determine _____ ?

- A. Individual mass transfer co-efficient (M.T.C.) in gaseous system**
- B. M.T.C. of individual components in a liquid-liquid system
- C. M.T.C. of liquid in liquid-gas system
- D. The overall M.T.C. of the system

_____ is the controlling step in a highly temperature sensitive fluid-solid non-catalytic reaction ?

- A. Gas film diffusion
- B. Ash diffusion
- C. Chemical reaction**
- D. None of these

Temper brittleness of a material can be fairly detected by the _____ test ?

- A. Fatigue
- B. Notched bar impact**
- C. Tensile
- D. Hardness

Mcleod gauge measures the _____ pressure?

- A. Positive
- B. Sub-atmospheric**
- C. Very high
- D. Atmospheric

For an incompressible fluid, the _____ is a function of both pressure as well as temperature?

- A. Internal energy
- B. Enthalpy**
- C. Entropy
- D. All (A), B. & (C)

The unit of velocity head is _____?

- A. ft-lb/sec
- B. ft-lb/ft³
- C. ft-lbf/lb**
- D. ft-lbf/sec

Which of the following is an autocatalytic reaction ?

- A. Photochemical reactions
- B. Microbial fermentation reaction**
- C. Enzyme fermentation reaction
- D. Ammonia synthesis reaction

Which law/principle of solid mechanics is similar/equivalent to Newton's law of viscosity in fluid mechanics ?

- A. Archimedes principle
- B. Newton's second law of motion
- C. Hooke's law**
- D. Newton's third law of motion

Accidents in chemical plants are mostly due to _____?

- A. Inadequate equipment design
- B. Faulty operating procedures**
- C. Improper layout of the equipments
- D. Failure of equipments

Corrosion is _____?

- A. A physical phenomenon
- B. A chemical phenomenon**

- C. Same as erosion
- D. An uncontrollable phenomenon

4 kg moles of an ideal gas expands in vacuum spontaneously. The work done is _____?

- A. 4 J
- B. ∞
- C. 0**
- D. 8 J

Pick out the wrong statement ?

- A. For the compressible cake, voidage & the specific resistance of the cake can be assumed to be constant
- B. Cake resistance is independent of the pressure drop**
- C. Crushing of explosive materials are done by employing dry-grinding
- D. Gyratory crusher is a coarse crusher

Poly-tetra-fluoro ethylene (PTFE) is known as _____?

- A. Dacron
- B. Teflon**
- C. Bakelite
- D. Celluloid

Colburn analogy is applicable for the value of Prandtl number from _____?

- A. 0.001 to 1
- B. 0.6 to 120**
- C. 0.5 to 5
- D. 120 to 400

Which of the following is the most suitable material of construction for evaporator & its tubes for concentrating NaOH solution to 70% ?

- A. Cast iron
- B. Steel
- C. Nickel**
- D. Carbide

Wrought iron is a suitable material of construction for handling _____ solutions?

- A. Dilute acidic
- B. Concentrated acidic
- C. Alkalis & alkaline**
- D. None of these

_____ are used as corrosion inhibitor for iron & steel in aqueous solutions ?

- A. Phosphates
- B. Chromates**
- C. Sulphates
- D. Bi-carbonates

For most salts, the solubility increases with rise in temperature, but the solubility of _____ is nearly independent of temperature rise?

- A. Sodium chloride**
- B. Sodium carbonate monohydrate
- C. Anhydrous sodium sulphate
- D. Hypo

_____ tower is the most suitable gas-liquid contacting device involving highly corrosive fluids?

- A. Sieve plate
- B. Packed**
- C. Bubble cap plate
- D. None of these

Friction produced by the formation of wakes is called the _____ friction?

- A. Disk
- B. Skin
- C. Form**
- D. None of these

The basic difference between vegetable oils and fats is in their _____?

- A. Density
- B. Chemical properties
- C. Physical state**
- D. Composition

In filtration, the use of 'filter aid' helps in _____?

- A. Reducing the filtration pressure
- B. Accelerating the rate of filtration
- C. Depugging the filter medium**
- D. Enhancing the cake porosity in case of a dense impermeable cake

H₂S is scrubbed from refinery gases by absorption using _____?

- A. Dilute H₂SO₄
- B. Ethanol amine**
- C. Chilled water
- D. Tri-butyl phosphate

Upper portion of hot metal mixer are lined with mullite bricks, which helps in resisting the _____?

- A. Washing action of metal**
- B. Corrosion by layer of slag
- C. Both A. & B.

D. Neither A. nor B.

The critical radius 'r' of insulation on a pipe is given by _____?

- A. $r = 2k/h$
- B. $r = k/h$**
- C. $r = k/2h$
- D. $r = h/k$

Use of raschig rings in place of crushed stones as packing in packed beds (other things being same) ?

- A. Increases pressure drop, increases surface area
- B. Increases pressure drop, decreases surface area
- C. Decreases pressure drop, increases surface area**
- D. Decreases pressure drop, decreases surface area

The value of critical Reynolds number for pipe flow is _____?

- A. 1,300**
- B. 10,000
- C. 100,000
- D. None of these

Hooke's law _____?

- A. Applies to elastic deformation**
- B. Applies beyond limit of proportionality in stress-strain curve
- C. States that stress is inversely proportional to strain upto elastic limit
- D. None of these

Stefan-Boltzmann law applies to _____ body?

- A. Black**
- B. White
- C. Grey
- D. Any colour

Presence of phosphorous in metallurgical coal _____?

- A. Is not undesirable
- B. Reduces its calorific value
- C. Badly affects the quality of steel**
- D. Increases its caking power

Pure oxygen is mixed with air to produce an enriched air containing 50 volume % of oxygen. The ratio of moles of air to oxygen used is _____?

- A. 1.72
- B. 0.58**
- C. 0.5
- D. 0.2

_____ is not a polyester fiber?

- A. Terylene
- B. Dacron
- C. Nylon**
- D. Polyacrylonitrile

Cold crushing strength of fireclay bricks is about _____ kgf/cm²?

- A. 50-100
- B. 100-150
- C. 200-400**
- D. 500-1000

Stainless steel is not corroded by _____?

- A. Hydrochloric acid (10%)
- B. Nitric acid (10%)**
- C. Sulphuric acid (10%)
- D. Saturated brine

Inversion of cane sugar is an example of _____?

- A. Unimolecular reaction with first order

- B. Bimolecular reaction with second order
- C. Bimolecular reaction with first order**
- D. Unimolecular reaction with second order

Average molecular weight of air is about _____?

- A. 21
- B. 29**
- C. 23
- D. 79

Coals used for the generation of producer gas should have _____?

- A. High caking index
- B. Low fusion point of ash
- C. High volatile matter content**
- D. Very low ash content (8-10%)

Styrene is produced from ethyl benzene by the process of _____?

- A. Dehydrogenation**
- B. Oxidation
- C. Alkylation
- D. Dehydration

Common salt is generally not produced commonly by _____ method from brine ?

- A. Freeze drying**
- B. Electrolytic
- C. Solar evaporation
- D. Vacuum evaporation

Pressure maintained in the high pressure primary tower of a three stage crude oil distillation system is about _____ kg/cm²?

- A. 1.5

- B. 3
- C. 6
- D. 12

Which of the following is the most widely used disinfectant in water treatment ?

A. Chlorine

- B. Irradiation of water by ultraviolet light
- C. Cation exchanger
- D. Coagulation

The heat flux (from outside to inside) across an insulating wall with thermal conductivity, $K = 0.04 \text{ W/m} \cdot ^\circ\text{K}$ and thickness 0.16m is 10 W/m^2 . The temperature of the inside wall is -5°C . The outside wall temperature is _____ ?

- A. 25°C
- B. 30°C
- C. 35°C**
- D. 40°C

The most suitable fertiliser for accelerating seeding or fruit formation in later stages of plant growth is _____ fertiliser?

- A. Nitrogenous
- B. Phosphatic**
- C. Potassic
- D. None of these

Reaction rate equation for the bellow figure reaction, If S at is present in large excess, what is the order of this reaction ?

- A. Zero
- B. One**
- C. Two
- D. Three

A relief valve _____?

- A. Provides back pressure for a cylinder
- B. Unloads a pump
- C. Is a directional control valve**
- D. None of these

The distance between metacentre and _____ is called metacentric height?

- A. Water surface
- B. Centre of gravity**
- C. Centre of buoyancy
- D. None of these

Magnesite refractories are generally not used in the _____?

- A. Electric furnace walls
- B. Steel melting furnace**
- C. Open hearth furnace
- D. Burning zone of cement kilns

The _____ is measured by a piezometric opening?

- A. Dynamic pressure
- B. Static pressure
- C. Total pressure**
- D. Point velocity

The Al_2O_3 content of cryolite in Hall-Heroult cell is maintained between _____ percent ?

- A. 2-5**
- B. 18-20
- C. 12-15
- D. 6-12

Noise level audible to audience sitting in the 5th row from the stage during a large orchestra show corresponds to about _____ decibels?

- A. 105
- B. 135**
- C. 160
- D. 185

Riboflavin is a/an _____?

- A. Vitamin**
- B. Analgesic drug
- C. Anaesthetics
- D. Anti-malarial drug

Gross calorific value will be equal to the net calorific value for _____?

- A. H₂
- B. C₂H₂
- C. CO**
- D. C₂H₆

Size range of the colloids particles is _____?

- A. 5 – 200 milli-microns**
- B. 50 – 200 microns
- C. 500 – 1000 microns
- D. 10 – 50 Angstrom

The hardenability of steel decreases with _____?

- A. Decrease in dislocation density
- B. Increase in solutionising temperature
- C. Increase in strength
- D. Decrease in grain size**

Which of the following options will facilitate the achievement of a very high

head (say 30 metres) in case of a centrifugal pump ?

- A. Increasing the impeller speed and the volute area
- B. Increasing the number of vanes in the impeller
- C. Mounting of two or more impellers in series on a single shaft**
- D. Either of A., B. or C.

Volatile matter content of metallurgical coke may be around _____ percent?

- A. 1-2**
- B. 10-15
- C. 22-26
- D. 30-33

Unrestrained expansion of an ideal gas does not result in its cooling due to the reason that the gas molecules _____?

- A. Do not lose energy on collision
- B. Are above the inversion temperature
- C. Do not exert attractive force on each other**
- D. Do work equal to loss in kinetic energy

Which adsorbent is used for removing sulphur compounds (S Q, H₂S, RSH etc.) removal from coke oven gas in by-products recovery plant ?

- A. Silica gel
- B. Diatomaceous earth
- C. Basalt
- D. Bog iron (i.e., moist ferric hydroxide)**

Among liquids, water has a comparatively high value of thermal conductivity, due to its _____?

- A. Low density
- B. High viscosity
- C. Partial ionisation**

D. Dense structure

Galvanised iron is _____?

A. Harder

B. Protected from rusting

C. Alumina coated iron

D. None of these

Space time in flow reactor is _____?

A. Usually equal to the residence time

B. The reciprocal of the space velocity

C. A measure of its capacity

D. Both A. and B.

Biuret formation in urea is kept at minimum ($< 1\%$), because it is _____?

A. Corrosive in nature

B. Toxic and harmful to some crops

C. Helpful in decomposition of urea

D. Explosive in nature

Pick out the wrong statement ?

A. Polystyrene is a thermoplastic polymer

B. Protein is a natural polymer

C. Neoprene is a natural rubber

D. Polythene is a copolymer, while SBR is a homopolymer

For crushing of solids, the Rittinger's law states that the work required for crushing is proportional to _____?

A. The new surface created

B. The size reduction ratio

C. The change in volume due to crushing

D. None of these

The rate constant of a chemical reaction increases by increasing the _____?

- A. Temperature
- B. Pressure
- C. Reactant's concentration
- D. None of these

Terminal velocity is _____?

- A. A constant velocity with no acceleration
- B. A fluctuating velocity
- C. Attained after moving one-half of total distance
- D. None of these

At what temperature, given mass of a gas that occupies a volume of 2 litres at N.T.P. will occupy a volume of 4 litres, if the pressure of the gas is kept constant?

- A. 273°C
- B. 273°K
- C. 100°C
- D. 200°C

Pick out the wrong statement ?

- A. A ceramic material which becomes fluid upon heating and can be moulded in liquid/viscous state is termed as glass
- B. Ceramic materials do not undergo vitrification on heating
- C. Ceramic materials are brittle in nature
- D. Non-oxide ceramic materials generally act as a semi-conductor

_____ moulding is used for shaping of thermosetting plastics exclusively?

- A. Compression
- B. Injection
- C. Transfer**
- D. Extrusion

Rayon is superior to cotton in making gauge for wound treatment, because rayon _____?

- A. Is a synthetic polymer
- B. Does not stick to the wound unlike cotton**
- C. Can absorb over 90% of its own weight of water
- D. Both B. and C.

Yeast is used in the manufacture of _____?

- A. Penicillin
- B. Antibiotics
- C. Wine**
- D. Pasteurised milk

Which of the following is used for very accurate measurement of flow of gas at low velocity ?

- A. Pitot tube
- B. Rotameter
- C. Segmental orificemeter
- D. Hot wire anemometer**

Hydrocracking employs _____?

- A. High pressure & temperature**
- B. Low pressure & temperature
- C. High pressure and low temperature
- D. High temperature and low pressure

Leaching of coffee from coffee beans is done by _____?

- A. Hot water**

- B. Hexane
- C. Lime water
- D. Dilute H₂SO₄ (hot)

A gas shows deviation from ideal behaviour at _____?

- A. Low pressure and high temperature
- B. Low pressure and low temperature
- C. Low temperature and high pressure**
- D. High temperature and high pressure

Float and sink test determines the possibility of cleaning of coal by a process based on the _____?

- A. Gravity separation**
- B. Wettability
- C. Particle shape
- D. None of these

Alum is commercially produced from _____?

- A. Gypsum
- B. Feldspar
- C. Galena
- D. Bauxite**

Cement setting under water employs a/an _____ process ?

- A. Hydration**
- B. Decomposition
- C. Oxidation
- D. Reduction

Which is not accomplished in an underfired furnace ?

- A. Increase in heating capacity/m² of floor space**
- B. Elimination of cold spot at the bottom of the charge
- C. Reduction in the temperature of furnace gases

D. Protection of the periphery of the charge from excessive radiation

Compound A is extracted from a solution of A + B into a pure solvent S. A Co-current unit is used for the liquid-liquid extraction. The inlet rate of the solution containing A is 200 moles of B/hr.m² and the solvent flow, rate is 400 moles of S/m². hr. The equilibrium data is represented by $Y = 3X^2$, where Y is in moles of A/moles of B and X is in moles A/moles of S. The maximum percentage extraction achieved in the unit is _____?

- A. 25%
- B. 50%**
- C. 70%
- D. 90%

Triple superphosphate which contains about 46% P₂O₅ is produced by the reaction of phosphate rock with ortho phosphoric acid of _____ percent concentration?

- A. 25-28
- B. 52-54**
- C. 75-80
- D. > 98

At absolute zero temperature, for any reaction involving condensed phases ?

- A. $\Delta G^\circ = 0, \Delta H^\circ = 0$
- B. $\Delta H^\circ = 0, \Delta S^\circ = 0$
- C. $\Delta S^\circ = 0, \Delta E^\circ = 0$**
- D. $\Delta S^\circ = 0, \Delta C_p^\circ = 0$

Pick out the correct statement ?

- A. A chemical reaction accompanied by absorption of heat is called an exothermic reaction
- B. A chemical reaction accompanied by evolution of heat is called an endothermic reaction
- C. The rate constant for a first order reaction does not change on changing the concentration units**

D. Chemical equilibrium state is dynamic in nature

Which of the following processes is used for the production of petroleum coke ?

- A. Stabilisation
- B. Visbreaking
- C. Cracking**
- D. Reforming

For an ideal gas, the internal energy depends upon its _____ only?

- A. Molecular size
- B. Temperature**
- C. Volume
- D. Pressure

Fibre reinforced plastic (FRP) are _____?

- A. Made of glass fibre and thermoplastic resins
- B. Anisotropic
- C. Made of thermosetting resin and glass fibre
- D. Both 'B' & 'C'**

In _____ converter for ammonia synthesis, the catalyst is arranged in the form of a single continuous bed?

- A. Fauser-Montecatini
- B. Claude**
- C. Uhde
- D. Kellogg

Which of the following achieves the least reduction ratio for a given feed size ?

- A. Jaw crusher
- B. Roll crusher**
- C. Cone crusher
- D. Gyratory crusher

At the same gas flow rate, the pressure drop in a packed tower being irrigated with liquid _____ that in dry packed tower ?

- A. Is greater than
- B. Is lower than
- C. Is same as
- D. Cannot be predicted as data are insufficient

Coke oven gas burns with a yellowish flame, because of the presence of _____ ?

- A. CO₂
- B. CH₄
- C. H₂
- D. NH₃

Circulation pump is located below the evaporator to _____ ?

- A. Avoid cavitation
- B. Avoid frequent priming
- C. Create more suction head
- D. None of these

For the liquid phase parallel reactions _____

R, $r_R = K_1.C_A^2$; $E_1 = 80$ KJ/mole

S, $r_S = K_1.C_A$; $E_2 = 120$ KJ/mole

The desired product is R. A higher selectivity of R will be achieved, if the reaction is conducted at

- A. Low temperature in a CSTR
- B. High temperature in a CSTR
- C. Low temperature in a PFR
- D. High temperature in a PFR

Aluminium as a material of construction suffers from the disadvantage of _____ ?

- A. Very high cost
- B. Rather low tensile strength**
- C. Very low strength to weight ratio
- D. Scarce availability

A good coking coal should have high _____ content?

- A. Ash
- B. Sulphur & phosphorus
- C. Moisture
- D. None of these**

Percentage of argon (by volume) in dry atmospheric air is about _____?

- A. 0.09
- B. 0.3
- C. 0.57
- D. 0.94**

Ammonia synthesis gas is produced from natural gas by _____?

- A. Thermal cracking
- B. Steam reforming**
- C. Partial oxidation
- D. Hydrogenation

_____ test is done to find out the softening point of bitumen?

- A. Impact
- B. Ball and ring**
- C. Flame
- D. Viscosity

Pick out the wrong statement ?

- A. DDT is manufactured by the condensation of chlorobenzene with chloral at 30°C in presence

of oleum, which is a highly exothermic reaction

- B. Chloral is obtained by the chlorination of ethyl alcohol
- C. Insecticides acting on the insects through the respiratory system are called fumigants
- D. Benzene hexachloride is not a contact insecticide**

Margarine is a/an _____?

- A. Fat**
- B. Explosive
- C. Plasticiser
- D. Rocket propellant

Higher is the mesh number, smaller will be the aperture size of the screen. It means that the aperture size of a 200 mesh screen will be smaller than that of 20 mesh screen. This is valid for _____?

- A. British standard screens
- B. German standard screens (DIN 1171) etc
- C. American standard screens (ASTM and Tyler standard screens)
- D. All A., B. and C.**

For a 25 mm hole drilled in plates to be riveted, the shank diameter of the rivet should be _____ mm?

- A. 25
- B. 23**
- C. 26
- D. 27

Which of the following is an organometallic compound ?

- A. Isopropyl alcohol
- B. Tetra-ethyl lead**
- C. Zeolite
- D. Cumene

Ordinary diffusion process is also called _____ diffusion?

- A. Pressure
- B. Thermal
- C. Concentration**
- D. Forced

In Joule's experiment, an insulated container contains 20 kg of water initially at 25°C. It is stirred by an agitator, which is made to turn by a slowly falling body weighing 40 kg through a height of 4 m. The process is repeated 500 times. The acceleration due to gravity is 9.8 ms⁻². Neglecting the heat capacity of agitator, the temperature of water (in °C) is _____?

- A. 40.5
- B. 34.4**
- C. 26.8
- D. 25

The process involved in converting rubber into a thin sheet or coating it on fabric is called _____?

- A. Extrusion
- B. Mastication
- C. Calendering**
- D. Vulcanisation

Agglomeration of individual particles into clusters (flocs) is called flocculation. To prevent flocculation, the most commonly used dispersing agents are _____?

- A. Carbonates
- B. Sulphates
- C. Silicates & phosphates**
- D. Bi-carbonates

Radioactivity of an isotope is expressed in _____?

- A. Barn

- B. MeV
- C. Curie**
- D. Ergs

Calorific values of both the solid as well as the liquid fuels can be determined by _____ calorimeter?

- A. Bomb**
- B. Boy's
- C. Junkers
- D. None of these

Crystallisation of solids from a homogeneous solution is a/an _____ process?

- A. Exothermic**
- B. Mildly endothermic
- C. Highly endothermic
- D. None of these

In SO₃ absorber (Contact Process), packing material used is of _____?

- A. Cast iron
- B. Chemical stoneware**
- C. Karbate
- D. Mild steel

An ideal liquid refrigerant should _____?

- A. Not have a sub-atmospheric vapour pressure at the temperature in the refrigerator coils
- B. Not have unduly high vapour pressure at the condenser temperature
- C. Both A. and B**
- D. Have low specific heat

Steel tower used for the storage of oleum _____?

- A. Is lined with lead

B. Need not be lined

- C. Is lined with rubber
- D. Is lined with acid-proof bricks

The rate of forward reaction, at chemical equilibrium is _____ the rate of backward reaction?

- A. More than
- B. Less than
- C. Equal to**
- D. Either B. or C.

Optimum reaction temperature in steam reforming of naphtha is _____ °C?

- A. 700 – 1000**
- B. 300 – 450
- C. 1500-1700
- D. 100-200

The pyrogallol solution used in Orsat apparatus can absorb _____ ?

- A. Only O₂
- B. Both O₂ and CO₂**
- C. Both O₂ and CO
- D. All CO, CO₂, and O₂

200 kg of solids (on dry basis) is subjected to a drying process for a period of 5000 seconds. The drying occurs in the constant rate period with the drying rate as, $N_c = 0.5 \times 10^{-3}$ kg/m².s. The initial moisture content of the solid is 0.2 kg moisture/kg dry solid. The interfacial area available for drying is 4 m²/1000 kg of dry solid. The moisture content at the end of the drying period is (in kg moisture/kg dry solid)?

- A. 0.5

- B. 0.05
- C. 0.1**
- D. 0.15

Celluloid is _____?

- A. Cellulose acetate
- B. Regenerated cellulose
- C. Cellulose nitrate**
- D. Cellulose acetate butyrate

Critical Air Blast (CAB) value of coke is a direct measure of its _____?

- A. Reactivity**
- B. Hardness
- C. Strength
- D. None of these

Thermodynamic equilibrium constant in a system is affected by _____?

- A. Inerts
- B. Pressure
- C. Temperature**
- D. All A., B. & C.

A hot liquid is kept in a big room. The logarithm of the numerical value of the temperature difference between the liquid and the room is plotted against time. The plot will be very nearly a/an _____?

- A. Ellipse
- B. Straight line**
- C. Parabola
- D. Circular arc

The catalyst used in shift converter is _____?

- A. Nickel**
- B. Vanadium
- C. Silica gel
- D. Alumina

The deflection in diaphragm (which is used as pressure sensor in pneumatic and electronic instruments) is dependent on the metal thickness, its diameter D , and shape & number of corrugations. Its deflection is proportional to _____?

- A. d
- B. d^2
- C. d^3
- D. d^4**

Which of the following grinding mills has the horizontally arranged rods as the grinding elements thereby delivering more uniform granular products with minimum fines ?

- A. Compartment mill
- B. Rod mill**
- C. Pebble mill
- D. Tube mill

The pressure outside a bubble/droplet of liquid is _____ the internal pressure?

- A. Greater than
- B. Less than**
- C. Equal to
- D. Unpredictable; depends on the bubble size

Inertial forces are obtained, when the elastic forces are multiplied by _____ number?

- A. Mach
- B. Froude
- C. Reynolds
- D. Euler

Air-refrigeration cycle _____?

- A. Is the most efficient of all refrigeration cycles
- B. Has very low efficiency
- C. Requires relatively large quantities of air to achieve a significant amount of refrigeration
- D. Both B. and C**

The commonly used solvent in supercritical extraction is _____?

- A. Methyl ethyl ketone
- B. Water
- C. Carbon tetrachloride
- D. Carbon dioxide**

Pick out the wrong statement ?

- A. In a batch reactor, which is exclusively used for liquid phase reactions; temperature pressure and composition may vary with time
- B. In a semi-batch reactor, one reactant is charged batch wise, while the other reactant is fed continuously
- C. In a continuous flow reactor, uniform concentration cannot be maintained throughout the vessel even in a well agitated system**
- D. In a continuous flow reactor, both the reactants and the products flow out continuously

For an ideal mixed flow reactor (CSTR), the exit age distribution $E(t)$ is given by _____?

- A. A Dirac delta function
- B. A step function
- C. A ramp function
- D. None of the above**

In case of vapour compression refrigeration system, elevating the evaporator temperature (keeping the condenser temperature constant) results in _____?

- A. Enhanced COP
- B. Decreased COP
- C. No change in the value of COP
- D. Increased or decreased COP; depending upon the type of refrigerant

Higher vapour pressure of gasoline indicates _____?

- A. Low flash point
- B. High breathing loss
- C. Both A. and B.
- D. Neither A. nor B.

Velocity head on sudden enlargement in a horizontal pipe is converted into _____ head?

- A. Elevation
- B. Pressure
- C. Both A. & B.
- D. Neither A. nor B.

Which of the following are considered applications of ultrasonic testing ?

- A. Determination of elastic constant
- B. Detection of defects in metal
- C. Measurement of material thickness
- D. None of the above

Fusion zone in the electric furnace used for reduction of phosphate rock to elemental phosphorous is maintained at _____ °C?

- A. 250-300
- B. 500-750

- C. 950-1050
- D. 1400-1450**

Removal of _____ results from the disinfection of water?

- A. Turbidity
- B. Odour
- C. Hardness
- D. Bacteria**

Which is a catalyst promoter used in catalytic ammonia synthesis reaction ?

- A. Al_2O_3
- B. Cr_2O_3
- C. K_2O**
- D. MnO

Babbitt metal used for bearings is a _____ base alloy?

- A. Tin**
- B. Lead
- C. Aluminium
- D. Copper

At what value of Prandtl number, conduction is negligible in the turbulent core of a fluid flowing through a heated pipe ?

- A. 0.5
- B. < 0.5
- C. > 0.6**
- D. < 0.1

Thermodynamic cycle involved in the working of a thermal power plant is the _____ cycle ?

- A. Joule
- B. Carnot
- C. Rankine**

D. Brayton

Electrolytic reduction cell used for conversion of calcined Al_2O_3 to Al is a carbon lined furnace operating at 800-900 °C. The purpose of electric current supplied to the furnace is to _____?

- A. Achieve very high purity of aluminium (99.9%)
- B. Keep the electrolyte in liquid condition by the generation of heat
- C. Electrolytically dissociate alumina
- D. Both B. & C.**

The maximum stress below which a material can withstand an infinite number of cycle of stress, is termed as the _____?

- A. Fatigue strength
- B. Creep strength
- C. Resilience
- D. Endurance limit**

The average boiling point of aviation turbine fuel is closest to that of _____?

- A. Lubricating oils
- B. LPG
- C. Diesel
- D. Kerosene**

Which of the following pairs is not correctly matched ?

- A. Uranium – 233 : Fertile material**
- B. Binding energy : Mass defect
- C. Scattering: Absorption cross-section
- D. Number of nucleons : Mass number

Pick out the wrong statement ?

- A. For the manufacture of styrene, the major raw materials are benzene and ethylene

- B. One important copolymer of styrene is SBR, which is widely used in the manufacture of automobile tyres
- C. Manufacture of phenol by chloroben-zene-caustic process involves. The chlorination of benzene, causticisation and hydrolysis
- D. Phenol manufacture by chlorobenzene-caustic process is competitive even when low cost chlorine is not available**

The absorption factor is defined as (where, L = liquid flow rate, G = gas flow rate and, m = slope of the equilibrium line) ?

- A. L/mG**
- B. G/mL
- C. mL/G
- D. LG/m

The time taken for gravity flow of a fixed volume of liquid (as in Redwood viscometer) is directly proportional to its _____?

- A. Absolute viscosity
- B. Ratio of absolute viscosity to density**
- C. Density
- D. Reynolds number

What is the co-efficient of contraction, if a fluid jet discharging from a 50 mm diameter orifice has a 40 mm diameter at its vena-contracta ?

- A. 0.64**
- B. 1.65
- C. 0.32
- D. 0.94

If moisture content of solid on dry basis is X , then the same on wet basis is _____?

- A. $X/(X + 1)$**
- B. $X/(1 - X)$
- C. $(1 + X)/X$

D. $(1 - X)/X$

Heat of solution in a system in which both solute and solvent are liquids is termed as _____?

- A. Heat of solvation
- B. Heat of hydration
- C. Standard integral heat of solution
- D. Heat of mixing**

Partial molar free energy of an element A in solution is same as its _____?

- A. Chemical potential**
- B. Activity
- C. Fugacity
- D. Activity co-efficient

Can the efficiency of a plate in the distillation tower be greater than 100% ?

- A. Yes
- B. Normally not; but is possible if infinite number of plates are put
- C. Never**
- D. Yes; if the reflux ratio is maximum

Which of the following materials does not form adherent oxide film on surface ?

- A. Copper
- B. Nickel
- C. Aluminium
- D. Gold & silver**

Pick out the wrong statement?

- A. Yellow phosphorous which is the most reactive allotropic form of phosphorous is transported under water
- B. Apatite is the principal material present in phosphate rock which is chemically Ca_{10}

(PO4)6 (F,
Cl, OH)

C. Urea is more hygroscopic than ammonium nitrate

D. Nitrogen fixation means the process of bringing atmospheric nitrogen into combination i.e. into nitrogen compound form

Pick out the correct statement pertaining to catalytic cracking ?

- A. With increase in the reactor pressure, octane number of gasoline decreases
- B. With increase in the reactor temperature, gasoline yield decreases for a given conversion
- C. Percentage conversion increases with increase in the catalyst to oil ratio
- D. All A., B. and C.**

In the reaction, represented by, $2\text{SO}_2 + \text{O}_2 \rightleftharpoons 2\text{SO}_3$; $\Delta H = -42$ kcal; the forward reaction will be favoured by _____?

- A. Low temperature
- B. High pressure
- C. Both A. and B**
- D. Neither A. nor B

Pick out the wrong statement?

- A. In practical operation, distillation towers having diameter 3-6 metres equipped with bubble cap (round) size of 15 cms are used
- B. Height of packing in a packed tower is about 3 times the column diameter for raschig rings and about 5 to 10 times the column diameter for saddle packing
- C. In a sieve tray, the minimum hole diameter is equal to the tray thickness
- D. In a stainless steel sieve tray, the minimum hole diameter is equal to 10 times the plate thickness**

The gas phase reaction $2\text{A} \rightleftharpoons \text{B}$ is carried out in an isothermal plug flow reactor. The feed consists of 80 mole % A and 20 mole % inerts. If the conversion of A at the reactor exit is 50%, then C_A/C_{A0} at the outlet of the reactor is _____?

- A. 2/3
- B. 5/8**
- C. 1/3
- D. 3/8

A perforated plate has holes of diameter d_h arranged in a pitch p_h . Each hole has a tube of I.D. d_t passing through it. The ligament efficiency is given by _____?

- A. $(p_h - d_h)/p_h$
- B. $(p_h - d_h \cdot d_t/2)/p_h$
- C. $(p_h - d_t)/p_h$**
- D. $(p_h - d_h)/d_h$

High temperature in gasification of coal favours _____?

- A. High production of CO_2
- B. Low production of CO_2
- C. High production of CO
- D. Both B. and C.**

What fraction of the total pressure is exerted by oxygen, if equal weights of oxygen and methane are mixed in an empty vessel at $25^\circ C$?

- A. 2/3
- B. 1/3**
- C. 1/2
- D. $1/3 \times (298/273)$

Latent heat of dry steam at atmospheric pressure is 539 Kcal/kg; which _____ with increase in the pressure of steam?

- A. Decreases**
- B. Increases
- C. Remain same
- D. May increase or decrease

As the chemical reaction proceeds, the rate of reaction _____?

- A. Increases
- B. Decreases**
- C. Remain same
- D. May increase or decrease depending on the type of reaction

The friction factor is _____?

- A. Always inversely proportional to the Reynolds number
- B. Not dimensionless
- C. Not dependent on the roughness of the pipe
- D. None of these**

Clay treatment of petroleum products _____?

- A. Decolorizes & stabilises cracked gasoline
- B. Desulphurise straight run gasoline & kerosene
- C. Adsorb arsenic from feedstock to catalytic reforming
- D. All A., B. & C.**

High magnesia lime is added to hot sugar cane juice (during the manufacture of sugar) to _____?

- A. Flocculate the impurities
- B. Facilitate fast filtration
- C. Both A. and B.**
- D. Neither A. nor B.

Catalyst used in the isomerisation is _____?

- A. Aluminium chloride**
- B. Alumina
- C. Nickel
- D. Phosphoric acid

Solvent extraction is the terminology applied to the liquid-liquid extraction, which is preferred for the separation of the components of liquids,

when _____?

- A. Extracting solvent is cheaply & abundantly available
- B. One of the liquid components is heat sensitive
- C. Viscosity of liquid components is very high
- D. One of the liquid components has very high affinity towards the solvent**

Heat transfer by conduction in the turbulent core of a fluid flowing through a heated pipe is negligible, if the value of Prandtl number is _____?

- A. 0.2
- B. 0.4
- C. 0.6**
- D. 0.8

'n' number of plug flow reactors (P.F.R) in series with a total volume 'V' gives the same conversion as one P.F.R. of volume _____?

- A. V/n
- B. V**
- C. $V.n$
- D. $1/V$

Thermosetting materials _____?

- A. Are cross-linked molecules**
- B. Soften on application of heat
- C. Are solvent soluble
- D. None of these

Sulphuric acid is mainly used in the _____ industry ?

- A. Fertiliser**
- B. Steel
- C. Paper
- D. Paint

The materials which fracture even at small strains are termed as brittle, while

those materials which exhibit an appreciable deformation before failure are termed as _____?

- A. Rigid
- B. Tough
- C. Ductile**
- D. Plastic

Enthalpy of a vapor gas mixture may be increased by increasing the _____?

- A. Temperature at constant humidity
- B. Humidity at constant temperature
- C. Temperature and the humidity
- D. All A., B. & C.**

Brazing is the joining of metals _____?

- A. Without melting the base metal
- B. With a non-ferrous filler
- C. Both A. & B.**
- D. Neither A. nor (B)

Out of the following refrigeration cycles, which one has maximum COP ?

- A. Air cycle
- B. Carnot cycle**
- C. Ordinary vapor compression cycle
- D. Vapor compression with a reversible expansion engine

The diffusion co-efficient of Ni in Cu at 1000 K is $1.93 \times 10^{-16} \text{ m}^2\text{S}^{-1}$ and it is $1.94 \times 10^{-14} \text{ m}^2\text{S}^{-1}$ at 1200 K. The activation energy (in k. J.mole⁻¹) for the diffusion of Ni in Cu is _____?

- A. 130
- B. 180
- C. 230**

D. 250

The force due to wind load acting on a tall vessel depends upon its _____?

- A. Shape
- B. Outside diameter
- C. Height
- D. All A, B. & C.**

Which of the following is not used as a filter medium in case of corrosive liquids?

- A. Nylon
- B. Glass cloth
- C. Metal cloth of monel or stainless steel
- D. Cotton fabric**

A first order system with a time constant of 1 min is subjected to frequency response analysis. At an input frequency of 1 radian/min, the phase shift is _____?

- A. 45°
- B. -90°
- C. -180°
- D. -45°**

For the free settling of a spherical particle through a fluid, the slope of, $CD\text{-log } NRe$, plot is _____?

- A. 1
- B. -1**
- C. 0.5
- D. -0.5

Pick out the wrong statement?

- A. α -particle emission from a radioactive element makes it electrically negative
- B. β -particle emission from a radioactive element makes it electrically positive
- C. A radioactive element having a half life period of 20 years will completely disintegrated in 40 years**
- D. The disintegration constant of a radioactive isotope is independent of pressure, temperature or concentration

In high temperature carbonisation (as compared to low temperature carbonisation) of coal _____?

- A. Coke oven gas yield is more
- B. Tar yield is less but free carbon in tar is more
- C. Calorific value of coke oven gas is less
- D. All A., B. and C.**

$PV^\gamma = \text{constant}$, holds good for an isentropic process, which is _____?

- A. Reversible and isothermal
- B. Isothermal and irreversible
- C. Reversible and adiabatic**
- D. Adiabatic and irreversible

Process degree of freedom indicates _____ number of controllers to be used?

- A. The maximum**
- B. The minimum
- C. Both maximum and the minimum
- D. Nothing about the

Pick out the wrong statement ?

- A. The concentric layer in atmosphere which contains about 70% of the total mass of atmosphere and characterised by a steady decrease in temperature is called stratosphere**
- B. Stratosphere is rich in ozone and is located just above the troposphere

- C. Troposphere is a turbulent dusty zone containing much of water vapor and clouds
D. The earth's atmosphere is an envelope of gases extending upto a height of about 200 kms

Dry air required to burn 1 kg of carbon completely may be around _____ kg?

- A. 11
B. 2
C. 20
D. 38

Of the total tar present in raw coke oven gas, the tar recovered in primary cooler is about _____ percent?

- A. 5
B. 25
C. 55
D. 75

For a sphere falling in the constant drag co-efficient regime, its terminal velocity depends on its diameter D . as _____?

- A. d
B. \sqrt{d}
C. d^2
D. $1/d$

The amplitude ratio for the sinusoidal response of a _____ is 1?

- A. First order system
B. Second order system
C. **Transportation lag**
D. None of these

Which of the following factors control the design of a fluid-solid reactor ?

- A. Reaction kinetics for single particle

- B. Size distribution of solids being treated
- C. Flow patterns of solids and fluid in the reactor
- D. All A., B. and C.**

Polythene is a/an _____ polymerisation product?

- A. Addition**
- B. Condensation
- C. Thermosetting
- D. None of these

Which of the following is not an ore of copper ?

- A. Cryolite**
- B. Azurite
- C. Chalcopyrite
- D. Malachite

Which fertiliser is made (using coke oven gas) in by products plant of an integrated steel plant ?

- A. Urea
- B. CAN
- C. Ammonium sulphate**
- D. Superphosphate

The ability of a material to offer resistance to scratching or indentation is a measure of its _____?

- A. Brittleness
- B. Toughness
- C. Hardness**
- D. Resilience

Illuminating characteristics of kerosene is expressed by its _____?

- A. Smoke point
- B. Aniline point

C. Luminosity number

D. Aromatic content

The experimentally determined overall order of the reaction, $A + B \rightarrow C + D$, is two. Then the _____?

A. Reaction is elementary with a molecularity of 2

B. Molecularity of the reaction is 2, but the reaction may not be elementary

C. Reaction may be elementary with molecularity of 2

D. Reaction is elementary but the molecularity may not be 2

The atomic mass of an element is fractional, because _____?

A. Of uncertainty principle

B. It may have isobars

C. It contains neutrons

D. It may have isotopes

Most important characteristics of gas-liquid reactors are the _____?

A. Specific inter-facial area

B. Liquid hold-up

C. Both A. and B.

D. None of these

Fatigue strength of a material increases by _____?

A. Having notches in the specimen

B. Rise in temperature

C. Under stressing the specimen

D. Having scratches on the surface

Which of the following is used as a catalyst in fluidised bed catalytic cracking ?

A. Silica-magnesia

B. Silica-alumina

- C. Bentonite clays
- D. All A., B. and C.**

_____ is an ore of lead?

- A. Quartz
- B. Galena**
- C. Siderite
- D. Chalcopyrite

A pyranometer is an instrument used for measuring the _____?

- A. Beam radiation
- B. Global radiation**
- C. Bright sunshine period
- D. None of these

In extrusion of metals, which of the following statement is true ?

- A. Speed of the extruded material is same as that of ram speed
- B. Redundant work is a function of the die angle
- C. Relative motion between the billet surface and the container wall is always present
- D. Hollow ram is used for indirect extrusion**

The fluid in which the shearing stress within it is proportional to the velocity gradient across the sheared section, is called a _____ fluid?

- A. Bingham
- B. Newtonian**
- C. Perfect
- D. None of these

Fertiliser produced during soda ash manufacture by dual process is ammonium _____?

- A. Chloride**
- B. Sulphate
- C. Nitrate

D. None of these

A piezometer provided in the pipe measures _____?

A. Friction factor

B. Static pressure

C. Dynamic pressure

D. None of these

For an input forcing function, $X(t) = 2t^2$, the Laplace transform of this function is _____?

A. $2/s^2$

B. $4/s^2$

C. $2/s^3$

D. $4/s^3$

A backmix reactor _____?

A. Is same as plug-flow reactor

B. Is same as ideal stirred tank reactor

C. Employs mixing in axial direction only

D. Is most suitable for gas phase reaction

Plasticisers are high boiling liquids added to plastic polymers to impart toughness and flexibility at ordinary temperature. Which of the following is not a plasticiser ?

A. Ethylene glycol

B. Stearic acid estors

C. Tricresyl phosphate

D. Esters of phthalic acid

Terylene is a/an _____?

A. Addition polymer

B. Poly amide

C. Homopolymer

D. None of these

In an exothermic reaction, the energy of the reacting substances as compared to that of products is _____?

A. More

B. Less

C. Same

D. Either A. or B., depends on order of reaction

The _____ of the fluid contained in the temperature sensing element (i.e., bulb) of filled system thermometers changes with change in temperature ?

A. Pressure

B. Volume

C. Viscosity

D. All A., B. and C.

Which of the following factors does not contribute to the pressure drop in a pipeline ?

A. Velocity of fluid

B. Size of pipe

C. Length of pipe and number of bends

D. None of these

_____ is a donor impurity for semi-conductors ?

A. Boron

B. Antimony

C. Gallium

D. None of these

Pick out the wrong statement?

A. Atomic heat capacities of the crystalline solid elements are nearly constant and equal to 6.2 kcal/kg-atom according to the law of Petit and Dulong

B. Atomic heat capacities of all solid elements decrease greatly with decrease in

temperature, approaching a value of zero at absolute zero temperature, when in the crystalline state

C. Generally, the heat capacities of compounds are lower in the liquid than in the solid state

D. The heat capacity of a heterogeneous mixture is an additive property, but when solutions are formed, this additive property may no longer exist

Anion exchanger is regenerated usually with _____?

A. NaOH

B. H₂SO₄

C. Hydrazine

D. Alum solution

Higher concentration of CO₂ in atmosphere _____?

A. Allows visible solar radiation (ultraviolet) of short wave-length to pass through

B. Reflects and absorbs the longer wavelength (infra-red) radiations

C. Prevents solar heat being radiated out completely, resulting in 'heat trap' i.e., global warming

D. All A., B. and C.

Crushing of mineral particles is accomplished in a 'cage mill', when one or more alloy steel bars are revolved in opposite directions. It is a type of _____ mill?

A. Impact

B. Roll

C. Vibratory

D. None of these

Shift conversion reaction _____?

A. Converts N₂ and H₂ into NH₃

B. Converts CO to CO₂ with steam

C. Is non-catalytic

D. Is highly exothermic

Pour point and freezing point is equal for _____?

- A. Petrol
- B. Diesel
- C. Water**
- D. Crude petroleum

In electrical resistance welding, distortion results from the use of improper _____?

- A. Clamping methods**
- B. Electrodes
- C. Current
- D. Filler material

In most of the vacuum crystalliser, vacuum is generally produced by means of a _____?

- A. Suction pump
- B. Compressed air jet
- C. Steam jet ejector with a barometric condenser**
- D. None of these

As per Newton's law of viscosity, the shear stress for a given rate of angular deformation of fluid is proportional to (where, μ = fluid viscosity) ?

- A. $1/\mu$
- B. μ**
- C. μ^2
- D. $1/\mu^2$

Urea is represented as _____?

- A. $\text{NH}_2.\text{CO}.\text{NH}_2$**
- B. $\text{NH}_3\text{CO}.\text{CH}_3$
- C. $\text{NH}.\text{CO}_2.\text{NH}$
- D. $\text{NH}_3.\text{CO}_2.\text{NH}_3$

The rate of the reaction, $X \rightarrow Y$, quadruples when the concentration of 'X' is doubled. The rate expression for the reaction is, $r = K C_x^n$, the value of 'n' in this case will be _____?

- A. 0
- B. 1
- C. 2**
- D. 3

A balanced chemical reaction equation conforms to the law of _____?

- A. Conservation of mass**
- B. Avogadro's hypothesis
- C. Gaseous volumes
- D. None of these

Multiple effect evaporation is generally recommended, when the _____?

- A. Large scale evaporation of liquor is needed**
- B. Corrosive liquids are to be concentrated
- C. Fuel is cheaply available
- D. Evaporation on small scale is to be done

Use of pulverised coal in boiler furnace provides _____?

- A. High calorific value
- B. Better combustion**
- C. Smokeless burning
- D. Less erosion on furnace walls

The interfacial area per unit volume of dispersion, in a gas-liquid contactor, for fractional hold up of gas = 0.1 and gas bubble diameter = 0.5 mm is given by (in m^2/m^3) ?

- A. 500
- B. 1200
- C. 900
- D. 800

Pitot tube measures the _____ of a fluid?

- A. Pressure
- B. Average velocity
- C. Average flow rate
- D. Point velocity**

C/H ratio (by weight) of naphtha used in nitrogenous fertiliser making is about _____?

- A. 2
- B. 6**
- C. 13
- D. 20

For the Stoke's law to be valid in the case of a falling sphere in a fluid, the _____?

- A. Reynolds number (based on sphere diameter) should be < 1
- B. Flow around the sphere should be in turbulent region
- C. Sphere must be metallic**
- D. Fluid density should be constant

The reservoir rock containing petroleum has _____?

- A. Low porosity
- B. High permeability
- C. High porosity
- D. Both B. and C.**

Oxide layer formed on the non-ferrous metal surface after its annealing is _____?

- A. Removed by acid pickling**
- B. Hammered into the surface
- C. Removed with coarse emery cloth
- D. Left as such to protect the surface

Magnesite refractories are generally not used in the _____?

- A. Electric furnace walls
- B. Steel melting furnace**
- C. Open hearth furnace
- D. Burning zone of cement kilns

The inherent characteristic of an equal percentage valve relating flow rate 'q' with valve stem movement 'x' are described by the equation _____?

- A. $dq/dx = K$**
- B. $dq/dx = K \cdot q$
- C. $dq/dx = K/q$
- D. $dq/dx = Kq^2$

_____ of hard alloy and tool steel is done to make it easily machinable ?

- A. Case carburising
- B. Tempering**
- C. Normalising
- D. Annealing

Ethyl alcohol cannot be produced _____?

- A. From waste sulphite substrate of paper mills
- B. By Esterification and hydrolysis of ethylene
- C. From molasses
- D. None of these**

Pick out the wrong statement?

- A. Dry process is used for the manufacture of cement, when the raw material is blast furnace slag
- B. Portland cement is made employing wet process
- C. Gypsum is added to Portland cement to lengthen its setting time
- D. None of these**

Strain gage pressure transducers are used to measure _____ pressures?

- A. Gage as well as vacuum
- B. Absolute as well as differential
- C. Both A. and B.**
- D. Neither A. nor B.

If a nuclear reactor produces more fissile nuclear fuel than it consumes, then it is called a _____ reactor?

- A. Critical
- B. Breeder**
- C. Fertile
- D. Heterogeneous

Fluorosis (a bone disease) is caused by the presence of high concentration of _____ in atmospheric air?

- A. Hydrocarbons
- B. Hydrogen fluoride**
- C. Hydrogen sulphides
- D. Nitrogen dioxide

Pick out the wrong statement?

- A. Trouton's ratio of non-polar liquids is calculated using Kistyakowsky equation
- B. Thermal efficiency of a Carnot engine is always less than 1
- C. An equation relating pressure, volume and temperature of a gas is called ideal gas equation**
- D. None of these

As per international norms, the maximum permissible value of noise level in the industrial environment is _____ decibels as measured at a distance of 1.5 meters from the source of noise?

- A. 110
- B. 85**
- C. 60
- D. 45

Effectiveness factor of a catalyst pellet is a measure of the _____ resistance?

- A. Pore diffusion**
- B. Gas film
- C. Chemical reaction
- D. None of these

The ratio of the actual mesh dimension of Taylor series to that of the next smaller screen is _____?

- A. 2
- B. $\sqrt{2}$**
- C. 1.5
- D. $\sqrt{3}$

Rayleigh's equation applies to _____ distillation?

- A. Continuous
- B. Steam
- C. Differential**
- D. Flash

Presence of nickel & chromium in steel does not raise its _____?

- A. Elastic limit**
- B. Machining properties

- C. Ductility
- D. Resilience

Pick out the wrong statement?

- A. There is no transfer lag for a single first order system
- B. Stirred tank with a water jacket exemplifies an interacting system
- C. Transfer lag is a characteristic of all higher order systems (other than first order systems)
- D. Transfer lag decreases as the number of stages decreases**

If the vapour pressure at two temperatures of a solid phase in equilibrium with its liquid phase are known, then the latent heat of fusion can be calculated by the _____?

- A. Maxwell's equation
- B. Clausius-Clapeyron Equation**
- C. Van Laar equation
- D. Nernst Heat Theorem

Bromides contained in hot mother liquor is treated with _____ during manufacture of bromine from sea water ?

- A. SO₃
- B. Cl₂**
- C. NH₃
- D. SO₂

The type of stress developed in a metallic bar on subjecting it to a change in temperature without allowing it to be deformed is _____ stress?

- A. Shear
- B. Tensile
- C. Compressive
- D. Thermal**

The effect of increasing pressure on the gaseous equilibrium of the reaction $2X +$

$3Y \rightleftharpoons 3X + 2Y$ indicates that _____?

- A. Pressure has no effect
- B. Backward reaction is favoured
- C. Forward reaction is favoured
- D. None of these

Polyhexamethylene adipamide is also known as _____?

- A. Bakelite
- B. Nylon-66**
- C. Epoxy resin
- D. Silicone rubber

Addition of 2% nickel in steel makes it suitable for making _____?

- A. Electronic valves
- B. Boiler plates, rivets etc.**
- C. Turbine blades
- D. Connecting rod

The ammonia synthesis reaction represented by $N_2 + 3H_2 \rightleftharpoons 2NH_3$; $\Delta H = -22.4$ kcal, is _____?

- A. Endothermic
- B. Exothermic**
- C. Isothermal
- D. Adiabatic

Neoprene which is used for making shoe heels & belts is superior to natural rubber in its stability to aerial oxidation and resistance to oils & other solvents. The monomer used for making neoprene is _____?

- A. Chloroethane
- B. Chloroprene**
- C. Isoprene

D. None of these

Saturated molal absolute humidity of the vapor-gas mixture depends upon the _____?

- A. Vapor pressure at dry bulb temperature
- B. Total pressure
- C. Both A. and B.**
- D. Neither A. nor B.

Antibiotic _____?

- A. Inhibits/destroys the growth of microorganisms**
- B. Is used as a pain reliever
- C. Is an antimalarial
- D. Is an anaesthetic

When the reaction is dominated by intraparticle diffusion, the apparent order of reaction (n_D) as measured is related to the true order (n) as

_____?

- A. $n_D = (n + 1)/2$**
- B. $n_D = n/2$
- C. $n_D = n + 1$
- D. None of these

Heat transfer rate to the stock/charge in the furnace does not depend upon the _____?

- A. Emissivity of the refractory walls
- B. Size of the furnace
- C. Use of waste heat recovery equipments**
- D. Thickness of the stock

A gas has a volume of 27.3 c.c. at 0°C. Its volume at 10°C (if pressure remains unchanged) will be _____ c.c.?

- A. 2.73
- B. 28.3**
- C. 273
- D. 283

Pick out the wrong statement ?

- A. Addition polymers are generally formed by chain growth polymerisation
- B. Condensation polymers are generally formed by step growth polymerisation
- C. Teflon is formed by step growth polymerisation**
- D. Bakelite is formed by step growth polymerisation

Conductance is given by (where, x = thickness, A = heat flow area, K = thermal conductivity.)?

- A. x/KA
- B. KA/x**
- C. K/Ax
- D. A/Kx

The calorific value of producer gas is around _____ kcal/Nm³?

- A. 1300**
- B. 500
- C. 4500
- D. 9000

An irreversible process _____ ?

- A. Is the analog of linear frictionless motion in machines
- B. Is an idealised visualisation of behaviour of a system
- C. Yields the maximum amount of work
- D. Yields an amount of work less than that of a reversible process**

In a cross linked polymer, the monomeric units are linked together to constitute a three dimensional network. Which of the following is a cross-linked polymer ?

- A. Bakelite (phenol formaldehyde)**

- B. Polyester
- C. Polythene
- D. Nylon-6

At a constant speed of the centrifugal pump, it's _____ the impeller diameter?

- A. Capacity varies directly with
- B. Head varies as the square of
- C. Horsepower varies as the cube of
- D. All A., B. and C.**

Concentration of H₂SO₄ catalyst in alkylation is kept between 90-98%, because H₂SO₄ having concentration?

- A. Less than 90% promotes polymerisation
- B. More than 98% promotes cracking
- C. Both A. and B.**
- D. Neither A. nor B.

Which of the following is a 'contact' pyrometer ?

- A. Resistance pyrometer**
- B. Optical pyrometer
- C. Radiation pyrometer
- D. Infra red pyrometer

Increase in ash content of blast furnace coke _____?

- A. Reduces its consumption in the furnace
- B. Increases its consumption in the furnace**
- C. Does not affect its consumption in the furnace
- D. Decreases its hardness and abrasion resistance

Weight of 56 litres of ammonia at N.T.P. is _____ gm?

- A. 2.5
- B. 42.5**

- C. 56
- D. 2800

A 30% (by volume) suspension of spherical sand particles in a viscous oil has a hindered settling velocity of $4.44 \mu\text{m/s}$. If the Richardson Zaki hindered settling index is 4.5, then the terminal velocity of a sand grain is _____?

- A. $0.90 \mu\text{m/s}$
- B. $1 \mu\text{m/s}$**
- C. $22.1 \mu\text{m/s}$
- D. $0.02 \mu\text{m/s}$

For the chemical reaction $X \rightarrow Y$, it is observed that, on doubling the concentration of 'X', the reaction rate quadruples. If the reaction rate is proportional to C_x^n , then what is the value of „n“ ?

- A. 1/4
- B. 2
- C. 4**
- D. 16

For a heterogeneous catalytic reaction _____?

- A. Free energy of activation is lowered in the presence of catalyst, which remains unchanged at the end of reaction**
- B. A relatively small amount of catalyst can cause the conversion of large amount of reactants which does not mean that catalyst concentration is important
- C. The catalyst does not form an intermediate complex with the reactant
- D. The surface of the catalyst does not play an important role during reaction

Products drawn from the top to bottom of the crude oil distillation column has progressively increasing _____?

- A. Boiling points

- B. Molecular weight
- C. C/H ratio
- D. All A., B. and C.**

_____ is concerned with the adsorption equilibria?

- A. Fick's law
- B. Gibb's equation
- C. Freundlich equation**
- D. None of these

Hardening of steel is not possible unless it is heated _____ critical point?

- A. Above the highest
- B. Above the lowest**
- C. Between the first & second
- D. Between the second & third

With rise in temperature, the solubility of ammonia in water at a fixed pressure _____?

- A. Increases
- B. Decreases**
- C. Remains unchanged
- D. Increases exponentially

Chrome magnesite bricks are _____?

- A. Acidic in nature
- B. Neutral in nature
- C. Having higher RUL than silica bricks**
- D. Made by mixing 30% Chromite and 70% Periclase

For a ternary mixture, in which equilateral triangular co-ordinate is used in leaching and extraction, a _____ of the equilateral triangular co-

ordinates?

- A. Binary mixture is represented by the apex
- B. Binary mixture is represented by any point inside
- C. Ternary mixture is represented by the sides
- D. Pure component is represented by the apex**

Where does the maximum stress occur in case of laminar flow of incompressible fluid in a closed conduit of diameter 'd' ?

- A. At the centre
- B. At $d/4$ from the wall
- C. At the wall**
- D. At $d/8$ from the wall

Which furnace employs preheating, heating and soaking zones ?

- A. Soaking pit
- B. Reheating furnace**
- C. Open hearth furnace
- D. Cupola

Prime coking coal is always blended with medium or non- coking coal before carbonisation _____?

- A. To check against its excessive swelling during heating, which may exert high pressure and damage coke oven walls
- B. Because, it alone produces unreactive coke
- C. Both A. and B.**
- D. Neither A. nor B.

Polycondensation reaction of polymerisation _____?

- A. Does not produce linear polymers
- B. Produces only thermoplastic material
- C. Produces epoxy polymers**
- D. Does not need any catalyst

_____ of air does not increase with increase in temperature?

- A. Density**
- B. Thermal diffusivity
- C. Viscosity
- D. Thermal conductivity

Maximum consumption of polymers is in _____?

- A. Electrical insulation
- B. Toys making
- C. Coating and films**
- D. Packaging

The value of $N_A/(N_A + N_B)$, for steady state equimolar counter diffusion of two gases 'A' and 'B' is _____?

- A. 1
- B. ∞**
- C. 0.5
- D. 2

_____ has a negative co-efficient of linear expansion?

- A. Iron
- B. Copper**
- C. Rubber
- D. Nickel

Roof of a basic open hearth furnace is lined with _____ bricks?

- A. Silica**
- B. Fireclay
- C. Dolomite
- D. Magnesite

Which of the following thermocouple materials does not contain nickel ?

- A. Alumel
- B. Chromel
- C. Constantan
- D. None of these**

_____ is produced by polymerisation of chloroprene?

- A. Thiokol (a polysulphide rubber)
- B. Butyl rubber
- C. Neoprene**
- D. Polyurethane rubber

Air enters an adiabatic compressor at 300K. The exit temperature for a compression ratio of 3, assuming air to be an ideal gas ($\gamma = C_p/C_v = 7/5$) and the process to be reversible, is _____?

- A. $300 \times (32/7)$**
- B. $300 \times (33/5)$
- C. $300 \times (333/7)$
- D. $300 \times (35/7)$

Nitro-glycerine absorbed in wood flour, sodium nitrate or ammonium nitrate is commercially used as controlled explosive called dynamite. The raw material used for its manufacture are glycerine, nitric acid and _____?

- A. Sulphuric acid**
- B. Phosphoric acid
- C. Hydrochloric acid
- D. Hydrofluoric acid

Which of the following processes does not produce Cl_2 as a co-product during the manufacture of caustic soda ?

- A. Diaphragm electrolytic cell process
- B. Mercury electrolytic cell process
- C. Lime-soda process**

D. None of these

The vapour pressure exerted by the moisture contained in a wet solid depends upon the_____?

- A. Nature of the moisture
- B. Temperature
- C. Nature of the solid
- D. All A., B. and C.**

In condensation polymerisation as compared to addition polymerisation_____?

- A. The monomers are unsaturated compounds
- B. No co-product is lost
- C. The monomers contain two functional groups**
- D. Generally only one monomer is involved

Due to its excellent permeability to air/gas and oxidation resistance, the tubes of automobile tyres is made of_____?

- A. Cold SBR
- B. Butyl rubber**
- C. Bunai N
- D. Buna S

At the boiling point of the liquid at the prevailing pressure, the saturated absolute humidity becomes_____?

- A. 1
- B. 0
- C. ∞**
- D. None of these

The sum of masses of two nuclei produced in nuclear fission compared to the mass of original nucleus is_____?

- A. Less
- B. More
- C. Same
- D. Much more

Components, having widely different boiling point in a binary mixture, can be separated using _____ distillation?

- A. Molecular
- B. Extractive
- C. Steam
- D. Simple**

Measurement of the interfacial area of mass transfer is achieved easily & accurately in case of a _____ column?

- A. Spray
- B. Packed
- C. Bubble cap plate
- D. Wetted wall**

Dehydrogenation of ethyl benzene produces _____ ?

- A. Styrene**
- B. Naphthalene
- C. Phenol
- D. Benzoic acid

Drag co-efficient for motion of spherical particles in a stationary fluid in the stoke's law range is _____ ?

- A. $24/NRe,P$**
- B. $16/NRe,P$
- C. $64/NRe,P$
- D. $48/NRe,P$

Which of the following is unimportant in forced convection ?

- A. Reynolds number
- B. Prandtl number
- C. Grashoff number**
- D. None of these

What is the Laplace transform of $\sin t$?

- A. $1/(s^2 + 1)$**
- B. $s/(1 + s^2)$
- C. $1/(s^2 - 1)$
- D. $s/(s^2 - 1)$

Percentage of straight run gasoline in a typical crude oil may be around _____?

- A. 6
- B. 18
- C. 38
- D. 52**

For an absorber, both equilibrium and operating line will be straight for _____?

- A. Concentrated solution and non-isothermal operation
- B. Dilute solution and non-isothermal operation
- C. Dilute solution and isothermal operation**
- D. Concentrated solution and isothermal operation

Prandtl number is a measure of the _____?

- A. Heat conduction to viscosity of a fluid**
- B. C_p/C_v of a fluid
- C. Elastic force to pressure force in the fluid flow
- D. Inertial force to elastic force in the fluid flow

The specific gravity of coal depends mainly on its _____ content?

- A. Carbon

- B. Volatile matter
- C. Ash**
- D. Moisture

A first order gaseous phase reaction is catalysed by a non-porous solid. The kinetic rate constant and the external mass transfer co-efficients are k and k_g respectively. The effective rate constant (k_{eff}) is given by _____?

- A. $k_{eff} = k + k_g$
- B. $k_{eff} = (k + k_g)/2$
- C. $k_{eff} = (kk_g)^{1/2}$
- D. $1/k_{eff} = 1/k + 1/k_g$**

Which furnace consumes maximum refractory annually in an integrated steel plant ?

- A. Soaking pit
- B. Blast furnace
- C. L.D. converter**
- D. Coke ovens

Presence of high phosphorous in cast iron increases its _____?

- A. Fluidity**
- B. Melting point
- C. Shrinkage
- D. Tensile strength

The filtrate flow rate in constant pressure filtration _____?

- A. Continuously increases
- B. Continuously decreases**
- C. Remain constant throughout
- D. May increase or decrease; depends on the pressure

Raoult's law is not applicable to the _____?

- A. Solutes which dissociate or associate in the particular solution

- B. Concentrated solutions
- C. Both B. & C.**
- D. Solutions containing non-volatile solute

The number of degrees of freedom for an azeotropic mixture in a two component vapourliquid equilibria is/are _____?

- A. Zero
- B. One**
- C. Two
- D. Three

Which of the following is not a mechanical pressure sensing element ?

- A. Bellows
- B. Diaphragm
- C. Bourdon tube
- D. U-tube**

Coal tar fuel – 200 (CTF 200) is a mixture of _____?

- A. Pitch and creosote oil**
- B. Light oil and pitch
- C. Anthracene and creosote oil
- D. Solar oil and pitch

_____ shaped roof is the most commonly used roof for cylindrical storage tanks?

- A. Conical**
- B. Flat
- C. Dome
- D. Umbrella

Commercial production of petrol from coal (as practised in a factory at Sasol in South Africa) is done by the _____ of coal?

- A. Hydrogenation**

- B. Gasification
- C. Carbonisation
- D. None of these

The units of the rate constant for a second order reaction are _____?

- A. Sec-1. mole°
- B. Moles¹. sec-1
- C. Moles⁻¹. sec¹**
- D. Moles¹. sec¹

Pick out the wrong statement.

- A. Caustic embrittlement of boiler's metallic parts is caused by high concentration of caustic soda in boiler feed water
- B. Cooling and freezing of water kills the bacteria present in it**
- C. With increasing boiler operating pressure of steam, the maximum allowable concentration of silica in feed water goes on decreasing
- D. Dissolved oxygen content in high pressure boiler feed water should be nil

The rate of reaction of a/an _____ reaction is not affected by temperature rise ?

- A. Autocatalytic
- B. Photochemical**
- C. Consecutive
- D. Zero order

Ammonium phosphate is a _____ fertiliser?

- A. Nitrogenous
- B. Phosphatic
- C. Complex
- D. Mixed**

Synthetic glycerine is produced from _____?

- A. Toluene
- B. Phenol
- C. Propylene**
- D. Naphthalene

An ideal gas is taken around the cycle ABCA as shown in P-V diagram below: The work done by the gas during the cycle is equal to _____?

- A. $12 P_1 V_1$
- B. $6 P_1 V_1$
- C. $3 P_1 V_1$**
- D. $P_1 V_1$

Cation exchange resins used in water treatment is made from _____ resin?

- A. Urea formaldehyde**
- B. Epoxy
- C. Amino
- D. Phenolic

In a neutral solution _____?

- A. H^+ ions are absent
- B. OH^- ions are absent
- C. Both H^+ and OH^- ions are present in very small but equal concentration**
- D. None of these

Drying of a wet solid under constant drying conditions means the exposure of the wet solid to the air of constant _____?

- A. Humidity
- B. Velocity
- C. Temperature
- D. All A., B. & C.**

Blue vitriol is chemically _____?

- A. Copper sulphate**
- B. Ferrous sulphate
- C. Copper nitrate
- D. Aluminium sulphate

Raw materials required for the manufacture of _____ is acetylene and hydrochloric acid?

- A. Phthalic anhydride
- B. Vinyl chloride**
- C. Maleic anhydride
- D. Dacron

Presence of nitrogen in steel _____?

- A. Makes it brittle**
- B. Increases its strength
- C. Increases its hardness
- D. Is desirable

In a consecutive reaction system of the given figure bellow, when E1 is much greater than E2, the yield of B increases with the _____?

- A. Increase of temperature**
- B. Decrease of temperature
- C. Increase in initial concentration of A
- D. Decrease in initial concentration of A

Saddle supports are used for supporting _____ vessels?

- A. Horizontal cylindrical**
- B. Tall vertical
- C. Thick walled vertical
- D. Thick spherical

Coal tar (produced by high temperature carbonisation) is the main source

of _____?

- A. Aromatic compounds
- B. Aliphatic compounds
- C. Paraffins
- D. Olefins

Gaseous diffusivity at atmospheric pressure is of the order of _____ cm²/second?

- A. 1
- B. 1 to 5
- C. 5 to 10
- D. > 10

In the equation, $PV^n = \text{constant}$, if the value of n is in between 1 and γ (i.e. C_p/C_v), then it represents a reversible _____ process?

- A. Isometric
- B. Polytropic
- C. Isentropic
- D. Isobaric

With increase in the oxygen content of the coal, its _____ decreases?

- A. Calorific value
- B. Caking power
- C. Both A. & B.
- D. Neither A. nor B.

Name the hydrocarbon having the poorest oxidation stability ?

- A. Naphthene
- B. Olefin
- C. Paraffin
- D. Aromatics

Pick out the wrong statement?

- A. The evaporation of aqueous solution of glucose causes its molarity to increase
- B. Both the freezing point as well as boiling point of sea water is more than that of distilled water
- C. The solution containing equal masses of two liquids 'X' and 'Y' has the same mole fraction of 'X' and 'Y'
- D. Both B. and C.**

Proximate analysis of coal determines its _____ content?

- A. Moisture, ash, sulphur & volatile matter
- B. Moisture, volatile matter, ash & fixed carbon**
- C. Moisture, sulphur, nitrogen & fixed carbon
- D. None of these

The emf of a Daniell cell " $\text{Zn} \mid \text{Zn}^{2+} \parallel \text{Cu}^{2+} \mid \text{Cu}$ " can be increased by _____?

- A. Decreasing the surface area of the electrodes
- B. Increasing the concentration of zinc sulphate solution
- C. Increasing the surface area of the electrodes
- D. Increasing the concentration of copper sulphate solution**

"The heat capacity of a solid compound is approximately equal to the sum of the heat capacities of the constituent elements." This is the statement of _____?

- A. Law of Petit and Dulong
- B. Kopp's rule**
- C. Nernst heat theorem
- D. Trouton's rule

Find the ultimate gain and frequency for a proportional controller in the case of a process having the transfer function $G_p(s) = 1/(4s + 1)(2s + 1)(s + 1)$?

- A. $w = 1/\sqrt{14}$, $K_c = 45/7 \sqrt{14}$
- B. $w = \sqrt{7/6}$, $K_c = 46/3$**

- C. $w = 1$, $K_c = 13$
- D. $w = \sqrt{7/8}$, $K_c = 45/4$

A fluid energy mill is used for _____?

- A. Cutting
- B. Grinding
- C. Ultra grinding**
- D. Crushing

Batch process is preferred over continuous process, when the _____?

- A. Product yields and quality cannot be achieved in continuous process, because of long residence time
- B. Sales demand of product is not steady**
- C. Same equipment cannot be used for several processes of the same nature
- D. All (A), B. & (C)

The vapor pressure of liquids (having similar chemical nature) at any specified temperature _____ with increasing molecular weight?

- A. Increases
- B. Decreases**
- C. Remains unchanged
- D. Increases linearly

A shallow pond in which the sewage is retained and biologically treated is called _____?

- A. Oxidation**
- B. Imhoff tank
- C. Lagoon
- D. Skimming tank

_____ circuit is most commonly used to measure strain with the help

of a strain gauge?

- A. Ballast
- B. Voltage balancing potentiometric**
- C. Simple current sensitive
- D. None of these

Minimum temperature upto which water can be theoretically cooled down in the cooling tower by evaporative cooling is equal to the _____ temperature of air?

- A. Wet bulb**
- B. Dry bulb
- C. Saturation
- D. Dew point

Collapsible tubes for tooth paste are produced by _____ extrusion?

- A. Direct
- B. Indirect
- C. Impact**
- D. None of these

Limestone is added in the blast furnace (during pig iron manufacture) to _____?

- A. Form slag by combining with impurities**
- B. Supply heat by undergoing exothermic reaction with impurities
- C. Reduce the coke consumption
- D. Reduce slag viscosity

Carbon content of pitch (residue of coal tar distillation) is around _____ percent?

- A. 70
- B. 55
- C. 80

D. 94

Thermal diffusivity of a substance is proportional to (where, k = Thermal conductivity) _____?

- A. $1/k$
- B. k**
- C. k^2
- D. $1/k^2$

During the constant rate period of drying of a solid ?

- A. Increased air humidity decreases the rate of drying
- B. Increasing the air temperature decreases the drying rate
- C. Surface evaporation of unbound moisture occurs**
- D. None of these

Coal tar is used as a _____?

- A. Binding material for coal briquettes
- B. Fuel in rotary kiln
- C. Binder in making carbon electrodes
- D. All A , B. and C.**

Which of the following fractions of petroleum contains maximum sulphur ?

- A. Diesel
- B. Gasoline
- C. Naphtha
- D. Atmospheric residue**

What is the value of entropy at 273°K ?

- A. 0**
- B. 1
- C. ∞
- D. None of these

The size of plug flow reactor (PFR) for all positive reaction orders and for any given duty, is _____ that of mixed reactor?

- A. Greater than
- B. Equal to
- C. Smaller than**
- D. Unpredictable from the data

Helium-mercury method can be used to determine the _____ of the catalyst particle?

- A. Pore volume
- B. Solid density
- C. Porosity
- D. All A., B., & C.**

Which of the following has the weakest intermolecular forces ?

- A. Polyisoprene**
- B. Nylon-66
- C. Polystyrene
- D. Bakelite

Pick out the correct statement?

- A. A forced vortex occurs when fluid rotates as a solid about an axis**
- B. In laminar flow, Newton's law of viscosity does not apply
- C. A free vortex occurs, when fluid rotates as a solid
- D. In turbulent flow, there are neither cross-currents nor eddies

For a solid catalysed chemical reaction, the effectiveness of solid catalyst depends upon the _____ adsorption?

- A. Physical
- B. Chemical**
- C. Both A. and B.
- D. Neither A. nor B.

Which of the following terminology is used for the temperature at which new grains are formed in a metal ?

- A. Eutectic temperature
- B. Lower critical temperature
- C. Recrystallisation temperature**
- D. Upper critical temperature

The boundary layer is that part of a moving fluid, in which the fluid velocity is _____ ?

- A. Affected by the fluid flow pressure
- B. Constant
- C. Affected by the presence of a solid boundary**
- D. All A., B. and C.

Alumina, silica, lime and iron oxide are the basic raw material for the manufacture of Portland cement. The component of Portland cement which first hardens is _____ ?

- A. $5\text{CaO} \cdot 3\text{Al}_2\text{O}_3$**
- B. $3\text{CaO} \cdot \text{Al}_2\text{O}_3$
- C. $3\text{CaO} \cdot \text{SiO}_2$
- D. $2\text{CaO} \cdot \text{SiO}_2$

Mineral matter, 'M' and ash percentage 'A' in coal are roughly related as _____ ?

- A. $M = 1.8 A$
- B. $M = 0.5 A$
- C. $M = 1.1 A$**
- D. $M = A$

Hydrogenation of oil is carried out in a/an _____ in Vanaspati manufacturing plant?

- A. Agitated vessel**

- B. Sieve tray column
- C. Bubble cap column
- D. Packed tower

Energy requirement (per unit mass of material crushed/ground) is highest for _____?

- A. Jaw crusher
- B. Rod mill
- C. Ball mill
- D. Fluid energy mill**

The losses in open channel flow generally vary as the _____?

- A. Inverse of the roughness
- B. First power of the roughness**
- C. Square of the velocity
- D. Inverse square of hydraulic radius

Silicone resins, which are highly water repellent and has good heat resistance cannot be used _____?

- A. As room temperature adhesive**
- B. As grease & lubricant
- C. Hydraulic fluid for heat transfer
- D. Resin for lamination

If a two phase system is in physical equilibrium; then it means that, the _____?

- A. Escaping tendency of each component from the liquid phase to the vapor phase is exactly equal to that from vapor phase to liquid phase
- B. Temperature of the liquid phase is equal to that of the vapor phase
- C. Total pressure throughout the liquid phase is equal to that throughout the vapor phase
- D. All A., B. and C.**

Sodium chloride content in sea water is about _____ gms/liter?

- A. 2
- B. 10
- C. 25**
- D. 50

Power alcohol as compared to straight run gasoline has lower _____?

- A. Calorific value**
- B. Octane number
- C. Specific gravity
- D. Viscosity

Maximum work that could be secured by expanding the gas over a given pressure range is the _____ work?

- A. Isothermal**
- B. Adiabatic
- C. Isentropic
- D. None of these

Fibrous material is broken by a _____?

- A. Roll-crusher
- B. Squirrel-cage disintegrator**
- C. Ball mill
- D. Tube mill

Potassium is kept & transported under _____?

- A. Water
- B. Liquid ammonia
- C. Kerosene oil**
- D. Alcohol

If heat contents of CH_4 , C_2H_4 and C_3H_8 are -17.9, 12.5 and -24.8 kcal/mole

respectively, than ΔH for the reaction $\text{CH}_4(\text{g}) + \text{C}_2\text{H}_4(\text{g}) \rightleftharpoons \text{C}_3\text{H}_8(\text{g})$ will be _____ Kcal?

- A. -19.4
- B. -30.2
- C. 55.2
- D. -55.2

Iron content in Indian iron ore is about _____ percent?

- A. 80-85
- B. 60-65
- C. 40-45
- D. 20-25

Vent pipes are provided in a condenser to _____?

- A. Remove non-condensable gases
- B. Purge the condenser
- C. Facilitate easy cleaning of tubes
- D. None of these

Poly-methyl-methacrylate (PMMA) is known as _____?

- A. Bakelite
- B. Teflon
- C. Perspex
- D. Nylon-6

Industrial production of chloroform requires acetone and _____?

- A. Phosgene
- B. Calcium hypochlorite
- C. Chlorine
- D. Ammonium chloride

Gunmetal and bronze are not corroded by the action of _____?

- A. Wet chlorine
- B. Synthetic detergent solution**
- C. Hydrochloric acid (10%)
- D. Nitric acid (< 25%)

Benzene is used _____ ?

- A. As a motor fuel
- B. As an explosive
- C. For making insecticides (e.g., DDT, BHC etc.), detergent & rubber (SBR)**
- D. As a perfume

Pick out the wrong statement?

- A. The shear stress at the pipe (dia = D, length = L) wall in case of laminar flow of Newtonian fluids is $(D/4L) \cdot \Delta p$
- B. In the equation, $T_g = k \cdot (du/dy)^n$ the value of 'n' for pseudoplastic and Dilatant fluid are 1 respectively
- C. Shear stress for Newtonian fluid is proportional to the rate of shear in the direction perpendicular to motion
- D. With increase in the Mach number >0.6, the drag co-efficient decreases in case of compressible fluids**

BET apparatus is used to determine the _____ ?

- A. Specific surface of a porous catalyst**
- B. Pore size distribution
- C. Pore diameter
- D. Porosity of the catalyst bed

COP of a refrigerator drawing 1 kW of power per ton of refrigeration is about _____ ?

- A. 0.5
- B. 3.5**
- C. 4.5
- D. 8.5

Which of the following is not an alloy of nickel and chromium ?

- A. Inconel
- B. Hastelloy
- C. Nimonic alloys
- D. Duralumin**

Low carbon steels are those in which carbon percentage is around _____ ?

- A. 0.1 to 0.35**
- B. 0.4 to 0.7
- C. 0.8 to 1.5
- D. 1.5 to 2

Pick out the wrong statement ?

- A. Change in barometric pressure does not affect the relative humidity
- B. In case of a packed tower, the operating velocity is about half of the flooding velocity, generally
- C. 'Elution' means the desorption of the adsorbed solute by a solvent
- D. The equilibrium moisture content of the solid can be reduced by increasing the absolute humidity**

Space velocity _____ ?

- A. Describes the extensive operating characteristics of a tubular flow reactor
- B. Is the maximum feed rate per unit volume of reactor for a given conversion
- C. Is a measure of the ease of the reaction
- D. All A., B. and C.**

_____ columns are used for liquid dispersion in a continuous gas phase ?

- A. Packed**
- B. Pulse

- C. Bubble cap
- D. Sieve plate

Laboratory determination of the diffusivity of vapor is done by _____ method?

- A. Wetted wall column
- B. Gilliland's
- C. Winkelmann's**
- D. Wike's

Out of the following fuels used in a furnace exhausting flue gas at a temperature of 600°C , the percentage stack loss will be maximum in case of complete combustion of _____?

- A. Furnace oil with air
- B. Furnace oil with oxygen
- C. Blast furnace gas with air**
- D. Blast furnace gas with oxygen

L.D. converter gas (produced in steel plant) comprises mainly of _____?

- A. CO (upto 65%) & CO₂**
- B. CO₂ & H₂
- C. CO & O₂
- D. CO₂ & O₂

Grignard reagent is chemically known as _____?

- A. Ethyl magnesium chloride**
- B. Methyl magnesium chloride
- C. Dichlorophenol
- D. Monochloroacetic acid

Prandtl number for water at 20°C is about _____?

- A. 7
- B. 70
- C. 0.7
- D. 150

Percentage of carbon monoxide in blast furnace gas may be around _____ ?

- A. 8
- B. 14
- C. 22
- D. 52

For hot feed, forward feeding as compared to backward feeding results in _____ economy?

- A. Increased
- B. Decreased
- C. No effect on
- D. None of these

Which of the following is not a naturally occurring nuclear fuel ?

- A. Uranium-238
- B. Thorium-233
- C. Plutonium-239
- D. None of these

What is the slope of the feed line, if the feed to a distillation column is a saturated liquid ?

- A. 0
- B. ∞
- C. > 1
- D. < 1

In a/an _____ vessel, the fluid enters and leaves following plug flow?

- A. Open
- B. Closed**
- C. Open-closed
- D. Close-opened

For an isothermal variable volume batch reactor, the following relation is applicable for a first order irreversible reaction?

- A. $X_A = k \cdot t$
- B. $[C_{A0}/(1 + \epsilon_A X_A)] (dX_A/dt) = k$**
- C. $-\ln(1 - X_A) = kt$
- D. $\epsilon_A \cdot \ln(1 - X_A) = k \cdot t$

Humid volume is the total volume in m³ of 1 kg of _____?

- A. Vapour laden gas at 1 atm. and room temperature
- B. Gas plus its accompanying vapour at 1 atm. and room temperature
- C. Gas plus its accompanying vapour at 1 atm. and gas temperature**
- D. Vapour laden gas at 1 atm. and gas temperature

Calcination of limestone is not done in a _____ kiln for producing lime ?

- A. Vertical shaft
- B. Rotary
- C. Fluidised bed
- D. Fixed bed**

Laminar flow of a Newtonian fluid ceases to exist, when the Reynolds number exceeds _____?

- A. 4000
- B. 2100**
- C. 1500
- D. 3000

Solid angle subtended by the finite surface at the radiating element

is _____ ?

- A. Called the view factor
- B. Called the angle of vision**
- C. Proportional to the square of the distance between surfaces
- D. Expressed in terms of radians

Which of the following is not an ultrafine grinder (colloid mill) ?

- A. Micronizers
- B. Agitated mills and fluid energy mills
- C. Toothed roll crusher**
- D. Hammer mills with internal classification

A distillation column separates 10000 kg/hr of a benzene-toluene mixture as shown in the figure below: In the figure x_F , x_D and x_W represent the weight fraction of benzene in the feed, distillate and residue respectively. The reflux ratio is _____ ?

- A. 0.5
- B. 0.6**
- C. 1.0
- D. 2.0

Flux addition during smelting of ore is done to _____ ?

- A. Remove impurities/gangue**
- B. Enhance rate of reaction
- C. Accelerate reduction of ore
- D. Separate slag from metal

Which of the following quantities need not be fixed before starting the design of a cocurrent absorber ?

- A. Heat gain or loss
- B. Flow rate of entering liquid**
- C. Flow rate of gas

D. None of these

During combustion of a gaseous fuel, the presence of a non-luminous flame is an indication of the _____?

- A. Incomplete combustion
- B. Complete combustion**
- C. High oxygen in flue gas
- D. None of these

In a neutral solution _____?

- A. H^+ ions are absent
- B. OH^- ions are absent
- C. Both H^+ and OH^- ions are present in very small but equal concentration**
- D. None of these

Filtration operation carried out by continuous increase of the inlet pressure of slurry, is called the _____ filtration?

- A. Constant rate**
- B. Varying pressure
- C. Varying rate
- D. Constant pressure

The ideal pulp for the manufacture of paper should have high _____ content?

- A. Cellulose**
- B. Lignin
- C. Both A. & B.
- D. None of these

Grindability of a material does not depend upon its _____?

- A. Elasticity
- B. Hardness
- C. Toughness

D. Size

Chemical formula of meta-phosphoric acid is _____?

- A. H_3PO_4
- B. $H_4P_2O_7$
- C. HPO_3**
- D. Same as that of Pyrophosphoric acid

Liquid discharge from a tank or reservoir cannot be measured by _____?

- A. Orificemeter**
- B. Weirs
- C. Mouthpieces
- D. Notches

Diameter of the sieve tray column is determined by the _____?

- A. Lower limit of vapour velocity
- B. Upper limit of the vapour velocity**
- C. Hole diameter of the sieve tray
- D. Height of the plate spacing

In a plate type heat exchanger, heat transfer plates are never made of _____?

- A. Stainless steel
- B. Cast iron**
- C. Titanium
- D. Hastelloy C

Which of the following is the costliest source of hydrogen needed for ammonia manufacture under Indian condition _____?

- A. Electrolysis of water**
- B. Cryogenic removal of H_2 from coke oven gas
- C. Steam reforming of naphtha

D. Natural gas cracking

Which of the following size reduction equipments employs mainly attrition for ultrafine grinding ?

- A. Jet mills
- B. Fluid energy mill
- C. Micronizer
- D. All A., B. and C.**

Steam distillation is used for separation of high boiling _____?

- A. Substances from non-volatile impurities
- B. Volatile impurity from still higher boiling substances
- C. Both A. and B.**
- D. Neither A. nor B.

To produce talcum powder, use _____?

- A. Ball mill**
- B. Hammer mill
- C. Jet mill
- D. Pin mill

A backward feed multiple effect evaporator is better than forward feed for concentrating cold feed, because it provides _____?

- A. Higher economy**
- B. Lower capacity
- C. Both A. & B.
- D. Lower economy

Forced recirculation of furnace gases is practised _____?

- A. To increase heat transfer by convection
- B. To ensure uniform temperature
- C. In furnaces, operating below 750°C
- D. All A., B. and C.**

Which of the following is not a second order instrument ?

- A. Mercury in glass thermometer with covering
- B. Bare mercury in glass thermometer**
- C. Pressure gauge with one bellow, two tubes and a tank
- D. None of these

Mercury electrolytic cell produces 50-70% NaOH solution. Its operating temperature is _____ °C?

- A. 25
- B. 60-70**
- C. 150-200
- D. 250-300

Effectiveness factor E. of a catalyst pellet is defined as, $E = (\text{actual rate within pore of the catalyst}) / (\text{rate if not snowed by pore diffusion})$, Effectiveness factor for a first order reaction is given by (where, $T = \text{Thiele modulus}$)

_____?

- A. $\tan hT/T$**
- B. $\tan T/T$
- C. $\tan hT/\tan T$
- D. None of these

“Encyclopaedia of Chemical Technology” has been _____?

- A. Authored by Kirk Othmer
- B. Edited by Perry and Chilton
- C. Edited by Kirk Othmer**
- D. Authored by Perry and Chilton

Elements in a periodic table are arranged in order of their _____?

- A. Atomic number**

- B. Mass number
- C. Atomic weight
- D. Metallic characteristics

Carnot cycle is also termed as the constant _____ cycle in thermodynamics?

- A. Entropy
- B. Pressure
- C. Volume
- D. Heat**

Boiling point of water gets lowered at high altitudes (e.g., hills), because _____?

- A. Temperature is low
- B. Atmospheric pressure is low**
- C. Atmospheric pressure is high
- D. None of these

Heat exchangers operating, when the asymptotic range is reached, ?

- A. Provide very large heat transfer co-efficient
- B. Results in making part of the heating surface inactive**
- C. Results in abruptly increased velocity
- D. None of these

The transfer function of a second order system is _____?

- A. $1/(T^2s^2 + 2\xi Ts + 1)$**
- B. $1/(T^2s^2 + 2Ts + 1)$
- C. $1/(T^2s^2 + 2\xi T + 1)$
- D. None of these

What is the number of degrees of freedom for liquid water in equilibrium with a mixture of nitrogen and water vapor ?

- A. 2**

- B. 0
- C. 3
- D. 1

Polyurethane cannot be used to make _____?

- A. Automobile cushion
- B. Thermal insulation in refrigerator
- C. Coating and adhesive
- D. Fibre reinforced plastic (FRP)**

Corrosion in boilers can be prevented by _____?

- A. Deaeration of feed water
- B. Enhancing pH of feed water by adding alkali
- C. Feeding sodium sulphite or hydrazine phosphate to the boilers, which combines with oxygen and prevents corrosion
- D. All A., B. and C.**

Fireclay refractories _____?

- A. Are not resistant to the action of basic slags
- B. Combine with salts (e.g. chlorides sulphates etc.) & bases (e.g. lime, magnesia etc.) forming fusible aluminates silicates etc
- C. Shrink during firing
- D. All A., B. and C.**

“At the absolute zero temperature, the entropy of every perfectly crystalline substance becomes zero”. This follows from the _____?

- A. Third law of thermodynamics**
- B. Second law of thermodynamics
- C. Nernst heat theorem
- D. Maxwell's relations

Addition of zircon to silica refractory brick improves its _____ ?

- A. Crushing strength
- B. Resistance to slag attack**
- C. Both A. and B.
- D. Neither A. nor B.

The expression, $nRT \ln(P_1/P_2)$, is for the _____ of an ideal gas?

- A. Compressibility
- B. Work done under adiabatic condition
- C. Work done under isothermal condition**
- D. Co-efficient of thermal expansion

Pick out the wrong statement ?

- A. An ideal liquid or solid solution is defined as one in which each component obeys Raoult's law
- B. If Raoult's law is applied to one component of a binary mixture; Henry's law or Raoult's law is applied to the other component also
- C. Henry's law is rigorously correct in the limit of infinite dilution
- D. None of these**

Which one of the following processes aims at producing higher yield of gaseous unsaturated hydrocarbons and aromatics like benzene & toluene ?

- A. Reforming**
- B. Pyrolysis
- C. Alkylation
- D. Hydrocracking

Crushing efficiency of a machine ranges between _____ percent?

- A. 0.1 to 2**

- B. 5 to 10
- C. 20 to 25
- D. 50 to 70

Main boring diameter for petroleum well is 20-30 cms in diameter, while the depth of the oil well may be about _____ kms?

- A. 0.1 to 0.5
- B. 1.5 to 4.5**
- C. 7.5 to 12.5
- D. 15-20

The main aim of cracking is to produce _____?

- A. Gasoline**
- B. Lube oil
- C. Petrolatum
- D. Coke

Pick out the wrong statement ?

- A. Heat transfer from a hot body to cold body by the emission of heat waves is called radiation
- B. Filmwise condensation takes place on non-wettable surfaces**
- C. The boiling point of a solution is affected by liquid head as well as boiling point elevation
- D. None of these

The steam ejector is used to _____?

- A. Remove condensate from the steam pipelines
- B. Create vacuum**
- C. Superheat the steam
- D. None of these

In case of a solution (not of a solid in a liquid), whose total volume is less than the sum of the volumes of its components in their pure states, solubility is _____?

- A. Independent of temperature
- B. Increases with rise in pressure**
- C. Increased with decrease in pressure
- D. Unchanged with pressure changes

Variables affecting the rate of homogeneous reactions are _____?

- A. Pressure and temperature only
- B. Temperature and composition only
- C. Pressure and composition only
- D. Pressure, temperature and composition**

Dechlorination of treated water is necessary to _____?

- A. Remove residual turbidity
- B. Reduce the bacterial load on filter
- C. Control taste and odour
- D. Remove chlorinous taste**

In case of non-ideal gases and liquids, the molal diffusivity _____?

- A. Varies inversely as the pressure
- B. Varies directly as the pressure
- C. Is independent of pressure**
- D. Is equal to the volumetric diffusivity

Pick out the wrong statement. Raoult's law does not apply, when the _____?

- A. Size of component molecules are not equal
- B. Attractive forces between like and unlike molecules in the solution are approximately equal
- C. Component molecules are non-polar**
- D. Chemical combination or molecular association between unlike molecules takes place in the formation of solution

A multiple reaction may be classified as a _____ reaction?

- A. Consecutive or side
- B. Parallel or side
- C. Mixed
- D. All A., B. and C.**

Nusselt number/Biot number varies _____?

- A. Inversely with thermal conductivity**
- B. Directly with heat transfer co-efficient
- C. Directly with thermal conductivity
- D. Inversely with the dimension of the solid

The binary diffusivity in gases and liquids vary respectively as _____?

- A. $T^{3/2}$ and T**
- B. T and $T^{3/2}$
- C. \sqrt{T} and $T^{3/2}$
- D. $T^{3/2}$ and \sqrt{T}

Pick out the wrong statement ?

- A. Cold cracking of a weld is due to the presence of hydrogen gas in the weld
- B. True stress is given by, $\zeta = \zeta_E (1 + \epsilon_E)$, where ζ_E and ϵ_E are engineering stress and engineering strain respectively
- C. Phosphorous can be easily recovered in the iron blast furnace**
- D. High residual stress at the surface is beneficial for fatigue properties of a material

Pressure drop (Δp) and the superficial gas mass velocity (G) in case of packed absorption tower operating in the preloading range are related as _____?

- A. $\Delta p = G$
- B. $\Delta p = G^{0.5}$
- C. $\Delta p = G^2$**

D. $\Delta p = 1/G0.6$

Pick out the most suitable instrument for measuring temperature in the range of -40 to 425°C ?

- A. Mercury thermometer
- B. Bimetallic thermometer**
- C. Radiation pyrometer
- D. None of these

Hot working of lead is carried out at _____ ?

- A. 75° C
- B. 373° K
- C. 150° C
- D. Room temperature**

The efficiency of a plate column will be maximum, when the flow is ideal _____ the plate?

- A. Across
- B. Above
- C. Both A. & B.**
- D. Neither A. nor B.

Gum formation in stored gasoline is mainly due to the _____ ?

- A. Alkylation of unsaturated
- B. Presence of sulphur**
- C. Oxidation & polymerisation of unsaturated
- D. Higher aromatic content

The monomer of poly vinyl chloride (PVC) is _____ ?

- A. Chloroethane**
- B. Ethylene dichloride
- C. Ethyl chloride
- D. Chloroform

Trouton's ratio is given by (where λ_b , = molal heat of vaporisation of a substance at its normal boiling point, kcal/kmol T_b = normal boiling point, °K)

_____?

- A. λ_b/T_b
- B. T_b/λ_b
- C. $\sqrt{(\lambda_b/T_b)}$
- D. $\sqrt{(T_b/\lambda_b)}$

McCabe-Thiele method of binary distillation does not assume that the _____?

- A. Sensible heat changes are negligible compared with latent heat changes
- B. Molar latent heats of all components are equal
- C. Heat of mixing is negligible
- D. **None of these**

Reaction of Cresylic acid with _____ produces Tricresyl phosphate?

- A. Phosphorous pentoxide
- B. **Phosphorous oxychloride**
- C. Ammonium phosphate
- D. Calcium phosphate

The mechanism of size reduction by a hammer mill is by impact and attrition between the _____?

- A. Grinding element & the housing
- B. Feed particles
- C. **Both A. and B.**
- D. Neither A. nor B.

The vapor pressure of the solvent decreased by 10 mm Hg, when a non-volatile solute was added to the solvent. The mole fraction of the solute in the solution is 0.2. What should be the mole fraction of the solvent, if the decrease in vapor

pressure of the solvent is required to be 20 mm Hg ?

- A. 0.2
- B. 0.1
- C. 0.4
- D. 0.6**

Flow rate of sludge is not measured by a/an _____?

- A. Orificemeter
- B. Open weir
- C. Kennison nozzle
- D. Both B. & C.**

For equilibrium process (i.e. reversible) in an isolated system
_____?

- A. $ds = 0$**
- B. $ds > 0$
- D. $ds = \text{Constant}$

$H_4P_2O_7$ is the chemical formula of _____ phosphoric acid?

- A. Pyro**
- B. Ortho
- C. Meta
- D. None of these

The relation connecting the fugacities of various components in a solution with one another and to composition at constant temperature and pressure is called the _____ equation?

- A. Gibbs-Duhem**
- B. Van Laar
- C. Gibbs-Helmholtz
- D. Margules

Presence of force moisture in coal is most disadvantageous during its _____?

- A. Transportation and handling
- B. Washing
- C. Pulverisation**
- D. Storage

Naphthalene is removed from coke oven gas by _____?

- A. Adsorbing on palladium
- B. Absorbing in ethanolamine
- C. Scrubbing with wash oil**
- D. Passing it through electrostatic precipitator

pH meter has _____?

- A. One cell
- B. Two cells**
- C. Three cells
- D. No cell

The purpose of controlling the furnace atmosphere is to prevent surface attack by _____?

- A. Oxidation/scaling
- B. Decarburising
- C. Sulphur penetration
- D. Either of the above**

While the total emissivity of a perfect black body is unity, the same for a real body is _____?

- A. 0
- B. 1
- C. > 1
- D. Between 0 and 1**

Presence of free moisture in coal during its high temperature carbonisation _____?

- A. Reduces the coking time
- B. Protects the volatile products from pyrolysis (cracking) in the presence of hot coke and hot oven walls**
- C. Increases the loss of fine coal dust from the ovens when charging
- D. None of these

Fatigue limit improvement by over stressing the metal by successively increasing the load is called coxing. In fatigue failure, the material fails ?

- A. Below the yield point**
- B. Above the yield point
- C. Below the elastic limit
- D. At the elastic limit

Permeability of bricks is a measure of the _____?

- A. Refractoriness
- B. Melting point
- C. Rate at which a fluid will pass through the pores**
- D. Expansion during heating

In a boundary layer developed along the flow, the pressure decreases in the downstream direction. The boundary layer thickness in this case will _____?

- A. Decrease gradually
- B. Increase gradually**
- C. Increase rapidly
- D. Remain constant

A hollow sphere and a solid sphere of the same material and equal radii are heated to the same temperature. In this case ?

- A. The cooling rate will be the same for the two spheres and hence the two spheres will have equal temperatures at any instant
- B. Both the spheres will emit equal amount of radiation per unit time in the beginning
- C. Both will absorb equal amount of radiation from the surrounding in the beginning
- D. Both B. & C.**

Water-ethyl alcohol solution can be concentrated (in respect of alcohol concentration) by _____ distillation?

- A. Atmospheric
- B. Vacuum**
- C. High pressure
- D. None of these

An isothermal irreversible reaction is being carried out in an ideal tubular flow reactor. The conversion in this case will _____ with decrease in space time?

- A. Increase
- B. Increase exponentially
- C. Decrease**
- D. Remain unchanged

A liquid under pressure greater than its vapour pressure for the temperature involved is called a _____ liquid?

- A. Sub-cooled**
- B. Saturated
- C. Non-solidifiable
- D. None of these

Ultimate strength in tension as compared to that in shear for steel is _____?

- A. Half

- B. One third
- C. One and half times**
- D. One fourth

Which nutrient in fertiliser makes the plant stems stronger and increases branching ?

- A. Nitrogen
- B. Phosphorous**
- C. Potassium
- D. Calcium

Which of the following is universally employed as the low expansion metal in the bimetallic thermometer, which is an iron-nickel alloy containing 36% nickel and has very low co-efficient of expansion (1/20th of ordinary metals) ?

- A. Invar**
- B. Constantan
- C. Chromel
- D. Alumel

The use of space time is preferred over the mean residence time in the design of a/an _____ ?

- A. Batch reactor
- B. Ideal tubular-flow reactor**
- C. Slurry reactor
- D. CSTR

What is the speed of sound (m/sec) in ordinary water ?

- A. 1500**
- B. 330
- C. 1000
- D. 3000

Gas based fertiliser plants use _____?

- A. Natural gas as a source of hydrogen
- B. Natural gas as heating medium
- C. Coal gas as a source of hydrogen
- D. Coal gas as heating medium

. The effect of friction on the flow of steam through a nozzle is to decrease the _____ of steam?

- A. Wetness
- B. Mass flow rate
- C. Both A & B
- D. Neither A nor B

Ideal gas law is applicable at _____?

- A. Low T, low P
- B. High T, high P
- C. Low T, high P
- D. High T, low P

A coal containing very high percentage of durain is called _____ coal?

- A. Bright
- B. Splint
- C. Non-banded
- D. Boghead

Select the correct practical example of steady non-uniform flow?

- A. Motion of water around a ship in a lake
- B. Motion of river around bridge piers
- C. Steadily decreasing flow through a reducing section
- D. Steadily increasing flow through a pipe

Molten ammonium nitrate is mixed with ground limestone in fertilizer plant in a _____?

A. Pug mill

- B. Mixer-extruder
- C. Banbury mixer
- D. Muller mixer

In actual operation of distillation column, the vapour is not distributed uniformly among the bubble caps, primarily because of the _____?

A. Liquid gradient on the tray

- B. Lower skirt clearance
- C. Lower static submergence
- D. Small downcomer liquid seal

In the absorption of ammonia in water, the main resistance to absorption is by the _____ phase?

- A. Liquid
- B. Gas**
- C. Both A. & B.
- D. Neither A. nor B.

A double acting reciprocating pump compared to a single acting pump (of almost same size working under same pressure levels) would give almost double _____?

- A. Head
- B. Discharge**
- C. Efficiency
- D. None of these

A pitched-blade turbine draws _____ a straight blade turbine?

- A. Less power than**
- B. More power than
- C. Same power as
- D. Data insufficient to predict

Out of the following four assumptions used in the derivation of the equation for LMTD [$LMTD = (\Delta t_1 - \Delta t_2) / \ln(\Delta t_1 / \Delta t_2)$], which one is subject to the largest deviation in practice ?

- A. Constant overall heat transfer co-efficient.
- B. Constant rate of fluid flow**
- C. Constant specific heat
- D. No partial phase change in the system

Enamels and paints are generally _____ fluid?

- A. Rheopectic
- B. Pseudo-plastic**
- C. Thixotropic
- D. Dilatant

In paper industry, paper is dried in a _____ dryer ?

- A. Tunnel
- B. Heated cylinder**
- C. Conveyor
- D. Festoon

Which is the most stable crystalline form of silica at room temperature ?

- A. Quartz**
- B. Cristobalite
- C. Tridymite
- D. None of these

The increase in the temperature of the aqueous solution will result in decrease of its _____ ?

- A. Weight % of the solute
- B. Mole fraction of the solute
- C. Molarity**
- D. Molality

Parallel straight line pattern of temperature distribution for both hot and cold fluids is observed in case of heat exchanger of the type _____?

- A. Parallel flow with equal heat capacities
- B. Counter flow with equal heat capacities**
- C. Counter flow with unequal heat capacities
- D. Parallel flow with unequal heat capacities

High pressure steam is expanded adiabatically and reversibly through a well insulated turbine, which produces some shaft work. If the enthalpy change and entropy change across the turbine are represented by ΔH and ΔS respectively for this process ?

- A. $\Delta H = 0$ and $\Delta S = 0$
- B. $\Delta H \neq 0$ and $\Delta S = 0$**
- C. $\Delta H \neq 0$ and $\Delta S \neq 0$
- D. $\Delta H = 0$ and $\Delta S \neq 0$

Increasing the carbon content of steel _____?

- A. Reduces the upper shelf energy
- B. Increasing the ductility transition temperature**
- C. Decreases brittleness
- D. Decreases hardness

Which of the following is an adsorbent for removal of nitrogen oxides from gas/air ?

- A. Active carbon
- B. Silica gel**
- C. Bog iron (iron oxide)
- D. Pulverised limestone

The optimum moisture content in solids to be crushed/ground ranges from _____ percent?

- A. 3 to 4**

- B. 8 to 10
- C. 10 to 15
- D. 15 to 20

A pycnometer is used for the measurement of _____?

- A. Flow rate of molten metal
- B. Specific gravity of a liquid**
- C. Composition of alloys
- D. Concentration of a solution

The only natural thermoplastic resin, which is a product of animal life is _____?

- A. Rosin
- B. Shellac**
- C. Amber
- D. Copal

Pick out the wrong statement ?

- A. Autocatalytic reactions are exemplified by microbial fermentation reactions
- B. The slowest step has the greatest influence on the overall reaction rate in case of an irreversible series reaction
- C. The fractional conversion at any time is same for both the constant as well as the variable volume system in case of an irreversible unimolecular type first order reaction
- D. Hydrolysis of ester in presence of alkali or acid is a zero order reaction**

A sinusoidal variation in the input passing through a linear first order system _____?

- A. Becomes more oscillatory (frequency increases)
- B. Becomes less oscillatory (frequency decreases)
- C. Gets amplified (magnitude increases)
- D. Gets attenuated (magnitude decreases)**

Atoms of U-238 and U-235 differ in structure by three _____?

- A. Electrons and three protons
- B. Protons
- C. Neutrons**
- D. Electrons

Third law of thermodynamics is concerned with the _____?

- A. Value of absolute entropy**
- B. Energy transfer
- C. Direction of energy transfer
- D. None of these

Powder metallurgy technique is used in the production of _____ tools ?

- A. Tungsten carbide**
- B. High carbon steel
- C. High speed steel
- D. Drilling

The pH value of a solution is 5.9. If the hydrogen ion concentration is decreased hundred times, the solution will be _____?

- A. Basic**
- B. More acidic
- C. Neutral
- D. Of the same acidity

For Laminar flow through a packed bed, the pressure drop is proportional to (V_s is the superficial liquid velocity and D_p is the particle diameter) ?

- A. V_s/D_p^2**
- B. V_s^2/D_p^2
- C. V_s^2/D_p^3

D. Vs/Dp3

Momentum correction factor used in fluid flow problems accounts for the _____?

- A. Change in direction of flow
- B. Change in total energy
- C. Change in pressure

D. Non uniform direction of velocities at inlet & outlet sections

Black smoke coming out of the chimney of a furnace is an indication of the use of _____ in the furnace?

- A. Low amount of excess combustion air**
- B. Large quantity of excess combustion air
- C. Hydrocarbon fuel
- D. Pulverised coal as fuel

Which of the following is a manmade source of air pollution ?

- A. Automobile exhaust**
- B. Forest fire
- C. Bacterial action in soil and swamp areas
- D. All A., B. and C.

Satellites burn off during re-entry to earth's atmosphere, because of the _____?

- A. Combustion with air
- B. Gravitational pull by earth
- C. Friction with earth's atmosphere**
- D. Loss in weight of the satellite

The rate of shear versus the shear stress curves are time dependent for _____ fluid?

- A. Thixotropic

- B. Rheopectic
- C. Both A. & B.**
- D. Neither A. nor B.

A _____ employs a set of screen across a flow channel for the separation of dirt/rust from a flowing liquid stream?

- A. Thickener
- B. Classifier
- C. Strainer**
- D. Clarifier

Presence of _____ bacteria in water causes disease like typhoid?

- A. Aerobic
- B. Pathogenic**
- C. Anaerobic
- D. Non-pathogenic

Temporary hardness of water can be removed by _____?

- A. Addition of alum (a coagulant)
- B. Boiling**
- C. Filtration (through gravity sand filter)
- D. Addition of lime

Extraction of uranium from its ore is done by _____ method?

- A. Chemical**
- B. Pyrometallurgical
- C. Physical beneficiation
- D. Electrometallurgical

Use of packed towers for distillation is generally limited to the _____?

- A. Small sizes**
- B. Multi-component distillation

- C. High pressure operation
- D. Vacuum distillation

Main constituent of natural gas is _____?

- A. CH₄**
- B. C₂H₂
- C. C₂H₄
- D. C₂H₆

The maximum delivery pressure of compressors can be upto _____ atmospheres?

- A. 10
- B. 100
- C. 250
- D. 1000**

Enriched uranium means that, it contains _____?

- A. More than 0.71% of U-235**
- B. Only fertile material
- C. Only fissile material
- D. No impurities

Pick out the wrong statement ?

- A. 'Solvates' are chemical compounds formed by solute with their solvents. When water is the solvent, then it is called a 'hydrate'
- B. In heat exchanger calculations (Δt) weighted is used in place of Δt , when it involves more than one sequence of heating or cooling i.e., desuperheating & condensation or condensation & sub-cooling
- C. Heat transfer co-efficient during nucleate boiling is not influenced by the agitation imparted**
- D. In case of short tube vertical evaporators, area of central downtake is about 50 to 100%

of the
total tube cross-sectional area

For the gaseous phase reaction, $N_2 + O_2 \rightleftharpoons 2NO$, $\Delta H = + 80$ kJ/kg. mole; the decomposition of NO is favoured by _____?

- A. Increasing the concentration of N_2
- B. Decrease in temperature**
- C. Increase in pressure
- D. Decrease in pressure

A refrigerator may be termed as a _____?

- A. Heat pump**
- B. Heat engine
- C. Carnot engine
- D. None of these

_____ heat exchanger is the most suitable, when the temperature of shell side fluid is much higher than that of tube side?

- A. Single pass, fixed tube sheet
- B. U-tube**
- C. Three pass, fixed tube sheet
- D. None of these

The open loop transfer function of a control system is $KR/(1 + TS)$. This represents _____?

- A. A first order system**
- B. Dead time system
- C. A first order time lag
- D. A second order system

The dew point of an unsaturated gas-vapor mixture does not depend upon the _____ of the mixture?

- A. Composition
- B. Temperature**
- C. Total pressure
- D. All A, B. and C.

The unit step response of the transfer function $(2s - 1)/[(3s + 1)(4s + 1)]$ reaches its final steady state asymptotically after _____?

- A. A monotonic increase**
- B. A monotonic decrease
- C. Initially increasing and then decreasing
- D. Increasing decreasing and then increasing

Calorific value of coke oven gas is around _____ Kcal/Nm³?

- A. 900
- B. 4200**
- C. 7500
- D. 2000

Ability of a material to _____ is indicated by its damping capacity?

- A. Withstand compression
- B. Absorb vibration**
- C. Absorb shock
- D. None of these

Packed column distillation is limited to the column _____ metres?

- A. Height < 6
- B. Diameter < 0.6
- C. Both A. & B.**
- D. Neither A. nor B.

A hydraulic ram acts as a/an _____ pump?

- A. Centrifugal
- B. Reciprocating**

C. Impulse

D. Parallel cylinder

Alloy powder manufactured by the following process have spherical shapes ?

A. Electrochemical deposition

B. Gaseous reduction

C. Atomisation

D. Mechanical attrition

The unit of dynamic viscosity in SI unit is _____ ?

A. kg/m. secB. N/m²C. m² /sec

D. m/N. sec

Glycerine can be obtained from _____ ?

A. Fat

B. Naphthalene

C. Cumene

D. Sucrose

Which of the following fertilisers is produced in the by-products recovery (from coke oven gas) plant attached to an integrated steel plant ?

A. Ammonium sulphate

B. Ammonium nitrate

C. Ammonium phosphate

D. None of these

What is the pipe called which lifts water from a reservoir to a greater height than the initial level in the supply reservoir ?

A. Penstock

B. Siphon

C. Tunnel

D. Pressure pipeline

Overall rate of reaction in a heterogeneous catalytic reaction depends upon the mass and energy transfer from the fluid to solid surface and its rate of reaction is usually _____ the concentration of catalyst, if it does not entail a chain mechanism?

A. Proportional to

B. Independent of

C. Inversely proportional to

D. Proportional to the square of

Annual depreciation costs are constant, when the _____ method of depreciation calculation is used ?

A. Declining balance

B. Straight line

C. Sum of the years digit

D. None of these

Steam is routed through the tube in case of a _____ evaporator?

A. Basket type

B. Horizontal tube

C. Short tube vertical

D. Long tube vertical

In an incompressible flow of fluid, the fluid _____?

A. Temperature remains constant

B. Compressibility is greater than zero

C. Density does not change with pressure & temperature

D. Is frictionless

Between 230 and 370°C, blue brittleness is caused in mild steel because of the _____?

- A. Immobility of dislocation
- B. Strain-ageing**
- C. Increase in Young's modulus
- D. Strain hardening

Steam distillation is used to _____?

- A. Reduce the number of plates
- B. Avoid thermal decomposition of a component**
- C. Increase the efficiency of separation
- D. Increase the total pressure of distillation

Supply of excess air for complete combustion of fuel is necessitated to facilitate _____?

- A. Its thorough mixing with air**
- B. Attainment of chemical equilibrium
- C. Attainment of high temperature
- D. None of these

Pick out the wrong statement pertaining to shell and tube heat exchanger _____?

- A. Clearance between shell & baffles and between tube & baffles should be minimum to avoid by-passing of the fluid, but it should be enough to permit the removal of tube bundle
- B. Baffles are supported independently of the tubes by tie rods and positioned by spacers
- C. Tie rods are fixed at one end in the tube sheet by making blind holes and the minimum number of tie rods is 4 with at least 10 mm diameter
- D. Bracket supports are used for horizontal shell, while saddle support is used for vertical shell**

The equilibria relations in a multi-component and multiphase system cannot be calculated with the help of the _____?

- A. Phase rule**
- B. Experimental data

- C. Empirical equations
- D. Theoretical equations

Grashoff number, which is defined as $g \cdot \beta (T_s - T_\infty) \rho^2 L^3 / \mu^2$, is proportional to the ratio of buoyancy force to _____ force?

- A. Viscous**
- B. Elastic
- C. Inertial
- D. None of these

What is the ratio of output amplitude to input amplitude for a sinusoidal forcing function in a first order system ?

- A. 1
- B. > 1
- C. < 1**
- D. None of these

Wohler test is a destructive test to find out the _____ strength of a prepared metal specimen ?

- A. Creep
- B. Fatigue**
- C. Endurance
- D. Tensile

Pick out the wrong statement ?

- A. In solvent extraction, the distribution co-efficient should be as large as possible for solvent economy
- B. With increase in pressure, the solubility of gases in solvent increases at a fixed temperature
- C. Decrease in Murphree plate efficiency is an indication of entrainment in distillation column
- D. The capacity of a distillation column is maximum at total reflux**

The point at which all the three (solid, liquid and gas) phases co-exist, is known as the _____ point?

- A. Freezing
- B. Triple**
- C. Boiling
- D. Boyle

Specific heating capacity of a furnace is expressed as _____?

- A. Weight heated/hr
- B. Weight heated/furnace volume
- C. Weight heated/hr/furnace volume**
- D. None of these

Pick the odd man out?

- A. Briquettes
- B. Wood**
- C. Oil gas
- D. Pitch creosote mixture

Raoult's law applies to the _____?

- A. All liquid solutions
- B. Non-ideal solution only
- C. Non-volatile solute
- D. Solvents**

For gases, the thermal conductivity increases with temperature rise. For liquids, with increase in concentration, its thermal conductivity generally ?

- A. Decreases**
- B. Increases
- C. Remains unchanged
- D. Increases exponentially

Which of the following is an undesirable characteristic for the solvent used in gas absorption ?

- A. Low vapor pressure
- B. Low viscosity
- C. High gas solubility
- D. None of these**

Following isothermal kinetic data are obtained in a basket type of mixed flow reactor for a porous catalyst. Determine the role of pore diffusion and external mass transfer processes ?

- A. Strong pore diffusion control and mass transfer not controlling**
- B. Both pore diffusion and mass transfer not controlling
- C. Both pore diffusion and mass transfer controlling
- D. Mass transfer controlling

The gas which contributes maximum to the heating value of natural gas is _____ ?

- A. CO
- B. CO₂
- C. H₂
- D. CH₄**

A catalyst is said to be a negative catalyst, if it _____ ?

- A. Retards the rate of reaction**
- B. Reduces the value of equilibrium constant
- C. Does not initiate the reaction
- D. All A., B. and C.

Raw Kerosene has a smoke point of 15 mm. After it is subjected to dearomatization by liquid SO₂ extraction (Edeleanu process), its smoke point may become _____ mm?

- A. 5

- B. 10
- C. 25**
- D. 100

If the flame is produced under the hearth and then sweeps up into the heating chamber, this is called a/an _____ furnace?

- A. Sidefired
- B. Underfired**
- C. Covered
- D. Recirculating

Diamagnetic materials _____?

- A. Are magnetised by eddy currents only
- B. Are non-magnetic and cannot be magnetised
- C. Are magnetised in direction opposite to the magnetic field**
- D. Can be magnetised in one direction only

Helium-mercury method is used for the measurement of the _____ of the catalyst?

- A. Surface area
- B. Porosity
- C. Pore volume
- D. Both B. & C.**

Circulation of gases in furnace is caused by the _____?

- A. Change in volume during a change of temperature
- B. Difference in density between hot and cold gases
- C. Furnace pressure in conjunction with draft in flues
- D. All A., B. and C.**

For what value of Prandtl number, the Colburn analogy is valid ?

- A. 0.06 to 120
- B. 0.6 to 120**

C. 1 to 103

D. 1 to 50

Vane anemometer _____?

A. Is an area meter

B. Is a variable head meter

C. Rotates an element at a speed determined by the velocity of the fluid in which the meter is

immersed

D. None of these

Tolerable concentration of toxic carbon monoxide in atmospheric air is about _____ ppm?

A. 50

B. 1000

C. 5000

D. 10000

The ratio of linear stress to linear strain is termed as the _____?

A. Modulus of elasticity

B. Modulus of rigidity

C. Bulk modulus

D. None of these

In general, the limit of inflammability/explosion limit of fuel gases is widened by the _____?

A. Increase in gas pressure

B. Increase in temperature (i.e. preheating)

C. Use of pure oxygen for combustion instead of air

D. All A., B. & C.

Hollow shafts can be made as strong as solid shafts by making the twisting

moments of both the shafts same. Shafts made by _____ have residual stresses ?

- A. Forging
- B. Cold rolling**
- C. Hot rolling
- D. Casting

Residual magnetism in steel for magnets is increased by the addition of _____?

- A. Nickel
- B. Cobalt**
- C. Tungsten
- D. Chromium

Diphenylamine is added to rubber to _____?

- A. Vulcanise it
- B. Protect it from deterioration on exposure to air**
- C. Make it non-inflammable
- D. Make it thermosetting

Flanges are connected to pipes by _____?

- A. Screwing
- B. Welding
- C. Brazing
- D. All A., B. and C.**

Maximum consumption of copper is in _____?

- A. Utensil manufacture
- B. Electrical industry**
- C. Industrial equipment manufacture
- D. Small scale industries

A liquid mixture contains 30% o-xylene, 60% p-xylene and 10%. m-xylene (all

percentages in w/w). Which of the following statements would be true in respect of this mixture ?

A. The mixture exhibits an azeotrope at 101.3 kPa

B. The composition of the mixture, in percent by volume is: o-xylene 30, p-xylene 60. and m-xylene

10

C. The composition of the mixture in mole percent is: o-xylene 30, p-xylene 60 and m-xylene 10

D. The mixture contain optical isomers

The chemical potential of a component (μ_i) of a phase is the amount by which its capacity for doing all work, barring work of expansion is increased per unit amount of substance added for an infinitesimal addition at constant temperature and pressure. It is given by_____?

A. $(\partial E/\partial n_i)_{S, v, n_j}$

B. $(\partial G/\partial n_i)_{T, P, n_j} = (\partial A/\partial n_i)_{T, v, n_j}$

C. $(\partial H/\partial n_i)_{S, P, n_j}$

D. All (A), B. and (C)

Post weld heat treatment is done by_____?

A. Normalising

B. Stress relieving

C. Tempering

D. Solution annealing

1 kg of calcium carbide (CaC_2) produces about 0.41 kg of acetylene gas on treatment with water. How many hours of service can be derived from 1 kg of calcium carbide in an acetylene lamp burning 35 litres of gas at NTP per hour ?

A. 5

B. 10

C. 15

D. 20

The heat of combustion of a fuel _____?

- A. Is equal to the heat of formation
- B. Is always negative**
- C. Can't be known without calculating it
- D. Is always positive

Pick out the wrong statement ?

- A. Alloys are harder than their component elements
- B. Presence of silicon in steel decreases its electrical resistance**
- C. Karbate is an acid resistant material of construction
- D. Nichrome, a steel alloyed with 10% Ni and 20% Cr can be used upto a temperature of 1100°C

To improve the machinability of steel by its softening, it is subjected to _____?

- A. Cold working
- B. Annealing**
- C. Shot blasting
- D. Heating

Pure rectified spirit contains about _____ percent alcohol?

- A. 45
- B. 70
- C. 95**
- D. 99.5

Pick out the wrong statement ?

- A. Carburetted water gas is also called blue gas**
- B. Coals are divided in four species according to their carbon content in Seylor's classification
- C. Carbonisation time in a by-product coke oven is about 16 hours
- D. Gross and net calorific value of a fuel is the same, if it does not contain hydrogen or

hydrocarbons

For a ternary mixture, in which equilateral triangular co-ordinate is used in leaching and extraction, a _____ of the equilateral triangular co-ordinates?

- A. Binary mixture is represented by the apex
- B. Binary mixture is represented by any point inside
- C. Ternary mixture is represented by the sides
- D. Pure component is represented by the apex**

Which one is not an induced draught furnace ?

- A. Blast furnace stove**
- B. Sintering furnace
- C. High pressure boiler
- D. None of these

The unit of heat transfer co-efficient is _____?

- A. BTU/hr. ft²F**
- B. BTU/hr. °F. ft
- C. BTU/hr. °F
- D. BTU/hr. ft

_____ test is the appropriate test to determine whether a material is ductile or brittle ?

- A. Impact
- B. Cupping
- C. Hardness
- D. Tensile

The decomposition of A into B is represented by the exothermic reaction, $A \rightleftharpoons 2B$. To achieve maximum decomposition, it is desirable to carry out the reaction ?

- A. At high P and high T
- B. At low P and high T
- C. At low P and low T**
- D. At high P and low T

The density of the gases (present in air) decreases with increasing altitude to such an extent, that about 70% of the mass of atmospheric air is found in the lower 5 km. of the atmosphere. This lower region of atmosphere is called the_____?

- A. Ionosphere
- B. Troposphere**
- C. Stratosphere
- D. None of these

A bed consists of particles of density 2000 kg/m³. If the height of the bed is 1.5 metres and its porosity 0.6, the pressure drop required to fluidise the bed by air is_____?

- A. 25.61 kPa
- B. 11.77 kPa**
- C. 14.86 kPa
- D. 21.13 kPa

In β -decay of radioactive material, the ratio of neutron to proton_____?

- A. Increases
- B. Remain same
- C. Decreases**
- D. Is unpredictable; may increase or decrease

Iron is not used alone as a catalyst in ammonia synthesis, because_____?

- A. Its activity declines rapidly, if heated to above 520°C**

- B. It decomposes ammonia
- C. It gets oxidised above 500°C
- D. None of these

Dorr thickener is an equipment used for _____?

- A. Classification
- B. Sedimentation**
- C. Clarification
- D. Leaching

Spark plugs, ignition tubes and electrodes are made of nickel _____ alloys?

- A. Beryllium
- B. Manganese**
- C. Copper
- D. Iron

Nitrogen content in ammonium sulphate (a fertiliser) is around _____ percent?

- A. 5
- B. 20**
- C. 50
- D. 65

Reaction of ethylene glycol and dimethyl terephthalate (DMT) produces _____?

- A. Nylon-6
- B. Dacron**
- C. Polyester
- D. PVC

Which of the following is a coarse crusher ?

- A. Smooth roll crusher

- B. Toothed roll crusher
- C. Gyratory crusher**
- D. Tube mill

The diffusivity, D_{AB} (for component A diffusing in B) is equal to the diffusivity D_{BA} (for component B diffusing in A) for a binary mixture of _____?

- A. Newtonian liquids
- B. Non-Newtonian liquids
- C. Ideal gases**
- D. Real gases

Three solid objects of the same material and of equal mass—a sphere, a cylinder (length = diameter) and a cube are at 500°C initially. These are dropped in a quenching bath containing a large volume of cooling oil each attaining the bath temperature eventually. The time required for 90% change in temperature is the smallest for _____?

- A. Cube**
- B. Cylinder
- C. Sphere
- D. Equal for all the three

Centrifugal pump can't be used to pump _____?

- A. Molten sodium (used as a coolant in Fast Breeder Reactor)
- B. Moderately viscous vegetable oil used in soap industry
- C. Thick molten soap at 80°C**
- D. None of the above

The unit of dynamic viscosity is _____?

- A. Stoke
- B. Poise
- C. gm/cm sec

D. Both B. & C.

Bed pressure drop in an air fluidised bed of catalyst particles ($\rho_p = 200 \text{ kg/m}^3$, $D_p = 0.05 \text{ cm}$) of 60 cm bed depth and bed porosity of 0.5 expressed in cm of water (manometer) is _____?

- A. 90
- B. 60**
- C. 45
- D. 30

Analogy between mass and heat transfer is not applicable in case of _____?

- A. Same velocity profile or equal eddy diffusivities
- B. Thermal or pressure mass diffusion
- C. Viscous heating or chemical reaction
- D. Both B. and C.**

For water, when the pressure increases, the viscosity _____?

- A. Also increases
- B. Decreases
- C. Remain constant
- D. First decreases, and then increases**

At the boiling point of the liquid at the prevailing pressure, the saturated absolute humidity becomes _____?

- A. 1
- B. 0
- C. ∞**
- D. None of these

Dorr thickener is an equipment used for _____?

- A. Classification

B. Sedimentation

- C. Clarification
- D. Leaching

The internal energy of an ideal gas does not change in a reversible _____ process?

A. Isothermal

- B. Adiabatic
- C. Isobaric
- D. Isometric

Wheat is ground into flour in a _____?

- A. Hammer crusher

B. Roller crusher

- C. Impact mill
- D. Fluid energy mill

Reason for operating an evaporator in multiple effects is to secure _____?

- A. Increased steam economy
- B. Decreased steam consumption

C. Both A. and B.

- D. Increased capacity

Rayleigh's equation applies to _____ distillation?

- A. Continuous
- B. Steam

C. Differential

- D. Flash

Chrome magnesite brick is not used for lining the _____?

- A. Hearth of soaking pits
- B. Bottom hearth of reheating furnace

C. Coke oven regenerator

D. Burning zone of limestone rotary kilns

N.T.P. corresponds to _____?

A. 1 atm absolute pressure & 0°C

B. 760 mm Hg gauge pressure & 0°C

C. 760 torr & 15°C

D. 101.325 KPa gauge pressure & 0°C

Poise is converted into stoke by _____?

A. Multiplying with density (gm/c.c)

B. Dividing by density (gm/c.c)

C. Multiplying with specific gravity

D. Dividing by specific gravity

The following type of bonding is strongly directional in solids ?

A. Vander Waal's

B. Ionic

C. Metallic

D. Covalent

For long flame and easy ignition, the coal used should have _____?

A. High volatile matter

B. Low ash

C. High calorific value

D. High ash

In case of cooling towers, the ratio of the rates of heat and mass transfer is indicated by the _____ number ?

A. Lewis

B. Grashoff

C. Sherwood

D. None of these

Tetra-ethyl lead is added in gasoline to _____?

A. Increase its smoke point

B. Reduce gum formation

C. Reduce the pour point

D. Increase its octane number

The variable required to be known in correlations used for estimating the horse power of a centrifugal gas compressor and hence its cost is P. Inlet pressure Q. Compressor rpm R. Delivery pressure S. Volumetric flow rate at inlet ?

A. P, Q and R

B. P and R

C. R and S

D. P, R and S

The crushed material received for separation is called feed or _____?

A. Tailing

B. Heading

C. Concentrate

D. Middling

Work study deals with the _____ study?

A. Time

B. Motion

C. Both A. & B.

D. Neither A. nor B.

The thermal boundary layer at $NPr > 1$?

A. Is thicker than hydrodynamic boundary layer

B. Is thinner than hydrodynamic boundary layer

C. And the hydrodynamic boundary layers are identical

D. Disappears

Black liquor is converted into white liquor by _____?

- A. **Evaporation and burning the concentrate followed by causticisation of products**
- B. Multi-effect evaporation only
- C. Selective liquid extraction
- D. Extractive distillation

In case of condensers & evaporators operating under given terminal conditions, LMTD (logarithmic mean temperature difference) for counter flow as compared to that for parallel flow is _____?

- A. More
- B. Less
- C. **Equal**
- D. Much more

Dichloro diphenyl _____ is the full form of DDT (an insecticide) ?

- A. Tetrachloroethane
- B. **Trichloroethane**
- C. Tetrachloromethane
- D. Trichloromethane

Additives used for promoting the flocculation of particles is a/an _____?

- A. Electrolyte
- B. Surface active agent
- C. **Both A. & B.**
- D. Neither A. nor B.

In case of compression of one kg of air, the work done will be the least, when the value of polytropic index 'n' is _____?

- A. **1**

- B. 1.4
- C. 1.5
- D. $Y = C_p/C_v$

Penetration test determines the _____ of the grease?

A. Stiffness

- B. Lubricating properties (e.g. oilness)
- C. Service temperature
- D. Variation in viscosity with temperature

In a chemical process plant, the total product cost comprises of manufacturing cost and the _____?

A. General expenses

- B. Overhead cost
- C. R & D cost
- D. None of these

Pick out the wrong statement pertaining to space velocity of flow reactors?

- A. The unit of space velocity is (time)⁻¹
- B. The space velocity of 3 hr⁻¹ means that three reactor volumes of feed at specified conditions are being fed into the reactor every hour
- C. The space velocity of 3 hr⁻¹ means that one third reactor volume of feed at specified conditions are being fed into the reactor**
- D. None of these

Mercaptans is represented as (where R and R' are alkyl groups)

_____?

- A. R-COOH
- B. R-S-H**
- C. R-S-R
- D. R-S-R'

A metal ball of radius 0.1 m at a uniform temperature of 90°C is left in air at 30°C. The density and the specific heat of the metal are 3000 kg/m³ and 0.4 kJ/kg.K respectively. The heat transfer co-efficient is 50 W/m².K Neglecting the temperature gradients inside the ball, the time taken (in hours) for the ball to cool to 60°C is _____?

- A. 555
- B. 55.5
- C. 0.55
- D. 0.15**

The concentration of water vapour in troposphere, which depends upon the altitude & temperature, varies in the range of zero to _____ percent?

- A. 1
- B. 4**
- C. 8
- D. 12

Which of the following contains least amount of N₂ ?

- A. Coke oven gas**
- B. Blast furnace gas
- C. Producer gas
- D. Water gas (blue gas)

Flash point of atmospheric distillation residue is determined by _____ apparatus?

- A. Pensky-Martens (closed cup type)
- B. Abel
- C. Cleveland (open cup type)**
- D. None of these

1m³ of an ideal gas at 500 K and 1000 kPa expands reversibly to 5 times its initial volume in an insulated container. If the specific heat capacity (at constant

pressure) of the gas is 21 J/mole . K, the final temperature will be ?

- A. 35 K
- B. 174 K
- C. 274 K**
- D. 154 K

_____ is a thermosetting plastic ?

- A. Polythene
- B. Epoxy polymer**
- C. P.V.C.
- D. Polystyrene

Gray King Assay and Swelling Index of a coal is a measure of its

_____ ?

- A. Swelling characteristics**
- B. Abradability
- C. Agglutinating properties
- D. Resistance to impact breakage

Speed of a submarine in deep sea & that of an aeroplane is measured by a/an _____ ?

- A. Pitot tube**
- B. Hot wire anemometer
- C. Rotameter
- D. Stroboscope

Low pressure steam (with saturation temperature between 105 to 120°C) is usually used in the vacuum evaporators, which normally employ a vacuum of about _____ mm Hg (referred to a 760 mm mercury barometer)?

- A. 250
- B. 450
- C. 650**

D. 750

Cold chisel & hammers are made of _____?

- A. High speed steel
- B. High carbon steel**
- C. Forged steel
- D. Mild steel

The energy of activation of a chemical reaction ?

- A. Is same as heat of reaction at constant pressure
- B. Is the minimum energy which the molecules must have before the reaction can take place**
- C. Varies as fifth power of the temperature
- D. Both B. and C.

Volute type of casing is provided in a centrifugal pump to _____?

- A. Convert velocity head to pressure head
- B. Convert pressure head to velocity head
- C. Reduce the discharge fluctuation
- D. Increase the discharge**

Which of the following does not figure in the list of seven substances selected for international temperature scale ?

- A. Ice (F.P) and steam (B.P)
- B. Oxygen and sulphur (B.P)
- C. Antimony and silver (F.P)
- D. Zinc (B.P) and mercury (F.P)**

Carbon refractories are exclusively used in the _____?

- A. Hearth of blast furnace**
- B. Walls of coke oven
- C. Regenerators of coke oven

D. Side wall of soaking pits

Ultimate analysis of coal determines its _____ content?

- A. Carbon, hydrogen, nitrogen & sulphur
- B. Carbon, ash, sulphur & nitrogen
- C. Carbon, sulphur, volatile matter & ash**
- D. Carbon, volatile matter, ash & moisture

A stable system is the one _____?

- A. For which the output response is bounded for all bounded input**
- B. Which exhibits an unbounded response to a bounded input
- C. Which satisfies the conditions for a servo problem
- D. None of these

The heat of adsorption of a gas caused by Van der Waals forces of attraction and capillarity is equal to the heat of _____?

- A. Normal condensation
- B. Wetting
- C. Sum of A. and B.**
- D. Difference of A. and B.

Annealing of white cast iron produces _____ iron?

- A. Grey
- B. Nodular
- C. Malleable**
- D. Spheroidal

Which of the following factors does not govern the mechanism of petroleum formation from organic sources ?

- A. pH of the soil**
- B. Bacterial action
- C. Heat
- D. Pressure

Corresponding to Nusselt number in heat transfer, the dimensionless group in mass transfer is the _____ number?

A. Sherwood

B. Schmidt

C. Peclet

D. Stanton

Which of the following fuel gases has the highest calorific value ?

A. Natural gas

B. Coal bed methane (CBM)

C. Liquefied petroleum gas (LPG)

D. Sewage gas

Reciprocating screens are normally inclined at an angle of 5° with the horizontal and employ gyratory motion at feed end & reciprocating motion at the discharge end. They are not suitable for the screening of the _____?

A. Light metal powder down upto 4 mesh size

B. Dry chemicals

C. Heavy tonnages of rocks or gravel

D. Powdered food & granular materials

The synthesis of proteins and metabolism in biological objects occur in the presence of biocatalyst called _____?

A. A ferment or an enzyme

B. Haemoglobin

C. Fungi

D. None of these

Freundlich equation applies to the adsorption of solute from _____?

A. Dilute solutions, over a small concentration range

- B. Gaseous solutions at high pressure
- C. Concentrated solutions
- D. None of these

The cooling medium used in dry quenching of coke is _____?

A. Nitrogen

- B. Air
- C. Phenolic water
- D. Carbon dioxide

Main constituents of Portland cement are calcium aluminate and _____?

A. Gypsum

B. Silicates

- C. Sodium silicate
- D. Carbonates

Super heating of steam is done at constant _____?

A. Enthalpy

B. Entropy

C. Pressure

D. Volume

Sacrificial anode method is used in the protection of pipelines which are buried underground. Sacrificial anode _____?

A. Occurs higher in the electro-chemical series of metals

B. Is exemplified by magnesium plate

C. Is much cheaper than the cathodic base material to be guarded against corrosion

D. All A, B. & C.

Which of the following is used as a coagulant in treating turbid water ?

A. Chlorine

B. Ferric sulphate

- C. Calcium sulphate
- D. Activated carbon

In a semi-batch reactor _____?

- A. Mixing takes place in axial direction only
- B. Velocity of reaction can be controlled**
- C. Condition similar to plug flow reactor exists
- D. Residence time is constant

Fireclay refractories _____?

- A. Are not resistant to the action of basic slags
- B. Combine with salts (e.g. chlorides sulphates etc.) & bases (e.g. lime, magnesia etc.) forming fusible aluminates silicates etc
- C. Shrink during firing
- D. All A., B. and C.**

The design stress, which is more than the damaging stress, is the least unit stress that will render a member unfit for service before the end of its normal life. The design stress factor or factor of safety indicates the margin between design stress and the _____ stress?

- A. Working
- B. Damaging**
- C. Allowable
- D. None of these

The escape velocity of a body on earth which is independent of its mass is about _____ km/second?

- A. 3
- B. 7
- C. 11**
- D. 15

For handling sulphuric acid of 95% strength, the suitable material of construction for pipes is_____?

- A. Stainless steel
- B. Cast iron**
- C. Aluminium
- D. Nickel

Lindane is_____?

- A. Not a fumigant
- B. BHC (Benzene Hexachloride) containing 99% γ -isomer**
- C. A by-product of BHC manufacture
- D. Both B. and C.

P.T.F.E. (Poly tetra fluoro ethylene) is commercially known as_____?

- A. Bakelite
- B. Neoprene
- C. Teflon**
- D. Nylon-66

Cox chart is useful in the design of_____?

- A. Distillation column**
- B. Evaporator
- C. Dryer
- D. Crystalliser

Catalytic oxidation of toluene produces_____?

- A. Styrene
- B. Phenol**
- C. Benzene
- D. Tri-nitro-toluene

Forced circulation evaporators are useful for the concentration of viscous, salting and scale forming liquors. Which of the following is a forced circulation evaporator ?

- A. Long vertical evaporator
- B. Horizontal tube evaporator
- C. Agitated film evaporator**
- D. Calandria vertical tube evaporator

Both asphalt and wax are produced by _____ base crude oils?

- A. Naphthenic
- B. Asphalt
- C. Paraffin
- D. Mixed**

What is the degree of freedom for two miscible (non-reacting) substances in vapor-liquid equilibrium forming an azeotrope ?

- A. 0
- B. 1
- C. 2**
- D. 3

The value of Joule-Thomson co-efficient, in case where cooling occurs after the throttling process is _____?

- A. 0
- B. ∞
- C. +ve**
- D. -ve

Diffusivity in concentrated solutions differs from that in dilute solutions, because of the changes in _____?

- A. Viscosity with concentration
- B. Degree of ideality of the solution

- C. Both A. and B.
- D. Neither A. nor B.

Solute atoms which cause yield point phenomenon in mild steel are/is _____?

- A. Aluminium
- B. Boron
- C. Carbon
- D. Nitrogen

The dimension of dynamic viscosity is _____?

- A. ML-1T-1
- B. L²T-1
- C. LT-2
- D. ML-1T-2

Addition polymerisation takes place either by a free radical mechanism or ionic mechanism depending on the reagents used. Free radical polymerisation is catalyzed by _____, which decompose to give free radicals?

- A. Organic peroxides
- B. Sulphuric acid
- C. Hydrofluoric acid
- D. None of these

_____ number indicates the ratio of the rates of the heat and mass transfer incase of a cooling tower?

- A. Sherwood
- B. Stanton
- C. Lewis
- D. Peclet

It is desired to concentrate a 20% salt solution (20 kg of salt in 100 kg of

solution) to a 30% salt solution in an evaporator. Consider a feed of 300 kg/min at 30°C. The boiling point of the solution is 110°C, the latent heat of vaporisation is 2100 kJ/kg and the specific heat of the solution is 4 kJ/kg.K. The rate at which the heat has to be supplied in (kJ/min) to the evaporator is _____?

- A. **3.06 × 10⁵**
- B. 6.12 × 10⁵
- C. 7.24 × 10⁵
- D. 9.08 × 10⁵

Vertical condenser is advantageous to the horizontal condenser from operation point of view, when _____?

- A. Hydrostatic head is required for refluxing the condensate
- B. Only the function of condensation is to be carried out
- C. Sub-cooling of condensate is desired
- D. **Both the functions of condensation & sub cooling are carried out in a single unit**

The units of resistance to heat transfer is _____?

- A. J.m⁻².K⁻¹
- B. J.m⁻¹.K⁻¹
- C. W.m⁻².K⁻¹
- D. **W-1m²K**

Sublimation temperature of dry ice (solid CO₂) is _____ °C?

- A. -273
- B. 0
- C. **-78**
- D. 5

The mechanism involved in the removal of metal in drilling operation is by _____?

- A. Compression

- B. Extrusion
- C. Shearing
- D. Both B & C**

A first order homogeneous reaction of the type $X \rightarrow Y \rightarrow Z$ (consecutive reaction) is carried out in a CSTR. Which of the following curves respectively show the variation of the concentration of X, Y and Z with time ?

- A. I, II, III
- B. III, II, I**
- C. III, I, II
- D. II, III, I

Pick out the wrong statement/

- A. The emissivity of a surface decreases, if it gets corroded by atmospheric environment**
- B. The emissivity of a surface increases with increase in surface roughness
- C. The emissivity of a polished surface is quite low
- D. The emissivity of a non-metallic surface decreases with increase in the temperature

Pick out the wrong statement?

- A. The integral heat of solution of either component cannot be calculated from heat of mixing data**
- B. The average value of heat of neutralisation of dilute solutions of weak acids and bases is much less compared to that for strong acids and bases
- C. The standard heat of solution of the hydrate of a substance is the difference between the heat of solution of the anhydrous substance and its heat of hydration
- D. The accompanying enthalpy change, when a solute is dissolved in solvent, depends upon the nature & amount of the solute & the solvent, on the temperature & on the initial & final concentrations of the solution

Close circuit grinding by a ball mill with air sweeping employs a _____?

- A. Classifier
- B. Cyclone separator between mill & classifier
- C. Both A. & B.**
- D. Neither A. nor B.

Babbitt metals used for making bearings are _____?

- A. Tin or lead based alloys**
- B. Short of antifrictional properties
- C. Having homogenous microstructure
- D. Yellow metals

Good quality kerosene should have _____?

- A. Low smoke point
- B. High smoke point**
- C. High aromatics content
- D. Low paraffins content

What is the emissivity of a black body ?

- A. 0
- B. 1**
- C. 0.5
- D. 0.90

For the case of flow of air past a wet bulb thermometer (air water vapour system), the approximate value of $h_2/k_y.C_z$ is around _____?

- A. 0.60
- B. 0.24
- C. 1**
- D. 0.72

In a shell and tube heat exchanger, the clearance of the tube is

generally _____?

- A. **Not less than one-fourth of the tube diameter or 3/16"**
- B. More than the tube diameter
- C. Equal to the tube diameter
- D. More in case of triangular pitch as compared to the square pitch tube layout

The essential ingredient of all the synthesis gas is _____?

- A. **H₂**
- B. O₂
- C. CO₂
- D. N₂

The advantages of firing pulverised coal in the furnace lies in the fact that, it _____?

- A. Permits the use of high ash content coal
- B. Permits the use of low fusion point ash coal
- C. **Accelerates the burning rate and economises on fuel consumption**
- D. All A., B. and C.

Vacuum steel degassing units are lined with _____?

- A. Silica bricks
- B. Low duty firebricks
- C. **High alumina bricks**
- D. Graphite blocks

Which of the following is not a commercially used feed-stock for the production of ammonia synthesis gas ?

- A. Water
- B. Naphtha
- C. **Tar**
- D. Coal/coke oven gas

Bleaching of paper pulp is done with _____?

- A. Activated clay
- B. Bromine
- C. Chlorine or chlorine dioxide**
- D. Magnesium sulphite

Mode of heat transfer in which the fluid moves under the influence of changes in fluid pressure produced by external work is called _____?

- A. Radiation
- B. Natural convection
- C. Forced convection**
- D. Conduction

Sodium tri poly phosphate (STPP) is manufactured by reaction of phosphoric acid with sodium _____?

- A. Carbonate**
- B. Phosphate
- C. Bicarbonate
- D. Silicate

The amplitude ratio for the sinusoidal response of _____ is < 1 ?

- A. Transportation lag
- B. First order system**
- C. Second order system
- D. None of these

Fanning equation is given by $(\Delta P/\rho) = 4f (L/D) (v^2/2gc)$. It is applicable to _____ region flow?

- A. Transition
- B. Laminar
- C. Turbulent
- D. Both B. and C.**

Silicon carbide refractories are used in the _____?

- A. Muffle furnace
- B. Zinc smelting furnace
- C. Ceramic recuperators
- D. All A., B. and C.**

In case of binary distillation, increasing the reflux ratio above optimum does not result in the increase of _____?

- A. Area between operating line and 45° diagonal x-y diagram**
- B. Condenser and reboiler surfaces
- C. Tower cross-section
- D. None of these

Pick out the wrong statement ?

- A. Catalytic hydrogenation of carbon monoxide produces methyl alcohol
- B. In nylon-6, the number 6 represents the total number of carbon atoms in the ring
- C. Raw materials for DDT manufacture are benzene and chlorine**
- D. Ethanolamines are produced by using ammonia and ethylene oxide as raw material

An oil is converted into fat by its _____?

- A. Hydrogenation**
- B. Hydrolysis
- C. Hydrocracking
- D. Hydration

For the irreversible reaction, $\text{Ca} + 2\text{C} = \text{CaC}_2$, $\Delta H^\circ_{298} = -60000 \text{ J} \cdot \text{mole}^{-1}$. If a system initially containing 2 moles of calcium, 3 moles of carbon and 1 mole of calcium carbide is allowed to react to completion, the heat evolved at 298 K will be _____?

- A. 30,000 J
- B. 60,000 J
- C. 90,000 J**
- D. 2,40,000 J

Identify the group in which all the polymers mentioned can be used to make fibres ?

- A. Butadiene copolymers, Polyamides, Urea-formaldehyde
- B. Cellulose derivatives, Polyisoprene, Polyethylene**
- C. Cellulose derivatives, Polyamides, Polyurethane
- D. Polypropylene, Poly vinyl chloride, Silicon

Acetylene gas holder is made of _____?

- A. Copper
- B. Cast iron
- C. Steel**
- D. Monel metal

In froth floatation, chemical agent added to cause air adherence is called _____?

- A. Collector**
- B. Frother
- C. Modifier
- D. Activator

Which of the following is an undesirable property in a tower packing ?

- A. Large surface per unit volume
- B. Large free cross-section
- C. Low weight per unit volume
- D. Large weight of liquid retained**

In case of vertical tube evaporator, with increase in liquor level, the overall heat transfer co-efficient _____?

- A. Increases
- B. Decreases**
- C. Is not affected
- D. May increase or decrease; depends on the feed

Melting point & boiling points of liquid oxygen are respectively -218.8°C & -183°C , while the same for liquid nitrogen is -210°C & -195.8°C respectively. The difference in melting points of liquid oxygen & liquid nitrogen is not equal to 8.8 ?

- A. $^{\circ}\text{C}$
- B. $^{\circ}\text{F}$**
- C. $^{\circ}\text{K}$
- D. $^{\circ}\text{R}$

Nylon-66 compared to nylon-6 has _____?

- A. Lower melting point
- B. More abrasion resistant properties**
- C. Higher hardness
- D. All A., B. and C.

The most commonly used substance to speed up the sedimentation of sewage is _____?

- A. Lime**
- B. Sulphuric acid
- C. Chlorine
- D. Sodium bisulphite

Pascal law is not applicable for a/an _____ fluid?

- A. Accelerating frictionless
- B. Static
- C. Uniformly moving
- D. None of these**

In financial accounting of a chemical plant, which of the following relationship is invalid ?

- A. Assets = equities
- B. Assets = liabilities + net worth

C. Total income = costs + profits

D. Assets = capital

The electrical conductivity of a _____ decreases with rise in temperature?

A. Metal/alloy

B. Semi-conductor

C. Dielectric

D. None of these

The digester of a Gobar gas plant is a _____?

A. Mild steel drum

B. Stainless steel vessel

C. Masonry well

D. Cast iron vessel

The concentration of (H⁺) ions is 4×10^{-5} in a solution. Then pH of the solution will be (Given $\log 4 = 0.6$) ?

A. 4.4

B. 5.6

C. 8.4

D. 2.4

Chromel (Nichrome) is an alloy of _____?

A. Chromium and molybdenum

B. Nickel and chromium

C. Molybdenum and nickel

D. Chromium and aluminium

Power required by a centrifugal pump is proportional to (where, D = diameter, N = r.p.m) _____?

A. N^2D^3

B. ND^2

- C. N2D
- D. N3D5**

Normality of a solution does not change with the increase in the _____?

- A. Pressure**
- B. Temperature
- C. Solute concentration
- D. Dilution of the solution

In the cyclone separator used for separation of dust from dust laden gas, the gas _____?

- A. Enters the cyclone from the top
- B. Is admitted tangentially at high velocity
- C. Develops a helical motion inside the chamber
- D. Both B. and C.**

Vinyl chloride ($\text{CH}_2 = \text{CH.Cl}$) is produced by the thermal pyrolysis of ethylene dichloride at a pressure & temperature of _____?

- A. 4 kgf/cm² & 500°C**
- B. 10 kgf/cm² & 1000°C
- C. 40 kg/cm² & 200°C
- D. 100 kgf/cm² & 500°C

Dip stick used for measuring the level of petro fuels (e.g. petrol, diesel, fuel oil etc.) in the storage tank is usually made of _____?

- A. Brass**
- B. Copper
- C. High carbon steel
- D. Aluminium

Neoprene is chemically known as _____?

- A. Polybutadiene
- B. Styrene butadiene rubber (SBR)
- C. Polyurethane
- D. Poly chloroprene**

Ash content in the coke produced from a coking coal having 20% ash may be around _____ percent?

- A. 6
- B. 12
- C. 18
- D. 24**

Polyvinyl chloride (PVC) is _____?

- A. A thermosetting material
- B. A condensation polymerisation product
- C. Made by employing emulsion polymerisation**
- D. None of these

The most widely used coagulant for removing suspended impurities from water is _____?

- A. Bleaching powder
- B. Chlorine
- C. Calcium sulphate
- D. Alum**

Varnish does not contain _____?

- A. Pigment**
- B. Thinner
- C. Dryer
- D. Anti-skimming agent

Washing of coal decreases its _____?

- A. Caking index

B. Mineral matter content

- C. Ash content
- D. Both B. and C.

On oscilloscope screen for dynamic measurement, lissajous diagram is normally used to determine the _____ of the input signal?

A. Frequency

- B. Amplitude
- C. Damping
- D. None of these

Artificial draught produced by a fan can be controlled by the _____?

- A. Speed of the fan
- B. Damper
- C. Variation in the pitch of the fan blades
- D. All A., B. and C.**

Uranium percentage in monazite sand is about _____?

- A. 0.01
- B. 0.25**
- C. 1.2
- D. 7

The pressure (kg/cm²) and temperature (°C) maintained in electrical desalters for crude oil are respectively _____?

- A. 10 and 120
- B. 1 and 200**
- C. 50 and 250
- D. 10 and 300

What is the pH of distilled water ?

- A. 0

- B. 1
- C. 7
- D. 14

In Langmuir treatment of adsorption, _____?

- A. Whole surface of the catalyst does not have the same activity for adsorption and there is attraction between the adsorbed molecule
- B. Whole surface of the catalyst is essentially uniform and the adsorbed molecule has no effect on the rate of adsorption per site**
- C. All the adsorption does not take place by the same mechanism
- D. Extent of adsorption is more than one complete monomolecular layer on the surface

The equilibrium constant 'K' of a chemical reaction depends on _____?

- A. Temperature only**
- B. Pressure only
- C. Temperature and pressure
- D. Ratio of reactants

Identify the false statement?

- A. Martensitic steels are less susceptible to pitting corrosion than austenitic steels**
- B. Pitting corrosion is usually very localised
- C. Hydrogen embrittlement is facilitated by tensile stress
- D. Stress corrosion cracking is facilitated by tensile stress

The main differentiation factor between tube mill and ball mill is the _____?

- A. Length to diameter ratio**
- B. Size of the grinding media
- C. Final product size
- D. Operating speed

Which of the following is not dimension-less ?

- A. Froude number
- B. Kinematic viscosity**
- C. Pressure co-efficient
- D. None of these

pH value of a solution containing 1 gm of hydrogen ion per litre will be _____ ?

- A. 0**
- B. 1
- C. 7
- D. 10

Transition length for a turbulent fluid entering into a pipe is around _____ times the pipe diameter?

- A. 5
- B. 50**
- C. 500
- D. 5000

Bernoulli's equation for steady, frictionless, continuous flow states that the _____ at all sections is same?

- A. Total pressure
- B. Total energy**
- C. Velocity head
- D. None of these

For turbulent flow in smooth circular pipe, the velocity distribution is a function of the distance 'd' measured from the wall of the pipe and the friction velocity 'v', and it follows a _____ relationship?

- A. Logarithmic**
- B. Linear

- C. Hyperbolic
- D. Parabolic

Heat transfer rate to the charge/stock in a furnace does not depend upon the _____?

- A. Type of fuels viz. solid, liquid or gaseous**
- B. Flue gas temperature
- C. Emissivity of refractory walls
- D. Initial temperature of the charged stock

Which of the following situations can be approximated to a steady state heat transfer system ?

- A. A red hot steel slab (having outside surface temperature as 1300°C) exposed to the atmospheric air at 35°C
- B. 10 kg of dry saturated steam at 8 kgf/cm^2 flowing through a short length of stainless steel pipe exposed to atmospheric air at 35°C**
- C. Boiling brine kept in open vessel when the bottom surface temperature of the vessel is maintained constant at 180°C
- D. A sub-cooled refrigerant liquid at 8°C flowing at the rate of 6 Kg/minute through a copper pipe exposed to atmospheric air at 35°C

For laminar flow of Newtonian fluid in a circular pipe, the velocity distribution is a function of the distance 'd' measured from the centre line of the pipe, and it follows a _____ relationship?

- A. Logarithmic
- B. Parabolic**
- C. Hyperbolic
- D. Linear

Euler's equation of motion states, that at every point, the _____?

- A. Fluid momentum is constant

B. Force per unit mass equals acceleration

- C. Rate of mass outflow is equal to the rate of mass inflow
- D. None of these

The compressive strength of cement should not be less than about 110Kg/cm² after three days & not less than 170Kg/cm² after seven days. The fineness of an ordinary cement as determined by turbidimetric method should be about _____ cm²/gm?

- A. 800
- B. 1600**
- C. 4000
- D. 8500

The economic life of a large chemical process plant as compared to a small chemical plant is _____?

- A. Only slightly more
- B. Much more**
- C. Slightly less
- D. Almost equal

Priming is needed in a _____ pump?

- A. Reciprocating
- B. Gear
- C. Centrifugal**
- D. Diaphragm

_____ is the most suitable fertiliser for paddy?

- A. Urea
- B. Ammonium sulphate**
- C. Superphosphate
- D. Potassium nitrate

Young's modulus of a material is the measure of its _____?

- A. Stiffness
- B. Malleability
- C. Creep resistance
- D. Tensile strength

Cold crushing strength of a refractory does not depend upon its _____?

- A. Shape
- B. Composition
- C. Firing temperature
- D. Texture

The minimum liquid rate to be used in an absorber corresponds to an operating line _____?

- A. Of slope = 1
- B. Of slope = 0.1
- C. Tangential to the equilibrium curve
- D. None of these

The ratio of Murphree plate efficiency to point efficiency is always > 1 in a _____ flow model?

- A. Plug
- B. Perfectly mixed
- C. Both A. & B.
- D. Neither A. nor B.

Multistage centrifugal pumps are generally used for _____?

- A. High head
- B. Low head but high discharge
- C. Highly viscous liquid
- D. Slurries of high solid concentration

Rain drops falling through atmospheric air attain limited terminal velocity, because of _____?

- A. Upward thrust due to air
- B. Viscous force exerted by air**
- C. Surface tension effects of water
- D. Force of gravity

The physical state in which polymers exist is _____?

- A. Melts & rubber like state
- B. Amorphous glassy state
- C. Partially crystalline state
- D. All A., B. and C.**

With increase in temperature, the leaching rate increases due to _____?

- A. Decreased liquid viscosity
- B. Increased diffusivity
- C. Both A. and B.**
- D. Neither A. nor B.

Which of the following thermocouples is the most suitable for measuring a temperature of about 1600°C in an oxidizing atmosphere ?

- A. Platinum-platinum + rhodium**
- B. Iron-constantan
- C. Copper-constantan
- D. Chromel-alumel

Which of the following is not an alloy of copper ?

- A. Muntz metal
- B. Admiralty gun metal
- C. German silver
- D. Pewter metal**

For spheres, the specific surface shape factor is given by _____?

- A. AD/V
- B. D/V
- C. A/V
- D. $\sqrt{AD/V}$

Pick out the wrong statement?

- A. Greater is the kinematic viscosity of the liquid, greater is the thickness of the boundary layer
- B. Blowers develop a maximum pressure of 2 atmospheres
- C. Friction losses in pipe fittings are generally expressed in terms of velocity heads**
- D. Fanning friction factor in case of turbulent flow of liquids in pipe depends upon relative roughness & Reynolds number

Fahrenheit and Centigrade scales have the same readings at

_____?

- A. -55°
- B. -40°**
- C. -33°
- D. -58°

The cooling effect in a cooling tower can be speeded up by

_____?

- A. Increasing the air velocity and area of exposed wet surface
- B. Reducing the barometric pressure
- C. Reducing the humidity of the air
- D. All A., B. and C.**

Chrome vanadium steels usually contain 0.8 to 1.1% Cr, 0.25 to 0.35% C and < 0.25% V. It is _____?

- A. Used for making axle & shafts of aeroplanes, automobiles and locomotives**
- B. Having poor fatigue resistance
- C. Having poor toughness

D. Not helpful in producing cleaner steel due to oxidising action of vanadium

Which of the following is not present in bagasse fiber?

- A. Cellulose
- B. Lignin
- C. Pentogens
- D. None of these**

Which of the following equations is obtained on combining 1st and 2nd law of thermodynamics, for a system of constant mass ?

- A. $dE = Tds - PdV$**
- B. $dQ = CvdT + PdV$
- C. $dQ = CpdT + Vdp$
- D. $Tds = dE - PdV$

In a bag filter, the pressure drop increases directly as the _____?

- A. Density of the gas, but is independent of the viscosity of the gas
- B. Density of the gas and inversely as viscosity of the gas**
- C. Viscosity of the gas and inversely as density of the gas
- D. None of these

Identify the correct statement with reference to the extractive metallurgy of aluminium ?

- A. The electrolyte consists of molten Na_3AlF_6 with approximately 1 to 8% Al_2O_3**
- B. Approximately 80% of the aluminium deposited on the cathode comes from cryolite
- C. Sodium is deposited along with aluminium, but is immediately vaporised
- D. Anode effect sets in when the cryolite concentration goes below 40%.

Chromite refractories are used in _____?

- A. Bottom of soaking pits
- B. Between acid & basic linings in basic open hearth furnaces to prevent their chemical action**

with each other

C. Both A. & B.

D. Neither A. and B.

Solvay process is used for the manufacture of _____?

A. Caustic soda

B. Soda ash

C. Caustic potash

D. Soda lime

Pick out the wrong statement ?

A. Percentage of ash in coke produced from medium coking coal is more than that in coal

B. The calorific value (kcal/Nm³) of coke oven gas reduces on removal of hydrogen from it by

cryogenic method

C. Ash is normally removed as 'fly-ash' in Kopper-Totzek process of coal gasification

D. Coal based fertiliser plants in India at Talcher (Orissa) and Ramagundam (A.P) employ Kopper-Totzek process of coal gasification

For a thermodynamic system undergoing a process, which of the following pairs best expresses the relationship similar to that expressed by the pressure volume plot ?

A. Temperature – entropy

B. Temperature – pressure

C. Enthalpy – entropy

D. Enthalpy-pressure

Polyvinyl chloride (PVC) _____?

A. Is produced by Polycondensation reaction

B. Uses either emulsion or suspension polymerisation methods

C. Can be made thermosetting by adding a plasticiser

D. Softening temperature is 200°C

Kinematic viscosity of $1 \text{ m}^2 / \text{second}$ is equivalent to _____ stokes?

- A. 10
- B. 102
- C. 103
- D. 104**

Pick out the wrong statement?

- A. Critical moisture content is not a property of the material itself
- B. A sharp increase in pressure drop gives an indication of the flooding in a distillation column
- C. Separation of components is not possible in liquid extraction, if selectivity is unity
- D. Dehydration of ethyl alcohol is most economically done by molecular distillation at very high vacuum**

Which of the following is a poisonous fuel gas ?

- A. Coke oven gas
- B. Blast furnace gas**
- C. Natural gas
- D. None of these

Vena-contracta formed during flow of a liquid through an orificemeter has _____?

- A. Minimum liquid cross-section**
- B. More diameter compared to orifice diameter
- C. Minimum velocity of fluid stream
- D. None of these

What causes cavitation in centrifugal pump ?

- A. High suction pressure
- B. Low barometric pressure
- C. Low suction pressure**
- D. High suction velocity

For an ideal solution, the total vapor pressure varies _____ with the composition (expressed as mole fraction)?

- A. Inversely
- B. Exponentially
- C. Linearly**
- D. Negligibly

Paper grade bamboo contains about _____ percent cellulose ?

- A. 5**
- B. 20
- C. 40
- D. 60

In a/an _____, the flow rate of fluids is obtained by measuring the difference between the impact and the static pressure?

- A. Rotameter
- B. Pitot tube**
- C. Venturimeter
- D. Flow nozzle

For steady ideal fluid flow, the Bernoulli's equation states that the _____?

- A. Velocity is constant along a stream line
- B. Energy is constant throughout the fluid
- C. Energy is constant along a stream line, but may vary across stream lines**
- D. None of these

Low thermal conductivity of heat insulating materials is due to its _____?

- A. Dense structure
- B. High proportion of air space**

- C. High specific heat
- D. None of these

Boiling point elevation for a strong and concentrated solution is found by Duhring's rule, which states that at the same pressure, the boiling point of a solution is a linear function of the _____ of pure water?

- A. Boiling point**
- B. Dynamic viscosity
- C. Kinematic viscosity
- D. Density

What is the Laplace transform of impulse input having magnitude „X“ ?

- A. X
- B. X²
- C. 1/X
- D. 1**

Unsteady state heat conduction occurs, when _____?

- A. Temperature distribution is independent of time
- B. Temperature distribution is dependent on time**
- C. Heat flows in one direction only
- D. Three dimensional heat flow is concerned

Air filtration in a furnace _____?

- A. Reduces its thermal efficiency**
- B. Is indicated by flame sting out
- C. Increases the flue gas temperature
- D. None of these

A fast breeder reactor _____?

- A. Uses natural uranium as fuel
- B. Does not require a moderator**
- C. Both A. and B.

D. Neither A. nor B.

Which of the following is the most wear resistant grade of carbide used for the cutting tools ?

- A. Aluminium carbide
- B. Tungsten carbide**
- C. Nickel carbide
- D. Iron carbide

Discharge in laminar flow through a pipe varies _____?

- A. As the square of the radius**
- B. Inversely as the pressure drop
- C. Inversely as the viscosity
- D. As the square of the diameter

Work done is a _____?

- A. Property of the system
- B. Path function**
- C. Point function
- D. State description of a system

Calcium ammonium nitrate (CAN) is _____?

- A. A mixed fertiliser
- B. A straight fertiliser
- C. A complex fertiliser**
- D. Not a fertiliser; it is an explosive

Which of the following gives the work required for size reduction of coal to -200 mesh in a ball mill most accurately?

- A. Rittinger's law**
- B. Kick's law
- C. Bond's law
- D. None of these

The _____ of a chemical company can be obtained directly from the balance sheet as the difference between current assets and current liabilities ?

- A. Cash ratio
- B. Net working capital**
- C. Current ratio
- D. Liquids assets

Kirchoff`s law applies to _____ radiation?

- A. Total
- B. Monochromatic
- C. Both A. & B.**
- D. Neither A. nor B.

Silicon percentage in acid resistant cast iron is about _____ ?

- A. 4**
- B. 8
- C. 14
- D. 20

For laminar flow of filtrate through the cake deposited on septum, which of the following will be valid ?

- A. Kozeny-Carman equation**
- B. Leva`s equation
- C. Blake-Plummer equation
- D. None of these

The work index in Bond`s law for crushing of solids has the following dimensions _____ ?

- A. No units (dimensionless)
- B. kWh/ton**
- C. kW/ton
- D. kWh.m^{1/2}/ton

With increase in temperature, the vapor pressure of liquids_____?

- A. Increases**
- B. Increases linearly
- C. Decreases
- D. Remain constant

With decrease in the throughput (compared with the design capacity) for a bubble cap distillation column, its efficiency_____?

- A. Increases**
- B. Decreases
- C. Remain same
- D. May increase or decrease; depends on individual design

A composite flat wall of a furnace is made of two materials 'A' and 'B'. The thermal conductivity of 'A' is twice of that of material 'B', while the thickness of layer of 'A' is half that of B. If the temperature at the two sides of the wall are 400 and 1200°K, then the temperature drop (in °K) across the layer of material 'A' is_____?

- A. 125
- B. 133
- C. 150
- D. 160**

For a spontaneous natural process at constant temperature and pressure, the free energy of the system always_____?

- A. Increases**
- B. Decreases
- C. Remain constant
- D. Increases to a maximum before decreasing

In case of a pipe exit fitted with a nozzle, the _____?

- A. Conversion of kinetic head to pressure head is facilitated
- B. Conversion of pressure head to kinetic head is facilitated
- C. Power transmitted through the nozzle is maximum, when the head lost due to friction in the pipe is equal to one third of the total supply head
- D. Both B. and C.**

Which of the following is the most harmful for the human being ?

- A. β -rays
- B. X-rays
- C. γ -rays**
- D. Ultra violet rays

Pick out the wrong statement?

- A. Wrought iron contains about 0.02% carbon
- B. Wrought iron cannot be easily forged and welded**
- C. The chilled cast iron does not contain graphite
- D. Spheroidal grey cast iron contains graphite flakes

Optimum ratio of operating speed to critical speed of a trommel is _____?

- A. 0.33-0.45**
- B. 1.33-1.45
- C. 0.5-2
- D. 1.5-2.5

Pick out the wrong statement ?

- A. A soft magnetic material should have high permeability and small area of hysteresis loop
- B. Poisson's ratio of high melting point metals is more than unity**
- C. Solders generally melt at less than 185°C
- D. Steel produced by B.O.F process is ideally suited for manufacturing flat product

A barometer measures the _____ pressure?

- A. **Absolute**
- B. Gauge
- C. Absolute as well as gauge
- D. dynamic

Which is an acidic refractory ?

- A. Magnesite
- B. Dolomite
- C. **Fireclay**
- D. Chrome magnesite

Solvent used in Edeleanu process is _____?

- A. Furfural
- B. Propane
- C. **Liquid SO₂**
- D. Phenol

The heat change for the reaction, $C(s) + 2S(s) \rightarrow CS_2(l)$, is 104.2 kJ. It represents the heat of _____?

- A. **Formation**
- B. Solution
- C. Combustion
- D. Fusion

Red phosphorous is changed into white phosphorous by _____?

- A. Heating in presence of light
- B. Melting under pressure
- C. **Vaporisation followed by condensation**
- D. None of these

The chlorinator used in the manufacture of DDT is made

of _____?

- A. Glass
- B. Glass lined steel**
- C. Teflon
- D. Bakelite

Absorption accompanied with chemical reaction is exemplified by the absorption of _____?

- A. Ammonia in water
- B. Benzol present in coke oven gas by wash oil
- C. SO₂ in alkaline solution**
- D. All A., B. and C.

Vacuum is applied in _____ zone, in case of a general type continuous rotary drum vacuum filter?

- A. Filtering
- B. Washing
- C. Drying
- D. All A., B. & C.**

In second order underdamped system ?

- A. Decay ratio = overshoot
- B. Decay ratio = (overshoot)²**
- C. Overshoot increases for increasing damping co-efficient
- D. Large damping co-efficient means smaller damping

Gage pressure within a spherical droplet of a fluid is 'p'. What will be gage pressure within a bubble of the same size & of the same fluid ?

- A. p
- B. 2 p**
- C. 0.5 p
- D. 0.25 p

If a solution of eutectic composition is cooled, _____ reaching the eutectic temperature ?

- A. The solvent begins to freeze out even before
- B. It will undergo no change until**
- C. It will not solidify even on
- D. None of these

Maximum acceptable total liquid gradient over a tray is about _____ mm?

- A. 5.5
- B. 12.5**
- C. 30.5
- D. 45.5

While the oxy-acetylene flame produces a temperature of 3200°C, the temperature produced by oxy-hydrogen flame is about _____ °C?

- A. 1800
- B. 2000**
- C. 2400
- D. 3000

Otto cycle used in spark ignition petrol engines is also known as the constant _____ cycle?

- A. Volume**
- B. Pressure
- C. Heat
- D. None of these

Very dilute solutions are generally used in fermentation reactions for which the optimum temperature range is _____ °C?

- A. -5 to 0
- B. 5 to 10**

C. 30 to 50

D. 75 to 80

Which of the following is prone to cup and cone fracture ?

A. Cast iron

B. Soft brass

C. Round specimen of ductile metal

D. Flat tensile specimen of ductile metal

Ferromagnetic materials owe their properties to _____ inner sub-shells ?

A. Completely filled

B. Partially filled

C. Equally filled

D. Vacant

The product out from a cupola is called _____ ?

A. Wrought iron

B. Pig iron

C. Cast iron

D. None of these

Hot & cold working of material causes its _____ deformation?

A. Visco-elastic

B. Isotropic

C. Elastic

D. Plastic

Raoult's law states that 'the equilibrium vapor pressure that is exerted by a component in a solution is proportional to the mole fraction of that component'. This generalisation is based on the assumption that the _____ ?

- A. Sizes of the component molecules are approximately equal
- B. Attractive forces between like and unlike molecules are approximately equal
- C. Component molecules are non-polar and no chemical combination or molecular association between unlike molecules takes place in the formation of the solution
- D. All A., B. & C.**

Operating velocity in a packed tower is usually _____ the flooding velocity ?

- A. Half**
- B. Twice
- C. Equal to
- D. More than

A stuffing box is used for _____ ?

- A. Absorbing the contraction/expansion of pipeline due to temperature changes
- B. Prevention of fluid leakage around moving parts**
- C. Facilitating smooth opening and closing of a valve
- D. Reducing the resistance of fluid flow

Which of the following is a controlling factor in very fast heterogeneous reaction ?

- A. Heat and mass transfer effects**
- B. Pressure
- C. Temperature
- D. Composition of reactant

Which of the following coals has the highest calorific value ?

- A. Lignite
- B. Sub-bituminous
- C. Anthracite**
- D. Peat

“Dry ice” is _____?

- A. Moisture free ice
- B. Solid helium
- C. Solid carbon dioxide**
- D. None of these

Cellulose content of bamboo and ideal fibrous raw material for the manufacture of paper is _____ percent?

- A. 10
- B. 50**
- C. 80
- D. 95

The rate expression for a heterogeneous catalytic reaction is given by, $-r_A = \frac{K K_A P_A}{1 + K_A P_A + K_R P_R}$, where K is surface reaction rate constant and K_A and K_R are absorption equilibrium constants of A and R respectively. If $K_R P_R \gg (1 + K_A P_A)$, the apparent activation energy E_A is equal to (given E is the activation energy for the reaction and ΔH_R and ΔH_A are the activation energies of adsorption of R and A) ?

- A. E
- B. $E + \Delta H_A$
- C. $E + \Delta H_A - \Delta H_R$**
- D. $\Delta H_A + \Delta H_R$

The capacity of a centrifugal pump Can be increased by increasing the _____?

- A. Impeller diameter or speed
- B. Number of pumps and joining them in series
- C. Number of pumps and joining them in parallel
- D. All A., B. and C.**

In a heat exchanger, shell side fluid velocity can be changed by changing the

tube _____?

- A. Layout
- B. Pitch
- C. Both A. & B.**
- D. Neither A. nor B.

With increase in the pressure drop across the cake, the specific cake resistance for the compressible sludge _____?

- A. Increases**
- B. Decreases
- C. Remains constant
- D. Increases linearly

Pick out the wrong statement?

- A. Net worth means paid up share capital and reserve & surplus (i.e. shareholders equity)
- B. Return on equity = profit after tax/net worth
- C. Working capital turnover ratio = sales/net working capital
- D. Total cost of production is more than net sales realisation (NSR) at breakeven point**

When the reaction occurs in the diffusion controlled region, the apparent activation energy as measured is only _____ the true value?

- A. Twice
- B. Half**
- C. Equal
- D. None of these

Thermal diffusivity is given by _____?

- A. $k/\rho C_p$**
- B. $\rho C_p/k$
- C. $\mu C_p/a$
- D. $\mu/h C_p$

Pressure of 0.0001 absolute psi can be measured by _____ gauge?

A. Mcleod

- B. Pirani
- C. Thermocouple
- D. None of these

Exposure to _____ accelerates the degradation of plastics?

A. Ultraviolet radiation

- B. High atmospheric temperature
- C. High ambient temperature
- D. Damp atmosphere

Xanthates are used in the froth floatation process as a/an

_____?

- A. Conditioner
- B. Frother
- C. Collector**
- D. Activator

For an ideal liquid solution, which of the following is unity ?

- A. Activity
- B. Fugacity
- C. Activity co-efficient**
- D. Fugacity co-efficient

Conversion formula for converting amplitude ratio (AR) into decibels is

_____?

- A. Decibel = $20 \log_{10} (AR)$**
- B. Decibel = $20 \log_e (AR)$
- C. Decibel = $20 \log_{10} (AR)^{0.5}$
- D. Decibel = $20 \log_e (AR)^{0.5}$

In a CSTR _____ varies with time ?

- A. Reaction rate

- B. Concentration
- C. Both A. & B.
- D. Neither A. nor B.**

The value of $(C_p - C_v)$ for a real gas obeying Vander Wall's equation is _____?

- A. R
- B. > R**
- C. < R
- D. 0.5 R

Which of the following liquid metals has the highest thermal conductivity ?

- A. Molten sodium**
- B. Molten lead
- C. Mercury
- D. Molten potassium

Rain coats are made of _____?

- A. Neoprene
- B. PVC**
- C. Polyurethane
- D. SBR

Gas cooling as compared to water cooling of nuclear reactors _____?

- A. Cannot attain a high temperature
- B. Is more efficient as gas has a higher specific heat
- C. Can produce only saturated steam for feeding to power turbine
- D. None of these**

95% (by volume) of LPG at 760 mm Hg pressure will evaporate at _____ °C?

- A. 2**

- B. -40
- C. 30
- D. 55

Fuel for a fast breeder nuclear reactor is _____?

- A. Plutonium**
- B. Uranium
- C. Radium
- D. Neptunium

Which of the following is not a by-product fuel ?

- A. Sewage gas
- B. Refinery gas
- C. Producer gas**
- D. Bagasse

In sub-cooled boiling ?

- A. Temperature of the heating surface is less than the boiling point of the liquid
- B. Temperature of the heating surface is more than the boiling point of the liquid**
- C. Bubbles from heating surface are absorbed by the mass of the liquid
- D. Very large vapour space is necessary

In an isothermal process on an ideal gas, the pressure increases by 0.5 percent.

The volume decreases by about _____ percent?

- A. 0.25
- B. 0.5**
- C. 0.75
- D. 1

Which of the following facilitates close control of flow of fluids ?

- A. Gate valve
- B. Globe valve**
- C. Butterfly valve

D. Check valve

One mole of nitrogen at 8 bar and 600 K is contained in a piston-cylinder arrangement. It is brought to 1 bar isothermally against a resisting pressure of 1 bar. The work done (in Joules) by the gas is _____?

- A. 30554
- B. 10373**
- C. 4988.4
- D. 4364.9

Hot, lumpy & abrasive materials are best transported by using a/an _____ conveyor ?

- A. Apron**
- B. Belt
- C. Screw
- D. Flight

Scheduling provides information about the _____?

- A. Proper utilisation of machines
- B. Means to minimise idle time for machines
- C. Time of completion of job
- D. Time of starting of job and also about how much work should be completed during a particular period**

For an ideal gas, the chemical potential is given by _____?

- A. $RT \ln P$**
- B. $R \ln P$
- C. $R \ln f$
- D. None of these

Diameter to height ratio for a raschig ring is _____?

- A. 1**
- B. 0.5

- C. 2
- D. 8

Screen efficiency is _____?

- A. Recovery/rejection
- B. Recovery
- C. Rejection
- D. None of these**

Fouling factor must be included in the calculation of overall design heat transfer coefficient, when the liquid _____?

- A. Containing suspended solids flows at low velocity**
- B. Containing suspended solids flows at high velocity
- C. Is highly viscous
- D. Is of high specific gravity

With increase in the liquid flow rate at a fixed gas velocity in a randomly packed counter current gas-liquid absorption column, the gas pressure drop _____?

- A. Decreases
- B. Remains unchanged
- C. Increases**
- D. Decreases exponentially

The optimum percentage of excess air for combustion depends upon the _____ of the fuel?

- A. Type (solid, liquid or gaseous)**
- B. Calorific value
- C. Sulphur content
- D. Ignition temperature

Which is the main reducing agent during production of iron from iron ore in a

blast furnace ?

- A. C
- B. CO**
- C. CO₂
- D. H₂

Triangular pitch tube layout as compared to square pitch in a shell and tube heat exchanger _____?

- A. Permits the use of less tubes in a given shell diameter
- B. Facilitates comparatively easier external cleaning because of large clearance
- C. Permits the use of more tubes in a given shell diameter**
- D. Both B. and C.

Phenol is mainly used _____?

- A. To produce benzene
- B. To produce phenol formaldehyde**
- C. To produce polyester resin
- D. As a plasticiser for unsaturated polyester

In a backward feed multiple effect evaporator _____?

- A. Feed is introduced in the first effect
- B. Feed flows from low pressure to high pressure**
- C. No pumps are required between successive effects
- D. None of these

A long cylinder and a sphere both of 5 cms diameter are made from the same porous material. The flat ends of cylinder are sealed. Both the cylinder and sphere are saturated with the same solution of sodium chloride. Later both the objects are immersed for a short and equal interval of time in a large tank of water which is well agitated. The fraction of salt remaining in the cylinder and the sphere are X_c and X_s respectively. Which of the following statement is correct ?

- A. $X_c > X_s$
- B. $X_c = X_s$
- C. $X_c < X_s$**
- D. X_c greater/less than X_s depending on the length of the cylinder

Response of a linear control system for a change in set point is called _____?

- A. Frequency response
- B. Transient response
- C. Servo problem**
- D. Regulator problem

While the recrystallisation temperature for pure metals is $0.3 T_m$, the same for alloys is equal to _____ $\times T_m$ (where, T_m Melting temperature) ?

- A. 0.25
- B. 0.45
- C. 0.70**
- D. 0.95

The unit of fugacity is the same as that of the _____?

- A. Pressure**
- B. Temperature
- C. Volume
- D. Molar concentration

An example of unsteady non uniform flow is the flow of liquid under pressure through a _____?

- A. Tapering pipe at constant flow rate
- B. Tapering pipe at either decreasing or increasing flow rate**
- C. Long pipeline of constant diameter
- D. None of these

A steam pipe is intended to be insulated with two layers of insulating materials

of different thermal conductivities. For minimum heat transfer to take place _____?

- A. The better insulation material should be put just next to pipe (i.e., inside)
- B. The better insulating material should be put outside
- C. Either of the insulating material could be put on either side
- D. Steam temperature is considered before deciding as to which insulating material is to be put inside (i.e., just next to the pipe)

Speed of sound in an ideal gas depends on its _____?

- A. Temperature
- B. Pressure
- C. Specific volume
- D. None of these

Pick out the wrong statement ?

- A. Gape is the greatest distance between the crushing surfaces or the jaws
- B. The angle of nip (2α) is the angle between roll faces at the level where they will just take hold of a particle and draw it in the crushing zone
- C. **Crushing efficiency is the ratio of the energy absorbed by the solid to the surfaces energy created by crushing**
- D. Reduction ratio is the ratio of the maximum size of the particles in the feed to that in the product

Removable connection of tubes to tube sheet is called _____?

- A. Ferrule
- B. Socket
- C. Nipple
- D. Saddle

Tank furnace used for melting of glass is made of _____?

- A. Mild steel
- B. Cast iron
- C. Refractory blocks**
- D. Stainless steel

An upper limit of oil content is limited to about _____ percent for achieving efficient and satisfactory level of wax sweating?

- A. 5
- B. 15
- C. 40**
- D. 60

Which of the following is not a part of the Blake jaw crusher ?

- A. Hanger**
- B. Check plates
- C. Toggles
- D. Pitman

To reduce the tube side pressure drop for the same flow rate, the heat exchanger recommended is _____?

- A. 1-2 heat exchanger
- B. 1-1 heat exchanger**
- C. 3-2 heat exchanger
- D. 2-4 heat exchanger

The value of gas constant 'R' is _____ kcal/kg.mole.°C?

- A. 2.79
- B. 1.987
- C. 3.99
- D. None of these**

The highest stress that a material can withstand for a specified length of time without excessive deformation is called the _____ strength ?

- A. Creep**
- B. Endurance
- C. Fatigue
- D. None of these

Desirable value of absorption factor in an absorber is _____?

- A. 1
- B. < 1
- C. > 1**
- D. 0.5

H₂S present in naphtha reformed gas is removed by absorbing with _____?

- A. Ethanolamine**
- B. K₂CO₃
- C. HCl
- D. Vacuum gas oil

Boiling point of a solution as compared to that of the corresponding solvent is _____?

- A. Less
- B. More**
- C. Same
- D. Either more or less; depends upon the solvent

Isotropic turbulence occurs _____?

- A. Where there is no velocity gradient**
- B. At higher temperatures
- C. Only in Newtonian fluids
- D. None of these

Increase in temperature, in general results in the _____?

- A. Decrease in the viscosities of both liquids & gases

- B. Increase in the viscosities of both liquids & gases
- C. Increase in the viscosity of liquids and decrease in that of gases
- D. Decrease in the viscosity of liquids and increase in that of gases**

_____ is not a constituent of gun powder?

- A. Carbon**
- B. Charcoal
- C. Sulphur
- D. Potassium nitrate

The loss of strength in compression which occurs, when there is a gain of strength in tension due to over loading is called _____?

- A. Bauschinger effect**
- B. Hooke's effect
- C. Hysteresis
- D. Relaxation

The relative saturation of an unsaturated mixture of gas and vapor is independent of the _____?

- A. Nature of the vapor
- B. Temperature of the mixture
- C. Composition of the mixture
- D. None of these**

Filler material used in welding should have _____ as compared to the parent metal to be welded ?

- A. Lower melting temperature
- B. Same melting temperature
- C. Same composition
- D. Both 'B' & 'C'**

Pick out the wrong statement ?

- A. LPG is also used as fuel for automobiles & small furnaces and for cutting & welding of

metals

B. The minimum temperature, at which a petroleum oil vapor catches fire and continues to burn, is called its flash point

- C. Each ton of petroleum oil on distillation produces about 30-50 Nm³ of gas
- D. Maximum yield of naphthalene is obtained on distillation of crude oil

The main function of baffles provided in a shell and tube heat exchanger is to _____?

- A. Facilitate the cleaning of outer tube surface
- B. Enhance turbulence**
- C. Hold the tubes in position
- D. All A , B & C

Thermal conductivity of a conducting solid material depends upon its _____?

- A. Temperature
- B. Porosity
- C. Both A. & B.**
- D. Neither A. nor B.

Metalloid is _____?

- A. An element, which exhibits the properties of both metal & non metal**
- B. Highly electronegative in nature
- C. An alloy
- D. All A., B. & C.

If the head is doubled in & centrifugal pump, the power required will increase in the ratio of _____?

- A. 23
- B. 23/2**
- C. 25/2
- D. 21/3

Pick out the correct conversion?

- A. 1 BTU =453.6 calories
- B. 1 BTU = 252 calories**
- C. 1 calorie = 252 BTU
- D. 1 calorie = 453.6 BTU

Buna-S is also known as _____?

- A. Teflon
- B. PTFE
- C. SBR**
- D. Polycrylates

In the downcomer of a distillation column, the minimum recommended residence time is about _____ seconds?

- A. 2.5
- B. 5**
- C. 12.5
- D. 17.5

Which of the following furnaces will have maximum thermal efficiency ?

- A. Soaking pits
- B. Walking beam reheating furnace
- C. Boiler furnace**
- D. Rotary kilns

Which of the following is not a neutral refractory ?

- A. Silicon carbide
- B. Magnesite**
- C. Chromite
- D. Graphite

Midrex process of sponge iron production uses reformed natural gas as the

reducing agent, which uses iron ore in the form of _____?

- A. Lumps
- B. Pellets**
- C. Briquettes
- D. Sinter

The expression for the work done for a reversible polytropic process can be used to obtain the expression for work done for all processes, except reversible _____ process?

- A. Isobaric
- B. Isothermal**
- C. Adiabatic
- D. None of these

One 'amu' is equivalent to _____?

- A. 9.31 MeV
- B. 931 eV
- C. 931 Mev**
- D. 931 J

Moist air is cooled along the line of constant _____, when it is passed over a cold & dry cooling coil, such that no condensation occurs ?

- A. Enthalpy
- B. Relative humidity
- C. Wet bulb temperature
- D. Dew point temperature**

Pick out the wrong statement pertaining to 'green house' for the plants ?

- A. 'Green house' (made of glass) allows visible sunlight (i.e., short wavelength solar radiation like ultra-violet rays) to pass through the glass and heat up the soil thereby warming up plants inside it

- B. The emitted longer wavelength radiation (e.g., infrared) is partly reflected and partly absorbed by the glass of the green house
- C. 'Green house effect' in earth's atmosphere is due to increasing CO₂ level in atmosphere, where CO₂ acts like the glass of 'green house' thereby warming up the earth's surface
- D. 'Green house' is colder than the outside atmosphere**

Which of the following is a low melting point metal ?

- A. Stainless steel
- B. Wrought iron
- C. Tin**
- D. Copper

Which of the following is resistant to the action of both heat & chemicals ?

- A. Borosilicate glass**
- B. Silica glass
- C. Soda lime glass
- D. None of these

Which is the stable form of silica below 870°C ?

- A. Tridymite
- B. Cristobalite
- C. Quartz**
- D. None of these

The thermal efficiency of a reversible heat engine operating between two given thermal reservoirs is 0.4. The device is used either as a refrigerator or as a heat pump between the same reservoirs. Then the coefficient of performance as a refrigerator (COP)_R and the co-efficient of performance as a heat pump (COP)_{HP} are _____ ?

- A. (COP)_R = (COP)_{HP} = 0.6
- B. (COP)_R = 2.5; (COP)_{HP} = 1.5

C. **(COP)_R = 1.5; (COP)_{HP} = 2.5**

D. $(COP)_R = (COP)_{HP} = 2.5$

All the thermocouples used for temperature measurement use dissimilar metal _____?

A. Strips

B. Bars

C. **Wires**

D. Beads

Which is not a refrigerant ?

A. SO₂

B. NH₃

C. CCl₂F₂

D. **C₂H₄Cl₂**

1 Kcal/kg. °C is equivalent to _____ BTU/lb. °F ?

A. **1**

B. 2.42

C. 4.97

D. None of these

Thermistor, which has high temperature co-efficient of resistivity, is used as the sensing element in resistance thermometer. It is a/an ?

A. Insulator

B. Conductor

C. **Solid semi-conductor**

D. Liquid semi-conductor

Calculation of mass transfer co-efficient is mostly/normally done using _____ theory?

A. Surface renewal

B. **Film**

- C. Penetration
- D. None of these

Fussain _____?

- A. Is friable, charcoal like substance
- B. Has highest fixed carbon and lowest volatile matter content of all the four banded components of coal
- C. Is non-coking, but when blended with highly coking coal, controls its swelling and produces high strength coke on carbonisation
- D. All A., B. and C.**

In fluid flow, the boundary layer separation cannot occur _____?

- A. In case of boundaries experiencing form drag
- B. At points of abrupt changes in the flow directions
- C. In laminar flow
- D. None of these**

Pick out the wrong statement pertaining to 'Horton sphere' used for the storage of liquid ammonia ?

- A. Diameter of Horton sphere is normally 6 to 25 metres and it is supported by 6 to 12 nos. tubular or rolled section column
- B. Thickness of spherical shell is half that of the cylindrical vessel under same operating pressure condition. Besides, the ratio of surface area to volume is less for sphere than any other shape; hence insulation required is less
- C. Horton sphere is used for the storage of gases and volatile liquid at a moderate pressure of 1 to 10 kg/cm²
- D. Horton sphere is used for the storage of liquid at sub-zero temperature at very high pressure upto 200 kg/cm²**

The function of skimming tank in sewage treatment is to remove

_____ substances?

- A. Dissolved solid
- B. Suspended solid
- C. Oil & fatty**
- D. Gritty & inorganic

Froude number is not a factor _____?

- A. For Reynolds number greater than 300
- B. When there is no vortex formation**
- C. For unbaffled tank
- D. None of these

(Le/D) for a Tee (used as elbow, entering branch) would be _____?

- A. Less than that for Tee (used as elbow, entering run)
- B. More than that for Tee (used as elbow, entering run)
- C. Around 90
- D. Both B. and C.**

_____ bricks are used in the burning zone of a cement rotary kiln ?

- A. High alumina**
- B. Fireclay
- C. Thoria
- D. Silicon carbide

A vessel of volume 1000 m³ contains air which is saturated with water vapour. The total pressure and temperature are 100 kPa and 20°C respectively. Assuming that the vapour pressure of water at 20°C is 2.34 kPa, the amount of water vapour (in kg) in the vessel is approximately ?

- A. 17**
- B. 20
- C. 25

D. 34

_____ flux is used for the extraction of metal from its self fluxing ores?

- A. No
- B. Acid
- C. Basic
- D. Neutral

The joint for soldering is supported by binding wire made of _____?

- A. Mild steel
- B. Copper
- C. **Soft iron**
- D. Stainless steel

For absorbing a sparingly soluble gas in a liquid, the _____?

- A. Gas side co-efficient should be increased
- B. **Liquid side coefficient should be increased**
- C. Gas side co-efficient should be decreased
- D. Liquid side co-efficient should be decreased

Sudden fall of atmospheric pressure by a large amount is an indication of the _____?

- A. Rain
- B. Cold wave
- C. **Storm**
- D. Fair weather

Drossing is a _____ operation?

- A. Smelting
- B. Dressing
- C. **Roasting**

D. Dressing

A mixture of 10% C₆H₆ vapour in air at 25°C and 750 mm Hg has a dew point of 20°C. Its dew point at 30°C and 700 mm Hg will be around _____ °C?

- A. 21.7
- B. 20
- C. 27.3
- D. 18.7**

Ramming masses are used for _____ ?

- A. Obtaining monolithic working faces
- B. Repairing construction of various furnace parts
- C. Both A. & B.**
- D. Neither A. nor B.

In a binary system, separation is very efficient, when the relative volatility is _____ ?

- A. 1
- B. > 1**
- C. < 1
- D. 0.5

According to Bond crushing law, the work required to form particle of size 'D' from very large feed is (where (S/V)_p and (S/V)_f are surface to volume ratio of the product and feed respectively) ?

- A. (S/V)_p
- B. $\sqrt{(S/V)_p}$**
- C. (S/V)_p²
- D. (S/V)_f

The metals occurring at the lower most position in the electromotive

series _____ ?

- A. Do not resist corrosion
- B. Resist corrosion very strongly**
- C. Are very brittle
- D. Are heat insulators

The softest material in Mho's scale (for measuring hardness)

is _____ ?

- A. Talc**
- B. Gypsum
- C. Rubber
- D. None of these

A hot body will radiate heat most rapidly, if its surface is _____ ?

- A. White & rough
- B. Black & rough**
- C. White & polished
- D. Black & polished

Dry bulb temperature of unsaturated air is more than its _____ temperature?

- A. Dew point
- B. Wet bulb
- C. Both A & B**
- D. Neither A nor B

Reid vapour pressure of gasoline is the measure of its _____ ?

- A. Pour point
- B. Cloud point
- C. Vapour locking tendency**
- D. Carbon residue

Teflon (PTFE) is corroded by _____ ?

- A. Hydrochloric acid (10%)
- B. Hydrochloric acid (95%)
- C. Sulphuric acid
- D. None of these**

Noise level during normal conversation among men is about _____ decibels?

- A. 10
- B. 45**
- C. 90
- D. 115

Bottom product of atmospheric pressure crude oil distillation column is termed as _____?

- A. Reduced crude**
- B. Heavy ends
- C. Asphalt
- D. Residuum

Which of the following is a periodic furnace ?

- A. Tunnel kiln
- B. Rotary kiln
- C. Soaking pit**
- D. Reheating furnace

Carbide tipped cutting tools are manufactured by powder metallurgy techniques and have a composition of _____?

- A. 90% tungsten carbide and 10% cobalt**
- B. 70% aluminium oxide & 30% silica
- C. 30% nickel, 15% chromium & 55% tungsten
- D. 65% tungsten & 35% zirconium

Liquid delivery by centrifugal pump starts, only when the head developed by it is

equal to the _____ head?

- A. Manometric**
- B. Total
- C. Static
- D. Friction

In an ideal refrigeration cycle, the change in internal energy of the fluid is _____?

- A. +ve
- B. -ve
- C. 0**
- D. Either of the above three; depends on the nature of refrigerant

Drag is the force component exerted on an immersed object, ?

- A. Passing the centroid of the body at 60° to the direction of motion
- B. The component being parallel to the flow direction**
- C. The component being normal to the flow direction
- D. None of these

N. second/m² is _____?

- A. The S.I. unit of dynamic viscosity**
- B. The S.I. unit of kinematic viscosity
- C. Equivalent to one poise
- D. Equivalent to one stoke

Decoction refers to the use of solvent _____?

- A. At ambient temperature
- B. At its boiling point**
- C. In its vapor form
- D. None of these

Water gas constitutes mainly of _____?

- A. CO & H₂**

- B. CO & N₂
- C. CO₂ & H₂
- D. CH₄ & H₂

A 2" gate valve fitted in a pipe is replaced by a similar globe valve. Pressure drop in gate valve was Δp . For the same discharge, the pressure drop across globe valve is _____?

- A. Δp
- B. $< \Delta p$
- C. $> \Delta p$**
- D. Δp^2

Phthalic anhydride is used _____?

- A. In making PVC
- B. As plasticisers**
- C. In insecticides manufacture
- D. For making nylon-6

Which of the following tests is not done for transformer oil ?

- A. Flash point and acid value
- B. Aniline point**
- C. Dielectric strength
- D. Copper strip corrosion test

Fermenter used in the production of penicillin by deep fermentation process is a _____ lined steel vessel ?

- A. Rubber
- B. Monel
- C. Glass**
- D. Nickel

A first order system with unity gain and time constant η is subjected to a

sinusoidal input of frequency $\omega = 1/\eta$. The amplitude ratio for this system is _____?

- A. 1
- B. 0.5
- C. $1/\sqrt{2}$**
- D. 0.25

Transistor parts and refrigerator components are normally made of _____?

- A. Polystyrene**
- B. Polyester
- C. High density polythene
- D. Polyurethane

The thermodynamic law, $PV^\gamma = \text{constant}$, is not followed by the _____?

- A. Free expansion of an ideal gas**
- B. Adiabatic expansion of steam in turbine
- C. Adiabatic compression of air
- D. Ideal compression of air

Pick out the wrong statement. Generally for physical adsorption, a gas of _____?

- A. Higher molecular weight is adsorbed in preference to a gas of low molecular weight
- B. High critical temperature is adsorbed in preference to a gas of low critical temperature
- C. Low volatility is adsorbed in preference to a gas of high volatility
- D. None of these**

Which of the following controllers has the least maximum deviation ?

- A. P-controller
- B. P-I controller
- C. P-I-D controller

D. P-D controller

Liquid ammonia is shipped in _____ containers?

- A. Steel
- B. Aluminium
- C. Glass**
- D. Lead lined

X-rays are _____?

- A. Positively charged
- B. Negatively charged
- C. Neutral**
- D. Of higher wavelength than visible light

Enthalpy changes over a constant pressure path are always zero for _____ gas?

- A. Any
- B. A perfect**
- C. An easily liquefiable
- D. A real

Silicone is a/an _____?

- A. Monomer
- B. Inorganic polymer**
- C. Thermoplastic material
- D. A natural polymer

Pick out the wrong statement ?

- A. Iso-paraffin crack faster than n-paraffin.
- B. Catalytic cracking is endothermic, but the regeneration of catalyst is exothermic**
- C. Rate of decomposition of olefins in catalytic cracking is slightly slower than the thermal cracking
- D. None of these

Producer gas consists mainly of _____?

- A. CO, CO₂ N₂, H₂
- B. CO, H₂
- C. H₂, CH₄
- D. C₂H₂, CO₂, H₂

The freezing point of a liquid decreases when the pressure is increased, if the liquid _____ while freezing?

- A. Contracts
- B. Expands
- C. Does not change in volume
- D. Either (A), B. or (C)

Which is a basic refractory ?

- A. Fireclay
- B. Silica
- C. Chrome magnesite
- D. None of these

Thermal efficiency of an open hearth furnace may be about _____ percent?

- A. 5
- B. 20
- C. 50
- D. 80

Leaching of phosphate rock by strong _____ acid produces phosphoric acid ?

- A. Sulphuric
- B. Hydrochloric
- C. Either A. or B.
- D. Neither A. nor B.

Thermosetting resins/polymers as compared to thermoplastic ones are _____?

- A. Soluble in all organic solvents
- B. More brittle**
- C. Formed by addition polymerisation only
- D. Easily reshaped & reused

Raoult's law is applicable to the _____?

- A. Ideal solutions**
- B. Real solutions
- C. Mixture of water and alcohol
- D. Non-ideal gases

The term "cooling range" in a cooling tower refers to the difference in the temperature of _____?

- A. Cold water leaving the tower and the wet bulb temperature of the surrounding air
- B. Hot water entering the tower and the wet bulb temperature of the surrounding air
- C. Hot water entering the tower and the cooled water leaving the tower**
- D. None of these

Critical solution temperature (or the con-solute temperature) for partially miscible liquids (e.g., phenol-water) is the minimum temperature at which _____?

- A. A homogeneous solution (say of phenol water) is formed**
- B. Mutual solubility of the two liquids shows a decreasing trend
- C. Two liquids are completely separated into two layers
- D. None of these

Moore filter is a _____ filter ?

- A. Leaf**
- B. Press

- C. Rotary
- D. Sand

_____ is used as jet engine fuel ?

- A. Petrol
- B. Diesel
- C. Kerosene**
- D. LPG

Out of the following, N₂ content is minimum in _____ ?

- A. Urea
- B. Ammonium nitrate
- C. Ammonium sulphate**
- D. Ammonium chloride

Annual depreciation cost are not constant when, the _____ method of depreciation calculation is used ?

- A. Straight line
- B. Sinking fund
- C. Present worth
- D. Declining balance**

Aniline point of high speed diesel may be about _____ °C ?

- A. 35
- B. 70**
- C. 105
- D. 150

Pick out the correct statement ?

- A. Difference between income and expense is termed as gross revenue
- B. Unamortised cost is the difference between the original cost of a property and all the depreciation charges made to date**
- C. Sum-of-the-years-digits methods of depreciation calculation accounts for the interest on

the
investment

D. Scrap value is the net amount of money obtainable from the sale of used property over and above any charges involved in its removal & sale

Caustic soda can be stored in _____ drums?

- A. Steel
- B. Cast iron
- C. Brass
- D. Gun metal

Fluorescent dyes are added in detergents to _____?

- A. Act as fabric brightener (by converting ultraviolet light to visible light) thereby improving the whiteness appearance of white fabrics
- B. Attain distinctiveness from other brands
- C. Act as tarnish inhibitor for metals like German silver
- D. None of these

Synthesis gas is a mixture of _____?

- A. CO and H₂
- B. N₂ and H₂
- C. H₂, CH₄ and CO
- D. CO₂ and H₂

Filter aid is used to _____?

- A. Increase the rate of filtration
- B. Decrease the pressure drop
- C. Increase the porosity of the cake
- D. Act as a support base for the septum

Pick out the wrong statement. In an agitated vertical cylindrical reaction vessel,

the _____ ?

- A. Ratio of liquid depth to tank diameter (i.e. the filling ratio) recommended for most purposes is 1
- B. Filling ratio for dispersing gas in a liquid is 2 for sufficiently long contact period
- C. Flat bottom and conical bottom vessels have low agitation efficiency for agitation of heavy solids in liquids
- D. Dished bottom vessel has very high power consumption**

Ultimate analysis of coal determines its _____ content?

- A. Carbon, hydrogen, nitrogen & sulphur**
- B. Carbon, ash, sulphur & nitrogen
- C. Carbon, sulphur, volatile matter & ash
- D. Carbon, volatile matter, ash & moisture

The calorific value of 'LPG' (50% propane + 50% butane) is about _____ kcal/Nm³?

- A. 5000
- B. 25,000**
- C. 10,000
- D. 15,000

If the interest rate of 10% per period is compounded half yearly, the actual annual return on the principal will be _____ percent ?

- A. 10
- B. 20
- C. > 20**
- D. < 20

The effectiveness factor for large value of Thiele modulus $[LV(K/D_1)]$ of a solid catalysed first order reaction is equal to (where, L = length of the reactor, cm, D_1 = diffusion co-efficient, cm²/second) ?

- A. $L\sqrt{(K/D_1)}$

B. $1/[LV(K/D1)]$

C. 1

D. ∞

During crystallisation, formation of crystal can occur in _____
solution only?

A. Saturated

B. Supersaturated

C. Under-saturated

D. All A., B. and C.

A bypass stream in a chemical process is useful, because
it _____?

A. Facilitates better control of the process

B. Improves the conversion

C. Increases the yield of products

D. None of these

Most commonly used crude heater before the fractionation tower in a refinery
is the _____ heater?

A. Electric immersion

B. Pipestill

C. Steam coil

D. None of these

Which of the following causes death by asphyxiation, if its presence in
atmospheric air exceeds maximum allowable concentration (i.e. > 50 ppm) ?

A. Benzopyrene

B. Peroxyacetyl nitrate

C. Carbon monoxide

D. Sulphur dioxide

In low temperature carbonisation of coal as compared to high temperature carbonisation _____ produced is less?

- A. Difference in gross & net calorific value of the coke oven gas
- B. Free carbon content in tar
- C. Yield percentage of coke
- D. Yield of ammonia present in coke oven gas

The pH value of oxidised sewage is about _____?

- A. 1.8
- B. 6.2
- C. 7.3
- D. 13.4

Which of the following will be unsuitable for dust cleaning from flue gas at 400°C from a pulverised coal fired boiler ?

- A. Multicyclones
- B. Bag filter
- C. Wet scrubber
- D. Hydrocyclones

Vernier calipers cannot be used to measure the _____?

- A. I.D. & O.D. of the shaft
- B. Thickness of parts
- C. Depth of holes
- D. Clearance between two mating surfaces

Boiler draught of 10 mm water column is equivalent to _____?

- A. 1 kgf/m²
- B. 10 kgf/m²
- C. 10 kgf/mm²
- D. 1 kgf/mm²

Which of the following is not increased by using preheated combustion air in place of ordinary air at room temperature ?

- A. Calorific value of the fuel
- B. Flame temperature achieved
- C. Speed of combustion of fuel
- D. Heat transfer rate to the stock in the furnace

Pick out the wrong statement. Iodine value of an oil or fat is _____?

- A. The number of grams of iodine taken up by 100 gm of oil or fat
- B. A measure of its unsaturation
- C. Helpful in findings its adulteration & its suitability for making soap
- D. Independent of the type of oil, whether it is drying or non-drying

Which of the following pairs of elements may form an alloy ?

- A. Iron & carbon
- B. Iron & mercury
- C. Platinum & mercury
- D. None of these

A space velocity of 5 hr⁻¹ means that _____?

- A. Five reactor volumes of feed (at specified conditions) are being fed into the reactor per hour
- B. After every 5 hours, reactor is being filled with the feed
- C. Cent per cent conversion can be achieved in at least 5 hours
- D. A fixed conversion of a given batch of feed takes 5 hours

The dew point of a saturated gas phase equals the _____ temperature?

- A. Gas
- B. Room
- C. Wet bulb
- D. None of these

The equation, $N_{st} = (f/2)/[1 + 5 (N_{pr} - 1) \sqrt{f/2}]$, corresponds to _____ analogy?

- A. Von-Karman
- B. Reynolds
- C. Colburn
- D. Prandtl**

Which of the following has the maximum compression ratio ?

- A. Blower
- B. Compressor
- C. Vacuum pump**
- D. Fan

_____ is the hardest material out of the following ?

- A. Boron carbide**
- B. Tungsten carbide
- C. Hardened steel
- D. Silicon carbide

'Fuel' can be defined as a substance which produces heat by _____ ?

- A. Combustion
- B. Nuclear fission
- C. Nuclear fusion
- D. All A., B. & C.**

High porosity refractory bricks have _____ ?

- A. Poor resistance to the penetration of molten slag, metal & flue gases
- B. Poor heat conductivity & low strength
- C. Better thermal spalling resistance
- D. All A., B. and C.**

Unsteady non-uniform flow is represented by flow through

a/an _____?

- A. Long pipe at constant rate
- B. Long pipe at decreasing rate
- C. Expanding tube at increasing rate**
- D. Expanding tube at constant rate

Thermal conductivity of a gas at low density, _____ with increase in temperature ?

- A. Decreases
- B. Increases**
- C. Remains unchanged
- D. May increase or decrease; depends on the gas

Porosity of silica bricks varies from _____ percent?

- A. 5 to 10
- B. 20 to 30**
- C. 45 to 60
- D. 60 to 75

The upper layer of atmosphere is called the _____?

- A. Stratosphere**
- B. Troposphere
- C. Ionosphere
- D. None of these

In case of liquids, the binary diffusivity is proportional to (where, T = temperature) _____?

- A. T**
- B. \sqrt{T}
- C. T^2
- D. $1/T$

A particle is settling in a liquid under Stokesian conditions. The free falling

velocity of the particle is proportional to _____?

- A. $\sqrt{\text{Particle diameter}}$
- B. Particle diameter**
- C. $(\text{Particle diameter})^2$
- D. $(\text{Particle diameter})^3$

Joule-Thomson effect i.e., a throttling process is a constant _____ process?

- A. Entropy
- B. Temperature
- C. Internal energy
- D. Enthalpy**

Rotary driers are most economically designed for the number of heat transfer units (HTU) from _____?

- A. 0.01 to 1
- B. 1.5 to 2.5**
- C. 5 to 10
- D. 10 to 20

The 'E' curve for a non-ideal reactor defines the fraction of fluid having age between t and $t + dt$ _____?

- A. At the inlet
- B. At the outlet**
- C. In the reactor
- D. Averaged over the inlet and outlet

Electrochemical corrosion can occur, only if _____ is present in contact with metal?

- A. Air
- B. Oxygen
- C. Liquid medium**

D. Gaseous medium

The continuity equation _____?

A. Relates mass flow rate along a stream tube

B. Relates work and energy

C. Stipulates that Newton's second law of motion must be satisfied at every point in the fluid

D. None of these

Octane numbers of motor gasoline used in India and America are respectively _____?

A. 87 & 94

B. 94 & 87

C. 94 & 100

D. 83 & 100

A/an _____ system is exemplified by a vessel containing a volatile liquid in contact with its vapor?

A. Isolated

B. Closed

C. Open

D. None of these

Which of the following is not a charge material for cupola ?

A. Limestone

B. Iron scrap

C. Iron ore

D. Pig iron

Metallic recuperators are not used for waste heat recovery, if the hot flue gas temperature is above _____ °C, because corrosion prevails at higher temperatures?

- A. 350
- B. 750**
- C. 1050
- D. 1250

The monomer for the production of neoprene rubber is _____?

- A. Acetylene
- B. Chloroprene**
- C. Isoprene
- D. None of these

Which of the following fixes the volume of a batch reactor for a particular conversion and production rate ?

- A. Operating conditions (e.g. pressure and temperature)
- B. Rate constant
- C. Density of mixture**
- D. None of these

With increase in temperature, the equilibrium _____ rises in case of endothermic reaction?

- A. Constant
- B. Conversion**
- C. Both A. & B.
- D. Neither A. nor B.

C.V. (kcal/Nm³) of gaseous fuels _____ with increase in molecular weight?

- A. Decreases
- B. Increases
- C. Remain constant
- D. May increase or decrease, depends on combustibles**

Bog iron used for the adsorption of H₂S from coke oven gas

is _____ ?

- A. **An intimate mixture of saw dust and iron dust (i.e. moist ferric hydroxide)**
- B. Iron impregnated with resin (usually Bakelite)
- C. Carbon free iron
- D. None of these

In case of end to end connection of two or more pipes in series, the _____ each pipe?

- A. **Same rate of flow passes through**
- B. Head loss is same through
- C. Rate of flow in each pipe is proportional to the length of
- D. Total flow rate is the sum of flow rate in

Boundary layer separation is caused by the _____ ?

- A. Reduction of pressure below vapour pressure
- B. Reduction of pressure gradient to zero
- C. **Adverse pressure gradient**
- D. Reduction of boundary layer thickness to zero

With increase in calorific value of fuels, their adiabatic flame temperatures _____ ?

- A. Increase
- B. Decrease
- C. Remain unchanged
- D. **May increase or decrease; depends on the quantity of products of combustion**

In the Solvay process, the product from the calciner is _____ ?

- A. **Light soda ash**
- B. Dense soda ash
- C. Sodium bicarbonate
- D. Dehydrated soda ash

The weight fraction of methanol in an aqueous solution is 0.64. The mole

fraction of methanol XM satisfies _____?

- A. $XM < 0.5$
- B. $XM = 0.5$
- C. $0.5 < XM < 0.64$
- D. $XM \geq 0.64$**

Solutions which distil without change in composition are called _____?

- A. Ideal
- B. Saturated
- C. Supersaturated
- D. Azeotropic**

Karbate is _____?

- A. A mixture of iron dust and saw dust
- B. Carbon impregnated with resin (usually Bakelite)
- C. An acid resistant material
- D. Both B. and C.**

Stainless steel contains _____?

- A. Chromium and nickel**
- B. Copper
- C. Aluminium
- D. Vanadium

Glass reacts with _____?

- A. H_2SO_3
- B. HF**
- C. HNO_3
- D. $K_2Cr_2O_7$

Lurgi gasifier (high pressure gasifier) as compared to Kopper Totzek gasifier (atmospheric pressure gasifier) produces _____?

- A. Higher amount of methane
- B. Lower amount of hydrogen
- C. Both A. and B.**
- D. Higher amount of both methane and hydrogen

Optimum number of effects in a multiple effect evaporator is decided by the _____?

- A. Cost benefit analysis**
- B. Floor area availability
- C. Terminal parameters
- D. Evaporation capacity required

Which one is neutral in character ?

- A. N₂O₄
- B. N₂O**
- C. N₂O₅
- D. N₂O₃

Separation of solid particles based on their densities is called _____?

- A. Sizing
- B. Sorting**
- C. Clarification
- D. Dispersion

Leidenfrost point is a term concerned with the _____?

- A. Condensation of the saturated vapor on a cold surface
- B. Concentration of a corrosive solution by evaporation
- C. Heat transfer between two highly viscous liquids
- D. Boiling of a liquid on a hot surface**

The capacity of a belt conveyor depends upon two factors. If one is the cross-section of the load, the other is the _____ of the belt?

- A. Speed
- B. Thickness
- C. Length
- D. None of these

Trough of an apron conveyor is made of _____?

- A. Lead lined concrete vessel
- B. Wood
- C. Metal
- D. Either B. or C.**

In case of simple harmonic motion, displacement is proportional to the _____?

- A. Velocity
- B. Acceleration**
- C. Both A. & B.
- D. Neither A. nor B.

Crystallisation of polymers is an undesirable property. Crystallisation of celluloid is prevented by adding _____?

- A. Glycerol
- B. Nitro cellulose
- C. Camphor**
- D. None of these

Which of the following metals is the most prone to work hardening ?

- A. Brass**
- B. Aluminium
- C. Copper
- D. Lead

Which is the stable form of silica between 1470°C and the melting point 1713°C ?

- A. Cristobalite
- B. Tridymite
- C. Quartz
- D. None of these

Laser is a device to produce _____ ?

- A. Gamma rays
- B. Microwaves
- C. A beam of white light
- D. **A beam of coherent light**

In an ideal solution, the activity of a component equals its _____ ?

- A. **Mole fraction**
- B. Fugacity at the same temperature and pressure
- C. Partial pressure
- D. None of these

Capacity of a hydraulic accumulator is defined in terms of maximum _____ ?

- A. **Amount of energy stored**
- B. Flow rate through accumulator
- C. Rate of falling of ram
- D. Volume available in the cylinder

Which of the following is generally not used as cord for synthetic rubber tyre casing ?

- A. Dacron
- B. Nylon
- C. **Cellulose**
- D. None of these

For the time domain function $f(t) = t$, the Laplace transform of $\int_0^t f(t) dt$ is given

by _____?

- A. 1/2 S3
- B. 2/S3
- C. 1/S3**
- D. 2/S2

The main type of sludge gas evolved during sewage treatment in Imhoff tank is _____?

- A. CO₂
- B. CH₄**
- C. CO
- D. H₂

The common pollutant generated in chlor-alkali industry and battery manufacture is _____?

- A. Mercury**
- B. Brine
- C. Phosphate
- D. None of these

Maximum plate efficiency is achieved in case of _____ flow?

- A. Split
- B. Cross**
- C. Cascade
- D. Reverse

Stacked packing compared to dumped packing _____?

- A. Provides poorer contact between the fluids
- B. Gives lower pressure drop
- C. Both A. and B.**
- D. Gives higher pressure drop

A hardness depth of about 3 mm can be achieved by induction hardness in

_____ seconds?

- A. 5
- B. 100
- C. 250
- D. 500

Pick out the wrong statement pertaining to leaching ?

- A. Fine solids cannot be leached in a Pachuca tank**
- B. Door classifier can be used for leaching of coarse solids
- C. Vegetable seeds can be leached in either of Bollman extractor, Rotocel or Kennedy extractor
- D. Very high temperature is not needed for the leaching of sugar beet

Visco-elastic behaviour of materials which is time dependent is common in _____?

- A. Plastics
- B. Crystalline solid
- C. Non-crystalline solids
- D. Non-crystalline organic polymer**

The forces causing the vaporisation of liquid are derived from the Kinetic energy of translation of its molecules. The heat of vaporisation _____?

- A. Increases with pressure rise
- B. Decreases with increasing pressure
- C. Becomes zero at the critical point
- D. Both B. & C.**

Neoprene is the trade name of _____?

- A. Polyurethane
- B. Phenol formaldehyde
- C. Polychlorophrene**
- D. Styrene butadiene rubber (SBR)

What is the steam economy in case of a single effect evaporator system ?

- A. 1
- B. > 1
- C. < 1**
- D. 0.1

All gases during throttling process at atmospheric temperature and pressure show a cooling effect except _____?

- A. CO₂
- B. H₂**
- C. O₂
- D. N₂

Which of the following decreases with increase in pressure ?

- A. Melting point of ice**
- B. Melting point of wax
- C. Boiling point of liquids
- D. None of these

Sorting classifiers employing differential settling methods for separation of particles make use of the differences in their _____?

- A. Particle sizes
- B. Densities
- C. Terminal velocities**
- D. None of these

The catalytic converter for conversion of SO₂ to SO₃ by contact process should have a feed with SO₂ content between _____?

- A. 2-5 %
- B. 7-10 %**
- C. 12-15 %
- D. 20-25 %

Equation which relates pressure, volume and temperature of a gas is called the _____?

- A. Equation of state
- B. Gibbs Duhem equation
- C. Ideal gas equation
- D. None of these

Heat is added at constant pressure in an ideal _____ cycle?

- A. Stirling
- B. Brayton
- C. Rankine
- D. Both B. and C

Perspex can be used as a substitute of glass. Its monomer is _____?

- A. Methyl methacrylate
- B. DMT
- C. Butadiene
- D. Tetrafluoroethylene

Which of the following metals is not subjected to electrolytic refining/purification ?

- A. Copper
- B. Zinc
- C. Tin
- D. Aluminium

The kinetic energy correction factor for velocity distribution of laminar flow is _____?

- A. 0.5
- B. 1.66
- C. 1

D. 2

Coke made in narrower by-product coke ovens (as compared to wider ovens) is _____?

- A. Less reactive
- B. Stronger
- C. Smaller in size
- D. All A., B. & C.**

The life of a ball bearing is inversely proportional to _____?

- A. (Load)¹
- B. (Load)²
- C. (Load)³**
- D. (Load)^{0.33}

Which one is true for a throttling process ?

- A. A gas may have more than one inversion temperatures
- B. The inversion temperature is different for different gases**
- C. The inversion temperature is same for all gases
- D. The inversion temperature is the temperature at which Joule-Thomson co-efficient is infinity

Metallic soap is _____ salt of fatty acids ?

- A. Sodium
- B. Potassium
- C. Both sodium & potassium
- D. Aluminium or calcium**

A solid is being dried in the linear drying rate regime from moisture content X_0 to X_F . The drying rate is zero at $X = 0$ and the critical moisture content is the same as the initial moisture X_0 . The drying time for $M = (L_s/AR_c)$ is (where, $L =$ total mass of dry solid, $A =$ total surface area for drying $R_c =$ Constant maximum

drying rate per unit area $X =$ moisture content (in mass of water/mass of dry solids) ?

- A. $M(X_o - XF)$
- B. $M(X_o/XF)$
- C. $M \ln(X_o/XF)$
- D. $MX_o \ln(X_o/XF)$**

Which of the following is not a unit of the equilibrium constant K_p ? (where, $\Delta x =$ number of moles of products number of moles of reactants) ?

- A. $(\text{atm})^{\Delta x}$, when Δx is negative
- B. $(\text{atm})^{\Delta x}$, when Δx is positive
- C. Dimensionless, when $\Delta x = 0$
- D. $(\text{atm})^{\Delta x^2}$, when $\Delta x > 0$**

A carbonaceous fuel (containing no H_2 or hydrocarbons) is burnt and the resulting flue gas contains 21% CO_2 . It means that _____ ?

- A. 21% excess air has been used for combustion
- B. 21% excess oxygen has been used for combustion
- C. Complete combustion of fuel has taken place**
- D. No excess air has been used for combustion

Concentration of the limiting reactant (with initial concentration of a moles/litre) after time t is $(a-x)$. Then 't' for a first order reaction is given by _____ ?

- A. $k \cdot t = \ln a/(a - x)$**
- B. $k \cdot t = x/a (a - x)$
- C. $k \cdot t = \ln (a - x)/a$
- D. $k \cdot t = \ln a (a - x)/x$

_____ is obtained as a by-product in the manufacture of sodium hydroxide using brine ?

- A. Chlorine**

- B. Ammonium chloride
- C. Sodium carbonate
- D. Sodium bi-carbonate

Double pipe heat exchangers are preferably useful, when _____?

- A. High viscosity liquid is to be cooled
- B. Requirement of heat transfer area is low**
- C. Overall heat transfer co-efficient is very high
- D. A corrosive liquid is to be heated

In a semi-batch reactor _____?

- A. Velocity of reaction can be controlled**
- B. Maximum conversion can be controlled
- C. Both the reactants flow counter-currently
- D. Residence time is constant

With the lowering of equilibrium pressure, at a given temperature, the amount of adsorbate on the adsorbent ?

- A. Increases
- B. Decreases**
- C. Remain same
- D. Either A. or B., depends on the system

For identical operating conditions, the pressure drop over _____ tray is the highest out of the following?

- A. Sieve
- B. Valve
- C. Counter flow
- D. Bubble cap**

Moisture can be removed from lubricating oil using _____?

- A. Tubular centrifuge**

- B. Clarifier
- C. Sparkler filter
- D. Vacuum leaf filter

Newton's law of viscosity relates the _____?

- A. Shear stress and velocity
- B. Velocity gradient and pressure intensity
- C. Shear stress and rate of angular deformation in a fluid**
- D. Pressure gradient and rate of angular deformation

Cascade control is _____?

- A. The continuous adjustment of the set point index of an automatic control loop by a primary(master) controller
- B. Used when changes in process conditions cause serious upsets in the controlled variable
- C. Useful to control flow from temperature
- D. All A, B & C**

Heavy water has maximum density at _____ °C ?

- A. 4
- B. 11.6**
- C. 0
- D. 18.6

For the same terminal conditions and valve size, the pressure drop in a fully opened globe valve as compared to that in a gate valve is _____?

- A. More**
- B. Less
- C. Equal
- D. Either A. or B.; depends on the viscosity of the fluid

Concentration of NaOH solution produced by diaphragm electrolytic cell is about _____ percent?

- A. 10
- B. 25
- C. 50
- D. 98

The terminal velocity of a small sphere settling in a viscous fluid varies as the _____?

- A. First power of its diameter
- B. Inverse of the fluid viscosity**
- C. Inverse square of the diameter
- D. Square of the difference in specific weights of solid & fluid

Pick out the wrong statement ?

- A. With decrease in feed temperature, the number of plates required for binary distillation decreases for a given 'L/V' ratio
- B. The extraction per unit of total height for a short packed column is more effective than for a tall column, in case of liquid-liquid extraction
- C. Natural draft cooling towers are made of ferroconcrete and its cross-section is wider at the bottom
- D. Vander wall adsorption is also called chemisorption**

Heat flux, as defined in heat flow is analogous to _____ in electricity flow?

- A. Current**
- B. Voltage
- C. Resistance
- D. None of these

Smoke density of the flue gas going out of the chimney is measured by a _____?

- A. Polarograph

- B. Thermal conductivity meter
- C. Photo electric cell**
- D. Chromatograph

In an ideal P.F.R. at steady state conditions _____?

- A. The composition of reactants remains constant along a flow path
- B. The conversion of the reactant varies from point to point along a flow path**
- C. There is no lateral mixing of fluid
- D. There may be diffusion along the flow path

Which of the following filled system expansion thermometer has the capability to measure the lowest temperature ?

- A. Mercury in glass thermometer
- B. Mercury in steel thermometer
- C. Alcohol in glass thermometer**
- D. Fused metal (Na or K) in steel thermometer

The ratio of thermal & electrical conductivity is same for all the metals at the same temperature; and at around room temperature, this ratio is proportional to (where, T = absolute temperature, $^{\circ}\text{K}$) ?

- A. T**
- B. $1/T$
- C. T^2
- D. $1/T^2$

Value of Prandtl number for water ranges from _____?

- A. 1 to 2
- B. 5 to 10**
- C. 100 to 500
- D. 1000 to 2000

Uranium is recovered from its ore (pitchblende) by _____?

- A. Froth floatation technique

B. Leaching with sulphuric acid

- C. Smelting in a furnace
- D. Dissolving in water

Most chemical plants use an initial working capital amounting to 10-20% of the total capital investment. But this percentage may increase to _____ percent in case of seasonal products manufacturing plant?

- A. 30
- B. 50**
- C. 75
- D. 95

Iron & manganese present as pollutant in water cannot be removed by _____?

- A. Ion exchange process
- B. Oxidation followed by settling & filtration
- C. Lime soda process or manganese zeolite process
- D. Chlorination**

In a stabilised soap bubble, pressure inside it compared to external pressure is _____?

- A. More**
- B. Less
- C. Same
- D. Unpredictable

Isothermal turbulent flow of a fluid results in decrease of its pressure, which depends on the _____?

- A. Wall roughness
- B. Reynolds number
- C. Both A. & B.**
- D. Neither A. nor B.

Specific volume of an ideal gas is _____ ?

- A. Equal to its density
- B. The reciprocal of its density**
- C. Proportional to pressure
- D. None of these

Pick out the wrong statement ?

- A. Alkylation produces a larger iso-paraffin (having higher octane number) from the reaction of an olefin with smaller iso-paraffin
- B. Catalytic alkylation processes use HF, $AlCl_3$ & H_2SO_4 as Catalysts
- C. All the alkylation processes use very high temperature ($> 1000^\circ C$)**
- D. Gasoline having an octane number of 90 can be produced by alkylation process

Invar used in thermocouples is an alloy of nickel and _____ ?

- A. Iron**
- B. Copper
- C. Chromium
- D. Lead

Pick out the correct statement ?

- A. A fat is converted into oil by its hydrogenation
- B. There is no difference between a fat and an oil so far as its physical properties are concerned
- C. All vegetable oils except coconut oil, contains fatty acids having more than sixteen carbon atoms**
- D. Vegetable oils are classified as drying, non-drying and semi drying oils depending upon their fatty acids content

Enzymes are _____ ?

- A. Proteins with high molecular weight (around 10,000)

- B. Derived from living organisms
- C. Catalyst for temperature sensitive reactions
- D. All A, B. and C.**

'Amortization' in respect of financial obligation of a company means the _____?

- A. Liquidation of financial obligations on instalment basis**
- B. Commitment of financial obligation on priority
- C. Liquidation of all the obsolete equipments of the company
- D. Modernisation of the plant equipments

The velocity distribution in direction normal to the direction of flow in plane Poiseuille flow is _____?

- A. Hyperbolic
- B. Parabolic**
- C. Linear
- D. None of these

The most common packing used in industrial operations is _____ rings?

- A. Raschig**
- B. Lessing
- C. Cross-partition
- D. Single spiral

Maximum size of the raschig rings used in a packed tower is about _____ of the column diameter?

- A. 1/10th
- B. 1/20th
- C. 1/30th**
- D. 1/50th

In a shell and tube heat exchanger, the overall heat transfer co-efficient is proportional to the tube side (volumetric flow rate)^{0.8}. This is valid, only when the ratio of the tube side film resistance to the total resistance is almost equal to _____?

- A. ∞
- B. 1**
- C. 20.8
- D. 2

The diameter of a propeller agitator used in agitation tank ranges from _____ percent of the tank diameter and its peripheral speed is normally 300 to 500 metres/minute ?

- A. 5 to 10
- B. 15 to 30**
- C. 40 to 50
- D. 55 to 75

In forced convection, the heat transfer depends on _____?

- A. Re, Pr**
- B. Re, Gr
- C. Mainly Gr
- D. Re only

A pulse tracer is introduced in an ideal CSTR (with a mean residence time I) at time, $t = 0$. The time taken for the exit concentration of the tracer to reach half of its initial value will be _____?

- A. 2η**
- B. 0.5η
- C. $\eta/0.693$
- D. 0.693η

No work is done by the system, when a reaction occurs at

constant _____?

- A. Volume
- B. Temperature
- C. Pressure
- D. None of these

Flash point of motor gasoline may be around _____ °C?

- A. 10
- B. 45**
- C. 100
- D. 150

In an irreversible process _____?

- A. $Tds = dE - dW = 0$
- B. $dE - dW - Tds = 0$
- C. $Tds - dE + dW < 0$**
- D. $Tds - dT + dW < 0$

Entropy change for an irreversible process taking system and surrounding together is _____?

- A. 0
- B. > 0**
- C. < 0
- D. None of these

Rayon is a _____ fibre?

- A. Cellulosic**
- B. Polyamide
- C. Polyester
- D. Natural

At low Reynold's number, the power (P) required for agitating a fluid in a stirred tank becomes independent of inertial forces. In this limit, indicate which of the

following relations is satisfied: $Po = \rho/\rho N^3 D^5$: Power number $Re = \rho N D^2/\mu$: Reynold's number N is the impeller rotational speed, and D is the impeller diameter ?

- A. $Po \propto Re^{-1.0}$
- B. $Po \propto Re^{0.0}$**
- C. $Po \propto Re^{0.5}$
- D. $Po \propto Re^{1.0}$

In high temperature carbonisation (as compared to low temperature carbonisation) of coal, the _____?

- A. Gas yield is less
- B. Tar yield is more
- C. Ignition temperature of coke produced is less
- D. Aromatic content of tar produced is more**

The passage between the nozzle and the _____ is called 'sprue' in case of injection moulding?

- A. Runner**
- B. Cylinder
- C. Mold
- D. None of these

In coal washeries, three products namely the valuable product (i.e. clean/washed coal), discarded product (i.e. mineral matter) and an additional concentrated product called _____ is produced?

- A. Concentrate
- B. Tailing
- C. Middling**
- D. None of these

Thermoplastic materials _____?

- A. Do not soften on application of heat

- B. Are heavily branched molecules
- C. Are solvent insoluble
- D. None of these**

Addition of small amount of _____ to grey cast iron is done to produce nodular grey cast iron ?

- A. Manganese
- B. Phosphorous
- C. Magnesium**
- D. Chromium

Separation of isotopes is generally done using a/an _____ centrifuge?

- A. Ultra**
- B. Disk-bowl
- C. Both A. & B.
- D. Neither A. nor B.

Ammonia gas can be dried by _____ ?

- A. PCl_5
- B. Quick lime**
- C. CaCl_2
- D. Concentrated H_2SO_4

The temperature at which both liquid and gas phases are identical, is called the _____ point?

- A. Critical**
- B. Triple
- C. Freezing
- D. Boiling

In a reversible process _____ ?

- A. $Tds = dE + dW$**

- B. $dE - dW = Tds$
- C. $dW - dE = Tds$
- D. $Tds - dW + dE > 0$

Second order consecutive irreversible reaction as shown in the bellow figure, were carried out in a constant volume isothermal batch reactor with different initial feed compositions. Reactor temperature was same in all the cases. In experiments where the ratio of concentration of B to that of A in the initial feed was less than 0.5, the concentration of B increased first, reached a maximum and then declined with time. However, for all experiments where this concentration ratio was 0.5 or above, concentration of B decreased monotonically with time right from the beginning. What is the ratio of the two rate constants (k_1/k_2) ?

- A. 1/4**
- B. 1/2
- C. 2
- D. 4

When all the limiting reactant is consumed in the reaction, the operational yield _____ the relative yield?

- A. Is greater than
- B. Is smaller than
- C. Equals**
- D. Can be either greater or smaller than (depends on the type of reaction)

In washing type plate and frame filter press, the ratio of washing rate to the final filtrate rate is _____ ?

- A. 4
- B. 1/4**
- C. 1
- D. 1/2

At low Reynolds number _____?

- A. Viscous forces are unimportant
- B. Viscous forces control
- C. Viscous forces control and inertial forces are unimportant**
- D. Gravity forces control

In practical operation of any furnace, zero oxygen percentage or theoretical CO₂ percentage in flue gas is rarely achieved, because of _____?

- A. Use of non-preheated combustion air
- B. Use of pulverised solid fuels
- C. Imperfect mixing of fuel & air and infiltration of air**
- D. Use of excessive positive draft in the furnace

Low grade coal is _____ to produce ammonia synthesis gas?

- A. Hydrogenated
- B. Liquefied
- C. Gasified**
- D. Dehydrogenated

Nitrogen present in the flue gas is determined in the Orsat apparatus by absorbing it in _____?

- A. KOH
- B. Ammoniacal cuprous chloride
- C. Pyrogallol solution
- D. None of these**

Which of the following bricks has the most close values of RUL and PCE ?

- A. Silica bricks**
- B. Fireclay bricks
- C. High alumina bricks
- D. Tar dolomite bricks

There is a change in _____ during the phase transition?

A. Volume

- B. Pressure
- C. Temperature
- D. All a, b & c

Internal energy is independent of the _____ for an ideal gas?

- A. Pressure
- B. Volume
- C. Both A. & B.**
- D. Neither A. nor B.

The depreciation during the year 'n', in diminishing balance method of depreciation calculation, is calculated by multiplying a fixed percentage 'N' to the ?

- A. Initial cost
- B. Book value at the end of (n – 1)th year**
- C. Depreciation during the (n – 1)th year
- D. Difference between initial cost and salvage value

Aniline point test of an oil qualitatively indicates the _____ content of an oil?

- A. Paraffin
- B. Olefin
- C. Aromatic**
- D. Naphthene

Vibrating screens are used for handling large tonnages of materials. The vibrating motion is imparted to the screening surface by means of _____?

- A. Electromagnets
- B. Cams or eccentric shafts
- C. Unbalanced flywheels

D. Either A., B. or C.

At higher temperatures, molal heat capacities for most of the gases (at constant pressure) _____ with increase in temperature?

A. Varies linearly

B. Increases

C. Decreases

D. Does not vary

Stainless steel is welded using _____?

A. Oxy-acetylene flame

B. Oxy-hydrogen flame

C. Arc welding

D. Inert gas arc welding

Fireclay bricks is not used for lining the _____?

A. Cupola

B. Gas producer

C. Bottom of hot metal mixer

D. Roof of open hearth furnace

According to maximum shear stress failure criterion, yielding in material occurs, when the maximum shear stress is equal to _____ times the yield stress ?

A. 0.5

B. 2

C. $\sqrt{2}$

D. $\sqrt{3}/2$

To reduce the stack loss, heat recovery from flue gas can be done by _____?

A. Preheating of cold stock

- B. Preheating of combustion air
- C. Steam generation in waste heat boilers
- D. All A., B. and C.**

The ratio of equilibrium constants (K_{p2}/K_{p1}) at two different temperatures is given by _____?

- A. $(R/\Delta H) (1/T_1 - 1/T_2)$
- B. $(\Delta H/R) (1/T_1 - 1/T_2)$**
- C. $(\Delta H/R) (1/T_2 - 1/T_1)$
- D. $(1/R) (1/T_1 - 1/T_2)$

Silicon percentage in the silicon steel used for electrical appliances/equipments is _____?

- A. 0.3-0.4
- B. 12-14
- C. 3-4**
- D. 20-25

Boundary layer thickness in turbulent flow over a flat plate increases as (where, d = distance from the leading edge.) ?

- A. \sqrt{d}
- B. $d^{2/3}$
- C. $d^{4/5}$**
- D. $d^{1/3}$

_____ catalyst is used in the production of urea from CO_2 and NH_3 ?

- A. Vanadium pentoxide
- B. No**
- C. Alumina
- D. Nickel

_____ Equation predicts the activity co-efficient from experimental

data ?

- A. Lewis-Randall
- B. Margules
- C. Van Laar
- D. Both B. & C.**

In packed absorption tower, onset of flooding usually occurs at a pressure drop of about _____ mm of water column per metre height of packing?

- A. 25-50
- B. 50-75**
- C. 200-250
- D. 750-1000

The product obtained on mixing calcium oxide with water is called _____?

- A. Quicklime
- B. Slaked lime**
- C. Milk of lime
- D. None of these

If the overall efficiency and Murphree plate efficiency are equal, then both the equilibrium and operating lines are _____?

- A. Straight
- B. Parallel
- C. Both A. & B.**
- D. Neither A. nor B.

Alcohols are not suitable as diesel engine fuel because the cetane number of alcohols is _____?

- A. Very low which prevents their ignition by compression**
- B. Very high which prevents their ignition by compression
- C. Zero

D. None of these

Thorium-232 (a fertile material) on absorption of a neutron gets converted into _____, which is a fissile material?

A. Thorium-233

B. Uranium-235

C. Uranium-233

D. Plutonium-239

Transformer cores are normally made from _____?

A. Soft ferrites

B. High purity iron

C. Grain oriented Fe-Si alloy

D. Al-Ni-Co alloy

Assam (India) coals suffers mainly from the disadvantage of high _____ content?

A. Ash

B. Volatile matter

C. Sulphur (4-6%)

D. Moisture

Higher specific speed (200-500) of a centrifugal pump indicates that the pump is of _____ flow type?

A. Axial

B. Radial

C. Mixed

D. None of these

Pick out the wrong statement ?

A. Economy of a multiple effect evaporator is not influenced by the boiling point elevation

B. Two identical cubes of iron and copper will have the same heat content under the same

conditions of temperature

- C. Double pipe heat exchangers are mostly used in the field of refrigeration
- D. Finned tube heat exchangers are suitable for heating air by steam

Hydro-cyclone is a _____?

- A. Crusher
- B. wet classifier**
- C. Dry classifier
- D. Magnetic separator

Mode of heat transfer involved in the cooling of air cooled internal combustion engine is _____?

- A. Conduction
- B. Natural convection**
- C. Forced convection
- D. None of these

BET apparatus _____?

- A. Measures the catalyst surface area directly
- B. Operates at very high pressure
- C. Is made entirely of stainless steel
- D. None of these**

The root locus plot of the roots of the characteristics equation of a closed loop system having the open loop transfer function $K(s + 1)/[2(2s + 1)(3s + 1)]$ will have a definite number of loci for variation of K from 0 to ∞ . The number of loci is _____?

- A. 1
- B. 2
- C. 3**
- D. 4

The first order series reaction as shown in the bellow figure is conducted in a batch reactor. The initial concentrations of A, B and C (C_{A0} , C_{B0} , C_{C0} respectively) are all non-zero. The variation of CB with reaction time will not show a maximum, if _____?

- A. $k_2 C_{B0} > k_1 C_{A0}$
- B. $k C_{A0} > k_2.C_{B0}$
- C. $C_{B0} > C_{A0}$
- D. $C_{A0} > C_{B0}$

The capacity of a gyratory crusher is _____ that of a jaw crusher with the same gape, handling the same feed & for the same product size range.?

- A. Same as
- B. **2.5 times**
- C. 5 times
- D. 10 times

Water content in the crude oil as it comes out of oil well may be upto _____ percent?

- A. 2
- B. 5
- C. 10
- D. **25**

In forced convection, the Nusselt number is a function of _____?

- A. **Re and Pr**
- B. Re and Gr
- C. Pr and Gr
- D. Re and Sc

The value of C_p & C_v respectively for monatomic gases in Kcal/kg Mole. $^{\circ}$ K are _____?

A. 5 & 3

B. 3.987 & 1.987

C. 1.987 & 0.66

D. 0.66 & 1.987

What are the methods of treatment & disposal of radioactive wastes ?

A. Evaporation & chemical precipitation

B. Biological methods & adsorption in ion exchange materials

C. Fixing into a solid mass with cement and sinking deep in the sea

D. All A., B. & C.

Pick out the correct statement ?

A. Plastic chips are called non-cohesive solids

B. Kick's crushing law is, $P/m = K \cdot \ln(\bar{D}_{sa}/\bar{D}_{sb})$

C. Comminution is a generic term for size enlargement operation

D. Energy required in kwh per ton of product, such that 80% of it passes through a 200 mesh

screen, is called 'Work index'

The continuity equation of fluid mechanics utilises the principle of conservation of _____?

A. Momentum

B. Mass

C. Energy

D. Both B. & C.

For ethanol-water system, the lowering of distillate quality from 95% to 92% will cause _____ plate requirement?

A. No change in theoretical

B. Marginal decrease in the number of

C. Major decrease in the number of

D. None of these

In a moderately sized packed absorption tower, channelling (which is most severe with stacked packings) can be minimised by taking the ratio of tower diameter to packing diameter ?

- A. > 4 :1
- B. < 8 : 1
- C. > 8:1**
- D. < 6:1

Critical Speed (N_c) of a ball mill is given by (where R_1 and R_2 are radii of ball mill and the ball respectively) ?

- A. $N_c = (1/4\pi) \cdot \sqrt{g/R_1 - R_2}$
- B. $N_c = (1/2\pi) \cdot \sqrt{g/R_1 - R_2}$**
- C. $N_c = (1/\pi) \cdot \sqrt{g/R_1 - R_2}$
- D. $N_c = (1/2\pi) \cdot \sqrt{R_1 - R_2/g}$

Hydraulic _____ works on the principle of Pascal's law of transmission of fluid pressure?

- A. Press**
- B. Turbine
- C. Pump
- D. Coupling

Disc compensators are provided in large diameter fuel gas carrying pipelines to _____?

- A. Keep the pipe in proper orientation
- B. Make the pipe joint leak-proof
- C. Account for contraction/expansion of pipe due to temperature changes of the surroundings**
- D. Account for the pressure variation side the pipeline

The equation $Tds = dE - PdV$ applies to _____?

- A. Single phase fluid of varying composition

- B. Single phase fluid of constant composition
- C. Open as well as closed systems
- D. Both B. and C**

Turndown ratio of a burner gives an idea of the _____ in the furnace?

- A. Range of fuel firing rates**
- B. Volume of the combustion chamber
- C. Maximum heat input rate only
- D. Minimum heat input rate only

_____ conveyor is the most suitable for long distance transportation of cold, nonabrasive granular/irregular shape/fine materials?

- A. Bucket
- B. Belt**
- C. Screw
- D. Apron

Autocatalytic reactions are best carried out in a _____?

- A. CSTR
- B. CSTR in series
- C. Plug flow reactor
- D. Recycle reactor**

Design of the casing of centrifugal pump should be such as to minimise the _____?

- A. Back flow through impeller
- B. Loss of kinetic head**
- C. Loss of static head
- D. None of these

Hardgrove Grindability index of four coal samples are given below. Which of

them is the easiest to grind ?

- A. 50
- B. 70
- C. 85
- D. 100**

In a thin cylindrical shell, the hoop stress is _____ stress?

- A. Radial
- B. Circumferential tensile**
- C. Compressive
- D. Longitudinal

In an absorber, HETP does not vary with the _____?

- A. Flow rate of liquid
- B. Flow rate of gas
- C. Type and size of packing
- D. None of these**

A system with a double pole at the origin is unstable since the corresponding term in the time domain _____?

- A. Is a constant
- B. Grows exponentially with time
- C. Grows linearly with time**
- D. Decays linearly with time

Gravity settling process is not involved in the working of a _____?

- A. Hydrocyclone**
- B. Classifier
- C. Dorr-thickener
- D. Sedimentation tank

The separation of liquid droplets from the vapor is done by a/an _____ in the evaporators?

- A. Steam ejector
- B. Entrainment separator**
- C. Compressor
- D. Vacuum pump

Bell metal is an alloy of _____?

- A. Copper & zinc
- B. Copper & tin**
- C. Copper & nickel
- D. Zinc & tin

If oxygen content in the flue gas rises too high, fuel is being wasted by _____?

- A. Incomplete combustion
- B. Dry gas/stack gas loss**
- C. Moisture loss
- D. None of these

Coke oven gas is a better fuel than blast furnace gas, because of its higher _____?

- A. Calorific value, cleanliness and relatively low distribution cost (due to its low specific gravity)
- B. Adiabatic flame temperature
- C. Heat release rate (thus requiring smaller combustion chamber)
- D. All A., B. and C.**

Which of the following properties of a solid is not dependent on crystal imperfection ?

- A. Ductility
- B. Semi-conductivity
- C. Melting point**
- D. Yield stress

In furnaces operating at very high temperature (say) 1250°C , e.g. soaking pit), the maximum heat transfer takes place by _____?

- A. Conduction
- B. Convection
- C. Radiation**
- D. Cannot be predicted

Oxygen percentage (by weight) in atmospheric air is _____?

- A. 19
- B. 21
- C. 23**
- D. 29

The safe height (h) to diameter D. ratio (i.e., h/d) for liquid/petro fuel storage tank of capacity more than 45 kilolitres is less than _____?

- A. 1**
- B. 2
- C. 3
- D. 3.5

What is the usual value of angle of nip for crushing of ordinary rock in smooth steel crushing rolls?

- A. 16°
- B. 32°**
- C. 40°
- D. 46°

Gibbs free energy (F) is defined as _____?

- A. $F = E - TS$
- B. $F = H - TS$**
- C. $F = H + TS$
- D. $F = E + TS$

Two particles are called to be equal settling, if they are having the same ?

- A. Size
- B. Specific gravity
- C. Terminal velocities in the same fluid & in the same field of force**
- D. None of these

With increase in drum speed, in a rotary drum filter, the filtration rate _____?

- A. Increases**
- B. Increases linearly
- C. Decreases
- D. Is not affected

Which of the following is not fixed by the process requirements, in the design of absorbers ?

- A. Flow rate of the entering gas
- B. Composition of the entering liquid
- C. Terminal concentrations of gas stream
- D. None of these**

Thermosetting plastic materials _____?

- A. Can be repeatedly melted
- B. Is useful for melt casting
- C. Cannot be melted after forming**
- D. Is useful for spinning

Maleic anhydride is produced by catalytic oxidation of _____?

- A. Toluene
- B. Ethyl alcohol
- C. Naphthalene
- D. Benzene**

In chamber process of sulphuric acid manufacture in industry, the gas phase

oxidation of SO_2 to SO_3 is accomplished by a _____ reaction ?

- A. Non-catalytic homogeneous
- B. Non-catalytic heterogeneous
- C. Catalytic homogenous**
- D. Catalytic heterogeneous

Which of the following is not concerned with the heat transfer ?

- A. Brinkman number
- B. Stanton number
- C. Schmidt number**
- D. Peclet number

Neoprene is a _____ ?

- A. Monomer
- B. Synthetic rubber**
- C. Polyester
- D. None of these

Bordeaux mixture is a/an _____ ?

- A. Fertiliser
- B. Inorganic fungicide**
- C. Insecticide
- D. Explosive

In a size reduction crushing operation, feed size is 300 to 1500 mm while the product size is 100 to 300 mm. This is a case of the _____ crushing?

- A. Secondary
- B. Fine
- C. Primary**
- D. Ultrafine

Pure oxide refractories are generally monocrystalline in nature and are self

bonded _____ bricks are generally used as moderator in nuclear reactors?

- A. Beryllia
- B. Carborundum
- C. Corundum
- D. Thoria

“The total volume occupied by a gaseous mixture is equal to the sum of the pure component volumes”. This is the _____ law?

- A. Dalton’s
- B. Amagat’s
- C. Gay-Lussac’s
- D. Avogadro’s

Paper pulp is an example of _____ fluid?

- A. Dilatant
- B. Bingham plastic
- C. Newtonian
- D. Pseudo-plastic

Multistage operation (as in the case of catalytic oxidation of SO₂) is not carried out for NH₃ synthesis, because of _____?

- A. Comparatively higher pressure drop
- B. High cost of the high pressure vessel used for the reactor
- C. Higher pumping cost
- D. Chances of entrainment and disturbance of catalyst bed

Power required in case of forced draught as compared to induced draught (for the same draught produced) is _____?

- A. Same
- B. Less
- C. More

D. Either more or less; depends on the flue gas density

Which of the following is dimensionless ?

- A. Angular velocity
- B. Fanning friction factor**
- C. Specific volume
- D. None of these

Presence of a non-condensing gas in a condensing vapour _____ ?

- A. Increases the rate of condensation
- B. Decreases thermal resistance
- C. Is desirable to increase the film co-efficient
- D. None of these**

Which of the following coke has the least percentage of ash ?

- A. Petroleum coke**
- B. Beehive coke
- C. Foundry coke
- D. Metallurgical coke

The capillary rise of mercury is maximum in glass tube of dia _____ mm?

- A. 0.5**
- B. 1
- C. 2
- D. 5

A coalescer in a mixer-settler liquid-liquid extraction column _____ ?

- A. Comprises of thin bed of substances of extended surface having high porosity
- B. Helps in increasing the bubble size entering the settler
- C. Helps in increasing the settling rate of the bubbles

D. All 'a', 'b', & 'c'

Which of the following has the highest flame velocity ?

- A. H₂
- B. CO
- C. CH₄
- D. C₂H₆

Pick out the wrong unit conversion ?

- A. 1 atm. = 760 mm Hg = 29.92 inch Hg = 14.7 psi = 1.013 bar = 1.013 kgf/cm²
- B. 1 kPa = 100 bar**
- C. 1 mm Hg = 1 torr = 133.3 Pa
- D. None of these

Pick out the wrong statement ?

- A. Constant pressure distillation cannot separate an Azeotropic mixture
- B. Relative volatility of a binary mixture changes appreciably with the minor change in temperature**
- C. The relative volatility of a binary mixture at Azeotropic composition is unity
- D. Flash distillation is practised on wide spread scale in petroleum refinery

The third law of thermodynamics states that the _____ ?

- A. Heat capacity of a crystalline solid is zero at absolute zero temperature**
- B. Heat transfer from low temperature to high temperature source is not possible without external work
- C. Gases having same reduced properties behaves similarly
- D. None of these

Mild steel storage vessels are suitable for the storage of _____ ?

- A. Anhydrous ammonia**
- B. Fatty acids
- C. Hydrochloric acid (95%)

D. Sulphuric acid (25%)

Spheroidising of a material is a/an _____ process?

- A. Normalising
- B. Annealing**
- C. Tempering
- D. Hardening

Low temperature oxidation of stored coal results in the _____?

- A. Decrease in its caking power & calorific value
- B. Decrease in its carbon & hydrogen content
- C. Increase in its oxygen content
- D. All A., B. and A.**

In catalytic cracking process, olefins crack _____ times faster than in thermal cracking process?

- A. 100
- B. 200-300
- C. 1000-10000**
- D. 10

Bright coal _____?

- A. Contains more than 90% durain
- B. Contains more than 90% fussain
- C. Contains mainly vitrain & clarain and is generally coking**
- D. Is non-coking

Polycaprolactam is commercially known as _____?

- A. Nylon-6**
- B. Nylon-66
- C. Dacron
- D. Rayon

JD factor for mass transfer is a function of Reynolds number. Mass transfer by molecular diffusion from a single drop to surrounding still air is given by _____?

- A. $N_{sh} = 2$
- B. $N_{st} = 2$
- C. $N_{sc} = 2$
- D. None of these

Enzymes are organic catalysts used in the _____ reactions ?

- A. Chemical
- B. **Biochemical**
- C. Photochemical
- D. Electrochemical

Which of the following constituents of a fuel does not contribute to its calorific value on combustion ?

- A. Hydrogen
- B. Sulphur
- C. Carbon
- D. **None of these**

When the ratio of the Grashoff number and to the square of Reynolds number is one, the dominant mechanism of heat transfer is _____?

- A. Free convection
- B. Entry length problem in laminar forced conduction (developing thermal boundary layer)
- C. **Mixed convection (both free and forced)**
- D. Forced convection

Lead pipes are not safe for carrying drinking water because water containing dissolved oxygen attacks lead thereby forming poisonous $Pb(OH)_2$. Lead pipes are readily corroded by _____?

- A. Dilute HCl

B. Acetic acid

- C. Concentrated H₂SO₄
- D. None of these

Navier-Stokes equation is useful in the analysis of _____ fluid flow problems?

- A. Non-viscous
- B. Viscous**
- C. Turbulent
- D. Rotational

The main size reduction operation in ultrafine grinders is _____?

- A. Cutting
- B. Attrition**
- C. Compression
- D. Impact

Which of the following fuels has the highest calorific value per unit mass (kcal/kg) ?

- A. Coal
- B. Kerosene
- C. Natural gas
- D. Furnace oil**

The discharge through a rectangular weir varies as _____?

- A. $H^{1/2}$
- B. $H^{5/2}$
- C. $H^{2/5}$
- D. $H^{3/2}$**

Which of the following controllers has maximum offset ?

- A. P-controller**
- B. P-I controller

- C. P-D controller
- D. P-I-D controller

The ratio of maximum to average velocity in case of streamline flow between parallel plates is _____?

- A. 1
- B. 1.5**
- C. 2
- D. 2.5

'Wobbe index' is a characteristic of _____?

- A. Solid fuels
- B. Gaseous fuels**
- C. Liquid fuels
- D. Fat coals

Thermit welding uses the following energy source ?

- A. Electrical energy
- B. Chemical energy**
- C. Energy of high velocity electrons
- D. Heat generated by friction

Nature of fluid flow during the opening of a valve in a pipeline is _____?

- A. Laminar
- B. Unsteady**
- C. Steady**
- D. Uniform

In a sedimentation tank, the detention period for water ranges from _____ hours?

- A. 2 to 4**
- B. 8 to 12

- C. 16 to 20
- D. 24 to 32

Pick out the wrong statement?

- A. Bronze is an alloy of copper & tin
- B. Brass is an alloy of copper & zinc
- C. The alloy named 'German silver' does not contain any silver
- D. The ability of a material to fracture without appreciable deformation is called its ductility**

Too much of excess air in combustion results in high _____?

- A. Fuel consumption for the same heat load
- B. Stack gas temperature
- C. Percentage of oxygen in flue gases
- D. All A., B. and C.**

Pick out the additive property of lube oil out of following ?

- A. °API gravity**
- B. Specific gravity
- C. Viscosity
- D. Flashpoint

_____ bricks should not be used in oxidising atmosphere?

- A. Tar dolomite
- B. Carbon**
- C. Silica
- D. Fireclay

Minimum fluidisation velocity for a specific system depends upon the _____?

- A. Particle size
- B. Fluid viscosity
- C. Density of both the particle & the fluid

D. All A., B. and C.

Pick out the wrong statement ?

A. Nitrogen is normally supplied in fertiliser either in Ammoniacal or the nitrate form, from which the soil takes it up in the form of ammonium ions or nitrate ions and forms amino acids

B. Calcium present in the fertiliser helps in correcting the soil acidity

C. Particle size range of a good granular fertiliser is 10-15 mesh and it contains less moisture as

compared to finely divided powder form of fertiliser

D. Ammonium nitrate fertiliser is obtained as a by-product in an integrated steel plant having byproduct coke ovens

Diameter of bubble caps used in high pressure columns is _____ as compared to that used in identical vacuum columns?

A. Less

B. More

C. Same

D. Either A. or B.; no generalisation can be made

Following the six-tenth factor rule, if a log-log plot of capacity of the equipment vs. cost of the equipment is made, then a straight line is obtained, whose slope is equal to _____?

A. 0.1

B. 0.6

C. 0.2

D. 0.8

A source rock that is too immature to generate petroleum in its natural setting is known as _____?

A. Effective Source Rock

B. Potential Source Rock

- C. Unconventional Source Rock
- D. All of above

Gelatine which is a nitrogenous organic protein is obtained by the hydrolysis of _____?

- A. Collagen**
- B. Tannin
- C. Molasses
- D. Carbohydrate

In centrifugal pump operation, the cavitation can be eliminated by maintaining suction pressure _____ the vapor pressure of the liquid at the suction temperature?

- A. Lower than
- B. Higher than**
- C. Equal to
- D. None of these

Which of the following terminology is not used for size reduction of materials to fine sizes or powders ?

- A. Comminution
- B. Dispersion
- C. Pulverisation
- D. Compression**

Acute danger to human life (i.e. death) exists, if the concentration of CO₂ in atmospheric air exceeds _____ percent (by volume)?

- A. 1
- B. 3
- C. 7
- D. 20**

Which of the following air pollutants is not toxic to vegetation i.e., doesn't cause vegetation damage ?

- A. Smog & ozone
- B. Hydrogen fluoride & nitrogen oxides
- C. Sulphur dioxide & spray of weed killers
- D. Carbon monoxide**

An isentropic process is the one, in which _____?

- A. $pV = \text{constant}$
- B. $pV^{\gamma} = \text{constant}$
- C. $pV^{\gamma} = \text{constant}$, and process is reversible**
- D. None of these

Cast iron compared to steel is better in _____?

- A. Ductility
- B. Fluidity & castability**
- C. Strength
- D. Malleability

Change of state namely evaporation condensation, freezing and melting is an _____ process?

- A. Isothermal**
- B. Adiabatic
- C. Isobaric
- D. Isochoric

Pick out the Clausius-Clapeyron equation from the following?

- A. $dP/dT = \Delta H/T\Delta V$
- B. $\ln P = -(\Delta H/RT) + \text{constant}$**
- C. $\Delta F = \Delta H + T [\partial(\Delta F)/\partial T]_P$
- D. None of these

_____ developed the film theory ?

- A. Higbie**
- B. Fick
- C. Ergun
- D. Levenspiel

Response of a system to a sinusoidal input is called _____ response?

- A. Impulse
- B. Unit step
- C. Frequency**
- D. None of these

The most suitable equipment for the transportation of 200 mesh size particles is a _____?

- A. Bucket elevator
- B. Pneumatic conveyor**
- C. Screw conveyor
- D. Belt conveyor

Large scale fire on fuel gas line is normally extinguished by _____?

- A. Water
- B. Steam
- C. Foam
- D. Nitrogen**

The Knudsen diffusivity is dependent on the _____?

- A. Molecular velocity only
- B. Pore radius of the catalyst only
- C. Molecular mean free path only
- D. Molecular velocity and pore radius of the catalyst**

The optimum performance for reactors operating in parallel is obtained when the feed stream is distributed in such a way, that the _____?

- A. Space time for each parallel line is same**

- B. Space time for parallel lines is different
- C. Larger reactors have more space time compared to smaller ones
- D. None of these

Ceramic compounds as compared to metallic compounds

_____ ?

- A. Crystallise faster
- B. Resist greater tensile stress at room temperature
- C. Have higher melting temperature**
- D. Are better conductor of electricity at higher temperature

The total change in the enthalpy of a system is independent of the

_____ ?

- A. Number of intermediate chemical reactions involved**
- B. Pressure and temperature
- C. State of combination and aggregation in the beginning and at the end of the reaction
- D. None of these

Leaching rate is independent of the _____ ?

- A. Agitation
- B. Temperature
- C. Particle size
- D. None of these**

Ceramic recuperators used for waste heat recovery from high temperature flue gas going out of the furnace is made of _____ ?

- A. Fireclay
- B. Silicon carbide**
- C. Corundum
- D. Siliceous fireclay

Reducing atmosphere is maintained in a _____ ?

- A. Calcination kiln

B. Blast furnace

- C. Soaking pit
- D. L.D. converter

The energy balance equation over a tubular reactor under transient conditions is _____?

- A. An ordinary non-linear differential equation
- B. An algebraic differential equation
- C. A linear partial differential equation**
- D. A non-linear partial differential equation

Exposure to chemicals having carcinogenic properties cause _____?

- A. Dermatitis (skin disorder)
- B. Cancer**
- C. Asphyxiation
- D. Asthma

Pyrometry refers to the measurement of temperature _____?

- A. With the mercurial thermometer upto 350°C
- B. Directly
- C. Which is of higher magnitude**
- D. All A., B. & C.

Aniline point of the diesel is a measure of its _____ content?

- A. Aromatic
- B. Paraffin**
- C. Olefin
- D. Naphthene

Dampers are located _____?

- A. Before the I.D fan**
- B. After the I.D. fan

- C. Near the top of the chimney
- D. Anywhere after the I.D. fan

There is practically no alternative/competitor to _____ in the beneficiation treatment of sulphide ores?

- A. Classification
- B. Tabling
- C. Jigging
- D. Froth floatation**

The most economical pulp for the production of newsprint would be the _____ pulp?

- A. Ground-wood**
- B. Sulphate
- C. Sulphite
- D. Semi-chemical

Hammers and railway rails are normally made of _____?

- A. Mild steel
- B. Dead mild steel
- C. Medium carbon steel
- D. High carbon steel**

A man exposed to excessive noise level in the working environment may suffer from _____?

- A. Hearing loss
- B. Rupture of ear drum
- C. Nervousness & fatigue
- D. All A., B. & C.**

Manufacture of phthalic anhydride uses _____ as a catalyst?

- A. Ni
- B. Cr

- C. V2O5
- D. Al2O3

Pick out the wrong statement ?

- A. Tin can be readily and very easily drawn into very fine wire
- B. Tin can be severely cold worked without the necessity of annealing due to its low recrystallisation temperature
- C. Tin exists in two allotropic forms
- D. The predominant use of tin is in the form of coating for steel & copper alloys

For the manometer set up shown in the figure, the pressure difference $P_A - P_B$ is given by _____?

- A. $(\rho_H - \rho_{air})gH$
- B. $(\rho_H - \rho_L)gH$
- C. $(\rho_H - \rho_L)gH + (\rho_L - \rho_{air}) \cdot g(L - H)$
- D. $(\rho_H - \rho_L)gL + (\rho_L - \rho_{air})gH$

The most suitable equipment used to devulcanise rubber scrap and to make water dispersion & rubber solution is a _____?

- A. Boundary mixer
- B. Propeller agitator
- C. Sharpies centrifuge
- D. None of these

Which glass is usually used in optical work ?

- A. Lead glass
- B. High silica (borosilicate) glass
- C. Photo-sensitive glass
- D. Fibre glass

Minimum thermal efficiency of a steam boiler may be around _____ percent ?

- A. 25

- B. 45
- C. 65
- D. 20**

For specified tube outside diameter, higher BWG means higher _____?

- A. Tube thickness
- B. Cross-sectional area**
- C. Weight per unit length
- D. None of these

The maximum adiabatic flame temperature is attained, when the fuel is burnt with _____?

- A. Theoretically required amount of air
- B. More than theoretically required amount of air
- C. Less than theoretically required amount of air
- D. Theoretically required amount of oxygen**

Furnace atmosphere for softening temperature determination of refractories (in which Seger Cones are placed) should be _____?

- A. Oxidising
- B. Neutral
- C. Either A. or B.**
- D. Neither A. nor B.

Which is the most efficient absorbent for SO₃ out of the following ?

- A. 20% oleum
- B. 65% oleum
- C. 78% H₂SO₄
- D. 98% H₂SO₄**

_____ is the undesirable by-product produced in the manufacture of

urea ?

- A. Ammonium carbonate
- B. Biuret**
- C. Carbon dioxide
- D. Ammonium carbamate

The equation, $PV = nRT$, is best obeyed by gases at _____ ?

- A. Low pressure & high temperature**
- B. High pressure & low temperature
- C. Low pressure & low temperature
- D. None of these

The energy loss over a length of pipeline according to Darcy-Weisbach equation for pipe flow is _____ the mean velocity of flow?

- A. Directly proportional to
- B. Directly proportional to square of**
- C. Inversely proportional to
- D. Inversely proportional to square of

The maximum liquid gradient over a tray must not exceed _____ ?

- A. 0.5" -1.25"**
- B. 2"-3.5"
- C. 5"
- D. Half the tray spacing

Grog addition in fireclay during brick manufacture is done to _____ ?

- A. Reduce its shrinkage on heating
- B. Impart greater spalling resistance
- C. Enhance the strength of fired refractories
- D. All A., B. and C.**

'Fat' coal means a coal having _____?

- A. Low calorific value
- B. High volatile matter**
- C. Low ash content
- D. Non smoking tendency

Pick out the wrong statement?

- A. Aromatics have higher specific gravity than paraffins
- B. Gross calorific value (GCV) of petrofuels is equal to $(12400 - 2100 \rho_2)$ where, ρ is the specific gravity of the fuel at 15.5°C
- C. Heavier petrofuels have higher GCV on weight basis (i.e., Kcal/kg) but lower GCV on volume basis (i.e., Kcal/litre)**
- D. Higher specific gravity of petrofuels means higher C/H ratio

If h_1 = inner film co-efficient and h_2 = outer film co-efficient, then the overall heat transfer co-efficient is _____?

- A. Always less than h_1
- B. Always between h_1 and h_2**
- C. Always higher than h_2
- D. Dependent on metal resistance

In an absorption column, the flooding velocity for random packing is _____ that for stacked/regular packing?

- A. Greater than
- B. Smaller than**
- C. Equal to
- D. Either A., or B.; depends on the type of packing

Dephosphorization of molten pig iron is favoured by _____?

- A. Oxidising and basic slag
- B. Reducing and basic slag**
- C. High activity co-efficient of phosphorous in metal

D. Oxidising and neutral slag

Brinell Hardness Number (BHN) for talc is approximately in the range of _____?

- A. 1-5
- B. 20-30**
- C. 100 -150
- D. 200 – 250

Fluid flow in a/an _____ is an example of pressure flow?

- A. Partially filled pipeline
- B. Pipe**
- C. Open channel
- D. River

Ponchon-Savarit method analyses the fractional equipment based on _____?

- A. Enthalpy balance only
- B. Material balance only
- C. Both enthalpy and material balances**
- D. The assumption of constant molal-overflow

Fireclay refractories have _____?

- A. Low co-efficient of thermal expansion**
- B. Poor thermal spalling resistance
- C. Tendency to expand unduly high during firing
- D. Very high cost

Porosity of fireclay refractories is _____ percent?

- A. 5-10
- B. 10-25**
- C. 25-35
- D. 35-50

Cast iron vessels are not suitable for the storage of _____?

- A. Freon
- B. H₂SO₄ (95%) at room temperature
- C. H₂SO₄ (fuming)
- D. Wet SO₂**

There is no correspondence between stoichiometric and the rate equation in case of a/an _____ reaction?

- A. Elementary
- B. Multiple
- C. Autocatalytic
- D. Non-elementary**

Gas turbine normally employs a constant _____ cycle?

- A. Pressure**
- B. Temperature
- C. Volume
- D. None of these

Thorium-232 is converted into uranium-233 in a/an _____ nuclear reactor?

- A. Thermal
- B. Fast breeder**
- C. Heavy water moderated
- D. Enriched uranium

Iso-octane is used as a reference substance in the definition of octane number and it is assigned an octane number value of 100. Iso-octane is chemically known as _____?

- A. α -methyl naphthalene
- B. 2-2-4 tri methyl pentane**

- C. 1, 3 butadiene
- D. Tetra methyl ethylene

The dimension of kinematic viscosity is _____?

- A. ML⁻²T⁻¹
- B. L²T⁻¹**
- C. ML⁻²T⁻²
- D. None of these

Pick out the wrong statement?

- A. Copper is the metal having the highest electronic conductivity**
- B. Hardenability & Weldability of metals are inversely related
- C. Covalent bonding formed by sharing of electrons is present in all semi-conductor materials
- D. Glass transition temperature applies to 'polymers' but not to 'glasses'

Fresh water carrying pipelines in chemical industries are coloured with _____ color?

- A. Sea green**
- B. Brown
- C. Yellow
- D. Red

Pick out the wrong statement?

- A. Change in barometric pressure does not affect the relative humidity
- B. In case of a packed tower, the operating velocity is about half of the flooding velocity, generally
- C. 'Elution' means the desorption of the adsorbed solute by a solvent
- D. The equilibrium moisture content of the solid can be reduced by increasing the absolute humidity**

Short distance transportation of grain, gravel, sand, ash, asphalt etc. is done by

using a _____ conveyor?

- A. Flight
- B. Slat or drag
- C. Ribbon
- D. Screw**

A 2-4 heat exchanger involves _____?

- A. Only counter-flow of fluids
- B. Only parallel-flow of fluids
- C. Both counter and parallel-flow of the fluids**
- D. Smaller pressure drop compared to 1-2 exchanger

The component of acceleration resulting due to unsteady nature of flow is called _____ acceleration?

- A. Normal
- B. Local**
- C. Convective
- D. Tangential

The purpose of floating head in a heat exchanger is to _____?

- A. Avoid buckling of tubes**
- B. Provide support for tubes
- C. Decrease the pressure drop
- D. Facilitate its lengthening, if needed

Dry bulb temperature of the gas is _____ the wet bulb temperature?

- A. Less than
- B. More than**
- C. Equal to
- D. None of these

Commercial power generation from fusion reactor is not yet possible, because _____?

A. It is difficult to control nuclear fusion reaction

B. The fuel required (i.e., deuterium & tritium) is scarce

C. It is difficult to initiate fusion reaction

D. Quantity of fuel required for initiating fusion reaction is prohibitively high

For Indian standard (IS) screens, the mesh number is equal to its aperture size expressed to the nearest deca-micron (0.01 mm). Aperture width of IS screen of mesh number 50 will be approximately _____ microns?

A. 5

B. 50

C. 500

D. 5000

For heat flow through very thick walled cylinder, use _____ mean radius?

A. Arithmetic

B. Logarithmic

C. Geometric

D. Either A. or C.

Which of the following fuel gases will require maximum amount of air for combustion of 1 Nm³ gas ?

A. Blast furnace gas

B. Natural gas

C. Producer gas

D. Water gas

Tubeless tyres are made of _____ rubber, which is a co-polymer of isoprene & isobutylene?

A. Nitrile

B. Silicone

C. Neoprene

D. Butyl

n the agitators, the power required will be changed with the increase of diameter of agitator D. as _____?

- A. D²
- B. D⁵**
- C. D
- D. D⁹

The rate of mass transfer is not dependent upon the _____?

- A. Degree of dispersion of one fluid in the other
- B. Interfacial surface exposed between the phases
- C. Both A. & B.
- D. None of these**

In physical terms, Schmidt number means _____?

- A. Thermal diffusivity/mass diffusivity
- B. Thermal diffusivity/momentum diffusivity
- C. Momentum diffusivity/mass diffusivity**
- D. Mass diffusivity/thermal diffusivity

Chromite refractories _____?

- A. Are bonded with lime and clay
- B. (Free from silica) have better thermal fatigue resistance than silica and magnesite refractories.
- C. Are resistant to basic slag
- D. All A., B. and C.**

Approximate value of the modulus of elasticity for steel is about _____
× 10⁶kg/cm²?

- A. 0.5
- B. 2**
- C. 40
- D. 75

The distribution of shear stress in a stream of fluid in a circular tube is _____?

- A. Linear with radius for turbulent flow only
- B. Linear with radius for laminar flow only
- C. Linear with radius for both laminar & turbulent flow**
- D. Parabolic with radius for both laminar & turbulent flow

Sudden temperature fluctuation does not affect pyrex glass, because of its _____?

- A. Low co-efficient of expansion**
- B. High co-efficient of expansion
- C. High melting point
- D. Both B. and (C)

The important dimensional group involved in the power requirement calculation in mixing operation is the _____ number?

- A. Reynold's
- B. Froude
- C. Both A. & B.**
- D. Neither A. nor B.

Kopper-Totzek coal gasifier _____?

- A. Can give ammonia synthesis gas ($H_2 + N_2$)**
- B. Is a moving bed reactor
- C. Cannot use coking coal
- D. Operate at very high pressure

Small furnace draught is accurately measured by an inclined tube manometer, in which the manometric liquid used most commonly is _____?

- A. Water
- B. Carbon tetrachloride
- C. Paraffin**

D. Ethylene glycol

_____ is added in low carbon steel to raise its yield point?

- A. Sulphur
- B. Phosphorous
- C. Silicon
- D. Manganese**

Monel alloy is _____?

- A. The costliest of all the alloys of nickel
- B. Not suitable for making kitchen utensils
- C. Used for making steam valves and turbine blades as it resists steam attack at high temperature**
- D. Not used in cast and wrought forms

Which of the following does not discharge the dust collected as a dry solid?

- A. Electrostatic precipitator
- B. Wet scrubber**
- C. Bag filter
- D. Gravity settling chamber

Refractoriness under load (RUL) is the most important property for the refractory bricks _____?

- A. At the hearth bottom of the furnace on which stock is placed**
- B. Used for furnace insulation
- C. Used in the roof of the furnace
- D. None of these

Natural draught produced by a chimney depends upon the _____?

- A. Density of the chimney gases
- B. Height of the chimney
- C. Both A. and B.**

D. Neither A. nor B.

_____ is the most suitable for compounding rubber and plastic solids?

A. Banbury mixer

B. Pan mixer

C. Pug mill

D. Charge can mixer

Size of the combustion chamber of a furnace depends upon the

_____?

A. Heat release rate of the fuel

B. Preheat temperature of fuel & air

C. Method of mixing the fuel & air

D. All A., B. and C.

For two non-interacting first order systems connected in series, the overall transfer function is the _____ of the individual transfer functions?

A. Product

B. Ratio

C. Sum

D. Difference

Catalyst used in the production of high density polythene by low pressure Ziegler process is _____?

A. Aluminium triethyl activated with $TiCl_4$

B. Platinum

C. Molybdenum

D. Nickel

Thorium metal _____?

A. Resembles steel in appearance

B. Is less hard (in the range of silver)

C. Is highly ductile

D. All A., B. and C.

Smoker's equation for the calculation of number of equilibrium stages in a continuous binary distillation column is used, when the _____?

- A. Relative volatility is close to one (e.g., separation of close boiling isomers)**
- B. Feed is not at its bubble point
- C. Number of equilibrium stages in only stripping section is to be calculated
- D. Number of equilibrium stages required is likely to be very small

Silica bricks are never used for lining the _____?

- A. Beehive coke ovens**
- B. By-product coke ovens
- C. Dome of blast furnace stoves
- D. Roof of open hearth furnace

An ideal plastic substance indicates no deformation, when stressed upto yield stress, but behaves like a Newtonian fluid beyond yield stress. Which of the following is an ideal plastic ?

- A. Sewage sludge**
- B. Rubber latex
- C. Blood
- D. Sugar solution

Which of the following is not a cutting machine ?

- A. Dicers
- B. Knife cutters
- C. Slitters
- D. Tube mills**

Ferric stainless steels compared to austenitic stainless steels _____?

- A. Have lower corrosion resistance**

- B. Are harder to fabricate
- C. Are less ductile and hence less suitable for cold pressing
- D. All A., B. and C.**

Forward reaction will be favoured for the exothermic reaction, represented by $\text{CO} + \text{H}_2\text{O} \rightleftharpoons \text{CO}_2 + \text{H}_2$, by _____?

- A. Low temperature and high pressure**
- B. Low temperature and low pressure
- C. High temperature and high pressure
- D. High temperature and low pressure

Presence of excess fluorine in water causes _____?

- A. Dental cavity
- B. Tooth decay
- C. Fluorosis**
- D. Respiratory disease

Which of the following relates the emf. generated in a single homogeneous wire to the temperature difference ?

- A. Peltier effect
- B. Thomson effect**
- C. Seebeck effect
- D. None of these

Dead mild steel, which contains 0.10 to 0.15 percent carbon is used for making _____?

- A. Shafts
- B. Flanges**
- C. Gears
- D. Shear blades

Superphosphate is manufactured by reacting phosphate rock

with _____ ?

- A. Acetic acid
- B. Sulphuric acid**
- C. Aluminium chloride
- D. None of these

Highly viscous liquids & pastes are agitated by _____ ?

- A. Propellers
- B. Turbine agitators
- C. Multiple blade paddles**
- D. None of these

Magnesite bricks have poor resistance to attack by _____ slag?

- A. Lime
- B. Basic
- C. Acid**
- D. None of these

What is the total pressure exerted by a mixture of 0.45 kg mole of benzene, 0.44 kg mole of toluene and 0.23 kg mole of o-xylene at 100°C, if their vapor pressures at 100°C are 1340, 560 and 210 mmHg respectively ?

- A. 756.2
- B. 780.5
- C. 801.5**
- D. 880.5

In case of unsteady fluid flow, conditions & flow pattern change with the passage of time at a position in a flow situation. Which of the following is an example of unsteady flow ?

- A. Discharge of water by a centrifugal pump being run at a constant rpm
- B. Water flow in the suction and discharge pipe of a reciprocating pump**
- C. Water discharge from a vertical vessel in which constant level is maintained

D. Low velocity flow of a highly viscous liquid through a hydraulically smooth pipe

The operation of a Rotameter is based on _____?

A. Variable flow area

B. Rotation of a turbine

C. Pressure drop across a nozzle

D. Pressure at a stagnation point

Coolant used in a fast breeder reactor is _____?

A. Molten sodium

B. Heavy water

C. Ordinary water

D. Helium

As the product becomes finer, the energy required for grinding _____?

A. Decreases

B. Increases

C. Is same as for coarser grinding

D. Is 1.5 times that for coarser grinding

The amount of benzene present in pure Benzol is about _____ percent ?

A. 30

B. 50

C. 70

D. 90

Specific _____ does not change during a phase change (e.g. sublimation, melting, vaporisation etc.)?

A. Entropy

B. Internal energy

C. Enthalpy

D. Gibbs free energy

Crude oil is transported inland from oil field to refineries, mainly by the _____?

- A. Road tankers
- B. Rail tankers
- C. Underground pipelines**
- D. None of these

What is the degree of freedom of an absorption process in which only one component is transferred between phases ?

- A. 1
- B. 2
- C. 3**
- D. 4

Reaction of ortho-phosphoric acid with soda ash produces _____?

- A. Sodium Tributyl phosphate (STPP)**
- B. Tricresyl phosphate
- C. Tributyl phosphate
- D. Nitrophosphate

Which of the following has the minimum compressibility ?

- A. Water at room temperature**
- B. Air at room temperature
- C. Oxygen at room temperature
- D. Nitrogen at room temperature

An aneroid barometer measures the _____ pressure?

- A. Atmospheric
- B. Absolute**
- C. Vacuum
- D. Gage

A pressure head of 320 metres of water in meters of CCl_4 (sp.gr = 1.6) will be _____?

- A. 100
- B. 200**
- C. 320
- D. 160

Co-efficient of performance of a Carnot cycle refrigerator operating between -23°C and $+27^\circ\text{C}$ is _____?

- A. 3
- B. 5**
- C. 0.5
- D. 1.5

Presence of cobalt in steel improves its _____?

- A. Cutting ability**
- B. Corrosion resistance
- C. Tensile strength
- D. None of these

Intermittent tube cleaning is possible to be done in case of a _____ evaporator?

- A. Basket type**
- B. Horizontal tube
- C. Calandria

Nitrolime is _____?

- A. Calcium nitrate
- B. Calcium ammonium nitrate**
- C. A mixture of nitric acid and lime
- D. A mixture of ammonium nitrate and calcium nitrate

Thiokol is nothing but _____?

- A. Polysulphide rubber
- B. Polyamide fibre
- C. Engineering plastic
- D. Expanded polystyrene

For a binary mixture with low relative volatility _____?

- A. Use steam distillation
- B. Use molecular distillation
- C. Use high pressure distillation
- D. An azeotrope may be formed during distillation

Sub-zero temperature ($< 0^{\circ}\text{C}$) can be measured by a constant volume gas thermometer employing ?

- A. Helium
- B. Nitrogen
- C. Hydrogen
- D. None of these

_____ is a copolymer ?

- A. Nylon-66
- B. Polypropylene
- C. PVC
- D. Poly tetra fluoro ethylene

Which of following error integral is considered as the best criterion in controller settings ?

- A. $\int_0^{\infty} |e| dt$
- B. $\int_0^{\infty} |e|^2 dt$
- C. $\int_0^{\infty} e^2 dt$
- D. None of these

Thermal efficiency of furnaces can be improved by _____?

- A. Waste heat recovery from flue gas
- B. Minimising heat losses from furnace walls
- C. Maintaining proper draught
- D. All A., B. and C.**

Stefan's block body radiation law can also be derived from _____ law?

- A. Kirchoff's
- B. Planck's**
- C. Fourier's
- D. None of these

_____ extractor uses centrifugal force for separating the two phases?

- A. Treybal
- B. Scheibel
- C. Podbielniak**
- D. None of these

The power number for a stirred tank becomes constant at high Reynolds number. In this limit, the variation of power input with impeller rotational speed (N) is proportional to _____?

- A. N^0
- B. N^1
- C. N^2**
- D. N^3

Fatigue failure of a material may occur, when it is subjected to _____ stress?

- A. Fluctuating**
- B. Tensile
- C. Compressive

D. Torsion

Mass transfer co-efficient of liquid is _____?

- A. Affected more by temperature than that for gases
- B. Affected much less by temperature than that for gases
- C. Not affected by the temperature
- D. None of these

Natural gas recovered along with crude oil from oil wells is called wet natural gas which has a higher _____ compared to the dry natural gas?

- A. Unsaturated hydrocarbon content
- B. Calorific value
- C. Quantity of propane
- D. Quantity of butane

Pick out the correct statement about the condensation?

- A. Filmwise condensation gives a lower heat transfer rate than the dropwise condensation
- B. Suitable coating or vapour additive is used to promote film wise condensation
- C. If a condensing liquid does not wet the surface dropwise, even then condensation will take place on it
- D. Reynolds number of condensing liquid is based on its mass flow rate

Which of the following is generally not drawn into fiber ?

- A. Polyamide
- B. Unsaturated polyesters
- C. Saturated polyesters
- D. Polyacrylonitrile

Natural convection is characterised by _____?

- A. Grashoff number
- B. Peclet number
- C. Reynolds number

D. Prandtl number

Presence of iron and manganese in water causes _____?

A. Reduction in its dissolved oxygen content

B. Discoloration of bathroom fixtures

C. Temporary hardness

D. None of these

The purpose of providing expansion bellows in the shell of tubular exchanger is to _____?

A. Increase the heating load

B. Impart structural strength

C. Account for the uneven expansion of shell and tube bundles

D. Facilitate increase of shell length, if needed

Which of the following conditions must be satisfied for lift force to be developed ?

A. The body should be bluff body

B. The body should be stream lined

C. Circulation around the body is essentially required

D. The main stream velocity must approach the velocity of sound in that fluid medium

If Blasius or Darcy friction factor is 'f1' then the Fanning friction factor is equal to _____?

A. f1/4

B. 4f2

C. 2f1

D. f1/2

For raschig rings, the sphericity is _____?

A. 0.5

B. 1

C. < 1

D. $\sqrt{3}$

The slope of 9-line is determined by the _____?

- A. Reflux ratio
- B. Plate efficiency to be achieved
- C. Thermal condition of the feed**
- D. Relative volatility

The contraction co-efficient for Borda's mouthpiece (for frictionless fluid) is _____?

- A. 0.1
- B. 0.5**
- C. 0.94
- D. 1

Which of the following is the most reactive (as regards the formation of CO + H₂ from C + H₂O) ?

- A. Blast furnace coke
- B. Low temperature coke**
- C. Anthracite coal
- D. Sub-bituminous coal

Magnesite chrome bricks are used in the _____?

- A. Roof lining of basic open hearth & other basic furnaces
- B. Reheating furnaces
- C. Soaking pits
- D. All A., B. and C.**

Pick out the wrong statement ?

- A. For the same conversion, the holding time required in a batch reactor, is always equal to the space time required in a PFR
- B. Two mixed reactors of unequal size are available for producing a specified product, formed by

a homogenous second order reaction. To achieve maximum production rate, the smaller reactor should be placed in series before the larger reactor

C. Arrhenius equation describing the effect of temperature on rate constant is given by,

$$K = A.e^{-E_a/RT}$$

D. The mechanism for the decomposition of CH₃CHO into CH₄ and CO in presence of I₂ is:



Then the rate of disappearance of CH₃CHO is equal to K.CCH₃I.CHI and acts as a catalyst

Ganister is a source of the _____?

- A. Silica
- B. Periclase
- C. Lime
- D. None of these

Increase in the entropy of a system represents the _____?

- A. Degradation of energy
- B. Decrease in system pressure
- C. Increase in the availability of energy
- D. Increase in the temperature

If a single tube pass heat exchanger is converted to two pass, then for the same flow rate, the pressure drop per unit length in tube side will

_____?

- A. Increase by 1.8 times
- B. Decrease by 22
- C. Increase by 216**
- D. Remain unchanged

Weathering of coal during storage causes _____?

- A. Reduction in coal size
- B. Increase in its friability
- C. Decrease in its caking capacity

D. All A., B. and C.

Which of the following is a rich fuel gas ?

- A. Producer gas
- B. Coal gas from underground gasification of coal
- C. Refinery gases**
- D. None of these

Operating profit of a chemical plant is equal to _____ ?

- A. Profit before interest and tax i.e., net profit + interest + tax**
- B. Profit after tax plus depreciation
- C. Net profit + tax
- D. Profit after tax

A slurry is to be dried to produce flaky solid. Which dryer would you recommend ?

- A. Spray dryer**
- B. Drum dryer
- C. Rotary dryer
- D. Dielectric dryer

In flue gas analysis by Orsat's apparatus, carbon dioxide is absorbed by _____ ?

- A. Potassium hydroxide**
- B. Dilute potassium carbonate
- C. Cuprous chloride
- D. Alkaline pyrogallol solution

Dispersion of a gas through liquid is done by using a _____ ?

- A. Sparger**
- B. Kneader
- C. Masticator
- D. None of these

Detergent is produced by the sulphonation of dodecyl benzene, which is an _____ reaction?

- A. Endothermic
- B. Exothermic
- C. Irreversible
- D. Both B. and C.**

Which of the following is not a graphical method (but is an analytical method) for the calculation of theoretical number of stages in case of continuous binary distillation ?

- A. Sorel-Lewis method**
- B. McCabe-Thiele's method
- C. Ponchon-Savarit method
- D. None of these

Pick out the correct statement ?

- A. In case of liquid-liquid extraction, no separation is possible, if the selectivity of the solvent used is unity
- B. With increase in temperature, the selectivity of the solvent used in solvent extraction decreases
- C. The selectivity of solvent used in solvent extraction is unity at the plait point
- D. All A., B. and C.**

A 25 cm × 25 cm × 1 cm flat sheet weighing 1.2 kg initially was dried from both sides under constant drying rate conditions. It took 1500 seconds for the weight of the sheet to reduce to 1.05 kg. Another 1m × 1m × 1cm flat sheet of the same material is to be dried from one side only. Under the same constant drying rate conditions, the time required for drying (in seconds) from its initial weight of 19.2 kg to 17.6 kg is _____?

- A. 1000**

- B. 1500
- C. 2000
- D. 2500

In sweetening process, solutizer agent used with caustic alkali is _____?

- A. Potassium isobutyrate**
- B. Sodium plumbite
- C. Methanol
- D. Phenol

Which of the following equations is used for the prediction of activity coefficient from experiments ?

- A. Van Laar equation
- B. Margules equation
- C. Wilson's equation
- D. All A, B. and C**

Carbon tetrachloride can be stored in a storage vessel made of _____?

- A. High silicon iron (14% Si)
- B. Tin
- C. Stainless steel
- D. All A., B. and C.**

Draining of shallow pits or sump is done by a sump pump, which is a _____ pump?

- A. Single stage vertical**
- B. Centrifugal
- C. Plunger
- D. Diffuser

The fugacity of liquid water at 298 K is approximately 3171 Pa. Considering the ideal heat of vaporisation as 43723 J/gm.mole, its fugacity at 300 K would be _____?

- A. 3171Pa
- B. 3567Pa**
- C. 1.01×10^5 Pa
- D. 5000Pa

Colour comparator is used to measure the _____?

- A. pH value**
- B. Electrode potential
- C. Colour intensity
- D. None of these

The number of atoms of oxygen present in 11.2 litres of ozone (O₃) at N.T.P. are _____?

- A. 3.01×10^{22}
- B. 6.02×10^{23}
- C. 9.03×10^{24}**
- D. 1.20×10^{24}

Scale up problem in design based on the similarity concept takes into account _____ similarity?

- A. Geometrical
- B. Kinematic
- C. Dynamic
- D. All A., B. and C.**

Channelling is most severe _____?

- A. In towers packed with stacked packing**
- B. In towers packed randomly with crushed solids
- C. In dumped packing of regular units

D. At very high liquid flow rate

Steel containing low percentage of nickel, chromium & tungsten are termed as the _____ steel ?

A. Wrought

B. Tool

C. Alloy

D. Plain carbon

The knowledge of initial concentration and rate constant is necessary to determine the half life time of a reaction of _____ order?

A. Zero

B. First

C. Second

D. None of these

Addition of nickel to copper improves its _____?

A. Machinability

B. Ductility

C. Strength

D. Hardness

Particle size range in which dust catcher (gravity settling chamber) works most effectively and efficiently is _____ microns?

A. < 5

B. 10 to 25

C. < 74

D. > 1000

In a single tank system, the transfer function of _____ to inlet flow rate is $1/(TS+1)$?

A. Outlet flow rate

- B. Level
- C. Both A. & B.
- D. Neither A. nor B.

Which of the following is not a 'manufactured' fuel ?

- A. LPG
- B. Coal briquettes
- C. Tar**
- D. Colloidal fuels

Van Laar equation deals with the activity co-efficients in _____?

- A. Binary solutions**
- B. Ternary solutions
- C. Azeotropic mixture only
- D. None of these

Heat transfer occurs by natural convection because change in temperature causes difference in _____?

- A. Viscosity
- B. Density**
- C. Thermal conductivity
- D. Heat capacity

Correction for capillary effect in manometers (used for pressure measurement) need not be applied, if diameter of the manometer tube is _____ mm?

- A. 4
- C. > 12.5**
- D. < 10

Preheating of a gaseous fuel results in increased _____?

- A. Flame length
- B. Flame temperature**
- C. Quantity of flue gas

D. Ignition temperature

Which of the following gives the crushing energy required to create new surface ?

- A. Taggarts rule
- B. Fick's law
- C. Rittinger's Law**
- D. None of these

Which of the following is not used as a bearing material ?

- A. Copper-lead alloys
- B. Babbitts
- C. Bronzes
- D. Cermets**

Largest constituent of blast furnace gas is _____?

- A. N₂**
- B. CO
- C. CO₂
- D. H₂

The grinding in a hammer crusher takes place due to the _____?

- A. Attrition
- B. Impact
- C. Both A. & B.**
- D. Neither A. nor B.

Which of the following is the most poisonous gas ?

- A. Coke oven gas
- B. Producer gas
- C. Blast furnace gas
- D. L.D. converter gas**

Water-tube boiler is the one, in which _____?

- A. **Water passes through tubes and flue gases around it**
- B. Tube carrying hot flue gases are immersed in a pool of water
- C. Tubes are placed in vertical position
- D. None of these

Answer: Option A

High specific speed of a pump implies that, it is a/an _____ pump?

- A. Centrifugal
- B. Mixed flow
- C. **Axial flow**
- D. None of these

Fatty material used in soap making is _____?

- A. Fatty acid
- B. Fatty alcohols
- C. **Tallow**
- D. Detergents

Which of the following is a Naphthene ?

- A. Butene
- B. Butadiene
- C. **Cyclohexane**
- D. Acetylene

Controlling heat transfer film co-efficient is the one, which offers _____ resistance to heat transfer?

- A. No
- B. The least
- C. **The largest**
- D. Lower

Refractoriness under loads (RUL) is quite close to the fusion temperature (PCE)

for _____ bricks?

- A. Fireclay
- B. Silica**
- C. Dolomite
- D. Very low alumina

Stabilising time for the controllers is the time required for the response to reach _____ percent of its ultimate value?

- A. 63.2
- B. 87.5
- C. 95**
- D. 100

Rate of filtrate delivery is inversely proportional to the _____?

- A. Filtering area & the pressure difference driving force
- B. Viscosity of filtrate
- C. Cake & filter medium resistance
- D. Both A. and B.**

The initial value ($t = 0$) of the unit step response of the transfer function $[(s + 1)/(2s + 1)]$ is _____?

- A. 0
- B. $\frac{1}{2}$**
- C. 1
- D. 2

Which of the following sugars is the sweetest ?

- A. Glucose
- B. Fructose**
- C. Sucrose
- D. Lactose

Removal of non-condensable from steam or other vapour is termed as the

_____ process?

- A. Condensation
- B. Deaeration**
- C. Scavenging
- D. Exhaust

The monomer of natural rubber is

- A. DMT
- B. Isoprene
- C. 2 methyl-1 propane
- D. Both B. and C.**

Pick out the wrong statement pertaining to the analogy between equations of heat and mass _____ transfer operations

- A. Sherwood number in mass transfer is analogous to Nusselt number in heat transfer
- B. Prandtl number in heat transfer is analogous to Schmidt number in mass transfer
- C. Reynolds number in mass transfer is analogous to Grashoff number in heat transfer**
- D. Reynolds number remains the same in both heat and mass transfer

Isotopes of an element have different _____?

- A. Mass number**
- B. Electronic configuration
- C. Nuclear charge
- D. Chemical properties

Throttling process is a/an _____ process?

- A. Reversible and isothermal
- B. Irreversible and constant enthalpy**
- C. Reversible and constant entropy
- D. Reversible and constant enthalpy

Projection welding & stud welding is categorised as the _____ welding?

- A. Pressure
- B. Thermit
- C. Resistance**
- D. Arc

Plasma is _____ ?

- A. A high temperature neutral gas
- B. Nothing but ionised gas**
- C. A source of steady and highest controllable pressure
- D. Formed at very low temperature

Size reduction of the _____ can be suitably done by ball mills, crushing rolls and rod mills?

- A. Metalliferous ores**
- B. Non-metallic ores
- C. Basic slags
- D. Asbestos & mica

Solution used in Doctor's treatment for the removal of mercaptans is _____ ?

- A. Sodium hydroxide
- B. Sodium plumbite**
- C. Cupric chloride
- D. Potassium isobutyrate

Which of the following behaves most closely like an ideal gas ?

- A. He**
- B. N₂
- C. O₂
- D. H₂

“The fugacity of a gas in a mixture is equal to the product of its mole fraction and its fugacity in the pure state at the total pressure of the mixture”. This

is _____?

- A. The statement as per Gibbs-Helmholtz
- B. Called Lewis-Randall rule**
- C. Henry's law
- D. None of these

A steel alloy containing 36% nickel is called _____, which has a zero co-efficient of expansion?

- A. Austenitic stainless steel
- B. Heat resisting steel
- C. Invar**
- D. High speed steel

Hydrogen gas is not produced commercially (for nitrogenous fertiliser manufacture) by _____?

- A. Iron-steam reaction**
- B. Electrolysis of water
- C. Steam reforming of naphtha
- D. Its cryogenic separation from coke oven gas

Sodium _____ has inverted solubility curve i.e. its solubility increases with the lowering of temperature?

- A. Carbonate (monohydrate)**
- B. Chloride
- C. Thiosulphate
- D. Bisulphite

Sometimes, batch process is preferred over continuous process, when the product _____?

- A. Quality & yield cannot be achieved in continuous processes, because of long residence time
- B. Sales demand is fluctuating

C. Both A. & B.

D. Neither A. nor B.

Measurement of the interfacial area of mass transfer is achieved easily & accurately in case of a _____ column?

A. Spray

B. Packed

C. Bubble cap plate

D. Wetted wall

Baffles in mixing tanks are provided to _____?

A. Reduce swirling and vortex formation

B. Increase the structural strength of the tank

C. Aid in rotational flow

D. None of these

Pick out the correct statement _____?

A. Centre to centre distance between two consecutives rivets in a row is called the pitch

B. A riveted joint made in overlapping plates is called butt joint

C. Hole size drilled in riveted plates is less than the actual size of the rivet

D. None of these

Sulphuric acid mist is arrested by using a _____ scrubber?

A. Packed wet

B. Hollow wet

C. Venturi

D. Co-current

Use of economiser in a boiler plant reduces the fuel consumption for steam generation by about _____ percent ?

A. 1

B. 10

C. 30

D. 50

The head loss due to sudden expansion is _____?

- A. $(V_1^2 - V_2^2)/2gc$
- B. $(V_1 - V_2)^2/2gc$**
- C. $(V_1 - V_2)/2gc$
- D. $(V_1^2 - V_2^2)/gc$

Fire refining process is employed in case of _____?

- A. Tin
- B. Copper**
- C. Zinc
- D. Aluminium

Joule-Thomson Co-efficient at any point on the inversion curve is _____?

- A. ∞
- B. +ve
- C. 0**
- D. -ve

The major constituent of black liquor generated during paper manufacture is sodium _____?

- A. Sulphate
- B. Carbonate**
- C. Hydroxide
- D. Bi-carbonate

Surge tanks are provided in high pressure water pipelines to _____?

- A. Store a definite quantity of water all the time
- B. Reduce the water hammer**
- C. Facilitate easy dismantling of pipeline for cleaning and maintenance

D. None of these

Refractory bricks having lower porosity have _____?

- A. High insulating properties
- B. Low heat capacity
- C. Low thermal conductivity
- D. Greater strength**

German silver used for decorative purposes contains maximum percentage of _____?

- A. Silver
- B. Copper**
- C. Zinc
- D. Nickel

Joining of thin foils is preferred to be done by _____?

- A. Gamma rays
- B. X-rays
- C. Microwaves**
- D. Gas welding

Molar heat capacity of water in equilibrium with ice at constant pressure is _____ Kcal/kg mole. °K _____?

- A. 0
- B. ∞**
- C. 50
- D. 100

Carbon is present in steel wholly in the _____?

- A. Combined form**
- B. Free state as graphite
- C. Both A. and B.
- D. Neither A. nor B.

According to the film theory of mass transfer, the mass transfer co-efficient is proportional to (where, D = molecular diffusivity) ?

- A. D
- B. D^2
- C. $D^{0.5}$
- D. $1/D$

Heat flow across a hollow sphere of inner radius ' r_1 ' and outer radius ' r_2 ' is directly proportional to _____ ?

- A. $(r_2 - r_1)/r_1 \cdot r_2$
- B. $r_1 \cdot r_2/(r_2 - r_1)$
- C. $(r_2 + r_1)/r_1 \cdot r_2$
- D. $r_1 \cdot r_2/(r_2 + r_1)$

Pick out the exothermic reaction out of the following ?

- A. $C + H_2O = CO + H_2$
- B. $CaC_2 + H_2O = Ca(OH)_2 + C_2H_2$
- C. $MgCO_3 = MgO + CO_2$
- D. All (A), B. and (C)

Hot wire anemometer is used for the measurement of _____ ?

- A. Flow rates of fluids
- B. Flow rates of granular solids
- C. Very high temperature
- D. Thermal conductivity of gases

Refractory castables are used for _____ ?

- A. Producing monolithic linings
- B. Patch work
- C. Minimising the number of joints in the structure
- D. All A., B. and C.

Boiling point diagram is not affected by the ambient _____?

- A. Pressure
- B. Humidity
- C. Temperature
- D. Both B. and C.**

In an integrated steel plant, NH_3 present in coke oven gas is normally recovered as _____?

- A. $(\text{NH}_4)_2\text{SO}_4$**
- B. NH_4Cl
- C. $(\text{NH}_4)_2\text{NO}_3$
- D. Liquid NH_3

A chain growth polymerisation reaction consists of three different types of reaction namely initiation reaction, propagation reaction & termination reaction. Chain growth polymerisation reaction is not involved in the manufacture of _____?

- A. Siloxane elastomers
- B. Polyamides
- C. Vinyl polymers
- D. Urea-formaldehyde resins**

Chemical kinetics can predict the _____ of a chemical reaction?

- A. Rate**
- B. Feasibility
- C. Both A. & B.
- D. Neither A. nor B.

The amount of chemical coagulant added for treatment of polluted water _____ with increase in temperature of the polluted water to be treated?

- A. Decreases**

- B. Increases
- C. Remain constant
- D. May increase or decrease; depends on the chemical characteristics of polluted water

Applicability of Bernoulli's equation is limited to a/an _____ fluid, that does not exchange shaft work with the surroundings?

- A. Incompressible
- B. Non-viscous
- C. Both A. and B.**
- D. Neither A. nor B.

Pick out the wrong statement?

A. The effect of pressure on heat capacity of gases at pressure above one atmosphere and above the critical temperature is negligible

- B. The value of C_p of gases increases with increase in pressure, above atmospheric pressure
- C. The value of C_p at critical temperature and pressure reaches infinity
- D. All A., B., and C.

In hot wire anemometer used for gas flow measurement, the wire is normally made of _____?

- A. Copper
- B. Platinum**
- C. Constantan
- D. Chromium

Prandtl number is given by _____?

- A. $CP \mu/a$
- B. hD/k
- C. $CP \mu/k$**
- D. $\mu/h CP$

With the same reaction time, initial concentration and feed rate, the reaction 2A

→ B is carried out separately in CSTR and P.F. reactor of equal volumes. The conversion will be _____?

- A. Higher in P.F. reactor**
- B. Higher in CSTR
- C. Same in both the reactors
- D. Data insufficient; can't be predicted

Which is the most suitable for the concentration of foamy & frothy liquors ?

- A. Agitated film evaporator
- B. Long tube vertical evaporator**
- C. Open pan evaporator
- D. None of these

Protective gas used in the annealing furnace for steel coil comprises of _____?

- A. 95% N₂ + 5% H₂**
- B. 5% H₂ + 9% N₂
- C. 100% CO
- D. 100% H₂

Catalytic action in a catalytic chemical reaction follows from the ability of catalyst to change the _____?

- A. Activation energy**
- B. Equilibrium constant
- C. Heat of reaction
- D. None of these

In which of the following gaseous phase reversible reactions, the product yield cannot be increased by the application of high pressure ?

- A. N₂ + O₂ ⇌ 2NO**
- B. PCI₃ + Cl₂ ⇌ PCI₅
- C. N + 3H₂ ⇌ 2NH₃



If in the gaseous phase reaction, $\text{N}_2\text{O}_4 \rightleftharpoons 2\text{NO}_2$, x is the part of N_2O_4 which dissociates, then the number of molecules at equilibrium will be _____?

- A. $(1 + x)$
- B. $(1 - x)$
- C. $(1 + x)^2$
- D. $(1 - x)^2$

A shareholder has _____ say in the affairs of company management compared to a debenture holder ?

- A. More
- B. Less
- C. Same
- D. No

Pick out the correct statement ?

- A. Chemical oxygen demand (COD) is a measure of chemically oxidisable organic matter present in water
- B. COD is determined by oxidising the organic matter present in water with potassium dichromate in cone, sulphuric acid solution at boiling temperature for specified time
- C. COD is related to BOD of a given waste in water but the relationship varies for different wastes. Typically COD of potable water may be 1-2 mg/litre
- D. All A., B. and C.

With increase in C/H ratio of a fuel, the amount of CO_2 formed on its complete combustion _____?

- A. Increases
- B. Decreases
- C. Remain same
- D. Either A. or B., depends on other factors

_____ fibres are made of polyamides?

- A. Dacron
- B. Nylon**
- C. Rayon
- D. Orion

The Schmidt number which is defined as, $\mu/\rho D$, is the ratio of the _____?

- A. Momentum diffusivity to the mass diffusivity**
- B. Thermal diffusivity to the mass diffusivity
- C. Momentum diffusivity to the thermal diffusivity
- D. None of these

Normal screwed fittings are used for pipes upto a diameter of _____ inches?

- A. 1.5
- B. 3**
- C. 5
- D. 9

An electron has a mass that is approximately _____ that of the proton?

- A. 1836 (approximately)
- B. 1/1836 (approximately)**
- C. 1
- D. ∞

Kopp's rule is used to calculate the heat capacity of _____?

- A. Solids**
- B. Liquids
- C. Gases
- D. All (A), B. & (C)

Maximum heat transfer in high temperature furnaces is by _____?

- A. Conduction
- B. Convection
- C. Radiation**
- D. Either A., B. or C.; depends on the type of furnace

Lead pipe is _____?

- A. Especially resistant to solutions containing H₂SO₄
- B. Usually joined by burning (e.g. by melting to adjacent pieces with a torch)
- C. Having very low elastic limit resulting in permanent deformation from either mechanical or thermal strain
- D. All A., B. and C.**

In Azeotropic mixture, the equilibrium vapour composition is _____?

- A. More than liquid composition
- B. Less than liquid composition
- C. Same as liquid composition**
- D. Independent of pressure

Coke oven gas produced by high temperature carbonisation of coal (as compared to that produced by low temperature carbonisation), has _____?

- A. Higher calorific value
- B. Lower hydrogen content
- C. Both A. and B.
- D. Neither A. nor B.**

During ageing of fluid carrying pipes, the _____?

- A. Pipe becomes smoother with use

- B. Friction factor increases linearly with time
- C. Absolute roughness decreases with time
- D. Absolute roughness increases linearly with time**

In case of steam distillation, the steam leaving the liquid is not completely saturated with distillate vapour, because_____?

- A. Temperature is less
- B. Total pressure is less
- C. Mixing of steam with the material being vaporised is not so intimate as to result in equilibrium condition**
- D. Saturated steam is used for steam distillation

Which of the following polymers has the tendency of decomposing before melting ?

- A. Polystyrene
- B. Nylon
- C. PVC**
- D. None of these

A centrifugal pump designed to pump water is employed to pump a more viscous oil. In the later case, the pump_____?

- A. Develops a lower head
- B. Capacity is reduced
- C. Requires more power
- D. All A., B. and C.**

Co-efficient of velocity is _____ the coefficient of discharge?

- A. Less than
- B. More than**
- C. Equal to
- D. Not related to

Most important factor to be considered in the selection of packings for absorbers is the _____ of packing?

- A. Size
- B. Durability
- C. Porosity**
- D. Cost

To get high tray efficiency _____?

- A. Interfacial surface between liquid and gas phase should be large**
- B. Time of contact between the two phases should be less
- C. Gas velocity should be very low
- D. Liquid entrainment should be severe

Heat pump _____?

- A. Accomplishes only space heating in winter
- B. Accomplishes only space cooling in summer
- C. Accomplishes both A. and B**
- D. Works on Carnot cycle

Which of the following is not a raw material used for the manufacture of ordinary glass ?

- A. Iron oxide**
- B. Soda ash
- C. Limestone
- D. Silica

'ADDUCTS' and 'CLATHRATES' are used in case of _____?

- A. Extractive distillation
- B. Crystallisation**
- C. Absorption
- D. None of these

_____ is used as a catalyst in fat splitting ?

- A. ZnO
- B. Ni
- C. V₂O₅
- D. FeO

In a forward feed multiple effect evaporator unit _____?

- A. Viscosity of liquid is highest in first effect
- B. Transfer from effect to effect is done by pumps
- C. No pump is required to withdraw the product from the last effect
- D. None of these

Ignition temperature of a fuel in air is _____ that in pure oxygen?

- A. More than
- B. Less than
- C. Equal to
- D. Either more or less; depends on the type of fuel

For grinding of cereals, grains, spices, pigments, saw dust, cork etc., the most extensively used size reduction equipment is a _____?

- A. Buhrstone mill
- B. Ball mill
- C. Crushing rolls
- D. Hammer mill

Which of the following constituents of cast iron is mainly responsible for imparting it an anti-corrosive property ?

- A. Silicon
- B. Phosphorus
- C. Sulphur
- D. None of these

_____ glass is used for the manufacture of optical glass ?

- A. Pyrex

- B. Soda
- C. Flint**
- D. Crooke's

The pressure drop per unit length for laminar flow of fluid through a long pipe is proportional to (where, A = cross-sectional area of the pipe & D = Diameter of the pipe) ?

- A. A
- B. D
- C. 1/A**
- D. 1/A²

Hard coke is manufactured from _____?

- A. Lignite
- B. Bituminous coal**
- C. Semi-anthracite
- D. Anthracite

Maximum water velocity in tubes of a 1-2 shell and tube heat exchanger may be around _____ metres/second?

- A. 1**
- B. 10
- C. 20
- D. 30

_____ alloys have the highest specific strength of all the structural materials out of the following?

- A. Magnetic steel
- B. Titanium**
- C. Chromium
- D. Magnesium

Conduction occurs in the buffer zone for a fluid flowing through a heated pipe, only when Prandtl number is _____?

- A. 0.1
- B. > 1
- C. < 1
- D. 1

Solvent used in extractive distillation _____?

- A. Is of low volatility
- B. Forms a low boiling azeotrope**
- C. Forms a high boiling azeotrope
- D. Does not alter the relative volatility of the original components

Steam reforming of naphtha is a source of hydrogen production for nitrogenous fertiliser industry. What is the usual ratio of steam to carbon maintained in the process of steam reforming of naphtha ?

- A. 1.5 : 1
- B. 3.5 : 1**
- C. 10 : 1
- D. 15 : 1

The excess of the sum of pressure & velocity heads over the vapor pressure of the liquid at the suction is called the _____?

- A. Static submergence
- B. Net positive suction head (NPSH)**
- C. Cavitation sensitivity
- D. Priming

The apex of an equilateral-triangular coordinate (in ternary liquid system) represents a/an _____?

- A. Pure component**
- B. Binary mixture

- C. Ternary mixture
- D. Insoluble binary system

Humidification involves mass transfer between a pure liquid phase and a fixed gas, which is _____?

- A. Insoluble in the liquid**
- B. Soluble in the liquid
- C. Non-ideal in nature
- D. At a fixed temperature

Fuel oil is subjected to visbreaking to reduce its _____?

- A. Pour point
- B. Viscosity
- C. Pressure drop on pumping
- D. All A., B. and C.**

A first order reaction is to be treated in a series of two mixed reactors. The total volume of the two reactors is minimum, when the reactors are _____?

- A. Equal in size**
- B. Of different sizes
- C. Of such size that the ratio of their volumes is < 5
- D. None of these

Solid and liquid phases of a substance are in equilibrium at the _____?

- A. Critical temperature
- B. Melting point
- C. Freezing point
- D. Both B. and C**

Heat of transition is the heat evolved or absorbed, when a substance is

converted from _____?

- A. Vapor to liquid
- B. Vapor to solid
- C. Solid to liquid
- D. One allotropic form to another allotropic form**

Two liquids manometer is used for measuring small pressure differences in _____?

- A. Liquids
- B. Gases**
- C. Mixture of hydrocarbons
- D. None of these

In any spontaneous process, ?

- A. Only F decreases
- B. Only A decreases
- C. Both F and A decreases**
- D. Both F and A increase

All materials obey Hooke's law within elastic limit. When elastic limit is reached, the tensile strain _____?

- A. Increases very quickly**
- B. Decreases very quickly
- C. Increases in proportion to stress
- D. Decreases in proportion to stress

The assumption made in Elis method in distillation is that enthalpy concentration lines of vapor and liquid are _____?

- A. Parallel
- B. Straight
- C. Both parallel and straight**
- D. Neither parallel nor straight

Hydrogen content of coke oven gas is _____ percent?

- A. 4
- B. 22
- C. 58**
- D. 84

Which of the following reactors is operated at high neutron flux and low power level ?

- A. Breeder reactor
- B. Research reactor**
- C. Heterogeneous reactor
- D. Liquid metal (e.g., molten sodium) cooled reactor

Bakelite (phenol-formaldehyde) resin cannot be used as _____ ?

- A. Decorative paint**
- B. Decorative laminates
- C. Electrical insulation
- D. Glass reinforced plastics

Melting of ice is an example of an _____ process?

- A. Adiabatic
- B. Isothermal**
- C. Isometric
- D. None of these

The yield point phenomenon observed in annealed low carbon steel is due to the presence of the following element ?

- A. Silicon
- B. Carbon**
- C. Phosphorous
- D. Chromium

Reverse osmosis is normally used for the _____ ?

- A. Separation of isotopes of uranium from gaseous uranium hexafluoride
- B. Separation of helium from natural gas
- C. Desalination of brackish water to produce potable (drinking) water**
- D. Purification of oxygen

Roof of a basic electric furnace is made of _____ bricks?

- A. Superduty fireclay
- B. Silica**
- C. Chromite
- D. None of these

The phenomenon in which slow extension of material takes place with the time at constant load is called _____?

- A. Plasticity
- B. Creep**
- C. Elasticity
- D. Ductility

The most serious disadvantage of an orificemeter is that _____?

- A. It is not very accurate
- B. It is very costly
- C. Most of the pressure drop is not recoverable**
- D. It is not suitable for measuring gas flow

Identify an unbounded input from inputs whose transfer functions are given below _____?

- A. 1
- B. $1/S$
- C. $1/S^2$**
- D. $1/(S^2 + 1)$

Alkyd resin cannot be used for making _____?

- A. Plasticiser

- B. Paint & varnish
- C. Fibers**
- D. Film forming materials

_____ conveyor is the most suitable for short distance transportation of non-abrasive loose materials like garbage, grain, food wastes etc?

- A. Flight**
- B. Screw
- C. Drag
- D. Belt

What is the absorptivity of a black body?

- A. 1**
- B. 0
- C. 0.78
- D. 0.95

Fine grit present in sewage is removed in the _____ during sewage treatment?

- A. Grit chamber
- B. Detritus tank**
- C. Trickling filter
- D. Skimming tank

Corrosion involves exchange of electrons in _____ corrosion?

- A. Chemical
- B. Electrochemical
- C. Both A. & B.**
- D. Neither A. nor B.

When dry bulb temperature & wet bulb temperature of moist air is the same, it means that the _____?

- A. Partial pressure of water vapour is less than the total pressure

- B. Humidity is $< 100\%$ & dew point temperature of air has not reached
- C. Dew point temperature of air has not reached & air is not saturated fully
- D. Air is fully saturated**

Paramagnetism method is not used for the composition determination of _____ in gases?

- A. Oxygen
- B. Oxides of nitrogen
- C. Carbon dioxide**
- D. Any of these

Which is an acidic refractory ?

- A. Magnesite
- B. Dolomite
- C. Fireclay**
- D. Chrome magnesite

Which of the following test is used for distinguishing among dry oils, semi-drying oils and non drying oils ?

- A. Elaiden test**
- B. Reichert-Meissl value test
- C. Hunter value test
- D. Iodine value test

Which of the following crushers can be considered as a combination of a jaw crusher and a roller crusher ?

- A. Rod mill
- B. Fluid energy mill
- C. Gyrotory crusher**
- D. Ball mill

Lagoons used for purification of polluted water _____?

- A. Are large shallow artificial lakes also known as clarification lakes, maturation ponds or

oxidation ponds

- B. Use micro-organisms/bacteria in presence of dissolved oxygen
- C. Gives an excellent final effluent (with 3 to 4 lagoons arranged in series) having suspended solid < 1 mg/litre and BOD = 3.8 mg/litre

D. All A., B. & C.

Maximum equilibrium conversion for endothermic reaction is obtained at the _____ temperature?

- A. Highest possible**
- B. Lowest possible
- C. Intermediate
- D. Room

For a counter current heat exchanger with $T_{i h} = 80^{\circ}\text{C}$, $T^{\circ}c = 60^{\circ}\text{C}$, $T^{\circ}h = 50^{\circ}\text{C}$ and $T_{i c} = 30^{\circ}\text{C}$, and the temperature difference between the two streams being the same everywhere along Z, the direction of flow of hot fluid. The temperature profile should satisfy _____?

- A. $d^2T/dZ^2 > 0$
- B. $d^2T/dZ^2 = 0$**
- C. $d^2T/dZ^2 < 0$
- D. $dT/dZ = 0$

Montecatini process is used for the manufacture of _____?

- A. Nitric acid
- B. Phosphoric acid
- C. Urea**
- D. Calcium ammonium nitrate (CAN)

Pick out the wrong statement about the recycle stream in a process ?

- A. Recycling in a process stream helps in utilising the valuable reactants to the maximum with minimum loss of reactants

- B. The ratio of the quantity of a reactant present in the reactor feed of a recycling operation to the quantity of the same reactant entering the process as fresh feed is called combined feed ratio
- C. Recycling in a process does not help in getting higher extent of reaction**
- D. Recycling is exemplified by refluxing back a part of the distillate to the distillation column to maintain the quantity of liquid within the column

In the Kraft process of sulphate paper pulp manufacture, the black liquor and the white liquor storage tank is made of _____?

- A. Concrete
- B. Wood
- C. Steel**
- D. Porcelain

For an autocatalytic reactor, the suitable reactor set up is _____?

- A. P.F. reactors in series
- B. CSTR in series
- C. CSTR followed by P.F. reactor**
- D. P.F. reactor followed by CSTR

Gibbs-Duhem equation relates composition in liquid phase and the _____ at constant temperature & pressure?

- A. Fugacity
- B. Partial pressure
- C. Activity co-efficient
- D. All (A), (B), and (C)**

Potassic fertilisers _____?

- A. Are useful during early stage of the plant growth
- B. Stimulate early growth and accelerate seeding
- C. Help in development of starches of potatoes and grain**

D. None of these

The continuity equation in ideal fluid flow states that _____?

A. Net rate of inflow into any small volume must be zero

B. Energy is not constant along a streamline

C. Energy is constant along a streamline

D. There exists a velocity potential

During coking of coal, the ash content (percentage) _____?

A. Increases

B. Decreases

C. Remain constant

D. None of these

According to Chilton-Colburn analogy for mass transfer, $N_{St} N_{Sc}^{2/3}$ is equal to _____?

A. f

B. $f/2$

C. $2f$

D. $1/f$

Which of the following holds good for an elementary reaction as shown in the bellow figure ?

A. The rate of disappearance of 'Y' is equal to the rate of appearance of 'Z'

B. The rate of disappearance of 'Y' is equal to the rate of disappearance of 'X'

C. Three times the rate of disappearance of 'X' is equal to the rate of appearance of 'Z'

D. The rate of disappearance of 'X' is equal to the rate of appearance of 'Z'

In sieve plate column, holes are drilled or punched in sizes ranging from 2.5 to 12 mm (5 mm being widely used). The hole pitch is normally _____ times the hole diameter to give the required hole area?

A. 0.5 to 1.5

B. 2.5 to 4.0

C. 5 to 10

D. 10 to 15

'Hollander beater' machine used in the paper manufacturing plant does not accomplish the task of _____?

A. Final rolling out of paper

B. Cutting of fibres

C. Hydration of fibres

D. Fibrillation of fibre

With increase in reduced temperature, the fugacity co-efficient of a gas at constant reduced pressure _____?

A. Increases

B. Decreases

C. Remain same

D. Decreases linearly

Sphericity is the ratio of the surface area of a spherical particle having the same volume as the particle to the surface area of the particle. Which of the following has the maximum value of sphericity ?

A. Sphere

B. Cube

C. Cylinder ($L/D = 1$)

D. Raschig rings

The open loop transfer function of a process is $K \frac{(s + 1)(s + 4)}{(s + 2)(s + 3)}$. In the root locus diagram, the poles will be at _____?

A. -1, -4

B. 1, 4

C. -2, -3

D. 2, 3

_____ steel is widely used for the manufacture of motor car crankshafts?

- A. Silicon
- B. Nickel
- C. Chrome**
- D. High speed

Which of the following processes can remove both temporary as well as permanent hardness of water ?

- A. Filtration
- B. Boiling
- C. Distillation**
- D. None of these

The LMTD correction factor (FT) is defined as the _____?

- A. Ratio of true temperature difference to the LMTD**
- B. Ratio of LMTD to the true temperature difference
- C. Differenced of true temperature difference and the LMTD
- D. Geometric mean of the true temperature difference and the LMTD

The Joule-Thomson co-efficient is defined as $(\partial T/\partial P)_H$. Its value at the inversion point is _____?

- A. ∞
- B. 1
- C. 0**
- D. -ve

Polymethyl methacrylate (PMMA) is known as _____?

- A. Bakelite
- B. Teflon
- C. Perspex**
- D. Nylon-6

In chemical dehumidification of air _____?

- A. Both specific humidity & dry bulb temperature increases
- B. Both specific humidity & dry bulb temperature decreases
- C. Specific humidity decreases & dry bulb temperature increases**
- D. Specific humidity increases & dry bulb temperature decreases

Which of the following dust collection equipments is the least efficient (for sub-micronic particles) ?

- A. Dust catcher (gravity type)**
- B. Cyclone separator
- C. Bag filter
- D. Hollow wet scrubber

A graph between _____ is called Wilson plot?

- A. (1/U) Vs. (1/v^{0.8})**
- B. (1/v^{0.8}) Vs. U
- C. v^{0.8} Vs. U
- D. (1/U) Vs. (1/V)

Pressure drop for laminar fluid flow through a circular pipe is given by _____?

- A. $4f(L/D)(v^2/2gc)\rho$
- B. $32(\mu LV/gc D^2)$**
- C. $16/NRe$
- D. $(fL\rho/D)(v^2/2gc)$

Neutraliser tank used for reacting nitric acid with ammonia for the production of ammonium nitrate is made of _____?

- A. Aluminium
- B. Stainless steel**
- C. High silicon (14%) iron
- D. Copper

Penicillin, an antibiotic drug was discovered by _____?

- A. Alexander
- B. Flaming
- C. Doctor Zhivago
- D. None of these

At equilibrium the concentration of water in vapour phase (C^*) in kg/m^3 of air space and the amount of water (m) adsorbed per kg of dry silica gel are related by, $C^* = 0.0667m$. To maintain dry conditions in a room of air space 100m^3 containing 2.2 kg of water vapour initially, 10 kg of dry silica gel is kept in the room. The fraction of initial water remaining in the air space after a long time (during which the temperature is maintained constant) is _____?

- A. 0.0
- B. 0.2
- C. 0.4
- D. 1.0

Which of the following is a continuous filter ?

- A. Plate and frame filter
- B. Cartridge filter
- C. Shell and leaf filter
- D. None of these

Pick out the correct statement ?

- A. Plastics are good conductors of heat and electricity
- B. All the polymers are highly crystalline in nature
- C. Polymers can be vaporised by heating to a very high temperature
- D. The liquid polymer becomes greasy, then waxy and finally solid on increasing the degree of polymerisation

Percentage of U-238 in natural uranium is around _____?

- A. 0.71
- B. 99.29**
- C. 0.015
- D. 29.71

Considering the endothermic dissociation of CaCO_3 in a closed vessel ($\text{CaCO}_3 \rightleftharpoons \text{CaO} + \text{CO}_2$), the pressure of CO_2 increases, if _____?

- A. A catalyst is added
- B. The temperature is increased**
- C. An inert gas is pumped keeping the temperature constant
- D. None of these

Pick out the wrong statement?

- A. Azoic dyes are mostly applied on cotton fabrics
- B. Basic dyes (e.g. amino derivatives) are applied mostly to paper
- C. Mordant dyes are applied mainly to wools
- D. None of these**

The Maxwell relation derived from the differential expression for the Helmholtz free energy (dA) is _____?

- A. $(\partial T / \partial V)_S = -(\partial P / \partial S)_V$
- B. $(\partial S / \partial P)_T = -(\partial V / \partial T)_P$
- C. $(\partial V / \partial S)_P = (\partial T / \partial P)_S$
- D. $(\partial S / \partial V)_T = (\partial P / \partial T)_V$**

Muntz metal is a/an alloys of _____?

- A. Magnesium & tin
- B. Ferrous material
- C. Lead & tin
- D. Copper & zinc**

What is the average life of a radioactive atom having a 'half life period' of T ?

- A. 1.44 T
- B. 0.144 T
- C. 14.4 T
- D. 2T

_____ test can be termed as the semi-destructive test?

- A. Impact
- B. Torsion
- C. Hardness**
- D. Charpy

Trap is used to remove _____ from steam pipe lines?

- A. Steam
- B. Condensate**
- C. Non-condensable
- D. None of these

Coke oven gas compared to blast furnace gas is _____?

- A. More explosive and inflammable
- B. Less poisonous
- C. Lighter
- D. All A., B. and C.**

Viscoelastic behaviour is observed in _____ materials?

- A. Non-crystalline organic polymeric**
- B. Ceramic
- C. All crystalline
- D. All amorphous

Higher concentration of nitrogen dioxide in atmospheric air causes _____?

- A. Cancer
- B. Bronchitis**

- C. Asphyxiation
- D. Corrosion

The boiling points of pure components of a binary system _____ with increase in total pressure of the system ?

- A. Decreases
- B. Increases**
- C. Remains unchanged
- D. May increase or decrease, depends on the system

A unit operation is exemplified by the process of _____ ?

- A. Reduction
- B. Desorption**
- C. Nitration
- D. Combustion

Insulation of liquid surface can be achieved by _____ on top of its surface?

- A. Floating hollow polypropylene spheres**
- B. Spraying alumina powder
- C. Putting cement
- D. None of these

Which of the following is a disaccharide ?

- A. Sucrose**
- B. Glucose
- C. Starch
- D. Maltose

The discharge through a V-notch weir varies as _____ ?

- A. $H^{3/2}$
- B. $H^{1/2}$
- C. $H^{5/2}$**

D. H2/3

LMTD for evaporators & condensers for a given terminal parameters & set of conditions for counter-flow is equal to that for parallel flow. In such heat exchangers, with one of the fluids condensing or evaporating, the surface area required is the least in the _____ flow?

- A. Parallel
- B. Mixed
- C. Counter flow
- D. Same in either A , B. or C.**

Venturimeter is used to measure the flow rate of fluids in pipes, when the pipe is in _____ position ?

- A. Horizontal
- B. Vertical
- C. Inclined
- D. Any**

A fluid gas produced on burning furnace oil contains 0.15 gm mole of CO₂, 0.05 gm mole of oxygen and 0.80 gm mole of N₂. What is its molecular weight ?

- A. 28.6
- B. 30.0
- C. 30.6**
- D. 32.6

In a shell and tube heat exchanger, the inlet temperature of heating/cooling fluid is the _____ variable?

- A. Load**
- B. Manipulated
- C. Controlled
- D. None of these

Which of the following is a primary fuel ?

- A. Blast furnace coke
- B. Gasoline
- C. Natural gas**
- D. Wood charcoal

Claude's liquefaction process employs the cooling of gases by _____?

- A. Expansion in an engine**
- B. Following a constant pressure cycle
- C. Throttling
- D. None of these

Non-ferrous alloys used for making cutting tools need not have high _____?

- A. Abrasion resistance
- B. Toughness**
- C. Red hardness
- D. Cutting speed

The range of Moh's scale of hardness is from _____?

- A. 1 to 15
- B. 1 to 8
- C. 1 to 10**
- D. 0 to 10

Separation of a mixture of two gases by absorption in the liquid solvent depends upon the difference in their _____?

- A. Viscosity
- B. Density
- C. Solubility**
- D. Relative volatility

_____ pumps are a group of vacuum pumps ?

- A. Hyster
- B. Sump
- C. Mono
- D. Submerged

Which of the following may be termed as a variable orifice flow-meter ?

- A. Rotameter
- B. Pitot tube
- C. V-notch
- D. All A., B. and C.

Notched bar test is used for testing the _____ of a material?

- A. Impact strength
- B. Endurance limit
- C. Machinability
- D. Corrosion resistance

The destruction of water-borne pathogens is termed as disinfection of water.

Which of the following is a water disinfectant ?

- A. Chlorine
- B. Alkalis
- C. Benzene hexachloride
- D. Alkyl benzene sulphonate (ABS)

A tank painted with which of the following coloured paints, would heat up maximum by radiation from sun ?

- A. Yellow paint
- B. White paint
- C. Black paint
- D. Grey paint

For evaporation of viscous solution in a multiple effect evaporator, the

preferred feeding scheme is _____?

- A. Forward
- B. Backward**
- C. Parallel
- D. None of these

Which of the following is not a unit of kinematic viscosity ?

- A. Poise**
- B. Stoke
- C. cm²/second
- D. None of these

The temperature in isentropic flow _____?

- A. Does not depend on Mach number
- B. Depends on Mach number only**
- C. Cannot drop and then increase again downstream
- D. None of these

Cetane number of a diesel fuel is the measure of its _____?

- A. Ignition delay**
- B. Smoke point
- C. Viscosity
- D. Oxidation stability

Fuel economy in an industrial furnace operation cannot be achieved by the use of _____?

- A. Stoichiometric combustion air**
- B. Non-preheated combustion air
- C. Combustion air not enriched with oxygen
- D. Recuperators

On mixing 56 gm of CaO with 63 gm of HNO₃, the amount of Ca(NO₃)₂ formed is _____ gm?

- A. 82
- B. 164
- C. 41
- D. 8.2

Death may occur, when SO₂ concentration in atmospheric air exceeds _____ ppm?

- A. 20
- B. 100
- C. 400
- D. 200

Movement of pipeline caused by thermal expansion is taken care by providing _____?

- A. Expansion joint
- B. Changes in its direction
- C. Change in the shape of pipeline
- D. All A., B. and C.

In saturated gas, the _____?

- A. Vapour is in equilibrium with the liquid at the gas temperature
- B. Vapour is in equilibrium with the liquid at the room temperature
- C. Partial pressure of vapour equals the vapour pressure of the liquid at room temperature
- D. None of these

Multistage compressors are used in industry, because they _____?

- A. Reduce the cost of compressor
- B. Reduce the size requirement
- C. Resemble closely to isothermal compression
- D. Are easy to control

An atom bomb works on the principle of _____?

- A. Nuclear fission**
- B. Nuclear fusion
- C. Both the nuclear fission & fusion
- D. Ionisation

In water treatment plant, zeolite process is used to remove the _____ of water?

- A. Acidity
- B. Alkalinity
- C. Hardness**
- D. Iron & zinc

Fluid energy mill comes in the category of _____?

- A. Grinder
- B. Crusher
- C. Cutter
- D. Ultrafine grinder**

The Hatta number is important in _____?

- A. Multi-component distillation
- B. Binary distillation
- C. Gas absorption without chemical reaction
- D. Gas absorption with chemical reaction**

High degree of toughness is a must for _____?

- A. High speed steel
- B. Shock resisting steel**
- C. Cold work tool steel
- D. None of these

To increase the speed of response of a pressure spring liquid or gas expansion thermometer, the clearance space between the thermometer bulb and the thermal well should not be filled with _____?

A. Air

- B. A metal powder or graphite
- C. Oil
- D. Mercury

As the difference between the wall temperature and bulk temperature increases, the boiling heat transfer co-efficient ?

- A. Continues to increase
- B. Continues to decrease
- C. Goes through a minimum**
- D. Goes through a maximum

Generally, income taxes are based on the _____?

- A. Total income
- B. Gross earning**
- C. Total product cost
- D. Fixed cost

Milk is fat dispersed in water. It is an example of _____?

- A. Suspension
- B. Emulsion**
- C. Gel
- D. Solution

Utilities cost in the operation of chemical process plant comes under the ?

- A. Plant overhead cost
- B. Fixed charges
- C. Direct production cost**
- D. General expenses

Low density polythene as compared to high density polythene is _____?

- A. Harder

- B. Tougher
- C. Chemically inert
- D. More flexible**

Aerobic biological oxidation ponds used for the purification of polluted water _____?

- A. Destroys/removes pathogen from the sewage
- B. Is not very effective for non-biodegradable substances (e.g. ABS) containing effluents
- C. Destroys/removes pathogen much more effectively if the sewage is chlorinated
- D. All A., B. & C.**

Rankine cycle comprises of two isothermal and two _____ processes?

- A. Isobaric
- B. Polytropic
- C. Isentropic
- D. None of these**

Out of the following _____ iron has the best capability to bear sudden & excessive shocks?

- A. White
- B. Cast
- C. Wrought**
- D. Pig

Dislocations are _____ defects?

- A. Point
- B. Line**
- C. Volume
- D. None of these

Removal of _____ is accomplished by aeration of water?

- A. Dissolved gases**

- B. Suspended solids
- C. Dissolved solids
- D. None of these

Lenz's law results from the law of conservation of _____?

- A. Mass
- B. Momentum
- C. Energy**
- D. None of these

Pick out the wrong statement ?

- A. Refractories used in muffle furnace should have low thermal conductivity**
- B. The electrical resistivity of refractories drops rapidly with rise in temperature
- C. For reducing spalling tendency, the refractory should be well fired and its porosity should be more
- D. Refractoriness under load (RUL) of a refractory is always less than its refractoriness

Which one of the following is incombustible ?

- A. H₂
- B. CCl₄**
- C. C₂H₂
- D. S

The change in _____ is equal to the reversible work for compression in steady state flow process under isothermal condition?

- A. Internal energy
- B. Enthalpy
- C. Gibbs free energy**
- D. Helmholtz free energy

Natural water contains approximately _____ percent of heavy water?

- A. 0.015**

- B. 0.71
- C. 1.2
- D. 3.5

Which of the following is not produced on commercial scale from sea water ?

- A. Bromine
- B. Magnesium compounds
- C. Potassium compounds
- D. Sodium sulphate**

What is the order of a chemical reaction of the bellow figure, if the rate of formation of 'C', increases by a factor of 2.82 on doubling the concentration of 'A' and increases by a factor of 9 on trebling the concentration of 'B' ?

- A. 7/2**
- B. 7/4
- C. 5/2
- D. 5/4

Flow rate of high velocity flue gas discharged through a stack to the atmosphere can be most conveniently measured by a _____?

- A. Pitot tube**
- B. Manometer
- C. Rotameter
- D. None of these

The eddy diffusivity for a liquid in plug flow must be _____?

- A. 1
- B. 0**
- C. ∞
- D. Between 0 and 1

Rubber latex is an example of _____ fluid?

- A. Dilatants

- B. Newtonian
- C. Pseudo plastic**
- D. Bingham plastic

Number of evaporators which can be used in service in a multiple effect evaporation system is limited by the _____?

- A. Practical limit reached, due to low heat transfer rate because of inadequate temperature difference
- B. Economic limit reached, when the plant cost exceeds the saving of steam
- C. Both A. & B.**
- D. Neither A. nor B.

Theoretical flame temperature of a fuel is that temperature which is attained, when the fuel is completely burnt 'using theoretical amount of air in _____?

- A. Air
- B. Oxygen
- C. Either A. or B.
- D. Either A. or B. without gain or loss of heat**

Separation of two volatile liquids by distillation makes use of their _____?

- A. Selectivity
- B. Relative volatility**
- C. Solubility
- D. Density difference

Heavy water (D₂O) in a nuclear reactor serves as a _____?

- A. Coolant
- B. Moderator
- C. Both A. & B.**
- D. Neutron absorber

With increase in the alumina content, the refractoriness of high alumina refractories _____?

- A. Increases
- B. Decreases
- C. Remain same
- D. May increase or decrease

If Reynolds number is greater than 1, then the _____?

- A. Viscous force is larger than the inertia force
- B. Inertia force is larger than the viscous force**
- C. Inertia force is larger than the surface tension force
- D. Inertia force is larger than the gravitational force

Bode stability method uses _____ loop transfer function?

- A. Open**
- B. Closed
- C. Either A. or B.
- D. Neither A. nor B.

In the complete turbulence zone (in rough pipes), the _____?

- A. Rough and smooth pipes have the same friction factor
- B. Laminar film covers the roughness projections
- C. Friction factor depends upon N_{Re} only
- D. Friction factor is independent of the relative roughness**

Black liquor generated during paper manufacture is concentrated in a _____?

- A. Single effect evaporator
- B. Single effect evaporator followed by a crystalliser
- C. Multiple effect evaporator**
- D. Multiple effect evaporators followed by a crystalliser

. Operating principle of cyclone separator is based on the action of

_____ dust particles?

- A. Diffusion of
- B. Centrifugal force on**
- C. Gravitational force on
- D. Electrostatic force on

Tubes of multiple effect evaporator used for concentration of sugar cane juice are made of _____?

- A. Nickel
- B. Copper**
- C. Stainless steel
- D. Brass

The specific speed of a pump is defined as the speed of a unit of such a size, that it _____?

- A. Delivers unit discharge at unit head**
- B. Requires unit power for unit head
- C. Delivers unit discharge at unit power
- D. None of these

The ratio of inertial forces to gravity forces is called the _____ number?

- A. Mach
- B. Froude**
- C. Euler
- D. Weber

Average sulphur content in Indian pyrites is about _____ percent?

- A. 15
- B. 35**
- C. 55

D. 70

Alloys having more than 80% copper are generally more _____?

- A. Abrasion resistant
- B. Corrosion resistant**
- C. Prone to season cracking
- D. Machinable

In a binary liquid solution of components „A“ and „B“, if component „A“ exhibits positive deviation from Raoult’s law, then component „B“ ?

- A. Exhibits positive deviation from Raoult’s law**
- B. Exhibits negative deviation from Raoult’s law
- C. Obeys Raoult’s law
- D. May exhibit either positive or negative deviation from Raoult’s law

The value of Steric factor ‘P’ in the equation $k = PZeE/RT$ usually ranges from _____?

- A. 1.0 to 10⁻⁸**
- B. 1.1 to 10²
- C. 0.1 to 0.9
- D. None of these

The rate constant of a reaction is a function of the _____?

- A. Time of reaction
- B. Temperature of the system**
- C. Extent of reaction
- D. Initial concentration of the reactants

Out of the following, the depreciation calculated by the _____ method is the maximum?

- A. Diminishing balance**

- B. Straight line
- C. Sum of the years digit
- D. Sinking fund

Catalytic cracking compared to thermal cracking of residue of vacuum distillation of crude oil _____?

- A. Gives higher yield of petrol**
- B. Lower octane number of petrol
- C. Higher sulphur content in the product
- D. Higher gum forming material in petrol

Pick out the wrong statement ?

- A. Geothermal energy is a non-conventional source of energy
- B. Mass is converted into energy in both nuclear fission & fusion reaction
- C. Inhalation of mercury vapour is not harmful for human beings**
- D. Inhalation of arsenic causes cancer

Thermal conductivity of a material does not depend upon its _____?

- A. Mass
- B. Volume
- C. Surface area
- D. All A, C & C**

Higher free energy of activation of a chemical reaction (at a given temperature) implies _____?

- A. Slower rate of reaction**
- B. Higher rate of reaction
- C. Higher equilibrium conversion
- D. Both B. and C.

A solid aluminium ball, when quenched in a water bath maintained at 40°C,

cools down from 550°C to 450°C in 20 seconds. The expected temperature of the ball after next 20 seconds may be about _____ $^{\circ}\text{C}$?

- A. 370
- B. 340
- C. 320
- D. 300

Which of the following has the highest flame speed ?

- A. CO
- B. H_2
- C. CH_4
- D. C_2H_6

Bound moisture is that liquid which exerts an equilibrium vapor pressure _____ that of the pure liquid at the given temperature ?

- A. Less than
- B. More than
- C. Equal to
- D. Either A. or B.; depends on the solid

Circumferential (hoop) stress in a thin cylindrical vessel under internal pressure is _____ the longitudinal stress?

- A. Half
- B. Equal to
- C. Twice
- D. Eight times

How many molecules per unit cell are there in a face centred cubic lattice ?

- A. 2
- B. 4
- C. 6
- D. 8

Reverberatory furnace is used for _____?

A. Roasting/reduction of ores

B. Annealing steel coil

C. Heating air

D. Steel melting

Which of the following gases is the most soluble in water ?

A. NH₃

B. CO₂

C. H₂S

D. CH₄

Turbine impeller _____?

A. Produces only radial current

B. Produces only tangential current

C. Is effective over wide range of viscosities

D. Does not produce tangential current

Which of the following gaseous fuels is likely to have the highest gross calorific value ?

A. Sewage gas

B. LPG

C. Producer gas

D. Natural gas

The Dittus-Boelter equation for convective heat transfer [(i.e. $h = 0.023 (K/D) (Re)^{0.8} (Pr)^{0.4}$] cannot be used for _____?

A. Low Reynold's number

B. Very low Grashoff number

C. Molten metals

D. All A., B. and C.

Efficiency of the combustion of a fuel is judged by the _____ the flue

gas?

- A. % of CO₂ in
- B. % of O₂ in**
- C. Temperature of
- D. Colour of

What is the range of tempering temperature (°C) for most of the materials ?

- A. 75-100
- B. 200-300**
- C. 350-450
- D. 500-600

Oleum produces fumes of _____ ?

- A. SO₂
- B. H₂SO₄
- C. SO₃**
- D. SO₂ + H₂SO₄

Consider the reaction, $C + O_2 \rightleftharpoons CO_2$; $\Delta H = -94$ kcal. What will be the value of ΔH for the reaction $CO_2 \rightarrow C + O_2$?

- A. -94 kcal
- B. +94 kcal**
- C. > 94 kcal
- D. < -94 kcal

_____ is added in stainless steel to prevent inter crystal corrosion?

- A. Vanadium
- B. Niobium**
- C. Chromium
- D. Nickel

Component A is diffusing in a medium B. The flux N_A relative to a stationary point is equal to the flux due to molecular diffusion, if _____ ?

- A. Mass transfer is accompanied by reaction
- B. Diffusion of A is in stagnant medium B
- C. Molecular mean free path is high
- D. There is equimolar counter diffusion**

The residence time distribution of an ideal CSTR is _____?

- A. $(1/\eta) \exp(-t/\eta)$
- B. $\eta \exp(-t/\eta)$
- C. $\exp(-t/\eta)$**
- D. $(1/\eta) (-t/\eta)$

_____ can replace tungsten in high speed steel ?

- A. Chromium
- B. Vanadium
- C. Cobalt**
- D. Molybdenum

Where the density difference of the two liquid phase to be separated is very small (as in milk cream separator), the most suitable separator is

a _____?

- A. Disc bowl centrifuge**
- B. Sharpies super-centrifuge
- C. Batch basket centrifuge
- D. Sparkler filter

Change of heat content when one mole of compound is burnt in oxygen at constant pressure is called the _____?

- A. Calorific value
- B. Heat of reaction
- C. Heat of combustion**
- D. Heat of formation

Maximum stability of white phosphorous is at _____?

- A. Very high pressure
- B. Atmospheric pressure
- C. Room temperature
- D. > 600°C**

At the point of boundary layer separation in fluid flow, the _____?

- A. Shear stress is maximum**
- B. Velocity gradient is flat
- C. Density variation is maximum
- D. Shear stress is zero

In a counter-current liquid extractor _____?

- A. Both liquids flow at fixed rate
- B. Both liquids can have any desired flow rate
- C. Only one of the liquids may be pumped at any desired rate**
- D. Liquid's flow rate depends upon the temperature and pressure

Ordinary water is not used as a moderator because, it _____?

- A. Has a low absorption cross-section
- B. Has a low scattering cross-section
- C. Absorbs neutrons**
- D. Does not absorb neutrons

A 'limiting reactant' is the one, which decides the _____ in the chemical reaction?

- A. Equilibrium constant
- B. Conversion**
- C. Rate constant
- D. None of these

In the equation $Q = UA\Delta t$; Δt is _____?

- A. Geometric mean temperature difference

- B. Arithmetic mean temperature difference
- C. Logarithmic mean temperature difference**
- D. The difference of average bulk temperatures of hot and cold fluids

Heat of neutralisation of HCl and NaOH is – 57.46 kJ/Kg mole. The heat of ionisation of water will be _____ kJ/Kg mole?

- A. 57.46**
- B. -57.46
- C. 114.92
- D. -28.73

Pick out the wrong statement ?

- A. Pensky-Marten apparatus is used for determining flash points above 50°C
- B. Characterisation factor of paraffinic crude oil is more than 12
- C. Abel apparatus is used for determining flash points below 50°C
- D. An oil having high susceptibility to change in viscosity with temperature changes, has a high viscosity index**

_____ Nature of hypo (sodium thiosulphate) makes it useful in photography ?

- A. Oxidising
- B. Reducing
- C. Complex forming**
- D. Photochemical

Conversion of CO to CO₂ by steam in presence of a catalyst is called _____ ?

- A. Steam reforming
- B. Shift conversion**
- C. Steam gasification
- D. None of these

Bromine is used in the preparation of _____ ?

- A. Fire extinguishing compounds
- B. Fire proofing agents
- C. Dyes and antiknock compounds
- D. All A , B. and C.**

The capacity of a pneumatic conveying system depends upon the _____ ?

- A. Bulk density of materials
- B. Pressure of the conveying air
- C. Diameter of the conveying line
- D. All A., B. and C.**

Factor of safety in machine design is defined as the ratio of ultimate stress to _____ stress ?

- A. Working**
- B. Bearing
- C. Yield
- D. None of these

Heating of ortho-phosphoric acid to 250°C produces _____ ?

- A. Meta-phosphoric acid
- B. Pyrophosphoric acid**
- C. No change in it
- D. None of these

Maximum carbon content in any variety of steel can be upto 1.3%. Steel containing 0.4% Carbon is not used for making _____ ?

- A. Nuts
- B. Bolts
- C. Chisels**
- D. Studs

Silica refractories _____ ?

A. crack when subjected to sudden change of temperature

- B. Cannot be used in the dome of hot blast stoves
- C. Have lower thermal conductivity than fireclay bricks
- D. All A., B. and C.

Pick out the wrong statement?

A. A slight haze at the top of chimney indicates good combustion in the furnace

B. A bag filter incurs very small pressure drop and is very efficient for removal of submicronic

dust particles from flue gases at very high temperature

- C. Electrostatic precipitator is the most efficient dust collection equipment for removal of submicronic dust particles present in flue gas
- D. None of these

For a cold viscous feed, backward feed gives _____ than forward feed?

A. A higher capacity

- B. A lower capacity
- C. Lower economy
- D. None of these

According to Taggart's rule for selecting between a gyratory crusher and a jaw crusher; the latter should be used, if the hourly tonnage to be crushed divided by the square of the gape expressed in cm is less than _____?

- A. 0.00184
- B. 0.0184**
- C. 0.184
- D. 1.84

Hot drink (e.g., tea) cups are usually made of _____?

A. Polystyrene

- B. Polythene
- C. Polypropylene
- D. PVC

Air vessel fitted to a reciprocating pump_____?

- A. Increases the work done
- B. Decreases the work done**
- C. Causes cavitation
- D. Results in non-uniform discharge

Bourdon gauges are used for measuring pressure (kg/cm²) ?

- A. < atmospheric
- B. > 2 (gauge)**
- C. 10 (absolute)

In case of saddle packing (e.g., berl and intralox saddles), the maximum size of the packing should not exceed _____ of the column diameter?

- A. 1/5th
- B. 1/15th**
- C. 1/30th
- D. 1/50th

Caking index of the coal blend used for the manufacture of metallurgical coke should be around_____?

- A. 5
- B. 21**
- C. 40
- D. 48

Instrumentation in a plant offers the advantage of_____?

- A. Greater safety of operation
- B. Better quality of product
- C. Greater operation economy
- D. All A., B. and C.**

In drop forging process, the forging is done by dropping the _____ at

high velocity?

- A. Hammer
- B. Workpiece
- C. Die with hammer**
- D. Weight on hammer

Which of the following will give maximum gas conversion ?

- A. Fixed bed reactor
- B. Fluidised bed reactor
- C. Semi-fluidised bed reactor**
- D. Plug-flow catalytic reactor

Saponification number of an oil or fat _____?

- A. Gives an idea about its molecular weight
- B. Is inversely proportional to its molecular weight
- C. Detects its adulteration
- D. All A , B. & C.**

Nickel is a _____ material?

- A. Ferromagnetic**
- B. Semi-conductor
- C. Paramagnetic
- D. Ferroelectric

In a chemical reaction as shown in the bellow figure, it is observed that the (i) Rate of formation of 'P' is doubled on doubling the concentration of 'X' (ii) Rate of formation of 'P' is quadrupled on doubling the concentration of 'Y' (iii) Doubling the concentration of 'Z' does not affect the rate of formation of 'P'

What is the order of the above chemical reaction ?

- A. Zeroth order
- B. First order
- C. Second order

D. Third order

Heat transfer in the laminar sub-layer in case of a liquid flowing through a pipe, is mostly by _____?

- A. Eddies current
- B. Conduction**
- C. Convection
- D. None of these

Which is the purest form of iron ?

- A. Wrought iron**
- B. Pig iron
- C. Bessemer iron
- D. Grey iron

Which of the following is true for Virial equation of state ?

- A. Virial co-efficients are universal constants
- B. Virial co-efficients 'B' represents three body interactions
- C. Virial co-efficients are function of temperature only**
- D. For some gases, Virial equations and ideal gas equations are the same

A certain pressure vessel manufacturer avoids doing reinforcements calculations for openings by always providing a reinforcing pad extending upto double the diameter of the opening and of the same material and thickness as that of the shell wall. If area compensation is accepted as a code guideline, his approach leads to safe design _____?

- A. Only if the opening is on spherical vessel
- B. Only if the opening is on a vertical cylindrical vessel
- C. Only if the opening is on a horizontal cylindrical vessel
- D. Irrespective of the shape of the vessel**

The most efficient equipment for the removal of sub-micronic dust particles

from blast furnace gas is the _____?

- A. Venturi atomiser
- B. Gravity settling chamber
- C. Electro-static precipitator**
- D. Cyclone separator

Vena-contracta pressure tapping is at a distance _____ from the position of an orificemeter fitted in a pipe of internal diameter 'd' ?

- A. d
- B. 0.5 d**
- C. 2d
- D. 4d

For experimental determination of mass transfer co-efficient by wetted wall tower, the mass transfer area is _____?

- A. Calculated
- B. Unknown
- C. Known**
- D. Not required

Gasification of the solid fuel converts its organic part into combustible by interaction with air/oxygen and steam so as to obtain a secondary gaseous fuel of high calorific value having no ash. Gasification reactions are normally carried out at about _____ °C?

- A. 400-500
- B. 900-1000**
- C. 1400-1500
- D. 1700-1800

Green house gases blanket/block the infrared radiation from earth's surface to the atmosphere leading to its progressive warming up. Which of the following gases does not exhibit green house effect ?

- A. CO₂
- B. H₂
- C. SO₃**
- D. N₂

Eutectic reaction for iron-carbon system occurs at a temperature of _____ °C ?

- A. 723**
- B. 959
- C. 1147
- D. 1493

The atomic weight of helium is 4 times that of hydrogen. Its diffusion rate as compared to hydrogen will be _____ times?

- A. 1/2
- B. 4
- C. $\sqrt{2}$**
- D. 1/4

Molasses is the starting material for the production of _____ ?

- A. Alcohol**
- B. Essential oil
- C. Fatty acids
- D. Masecuite

Dryness fraction of dry steam is _____ ?

- A. 0
- B. ∞
- C. 1**
- D. 0.5

In a first order reaction, the time required to reduce the concentration of reactant from 1 mole/litre to 0.5 mole/litre will be _____ that

required to reduce it from 10 moles/litre to 5 moles/litre in the same volume ?

- A. More than
- B. Less than
- C. Same as**
- D. Data insufficient; can't be predicted

Mollier chart is a _____ plot?

- A. Pressure vs. enthalpy
- B. Pressure vs. volume
- C. Enthalpy vs. entropy**
- D. Temperature vs. entropy

_____ of depreciation calculation does not take into account the interest on investments?

- A. Present worth method
- B. Sinking fund method
- C. Sum of the years-digits method**
- D. All A, B. and C.

Design of waste heat boiler for recovery of waste heat from furnace gases depends upon the _____?

- A. Quantity & temperature of waste gas
- B. Dust concentration & nature of dust in waste gas**
- C. Corrosive nature of the waste gas
- D. All A., B. and C.

Compositional analysis of flue gas coming out of a furnace in respect of O₂ and CO₂% can be continuously done by a/an _____?

- A. Orsat apparatus
- B. Thermal conductivity cell**
- C. Zirconia probe
- D. Chromatograph

A high space velocity means that a given _____?

- A. Reaction can be accomplished with small reactor
- B. Conversion can be obtained with a high feed rate
- C. Both A. and B.**
- D. None of these

Safe condition for storage of high V.M. bituminous coal is that _____?

- A. Height of the coal heap should be < 3 metres
- B. Maximum 200 tons should be stored in a heap
- C. Both A. and B.**
- D. Neither A. nor B.

Baffle spacing _____?

- A. Is not the same as baffle pitch
- B. Should be less than one fifth the diameter of the shell
- C. Should be less than the inside diameter of the shell**
- D. None of these

Percentage of silver in German silver is _____?

- A. 5
- B. 10
- C. 20
- D. 0**

With increase in temperature, the electrical conductivity of the platinum used in the resistance thermometer ?

- A. Increases
- B. Decreases**
- C. Remain constant
- D. Increases exponentially

_____ is the most important element, which controls the physical

properties of steel ?

- A. Manganese
- B. Silicon
- C. Carbon**
- D. Vanadium

Propellers are _____ ?

- A. Axial flow mixers**
- B. Low speed impeller
- C. Used for mixing liquids of high viscosity
- D. Radial flow mixers

All gases above its inversion temperature, in a throttling process will show _____ ?

- A. A heating effect**
- B. No change in temperature
- C. A cooling effect
- D. Either A. or (C)

Styrene-butadiene-rubber (SBR) as compared to natural rubber has _____ ?

- A. Poorer tensile strength
- B. Poorer resistance to oxidation
- C. Greater amount of heat build-up under heavy loading
- D. All A , B. and C.**

The absorptivity of a body is equal to its emissivity _____ ?

- A. At a particular temperature
- B. For circular bodies
- C. Under thermal equilibrium**
- D. None of these

Prandtl number for most of dry gases is about _____ ?

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- A. 0.001
- B. 0.72**
- C. 70
- D. 150

In case of isentropic flow, the speed of sound in an ideal gas is proportional to (where M = molecular weight of the gas) ?

- A. $1/\sqrt{M}$**
- B. \sqrt{M}
- C. $1/M$
- D. M

The molecular weight of heavy water is _____ ?

- A. 10
- B. 18
- C. 20**
- D. 36

With increase in steam pressure, its specific volume decreases _____ ?

- A. Rapidly first and then slowly**
- B. Linearly
- C. Slowly first and then rapidly
- D. Exponentially

For an ideal gas, the activity co-efficient is _____ ?

- A. Directly proportional to pressure
- B. Inversely proportional to pressure
- C. Unity at all pressures**
- D. None of these

Pick out the wrong statement about cavitation?

- A. Sudden reduction of pressure in a fluid flow system caused by flow separation, vortex

formation or abrupt closing of valve leads to cavitation

- B. Cavitation may be caused due to boiling of liquid by decreasing the pressure resulting in formation & collapse of vapor cavities
- C. Cavitation begins at higher static pressure and lower velocity in larger diameter pipelines resulting in audible noise
- D. Large scale cavitation cannot damage pipeline, restrict fluid flow and damage steam turbine blades**

In the equation $PV^n = \text{constant}$, if the value of $n = \gamma = C_p/C_v$, then it represents a reversible _____ process?

- A. Isothermal
- B. Adiabatic
- C. Isentropic**
- D. Polytropic

Calorific value of blast furnace gas is around _____ KCal/Nm³?

- A. 850**
- B. 1800
- C. 4200
- D. 6500

Perspex is nothing but _____ ?

- A. Acrylic sheet**
- B. An elastomer
- C. An alloy of lead and tin
- D. Aluminium foil clad with Bakelite

With increase in moisture content of coal, its _____ ?

- A. Calorific value increases
- B. Caking properties diminish**
- C. Swelling during carbonisation becomes excessive
- D. None of these

Thermosetting materials _____?

- A. Are cross-linked molecules**
- B. Soften on application of heat
- C. Are solvent soluble
- D. None of these

Spalling tendency of refractories is reduced by increasing its _____?

- A. Porosity**
- B. Specific gravity
- C. Thermal conductivity
- D. Strength

Which of the following is the second major component of cement ?

- A. Al_2O_3
- B. SiO_2**
- C. CaO
- D. Fe_2O_3

Condensation polymerisation of caprolactam is carried out in the reactor maintained at a temperature of _____ °C for producing nylon-6?

- A. -20 to 25
- B. 50 to 75
- C. 100 to 150
- D. 250-280**

Vapor pressure of a solution is proportional to (where, S_v and S_t are mole fraction of solvent and solute respectively) ?

- A. S_v**
- B. $1/S_t$
- C. S_t
- D. $1/S_v$

Sweetening of petroleum product means the removal of _____?

- A. Sulphur & its compounds
- B. Water
- C. Organic impurities
- D. Wax

Size reduction of _____ is accomplished in steam heated rollers and roll crushers?

- A. Resins
- B. Gums
- C. Hard rubber
- D. Waxes

Cross linked polymers formed from bi-and trifunctional groups in which cross-linkage in three dimensions via few chemical bonding across linear chains occur imparts to the polymer _____ properties?

- A. Thermoplastic
- B. Thermosetting
- C. Elastometric
- D. Brittleness

Nitrolime is chemically known as _____?

- A. Calcium nitrate
- B. Ammonium nitrate
- C. Calcium ammonium nitrate (CAN)
- D. None of these

The suitable evaporator for concentration of foaming liquids is a _____ evaporator?

- A. Long tube

- B. Short tube
- C. Vacuum
- D. Falling film

In distillation, overhead product contains _____?

- A. Only one component
- B. Two components
- C. Any number of components**
- D. Only saturated liquid

Fenske-Underwood equation used for calculating the minimum number of theoretical plates in distillation column is valid for _____?

- A. Constant molal overflow
- B. Total reflux
- C. Constant relative volatility
- D. All A., B. and C.**

_____ of austenite decreases the hardenability in steel?

- A. Fine grains
- B. Coarse grains
- C. Homogeneity
- D. Dissolved elements (except cobalt)**

With increase in pump speed, its NPSH requirement _____?

- A. Decreases
- B. Increases**
- C. Remains unaltered
- D. Can either increase or decrease; depends on other factors

Vulcanisation of rubber _____?

- A. Decreases its tensile strength
- B. Increases its ozone & oxygen reactivity
- C. Increases its oil & solvent resistance

D. Converts its plasticity into elasticity

A refrigerator works on the principle of _____ law of thermodynamics?

- A. Zeroth
- B. First
- C. Second**
- D. Third

Calorific value of coke oven gas produced by low temperature carbonisation of coal is about _____ Kcal/Nm³?

- A. 4000
- B. 2500
- C. 6500**
- D. 10000

If the heat of solution of an ideal gas in a liquid is negative, then its solubility at a given partial pressure varies with the temperature as _____?

- A. Solubility increases as temperature increases
- B. Solubility increases as temperature decreases**
- C. Solubility is independent of temperature
- D. Solubility increases or decreases with temperature depending on the Gibbs free energy change of solution

The catalytic activity of enzymes is due to their capacity to lower the _____ energy?

- A. Activation**
- B. Potential
- C. Kinetic
- D. None of these

Which of the following plants does not emit appreciable amount of SO₂ in atmosphere ?

- A. Thermal power plant
- B. Petroleum refinery
- C. Nitric acid plant**
- D. Sulphuric acid plant

In an exothermic chemical reaction, the reactants compared to the products have _____?

- A. Higher temperature
- B. More energy**
- C. Less energy
- D. Same energy

Hardest material so far found is _____?

- A. Diamond**
- B. Graphite
- C. Carborundum
- D. Pumice stone

The relative humidity of air decreases in-spite of an increase in the absolute humidity, when the _____?

- A. Temperature rises**
- B. Pressure rises
- C. Temperature falls
- D. Pressure falls

Heat transfer rate described by Fourier's law will decrease, if the _____ increases?

- A. Thermal conductivity
- B. Thickness**
- C. Temperature difference

D. Heat transfer area

Stability of a control system containing a transportation lag can be best analysed by _____?

A. Routh test

B. Root locus methods

C. Frequency response methods

D. None of these

Laboratory gas is obtained by the cracking of _____?

A. Gasoline

B. Diesel

C. Fuel oil

D. Kerosene

A gas (density = 1.5 kg/m^3 , viscosity = $2 \times 10^{-5} \text{ kg/m.s}$) flowing through a packed bed (particle size = 0.5 cm , porosity = 0.5) at a superficial velocity of 2 m/s causes a pressure drop of 8400 Pa/m . The pressure drop for another gas, with density of 1.5 kg/m^3 and viscosity of $3 \times 10^{-5} \text{ kg/m.s}$ flowing at 3 m/s will be _____?

A. 8400 Pa/m

B. 12600 Pa/m

C. 18900 Pa/m

D. 16800 Pa/m

The property of material, by which a given amount of energy is absorbed by it, without plastic deformation, is called _____?

A. Resilience

B. Toughness

C. Ductility

D. Impact strength

In a shell and tube type heat exchanger, the floating tube bundle heat arrangement is used _____?

- A. In low range of temperature differences
- B. In high range of temperature differences**
- C. Because of its low cost
- D. To prevent corrosion of the tube bundles

A pressure vessel is said to be made of 'thick' shell, if the ratio of its diameter to wall thickness is _____?

- A. < 10
- B. > 10**
- C. > 20
- D. < 20

Separation of materials of the same density based on their sizes by using then-different rates of flow is called _____?

- A. Sorting
- B. Sizing**
- C. Flocculation
- D. Elutriation

Half life period of a chemical reaction is _____?

- A. The time required to reduce the concentration of the reacting substance to half its initial value**
- B. Half of the space time of a reaction
- C. Half of the residence time of a reaction
- D. None of these

Catalyst used in the oxidation of benzene to produce Maleic anhydride is _____?

- A. V2O5**
- B. Pt

- C. Ni
- D. Cr

The average velocity in the tubes of a 1-4 heat exchanger is _____ times that in 1-1 heat exchanger having the same size & number of tubes and operated at same liquid flow rate ?

- A. 2
- B. 1/2
- C. 4**
- D. 1/4

P2O5 content in triple superphosphate is about _____ percent?

- A. 42-50**
- B. 15-20
- C. 85-90
- D. 70-75

A 'body' which allows the short wavelength incoming solar radiation to enter in, but does not allow long wave length outgoing infra red radiation to escape out is called the _____?

- A. Global warming
- B. Green house**
- C. Atmospheric effect
- D. Ionosphere

The exit age distribution of a fluid leaving a vessel (denoted by E) is used to study the extent of non-ideal flow in the vessel. The value of $\int_0^{\infty} E \cdot dt$ is _____?

- A. 0
- B. 1**
- C. ∞
- D. $\sqrt{2\pi}$

Which of the following is the most suitable for preheating combustion air above 650°C ?

- A. Regenerator
- B. Metallic recuperator
- C. Ceramic recuperator**
- D. None of these

Low temperature carbonisation of coal produces _____ ?

- A. Metallurgical coke
- B. Soft coke**
- C. Very low calorific value coke oven gas
- D. No by-products

Slow plastic deformation of metals under a constant stress is termed as _____ failure?

- A. Fatigue
- B. Endurance
- C. Creep**
- D. None of these

Liquid levels in autoclaves are measured by _____ ?

- A. Simple float
- B. Differential float type manometer**
- C. Glass gauge
- D. None of these

Which of the following hardness tests does not measure the indentation hardness of metals and alloys ?

- A. Vickers hardness test
- B. Shore scleroscope test**
- C. Brinell hardness test
- D. Rockwell hardness test

Which of the following is the most elastic material ?

- A. Plastic
- B. Glass
- C. Steel**
- D. Rubber

The simple Pitot tube does not measure the _____?

- A. Static pressure
- B. Dynamic pressure
- C. Velocity at the stagnation point
- D. All A., B. and C.**

At 750°K and 1 atm, the approximate value of Schmidt number for air is _____?

- A. 0.01
- B. 0.1**
- C. 1
- D. 10

When liquid and vapour phases of one component system are in equilibrium (at a given temperature and pressure), the molar free energy is _____?

- A. More in vapour phase
- B. More in liquid phase
- C. Same in both the phases**
- D. Replaced by chemical potential which is more in vapour phase

Entropy is a measure of the _____ of a system?

- A. Disorder**
- B. Orderly behaviour
- C. Temperature changes only
- D. None of these

The main ore of thorium is _____?

- A. Pitchblende
- B. Monazite sand**
- C. Limonite
- D. Galena

Foot valves provided in pumps are _____ valves?

- A. Relief
- B. Three/four way
- C. Pressure reducing
- D. Directional control**

Conditioners like finely divided peat are added to the fertiliser to _____?

- A. Counteract burning
- B. Avoid caking & hardening**
- C. Produce bulk
- D. Increase its solubility

A material being tested for endurance strength is subjected to the _____ load ?

- A. Impact
- B. Completely reversed**
- C. Dynamic
- D. Static & dynamic

Arithmetic mean area can be used in heat transfer problem to calculate the heat flow by conduction through a cylinder which is _____?

- A. Thin walled having the value of $A_o/A_i < 2$**
- B. Thick walled
- C. Having the value of $A_o/A_i > 2$
- D. Both B. and C.

Pick out the wrong statement ?

- A. Chemical reactions with high activation energy are very temperature sensitive
- B. A flat velocity profile exists in a plug flow reactor
- C. The residence time for all the elements of fluid in case of a P.F.R. need not be same**
- D. Half life of a reaction increases with increased initial concentration for reaction orders more than one

A coal having higher volatile matter content will necessarily have lower _____ ?

- A. Ash fusion temperature
- B. Calorific value
- C. Ignition temperature**
- D. Caking index

The two elements required to form substitutional solid solution should not have _____ ?

- A. Same crystalline structure
- B. Same valency
- C. Widely differing electronegativity**
- D. Same atomic sizes

Which of the following is the most adverse factor challenging the choice of mercury electrolytic cell process for the production of caustic soda ?

- A. High cost of mercury
- B. High specific gravity of mercury
- C. Non-availability of high purity mercury
- D. Pollution of water stream by mercury**

Liquefied petroleum Gas (LPG) used for the household cooking comprises mainly of _____ ?

- A. Propane & butane
- B. Butane & ethane
- C. Methane & ethane
- D. Methane & carbon monoxide

Bubble cap plate column is _____?

- A. A finite stage contactor
- B. Used only for distillation, not for absorption
- C. A differential stage contactor
- D. A continuous contactor

_____ conveyors are also called scrapers?

- A. Apron
- B. Screw
- C. Helical flight
- D. Both B. & C.

The equation, $C_p - C_v = R$, is true for _____ gas?

- A. No
- B. Any real
- C. Only ideal
- D. Both B. and C.

Unsaturated air (with dry and wet bulb temperatures being 35 and 25°C respectively) is passed through water spray chamber maintained at 35°C. The air will be _____?

- A. Cooled
- B. Humidified
- C. Both A. & B.
- D. Dehumidified

Which of the following additives/water proofing agents is added to lower the hydrophilic (moisture loving) characteristic of cement ?

- A. Xanthates
- B. Stearic acid
- C. Calcium & aluminium stearate**
- D. Formic acid

Bunsen burner is an example of a/an _____ burner?

- A. Inside mixing/premix type**
- B. Outside mixing/diffusion flame/nozzle mix type
- C. Rotary cup
- D. Submerged combustion

Prandtl number is the ratio of _____ ?

- A. Mass diffusivity to thermal diffusivity
- B. Momentum diffusivity to thermal diffusivity**
- C. Thermal diffusivity to mass diffusivity
- D. Thermal diffusivity to momentum diffusivity

Ingress of cold air in the furnaces through cracks, charging doors, openings etc _____ ?

- A. Reduces the flue gas temperature and makes the furnace atmosphere oxidising
- B. Increases the load on the induced draft fan
- C. Reduces the furnace draught
- D. All A., B. and C.**

80% less than 200 mesh size particles are called _____ ?

- A. Smoke
- B. Powder**
- C. Grit
- D. Aggregates

Sea water contains about _____ ppm of bromine ?

- A. 5
- B. 70**

- C. 500
- D. 1700

A copolymer of vinyl and vinylidene chloride is called _____?

- A. Treylene
- B. Orlon
- C. Saran**
- D. Dacron

Stalagmometer is used for the measurement of _____?

- A. Kinematic viscosity
- B. Surface tension**
- C. Refractive index
- D. Optical activity

Centrifugal compressors compared to reciprocating compressors _____?

- A. Require less space
- B. Have quieter operation
- C. Have lower operating costs
- D. All A., B. and C.**

Lurgi coal gasifier is a pressurised _____ bed reactor ?

- A. Moving**
- B. Fixed
- C. Fluidised
- D. Entrained

Diaphragm valves are used for handling _____ fluids?

- A. Corrosive**
- B. Viscous
- C. Non-Newtonian
- D. Solid suspended

Brown spots in fabrics will be caused by washing with water containing large amount of _____?

- A. Iron
- B. Zinc
- C. Iodine
- D. Bromine

A centrifugal pump has the following specifications: Power = 4 H.P.; Speed = 800 rpm Head = 8 metres Flow = 1000 litres/minutes. If its speed is halved, the new discharge will be _____ litres/minute ?

- A. 500
- B. 200
- C. 1000
- D. 750

Semi-silica bricks compared to silica bricks have _____?

- A. Less fusion point
- B. Better spalling resistance
- C. Both A. and B.
- D. Neither A. nor B.

Which of the following has the maximum °API gravity of all ?

- A. Diesel
- B. Kerosene
- C. Petrol
- D. Furnace oil

Make up water is required in a cooling tower to replace the water lost by _____?

- A. Evaporation
- B. Drift

- C. Blowdown and leakage
- D. All A., B. and C.**

All gases except _____ shows a cooling effect during throttling process at atmospheric temperature and pressure?

- A. Oxygen
- B. Nitrogen
- C. Air
- D. Hydrogen**

The malleability of a material is the property by virtue of which it can be rolled or hammered into thin sheets. Which of the following materials has the maximum malleability ?

- A. Lead**
- B. Copper
- C. Aluminium
- D. Wrought iron

Which of the following forces does not act on a fluid at rest ?

- A. Viscous force**
- B. Gravity force
- C. Hydrostatic force
- D. Surface tension force

For water at 300°C, it has a vapour pressure 8592.7 kPa and fugacity 6738.9 kPa Under these conditions, one mole of water in liquid phase has a volume of 25.28 cm³ and that in vapour phase in 391.1 cm³. Fugacity of water (in kPa) at 9000 kPa will be _____ ?

- A. 6738.9
- B. 6753.5**
- C. 7058.3
- D. 9000

Urea is formed only _____?

- A. In liquid phase
- B. In vapour phase
- C. At very high temperature
- D. At very low pressure (vacuum)

Avogadro number is the number of molecules in one _____ of a gas?

- A. gram
- B. Kilogram
- C. gm.mole
- D. Litre

The equivalent diameter for pressure drop is _____ that for heat transfer?

- A. Smaller than
- B. Greater than
- C. Equal to
- D. Not related with

Maximum change in the hardness of martensite occurs in the carbon content range of _____ percent in steel?

- A. 0.01 to 0.10
- B. 0.2 to 0.4
- C. 0.5 to 0.7
- D. 0.8 to 1.0

The pressure of 'V' litres of a dry gas is increased from 1 to 2 kgf/cm² at a constant temperature. The new volume will become _____?

- A. V/2
- B. 2V
- C. V/4
- D. V2

Which of the following does not occur during firing/burning of refractories ?

- A. Removal of water of hydration
- B. Vitrification
- C. Decrease in crushing strength**
- D. Development of stable mineral form

Phosphatic fertiliser is graded based on its _____ content?

- A. P₂O₃
- B. PCl₅
- C. P₂O₅**
- D. H₃PO₄

High speed steel should have high _____ ?

- A. Toughness
- B. Wear resistance
- C. Hardenability
- D. Both B. & C.**

Removal of dirt/soil by soaps or detergent does not involve the _____ of soil ?

- A. Emulsification
- B. Dispersion
- C. Precipitation**
- D. Wetting

Pick out the wrong statement?

- A. The vacuum pressure is always the negative gauge pressure
- B. The pressure of the liquid measured by a piezometer tube is the gauge pressure
- C. Manometric liquid should have high surface tension
- D. The point at which the resultant pressure on an immersed surface acts, is known as the centre of gravity**

Select the wrong statement pertaining to flow of an incompressible fluid through a Venturimeter ?

- A. For frictionless flow, the fluid pressure entering the venturi meter will be exactly equal to that leaving the Venturimeter
- B. Discharge of fluid through a Venturimeter depends upon the gage difference irrespective of the orientation of Venturimeter
- C. Venturimeter occupies less space than an orificemeter**
- D. Venturimeter incurs less power loss compared to an equivalent orificemeter

In centrifugal pumps, cavitation occurs, when pressure of the impeller eye or vane becomes _____?

- A. Less than atmospheric pressure
- B. More than liquid vapor pressure
- C. Less than liquid vapor pressure**
- D. More than atmospheric pressure

The slope of the operating line for a single component co-current absorber when plotted in terms of mole ratio units is _____?

- A. 0
- B. ∞
- C. -ve**
- D. +ve

For motion of spherical particles in a stationary fluid, the drag co-efficient in hindered settling compared to that in free settling is _____?

- A. More**
- B. Less
- C. Equal
- D. More or less, depending on the type of particle

If f = moles of vapour present per mole of feed, then the slope of feed line is (McCabe- Thiele method) _____?

- A. $(1 - f)/f$
- B. $-(f - 1)/f$
- C. $-1/f$**
- D. $-f/(1 - f)$

Poly Vinyl Chloride (P.V.C.) is a _____ material ?

- A. Thermosetting
- B. Thermoplastic**
- C. Fibrous
- D. Chemically active

The most distinguished property of malleable cast iron is its high _____?

- A. Ductility**
- B. Hardness
- C. Malleability
- D. None of these

Drag force on the float of a Rotameter is (where Q = flow rate of the) _____?

- A. $\propto Q$
- B. $\propto \sqrt{Q}$
- C. $\propto Q^2$
- D. Constant**

Rotary kiln is not involved in the production of _____?

- A. Cement
- B. Lime from limestone
- C. Slaked lime from quick lime**
- D. None of these

Tube height in a calandria type evaporator is normally less than _____ metres?

- A. 1
- B. 2**
- C. 3.5
- D. 5.5

Calorific value of gobar gas (containing $\text{CH}_4 = 60\%$, $\text{H}_2 = 10\%$; $\text{CO}_2 = 30\%$) may be about _____ Kcal/Nm³?

- A. 1,800
- B. 3,200
- C. 5,400**
- D. 10,200

Air is best heated with steam in a heat exchanger of _____?

- A. Plate type
- B. Double pipe type with fin on steam side
- C. Double pipe type with fin on air side**
- D. Shell and tube type

Brazing filler metal used for joining steel plates _____?

- A. Melts below the melting points of base metals**
- B. Melts below 300°C
- C. Is copper phosphorous alloy
- D. Is copper

Which of the following can be calculated theoretically using steam table and Dalton's law of partial pressure; if the relative humidity and dry bulb temperature of moist air is known ?

- A. Dew point
- B. Humidity ratio
- C. Wet bulb temperature**

D. None of these

Design of heterogamous catalytic reactor involves consideration of _____ steps?

- A. Only chemical
- B. Only physical
- C. Both A. & B.**
- D. Neither A. nor B.

In condensers used in thermal power plants, steam is normally used in shell side and cooling water on the tube side, because of the reason that ?

- A. Compared to the mass flow rate of cooling water, the rate of condensation of steam is invariably smaller
- B. Maintaining vacuum on tube side is more difficult than that on the shell side
- C. Water velocity can be increased conveniently to increase the overall heat transfer coefficient**
- because of its lower specific volume compared to steam
- D. Condenser can act as a storage unit for condensed steam

Liquid column manometers are used for measuring the pressure _____ kgf/cm²?

- A. > 2 (gage)
- B. < 3 (gage)**
- C. < 10 (gage)
- D. < atmospheric

Water on heating from 1 to 4°C _____ ?

- A. Contracts**
- B. Expands
- C. Has same volume
- D. May contract or expand

During electrical desalting of crude oil, the electrical conductivity of a mixture of

crude oil and water (which ranges between 3 to 8% water) _____
with increase in the amount of water?

- A. Decreases
- B. Increases**
- C. Remains unchanged
- D. Decreases linearly

Multistage catalytic converter is not used in the _____?

- A. Conversion of SO_2 to SO_3
- B. NH_3 synthesis reaction**
- C. Both A. and B.
- D. Neither A. nor B.

A back mix reactor is _____?

- A. Suitable for gas phase reactions
- B. Ideal at very low conversion
- C. Same as plug flow reactor (PFR)
- D. Same as ideal stirred tank reactor**

Catalyst used in Haber's process for ammonia production
is _____?

- A. Reduced iron oxide**
- B. Nickel
- C. Vanadium pentoxide
- D. Silica gel

The property of material, by which a given amount of energy is absorbed by it
without plastic deformation, is called the _____?

- A. Resilience**
- B. Toughness
- C. Ductility
- D. Impact strength

With increase in temperature, the thermal conductivity of non-metallic amorphous solids _____?

- A. Decreases
- B. Increases**
- C. Remain constant
- D. First decreases upto certain temperature and then increases

In chemical process equipments, the conical bottom heads used, usually has an apex angle of _____?

- A. 20°
- B. 40°
- C. 60°**
- D. 80°

Inhalation of lead compounds present in the automobile exhausts (using leaded petrol) causes _____?

- A. Blood poisoning
- B. Anaemia
- C. Nervous system disorder
- D. All A., B. and C.**

Metalloid is _____?

- A. Highly electronegative in nature
- B. An element which exhibits the properties of both metal & non-metal**
- C. An alloy
- D. All A., B. and C.

The dimensional formula of bulk modulus of elasticity is same as that of the _____?

- A. Pressure**
- B. Density
- C. Force

D. None of these

A pipe is generally made of circular cross-section, because a circular cross-section has the _____?

- A. Higher structural strength
- B. Lowest surface area requirement for a given volume
- C. Both A. & B.**
- D. None of these

Which of the following fertilizers is used as a cattle feed ?

- A. Urea**
- B. Calcium ammonium nitrate
- C. Superphosphate
- D. Ammonium sulphate

While dissolving a gas into a liquid at a constant temperature, the ratio of the concentration of the gas in the solution phase and in the gaseous phase is _____?

- A. Infinity
- B. Unity
- C. Constant**
- D. Negative

The gasification reaction represented by, $C + H_2O = CO + H_2$, is _____?

- A. Exothermic
- B. Endothermic**
- C. Catalytic
- D. Autocatalytic

As the entropy of the universe is increasing, day by day, the work producing capacity of a heat engine is _____?

- A. Not changed
- B. Decreasing**
- C. Increasing
- D. Data sufficient, can't be predicted

'Unreacted core model' represents the reaction involving _____?

- A. Combustion of coal particles
- B. Roasting of sulphide ores**
- C. Manufacture of carbon disulphide from elements
- D. None of these

Co-efficient of discharge (C_d) is defined as actual discharge/theoretical discharge and is equal to $C_c \cdot C_v$; where C_c = Co-efficient of contraction and C_v = co-efficient of velocity. C_d of an orifice is usually about _____?

- A. 0.42
- B. 0.62**
- C. 0.82
- D. 0.98

The necessary condition for phase equilibrium in a multiphase system of N components is that the _____?

- A. Chemical potentials of a given component should be equal in all phases**
- B. Chemical potentials of all components should be same in a particular phase
- C. Sum of the chemical potentials of any given component in all the phases should be the same
- D. None of these

A mixture of chlorine & sodium bromide acts as a/an _____?

- A. Insecticides
- B. Analgesic drug
- C. Fire retardant**
- D. Hydrogenation catalyst

The time constant of a unity gain, first order plus time delay process is 5 min. If the phase lag at a frequency of 0.2 rad/min is 60° , then the dead time (in minutes) is _____?

- A. $5\pi/12$
- B. $\pi/6$
- C. $\pi/12$
- D. $\pi/3$

A perfectly insulated container of volume V is divided into two equal halves by a partition. One side is under vacuum, while the other side has one mole of an ideal gas (with constant heat capacity) at 298 K. If the partition is broken, the final temperature of the gas in the container _____?

- A. Will be greater than 298 K
- B. Will be 298 K
- C. **Will be less than 298 K**
- D. Cannot be determined

Length to diameter ratio of most rotary driers is in the range of _____?

- A. 1 to 2
- B. **4 to 10**
- C. 10 to 20
- D. 20 to 30

A fluid whose apparent viscosity increases with shear rate is termed as the _____ fluid?

- A. Newtonian
- B. Viscous
- C. **Dilatant**
- D. Non-viscous

Net calorific value is the gross calorific value less the _____ heat of water in the product of combustion when cooled to 15°C ?

- A. Sensible
- B. Latent
- C. Sensible and latent**
- D. None of these

In the hydrodealkylation of toluene to benzene, the following reactions occur:
 $C_7H_8 + H_2 \rightarrow C_6H_6 + CH_4$ $2C_6H_6 \rightleftharpoons C_{12}H_{10} + H_2$
Toluene and hydrogen are fed to a reactor in a molar ratio 1:5.80% of the toluene gets converted and the selectivity of benzene (defined as moles of benzene formed/moles of toluene converted) is 90%. The fractional conversion of hydrogen is _____ ?

- A. 0.16
- B. 0.144**
- C. 0.152
- D. 0.136

The momentum correction factor for the velocity distribution of laminar flow is _____ ?

- A. 1.3
- B. 1.66
- C. 2.5
- D. None of these**

Which of the following is not a dimension-less parameter ?

- A. Pressure-co-efficient
- B. Froude number
- C. Kinematic viscosity**
- D. Weber number

Each term in Bernoulli's equation represents the _____ of the fluid?

- A. Energy per unit mass
- B. Energy per unit weight**
- C. Force per unit mass
- D. None of these

The inventory of raw materials included in the working capital is usually about _____ month's supply of raw materials valued at delivery prices?

- A. One**
- B. Three
- C. Six
- D. Twelve

A catalyst loses its activity due to _____?

- A. Loss in surface area of the active component
- B. Agglomeration of metal particles caused by thermal sintering of the solid surface
- C. Covering of the catalytic active sites by a foreign substance
- D. All A., B. and C.**

Free energy, fugacity and activity co-efficient are all affected by change in the temperature. The fugacity co-efficient of a gas at constant pressure _____ with the increase of reduced temperature?

- A. Decreases
- B. Increases**
- C. Remains constant
- D. Decreases logarithmically

Number of gram equivalent of solute dissolved in one litre of solution is called its _____?

- A. Normally**
- B. Molarity
- C. Molality
- D. Formality

Artificial draught produced by a fan in the furnace can be controlled by the _____?

- A. Speed of the fan
- B. Damper
- C. Variation in the pitch of fan blades
- D. All A., B. and C.**

In McCabe-Thiele method, at infinite reflux ratio _____?

- A. Number of plates is maximum
- B. Overhead product is maximum
- C. Both the operating lines coincide with the diagram**
- D. None of these

Which is the most efficient dust removal equipment for removal of submicronic dust particles from blast furnace gas ?

- A. Packed scrubber
- B. Gravity settling chamber
- C. Electrostatic precipitator**
- D. Hydrocyclone

A centrifugal pump has the following specifications: Power = 4 H.P.; Speed = 800 rpm Head = 8 metres Flow = 1000 litres/minutes. If its speed is halved, the power consumed now will be _____ hp?

- A. 0.5**
- B. 2
- C. 4
- D. 1

The catalyst in a second order reversible reaction increases the rate of the forward reaction _____?

- A. And decreases that of backward reaction
- B. And backward reaction equally**

- C. Only
- D. To a greater extent than that of the backward reaction

Overall efficiency of the distillation column is _____?

- A. The ratio of number of ideal plates to actual plates**
- B. The ratio of number of actual plates to ideal plates
- C. Same as the Murphree efficiency
- D. Always more than the point efficiency

The major component of acrylic fibers is _____?

- A. Polyamides
- B. Polyolefins
- C. Polyacrylonitrile**
- D. Polyesters

Carboxymethyl cellulose (CMC) is added in detergents to _____?

- A. Prevent redeposition of soil on cleaned surface**
- B. Act as optical brightening agent
- C. Inhibit corrosion in washing machines made of aluminium
- D. None of these

The left face of a one dimensional slab of thickness 0.2 m is maintained at 80°C and the right face is exposed to air at 30°C . The thermal conductivity of the slab is 1.2 W/m.K and the heat transfer co-efficient from the right face is $10 \text{ W/m}^2.\text{K}$. At steady state, the temperature of the right face in $^{\circ}\text{C}$ is _____?

- A. 77.2
- B. 71.2
- C. 63.8
- D. 48.7**

Removal of light fractions from crude oil is called its _____?

- A. Sweetening
- B. Dehydration
- C. Stabilisation**
- D. Visbreaking

If G = insoluble gas in gas stream and L = non-volatile solvent in liquid stream, then the slope of the operating line for the absorber is _____?

- A. L/G**
- B. G/L
- C. Always < 1
- D. None of these

Highly porous refractory bricks are _____?

- A. Less susceptible to chemical attack by molten fluxes and gases etc
- B. Very strong
- C. Having very high thermal conductivity
- D. None of these**

Which of the following reactions is undesirable in the production of catalytically reformed gasoline ?

- A. Dehydrogenation of Naphthene
- B. Dehydrogenation of lower paraffins**
- C. Dehydrocyclization of higher paraffins
- D. Isomerisation of paraffins

Pick out the wrong statement ?

- A. Molecules with symmetrical arrangements (e.g. CH₄ or CCl₄) are non-polar
- B. Generally, non-polar compounds are chemically inactive, conduct electricity poorly and do not ionise
- C. Most of the hydrocarbons are non-polar
- D. None of these**

Example of an indirectly heated furnace is _____?

- A. Hood annealing furnace
- B. Muffle furnace
- C. Both A. and B.**
- D. Neither A. nor B.

Coking coals are invariably _____?

- A. Lignites
- B. Bituminous coals**
- C. Semi-anthracites
- D. Anthracites

The pressure head on sudden contraction in a horizontal pipe is converted into the _____ head?

- A. Elevation
- B. Velocity**
- C. Both A. & B.
- D. Neither A. nor B.

Fixed charges for a chemical plant does not include the _____?

- A. Interest on borrowed money
- B. Rent of land and buildings
- C. Property tax, insurance and depreciation
- D. Repair and maintenance charges**

Calorific value as determined by bomb calorimeter is the _____?

- A. Higher calorific value at constant volume**
- B. Gross calorific value at constant pressure
- C. Lower calorific value at constant pressure
- D. Net calorific value at constant volume

Air vessel provided in a reciprocating pump is for _____?

- A. Increasing the acceleration head
- B. Making the friction in pipe uniform**
- C. Decreasing the acceleration head
- D. None of these

Which of the following is an undesirable property of a manometric liquid ?

- A. Non-sticky & non-corrosive nature
- B. High vapour pressure**
- C. Low viscosity & surface tension
- D. Low co-efficient of thermal expansion

Equivalent length of a pipe fitting is _____ ?

- A. Dependent on Reynolds number**
- B. Independent of Reynolds number
- C. Dependent on the length of the pipe
- D. None of these

A spherical particle is falling slow in a viscous liquid such that Reynolds number is less than 1. Which statement is correct for this situation ?

- A. Inertial and drag forces are important
- B. Drag, gravitational and buoyancy forces are important**
- C. Drag force and gravitational forces are important
- D. None of the above

Calorific value of dry wood may be around _____ Kcal/kg?

- A. 5**
- B. 50
- C. 500
- D. 5000

The process opposite to 'dispersion' is termed as the _____ ?

- A. Flocculation**
- B. Sedimentation

- C. Filtration
- D. None of these

A considerable part of the harmful ultraviolet radiation of the sun does not reach the earth surface, because of the fact that, there is a layer of _____ high above earth's atmosphere, which absorbs it?

- A. Hydrogen
- B. Carbon dioxide
- C. Ozone**
- D. None of these

Alpha iron is stable _____ °C?

- A. Above 1403
- B. Upto 910**
- C. Above 1800
- D. Between 910 & 1403

Production of one ton of paper in Indian paper industry consumes about _____ kWh of electricity ?

- A. 300
- B. 800
- C. 1400**
- D. 2000

Absolute zero temperature signifies the _____?

- A. Minimum temperature attainable
- B. Temperature of the heat reservoir to which a Carnot engine rejects all the heat that is taken in
- C. Temperature of the heat reservoir to which a Carnot engine rejects no heat**
- D. None of these

Which of the following accounts for maximum energy loss in a boiler ?

- A. Flue gases**

- B. Ash content in the fuel
- C. Incomplete combustion
- D. Unburnt carbon in flue gases

Main gas valve in a gaseous fuel burner is a _____ valve?

- A. Gate**
- B. Butterfly
- C. Globe
- D. None of these

_____ of depreciation calculation accounts for the interest on investment?

- A. Straight line method
- B. Declining balance
- C. Both A. and B.
- D. Neither A. nor B.**

By-products recovery process from coal carbonisation is termed as direct, indirect and semi direct process depending upon the method of recovery of _____?

- A. Tar
- B. Benzol
- C. Ammonia**
- D. None of these

Ethanol amine is produced using ammonia and _____?

- A. Ethyl benzene
- B. Ethylene oxide**
- C. Ethanol
- D. Ethane

Check valve provided in the discharge line of a centrifugal pump serves the

purpose of controlling the _____?

- A. Back flow of fluid in the event of stoppage of pump**
- B. Discharge pressure
- C. Flow of liquid during operation of the pump
- D. All A., B. and C.

The minimum number of theoretical plates is required for achieving a given separation in distillation column with _____?

- A. No reflux
- B. Total reflux**
- C. Zero reflux ratio
- D. Minimum reflux ratio

Which of the following liquid-vapor contacting devices provides maximum contact surface area for a particular duty ?

- A. Sieve plate column
- B. Bubble cap column
- C. Randomly packed column
- D. Wetted wall column**

In steam distillation, the _____?

- A. Temperature is 100°C
- B. Temperature is more than 100° C
- C. Product must be immiscible with water**
- D. Temperature is higher than the boiling point of either component

An endothermic second order reaction is carried out in an adiabatic plug flow reactor. The rate of heat generation is _____?

- A. Maximum at the inlet of the reactor**
- B. Maximum at the exit of the reactor
- C. Maximum at the centre of the reactor
- D. Constant throughout the reactor

Coloured glass is obtained by mixing of colored salts. Addition of _____ oxide is done to impart greenish blue color to the glass?

- A. Chromium
- B. Arsenic
- C. Copper**
- D. Manganese

Highly reactive coke have lower _____?

- A. Porosity
- B. Coke reactivity index (CRI)
- C. Critical air blast (CAB) value**
- D. Both B. and C.

Wood is a/an _____ material ?

- A. Amorphous
- B. Cellular**
- C. Homogeneous
- D. Granular

Air/gas ratio for complete combustion will be the highest for _____?

- A. LPG**
- B. Gobar gas
- C. Coke oven gas
- D. Carburetted water gas

Hearth furnaces are not used for _____?

- A. Roasting
- B. Melting
- C. Reheating
- D. None of these**

The shape of T-S diagram for Carnot Cycle is a _____?

- A. Rectangle
- B. Rhombus
- C. Trapezoid
- D. Circle

Which of the following is used for calcination of limestone and dolomite in industrial practice?

- A. Fluidised bed reactor
- B. Moving bed reactor**
- C. Fixed bed reactor
- D. None of these

Refined acetic acid storage vessel are made of _____?

- A. Copper
- B. Aluminium**
- C. High carbon steel
- D. Nickel

Heavy water is used as a moderator in a _____?

- A. Pressurised water reactor (PWR)
- B. Boiling water reactor (BWR)
- C. Candu reactor**
- D. Molten sodium cooled reactor

Pick out the correct statement ?

- A. Dialysis process is used for the production of fresh water from brine
- B. Electrodialysis is used in the manufacture of NaOH**
- C. Electrodialysis is used for the refining/purification of petrol
- D. Both B. and C.

Tanks used for the storage of petroleum products (which are inflammable) should be painted with a _____ paint?

- A. Black

B. White

C. Red

D. Yellow

β – glucose is the monomer of _____?

A. Cellulose

B. Starch

C. Protein

D. None of these

LPG stands for _____?

A. Liquid petroleum gas

B. Liquefied petrol gas

C. Liquid petrol gas

D. Liquefied petroleum gas

Air initially at 101.3 kPa and 40°C and with a relative humidity of 50%, is cooled at constant pressure to 30°C. The cooled air has a _____?

A. Higher dew point

B. Higher absolute (specific) humidity

C. Higher relative humidity

D. Higher wet bulb temperature

With increasing carbon percent in steel beyond 0.8%, its ultimate tensile strength (UTS) and _____ is not affected?

A. Impact strength

B. Percent elongation

C. Hardness

D. Both B & C

Haemoglobin is a/an _____?

A. Amino acid

B. Biological catalyst

C. Protein

D. Enzyme

Very low pressure is expressed in microns (μ), which is equal to _____ mm of Hg column (absolute) at 0°C ?

A. 0.0001

B. 0.001

C. 0.01

D. 0.1

What is the logarithmic mean of r_1 and r_2 ?

A. $(r_1 - r_2)/\ln(r_1/r_2)$

B. $(r_1 - r_2)/\ln(r_2/r_1)$

C. $(r_2 - r_1)/\ln(r_1/r_2)$

D. $(r_1 - r_2)/-\ln(r_1/r_2)$

Which of the following gas-liquid contacting devices incurs the least pressure drop for a particular duty ?

A. Grid tray tower

B. Perforated tray tower

C. Wetted wall tower

D. Bubble cap tower

In a double pipe (concentric) heat exchanger, the hydraulic radius for heat transfer (for a fluid flowing through the annulus) would be _____?

A. Same as that for fluid flow

B. Less than that for fluid flow

C. More than that for fluid flow

D. $D_2 - D_1$ (D_1 and D_2 are I.D. of inner and outer pipes respectively)

Fat dispersed in water is exemplified by _____?

A. Colloids

B. Gel

C. Butter

D. Emulsion

The specific cake resistance for incompressible sludges is (where ΔP = pressure drop over cake) _____?

A. $\propto \Delta P$

B. $\propto 1/\Delta P$

C. $\propto \sqrt{\Delta P}$

D. Independent of ΔP

View factor is important in heat transfer by _____?

A. Steady state conduction

B. Natural convection

C. Forced convection

D. Radiation

Current employed in resistance welding ranges from _____
kVA/cm²?

A. 1.2 to 2.5

B. 4.5 to 6.2

C. 7.5 to 8.5

D. 10.5 to 15.5

Co-efficient of Performance (COP) of a refrigerator is the ratio of the
_____?

A. Work required to refrigeration obtained

B. Refrigeration obtained to the work required

C. Lower to higher temperature

D. Higher to lower temperature

A car tyre of volume 0.057 m³ is inflated to 300 kPa at 300 K. After the car is driven for 10 hours, the pressure in the tyre increases to 330 kPa. Assume air is

an ideal gas and C_v for air is 21 J/mole.K. The change in the internal energy of air in the tyre in J/mole is _____?

- A. 380
- B. 630**
- C. 760
- D. 880

The increase in the rate of reaction with temperature is due to _____?

- A. Increase in the number of effective collisions
- B. Decrease in activation energy**
- C. Increase in the average kinetic energy of the reacting molecules
- D. None of these

Naphthols are derivatives of _____?

- A. Methyl amine
- B. Naphthalene**
- C. Phenol
- D. Xylene

_____ stress cannot be sustained by a fluid in equilibrium ?

- A. Shear**
- B. Tensile
- C. Compressive
- D. None of these

Effluent treatment cost in a chemical plant is categorised as the _____ cost?

- A. Fixed
- B. Overhead
- C. Utilities**
- D. Capital

Power loss in an orificemeter is _____ that in a Venturimeter?

- A. Less than
- B. Same as
- C. More than**
- D. Data insufficient, cannot be predicted

Dry powdery solid materials are transported by a _____ conveyor?

- A. Belt
- B. Bucket
- C. Screw**
- D. None of these

The ratio of gross annual sales to the fixed capital investment is termed as the _____ ratio?

- A. Cash reserve
- B. Capital
- C. Turnover**
- D. Investment

Pick out the wrong statement ?

- A. Biological oxygen demand (B.O.D.) value of a sewerage sample is always lower than its chemical oxygen demand (C.O.D.) value
- B. Environmental pollution by NO_x emission is much higher by four stroke petrol engines as compared to the two stroke engines
- C. Temperature in stratosphere rises with increasing altitude
- D. The characteristic of a green house body is that it allows the long wavelength incoming solar radiation to come in but does not allow the short wavelength infra red radiation to escape out of the earth's atmosphere**

Exposure to chemicals having carcinogenic properties cause _____?

- A. Dermatitis (skin disorder)
- B. Cancer**
- C. Asphyxiation (suffocation)
- D. Asthma

Aerosols present in atmospheric air may be _____?

- A. Positively charged
- B. Negatively charged
- C. Neutral
- D. Combination of all A., B. & C.**

A photo electric device in which the resistance of the metal is directly proportional to the light striking on it, is known as photo-conductive cell. Photoelectric transducers are used for the measurement of those parameters, which can be used to produce variation in _____?

- A. Light intensity**
- B. Current
- C. Flux density
- D. Voltage

Copper deposits are found in India at the following location ?

- A. Kudremukh
- B. Kolar
- C. Khetri**
- D. Ramagundam

Which of the following has the minimum absorptivity ?

- A. Aluminium foil**
- B. Coal dust
- C. Refractory bricks
- D. Iron plates

Which is not a fissile nuclear material ?

- A. U-233
- B. U-235
- C. U-238**
- D. Pu-239

The amount of a radioisotope remaining undecayed after a time equal to four times its half life, will be _____ percent?

- A. 3.125
- B. 6.25**
- C. 12.50
- D. 25

Relative volatility does not change appreciably with the change in _____?

- A. Temperature**
- B. Vapour pressure of either component
- C. Total pressure
- D. None of these

In an interphase heat transfer process, the equilibrium state corresponds to equality of temperature in the two phases, while the condition for equilibrium in an interphase mass transfer process is equality of _____?

- A. Concentrations**
- B. Chemical potentials
- C. Activity co-efficients
- D. Mass transfer co-efficients

Poly-methyl-methacrylate, which is an acrylic resin, is also called _____?

- A. Thiokol
- B. Plexiglass or Lucite**
- C. Dacron

D. Teflon

Sphericity of pulverised coal is _____?

- A. 1
- B. < 1**
- C. > 1
- D. ∞

In a shell and tube heat exchanger having square pitch, the shell side equivalent diameter is given by (where, P = pitch, d = outside diameter of the tube) ?

- A. $4(P^2 - \pi d^2/4)/\pi d$**
- B. $(P^2 - \pi d^2/4)/\pi d$
- C. $4P^2/\pi d$
- D. $\pi d/4P^2$

The hydraulic diameter of an annulus of inner and outer radii R_i and R_o respectively is _____?

- A. $4(R_o - R_i)$
- B. $\sqrt{R_o - R_i}$
- C. $2(R_o - R_i)$**
- D. $R_o + R_i$

Which of the following metals cannot be hot worked at room temperature ?

- A. Zinc
- B. Nickel**
- C. Lead
- D. Tin

Isotherm on an enthalpy-concentration diagram, for an ideal solution will be a _____?

- A. Straight line**
- B. Sine curve
- C. Parabola

D. Hyperbola

Pressure drop per tray in the atmospheric distillation column is about _____ psi?

- A. 0.01 – 0.5
- B. 0.07 – 0.12**
- C. 0.5 – 1.0
- D. 1 – 3

Catalyst used in the hydrogenation of oil is _____?

- A. Nickel**
- B. Platinum
- C. Iron
- D. Alumina

Nickel percentage in invar which is an iron-nickel alloy, and is used as a thermocouple material is _____?

- A. 12
- B. 36**
- C. 54
- D. 68

Catalyst used during the manufacture of 'Vanaspati Ghee' is _____?

- A. Zinc
- B. Nickel**
- C. Platinum
- D. Copper

Pick out the wrong statement?

- A. Riveting provides a permanent fastening method
- B. The joint made by overlapping of one plate over the other, and then riveting the two plates together with two rows of rivets is called 'double riveted butt joint'**

- C. Shank diameter of the rivets should be less than the size of the hole drilled in the plate for riveting
- D. The efficiency of a riveted joint is the ratio of the strength of the riveted joint to the strength of the solid plate

A two stage compressor is used to compress an ideal gas. The gas is cooled to the initial temperature after each stage. The intermediate pressure for the minimum total work requirement should be equal to the _____ mean of P_1 and P_2 . (where, P_1 and P_2 are initial and final pressures respectively) ?

- A. Logarithmic
- B. Arithmetic
- C. Geometric**
- D. Harmonic

_____ resins are produced by the condensation polymerisation of formaldehyde with urea or melamine?

- A. Epoxy
- B. Amino**
- C. Alkyd
- D. Phenolic

Case hardening is not done by _____?

- A. Nitriding
- B. Hot dipping
- C. Electroplating
- D. Both 'B' & 'C'**

Internal energy of an element at 1 atm and 25°C is _____ kcal/kg.mole?

- A. 0**
- B. 273
- C. 25

D. None of these

Which of the following factors is the most important in the site selection for a nuclear power plant ?

- A. **Absence of earthquake prone zone in nearby areas**
- B. Abundant availability of water
- C. Remotely located from residential areas
- D. Proximity to fuel source

$\text{FeO (s)} + \text{CO (g)} = \text{Fe (s)} + \text{CO}_2 \text{ (g)}$, $k = 0.435$ at 1173E ; at equilibrium, what will be the number of moles of CO gas required to reduce one mole of FeO at 1173 K ?

- A. 1.0
- B. 1.3
- C. 2.3
- D. **3.3**

Ignition temperature decreases progressively from anthracite to lignite, because _____ ?

- A. **Volatile matter content increases**
- B. Carbon content decreases
- C. Moisture content increases
- D. Ash content increases

The pH value of potable water should be between _____ ?

- A. 1 to 1.5
- B. **6.5 to 8**
- C. 13 to 14
- D. 4 to 5

Dacron is a/an _____ ?

- A. **Polyester**

- B. Unsaturated polyester
- C. Polyamide
- D. Inorganic polymer

Characteristic curves for a centrifugal pump plotted against its capacity is shown in the diagram. x, y and z denote respectively _____?

- A. Efficiency, head and B.H.P.
- B. Head, efficiency and B.H.P.**
- C. B.H.P., efficiency and head
- D. Efficiency, B.H.P. and head

Change of angle of refraction with composition comprises the working principle of a _____?

- A. Polarimeter
- B. Polarograph
- C. Spectrometer
- D. Refractometer**

On-off controllers are normally used for _____?

- A. Low loads**
- B. Temperature changes
- C. Flow rate changes
- D. None of these

Cross linked polymers are _____?

- A. Thermoplastic
- B. Thermosetting**
- C. Either A. or B.
- D. Fibres only

The fermenter used in the production of penicillin (by deep fermentation process) is made of _____?

- A. Glass

B. Glass lined steel

- C. High silicon cast iron
- D. Porcelain

Sodium bicarbonate is produced during soda ash manufacture using a _____ tower?

- A. Plate
- B. Baffle**
- C. Packed
- D. None of these

The most reactive allotropic form of phosphorus is _____ phosphorus?

- A. Red
- B. Yellow**
- C. Violet
- D. Black

The number of neutrons accompanying the formation of $^{139}_{54}\text{Xe}$ and $^{94}_{38}\text{Sr}$ from the absorption of a slow neutron by $^{235}_{92}\text{U}$, followed by nuclear fission is _____?

- A. 1
- B. 2
- C. 3**
- D. 4

Diesel index is defined as _____?

- A. $(^\circ\text{API}) \times (\text{Aniline Point, } ^\circ\text{F})/100$**
- B. $(^\circ\text{API}) \times (\text{Aniline Point, } ^\circ\text{C})/100$
- C. $(^\circ\text{API}) \times (100)/\text{Aniline Point, } ^\circ\text{F}$
- D. $(^\circ\text{API}) \times (100)/\text{Aniline Point, } ^\circ\text{C}$

With increase in the time of carbonisation at a particular temperature (say 1000°C), the _____ percentage in coke oven gas increases?

- A. Hydrogen
- B. Methane
- C. Unsaturated hydrocarbons
- D. All A., B. and C.

Colloid mills achieve size reduction mainly by _____?

- A. Impact
- B. Attrition
- C. Cutting
- D. Compression

The net positive suction head (NPSH) of a centrifugal pump is defined as the sum of the velocity head and the pressure head at the _____?

- A. Discharge
- B. Suction
- C. Suction minus vapor pressure of the liquid at suction temperature
- D. Discharge minus vapor pressure of the liquid at the discharge temperature

An example of shaft furnace is the _____?

- A. L.D. converter
- B. Glass melting tank
- C. Blast furnace
- D. Soaking pit

Payback period _____?

- A. And economic life of a project are the same
- B. Is the length of time over which the earnings on a project equals the investment
- C. Is affected by the variation in earnings after the recovery of the investment
- D. All A, B. and C

Zirconia refractory _____?

- A. Does not react with basic slags
- B. Is produced from baddeleyite**
- C. Cannot be used as an insulator
- D. Has poor electrical conductivity at high temperature

In a solution containing 0.30 Kg mole of solute and 600 kg of solvent, the molality is _____?

- A. 0.50**
- B. 0.60
- C. 1
- D. 2

The offset introduced by proportional controller with gain K_c in response of first order system can be reduced by _____?

- A. Reducing value of K_c
- B. Introducing integral control**
- C. Introducing derivative control
- D. None of the above

It is not recommended to use a 1-2 shell and tube heat exchanger for a particular heat duty, whenever the LMTD correction factor is _____?

- A. > 0.75
- B. < 0.75**
- C. < 0.50
- D. < 0.25

Thermocouple in a thermal well behaves as a true _____?

- A. First order system
- B. Second order system (overdamped)
- C. Multiple first order system**
- D. Second order system (underdamped)

In deriving Bernoulli's equation, fluid is assumed to be _____?

- A. Incompressible, frictionless, steady, along a streamline
- B. Uniform, steady, incompressible, along a streamline
- C. Steady, density being pressure dependent, frictionless
- D. None of these

Fluorosis is caused due to the presence of excessive amount of _____ in drinking water?

- A. Mercury
- B. Lead
- C. Fluoride
- D. Arsenic

Thermal conductivity cell is the primary element of a/an _____ analyser?

- A. Oxygen
- B. Carbon dioxide
- C. Carbon monoxide
- D. Sulphur dioxide

The line traced by a single fluid particle as it moves over a period of time is called _____ line?

- A. Stream
- B. Path
- C. Equipotential
- D. None of these

Maximum alumina content in high alumina refractory can be as high as _____ percent?

- A. 30
- B. 50
- C. 70

D. 90

Sauter mean diameter is the same as the _____ mean diameter?

- A. Mass
- B. Arithmetic
- C. Volume-surface**
- D. Geometric

In case of calcination of limestone, $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$, the addition of more of CaO will result in _____ in the concentration of CO_2 ?

- A. No change**
- B. Increase
- C. Decrease
- D. Unpredictable from the data

The transition temperature at which all the ferromagnetic materials become paramagnetic materials is termed as the 'Curie temperature'. Its value for cobalt is _____ °C?

- A. 768
- B. 1127**
- C. 1359
- D. 1480

Which of the following is artificially produced as it does not occur in nature ?

- A. Uranium-235
- B. Uranium-233
- C. Plutonium-239
- D. Both B. and C.**

In a fluidised bed reactor _____ ?

- A. Temperature gradients are very high
- B. Temperature is more or less uniform**
- C. Hot spots are formed

D. Segregation of the solids occurs

A machine has an initial value of Rs. 5000, service life of 5 years and final salvage value of Rs. 1000. The annual depreciation cost by straight line method is

Rs _____?

- A. 300
- B. 600
- C. 800**
- D. 1000

Metal at the top of the electromotive series is _____?

- A. Least active
- B. Most stable
- C. Most active**
- D. Most noble

Size range of polymer molecules varies from _____ meter?

- A. 10^{-2} to 10^{-5}**
- B. 10^{-4} to 10^{-7}
- C. 10^{-1} to 10^{-2}
- D. 10^{-8} to 10^{-10}

With increase in the distance between the heat source and the object receiving the heat, the radiation heat transfer ?

- A. Decreases**
- B. Increases
- C. Increases exponentially
- D. Remain unaffected

Nuclear fuel generally used in reactors is uranium oxide instead of uranium, because the former has higher _____?

- A. Melting point, hence can be subjected to higher temperature

- B. Density; hence core volume for a given power output would be smaller
- C. Resistance to effects of irradiation
- D. All A., B. and C.**

Neoprene is chemically known as _____?

- A. Polybutadiene
- B. Styrene butadiene rubber (SBR)
- C. Polyurethane
- D. Polychlorophrene**

Pick out the wrong statement?

- A. Polymers made of only one monomer is called homopolymer**
- B. Polymers made of more than one monomer is called copolymer or mixed polymer
- C. Vulcanised rubber is more elastic than natural rubber
- D. The intermolecular forces in thermoplastic polymers are intermediate to that of elastomers & fibres

_____ furnace is generally used in the non-ferrous foundries ?

- A. Direct arc
- B. Indirect arc**
- C. Resistance
- D. Induction

Ceramic materials _____?

- A. Are exemplified by clay and mica
- B. Are poor electrical conductors due to lack of free electrons
- C. Never exhibit polymorphism
- D. All A., B. and C.**

Volumetric expansion is the working principle of the _____ thermometers?

- A. Mercury in glass**

- B. Constant volume gas
- C. Vapor pressure
- D. Bimetallic

Vapor velocity in a distillation column for non-foaming mixture is in the range of _____ times the flooding velocity?

- A. 0.1 to 0.3
- B. 0.6 to 0.7**
- C. 0.85 to 0.95
- D. 1.5 to 2

Which of the following petroleum products contain minimum sulphur ?

- A. Naphtha**
- B. Kerosene
- C. LSHS
- D. Furnace oil

For a single component absorber, the operating line is straight only when plotted in term of _____ units?

- A. Partial pressure
- B. Mole ratio**
- C. Mole fraction
- D. None of these

The rate of the chemical reaction $A \rightarrow B$ doubles as the concentration of A i.e., C_A is doubled. If rate of reaction is proportional to C_A^n , then what is the value of n for this reaction ?

- A. 0
- B. 0.5
- C. 1**
- D. 2

Nitrogen oxides (NO_x) is not produced in the _____ industry?

- A. Nitric acid making
- B. Nitrogenous fertiliser
- C. Detergent**
- D. Any of these

Transportation of 35% oleum during winter suffers from the problem of freezing, which can be overcome by the addition of small quantity of _____?

- A. Nitric acid**
- B. Hydrochloric acid
- C. Methyl alcohol
- D. Formic acid

The compressibility factor for an ideal gas is 1. Its value for any other real gas is _____?

- A. 1
- B. 1
- D. Either B. or C, depends on the nature of the gas**

_____ kg of CaCO₃ on heating will give 56 kg of CaO?

- A. 56
- B. 100**
- C. 144
- D. 1000

Workers working in _____ industry are most prone to white lung cancer?

- A. Coal mining
- B. Limestone mining
- C. Textile**
- D. Asbestos

Number of phases in a colloidal system is _____?

- A. 1
- B. 2**
- C. 3
- D. 4

For a neutral solution (pH = 7), the value of $[H^+]$ $[OH^-]$ is equal to _____?

- A. 0
- B. 1**
- C. 1

Wavelength of radiation emitted by a body depends on the _____ of its surface?

- A. Temperature**
- B. Area
- C. Nature
- D. All 'A', 'B' & 'C'

In a forced draft cooling tower, water is cooled from 95 to 80°F by exposure to air with a wet bulb temperature of 70°F. In this case, the _____?

- A. Range is 15°F
- B. Approach is 10°F
- C. Both A. & B.**
- D. Neither A. nor B.

Quantity of fissionable material (i.e. U-235) in natural uranium is _____ percent?

- A. 0.71**
- B. 6.31

- C. 99.29
- D. 12.73

Condensation polymerisation of formaldehyde with _____ does not produce phenolic resin?

- A. Resorcinol
- B. Phenol
- C. Para-cresol
- D. Melamine**

The increase in hardness of metal due to its cold working is termed as the _____ hardening?

- A. Work**
- B. Age
- C. Induction
- D. Flame

Conversion of yellow phosphorus to red phosphorous is done in retorts at 250-450°C in the _____?

- A. Presence of an inert atmosphere
- B. Presence of a reducing atmosphere
- C. Absence of air**
- D. Presence of an oxidising atmosphere

'Light water' used as a coolant in nuclear reactor is nothing but _____?

- A. Ordinary water**
- B. Mildly acidic (pH = 6) water
- C. Mildly alkaline (pH = 8) water
- D. None of these

Pick out the wrong statement pertaining to the turbine agitator ?

- A. Recommended peripheral speed for the turbine agitator is 200-250 metres/minute
- B. Pitched blade turbine agitator gives only radial flow with complete absence of the axial flow**
- C. Generally, the diameter of the agitator is kept between 1/3rd to 1/6th of the tank diameter while the blade length is 1/4th of agitator diameter (with central disc, it is 1/8th of the agitator diameter)
- D. Turbine agitator should be located at a height not less than one agitator diameter length from the bottom. If the depth of liquid in the tank is more than twice the agitator diameter, two agitators should be used

Which of the following employs an accessory known as 'drift eliminator' ?

- A. Multiple effect evaporator
- B. Mechanical draft cooling tower**
- C. Rotary dryer
- D. Rotating disc contactor

The rate controlling step for the heterogeneous irreversible catalytic reaction $A(g) + B(g) \rightarrow C(g)$ is the surface reaction of adsorbed A with adsorbed B to give adsorbed C. The rate expression for this reaction can then be written as (where, K_A , K_B and K_C are the equilibrium constants and k is the rate constant of the rate controlling step) ?

- A. $k K_A p_A p_B / (1 + K_A p_A + K_B p_B)$
- B. $k K_A K_B p_A p_B / (1 + K_A p_A + K_B p_B)$
- C. $k K_A K_B p_A p_B / (1 + K_A p_A + K_B p_B + K_C p_C)$
- D. $k K_A K_B p_A p_B / (1 + K_A p_A + K_B p_B + K_C p_C)^2$**

Heat transfer co-efficient, h_G (Kcal/hr.m² .°C) and mass velocity of air, G (kg/hr.m²) for air flow parallel to the surface in case of constant drying rate in batch drying is related as $h_G = 0.0176 G^{0.8}$. But when the flow of air perpendicular to the surface is encountered, this equation changes to

_____?

- A. $h_G = 1.004G0.37$
- B. $1.004G0.8$
- C. $h_G = 0.0176G0.37$
- D. $0.0176G1.37$

If the pressure of a gas is reduced to half & its absolute temperature is doubled, then the volume of the gas will _____?

- A. Be reduced to 1/4th
- B. Increase four times
- C. **Increase two times**
- D. None of these

Presence of _____ in a dry gaseous fuel does not contribute to its calorific value?

- A. Sulphur
- B. **Oxygen**
- C. Hydrogen
- D. Carbon

Cetane number of diesel used in trucks may be about _____?

- A. **50**
- B. 14
- C. 35
- D. 85

Pick out the correct statement?

- A. The capacity and the effectiveness of a screen are the same
- B. The capacity and the effectiveness of screen are opposing factors
- C. The screening surface of a 'reel' (a revolving screen used in flour mills) is made of silk bolting cloth supported by wire mesh
- D. **Both B. and C.**

To resist spalling tendency, a refractory should have _____?

- A. Greater diffusivity
- B. Low specific heat
- C. Low thermal co-efficient of expansion
- D. All A., B. and C.**

The specific surface of spherical particles is proportional to (where, D_p = diameter of particle)?

- A. D^2
- B. D_p
- C. $1/D_p$**
- D. $1/D^2_p$

Which is the most suitable for the concentration of highly concentrated solution?

- A. Open pan evaporation**
- B. Long tube vertical evaporator
- C. Agitated film evaporator
- D. None of these

Alkyd resin is a/an _____?

- A. Polyamide
- B. Polyester**
- C. Polyolefin
- D. Addition polymer

Pollution by particulate matter emission in the atmosphere does not take place during metal _____?

- A. Grinding
- B. Machining
- C. Cutting
- D. Polishing**

The flow of gas along a pipe in the direction of decreasing pressure causes decrease in its _____?

- A. Viscosity
- B. Specific volume**
- C. Velocity
- D. None of these

A pyr heliometer is an instrument used for measuring the _____?

- A. Bright sunshine period
- B. Beam radiation**
- C. Diffuse radiation
- D. None of these

Pure carbon is completely burnt in oxygen. The flue gas analysis is 70%CO₂, 20%CO and 10%O₂. The percent excess oxygen used is _____?

- A. 20
- B. 12.5
- C. 0**
- D. 10

Continuous shell temperature measurement in a liquid-liquid heat exchanger is done by a _____?

- A. Thermocouple**
- B. Resistance thermometer
- C. Mercury in glass thermometer
- D. Vapor pressure thermometer

For a given Reynolds number, in a hydraulically smooth pipe, further smoothening _____ the friction factor?

- A. Brings about no further reduction of**
- B. Increases

- C. Decreases
- D. None of these

For turbulent fluid flow in pipe, the expression for Prandtl one seventh power law is (where, r = pipe radius, x = distance) ?

- A. $V/V_{\max} = (x/r)^{1/7}$
- B. $V/V_{\max} = (r/x)^{1/7}$
- C. $V/V_{\max} = (x.r)^{1/7}$
- D. None of these

Which one of the following is not likely to be a constituent of vegetable oils ?

- A. Citric acid
- B. Oleic acid
- C. Stearic acid
- D. Glycerol

Equivalent diameter for heat transfer calculation for a duct of square cross-section having each side as 'd' will be _____?

- A. d
- B. \sqrt{d}
- C. $\sqrt{2\pi d}$
- D. $\sqrt{2d}$

Unit of radioactivity is _____?

- A. Barn
- B. Fermi
- C. Angstrom
- D. Curie

Fugacity is most helpful in _____?

- A. Representing actual behaviour of real gases
- B. Representing actual behaviour of ideal gases
- C. The study of chemical equilibria involving gases at atmospheric pressure

D. None of these

Drying of a wet solid under constant drying conditions means the exposure of the wet solid to the air of constant _____?

- A. Humidity
- B. Velocity
- C. Temperature
- D. All A., B. & C.**

The sequence of absorption in flue gas analysis by Orsat's apparatus is respectively _____?

- A. CO₂, O₂, CO**
- B. CO, O₂, CO₂
- C. CO₂, CO, O₂
- D. O₂, CO₂, CO

Internal energy of a gas obeying Van-Der-Waals equation of state, $[p + (a/v^2)] (V - b) = RT$, depends upon its _____?

- A. Pressure & temperature**
- B. Pressure & specific volume
- C. Temperature & specific volume
- D. Temperature only

Welded joint efficiency in the design of chemical process equipment is taken as _____?

- A. 0.55
- B. 0.75
- C. 0.85**
- D. 0.95

Petroleum coke is used mainly in the _____?

- A. Discoloration of yellow glycerine

- B. Sugar refining
- C. Manufacture of carbon electrode**
- D. Blast furnace for reduction of iron ore

Pick out the wrong statement ?

- A. Linear polymers are formed from bifunctional groups only and are normally thermoplastic
- B. Cross-linked branched chain polymers are either elastometric or thermosetting
- C. Branching in case of cross-linked polymers caused by small amount of impurities in bifunctional monomer formulation reduces its solubility and increases the softening point
- D. Dibasic acids reacts with dihydric alcohols to give polyesters using addition polymerisation reaction**

As the temperature is lowered towards the absolute zero, the value of the quantity $(\partial\Delta F/\partial T)$ approaches _____?

- A. Zero**
- B. Unity
- C. Infinity
- D. None of these

A photochemical reaction is _____?

- A. Accompanied with emission of light
- B. Catalysed by light
- C. Initiated by light**
- D. All A., B. & C.

Steels with high carbon equivalent have poor Weldability, because in these steels during welding _____?

- A. Carbon and other alloying elements get oxidised from the weld pool
- B. Excessive ferrite forms in the heat affected zone leading to poor toughness of the weld
- C. Martensite forms in the heat affected zone leading to poor toughness/ductility of the weld**

D. Segregation of carbon and other element occurs in the weld pool leading to poor properties of the weld

A typical example of an exothermic reversible reaction conducted at high pressure in industry is _____?

- A. Dehydration of ethanol
- B. Methanol synthesis
- C. Reformation of methane
- D. Polymerisation of ethylene

A system is said to be at equilibrium, if the entropy of the system has reached _____ value?

- A. Minimum
- B. Zero
- C. Maximum
- D. None of these

In the nuclear reaction, ${}_{93}\text{N}^{239} \rightarrow {}_{94}\text{Pu}^{239} + ?$; the missing particle is a/an _____?

- A. Electron
- B. Proton
- C. Neutron
- D. Position

If atmospheric temperature and dew point are nearly equal, then the relative humidity is _____?

- A. Zero
- B. 50%
- C. Almost 100%
- D. unpredictable

All pipes of a particular nominal size have the same _____?

- A. Inside diameter
- B. Outside diameter**
- C. Thickness
- D. None of these

Preheating before welding is done to _____?

- A. Make the plate softer
- B. Burn oil & grease sticking to plate surfaces
- C. Avoid plate distortion
- D. Prevent cold cracks**

Non-ferrous metals and hard steels do not exhibit a definite yield point, when pulled in the testing machine and hence for these cases, a better measure of their elastic properties is defined by the _____ stress?

- A. Ultimate
- B. Yield point
- C. Proof**
- D. None of these

With increase in temperature, the rate of leaching increases, because the _____?

- A. Diffusivity of solute increases**
- B. Viscosity of solvent decreases
- C. Thermal conductivity of solute increases
- D. None of these

Firing of refractory brick is done to _____?

- A. Dehydrate the dried refractory
- B. Develop stable mineral forms in them
- C. Form ceramic bonds necessary for development of high crushing strength in the finished product
- D. All A., B. and C.**

Which of the following material is seldom used for pressure vessel construction ?

- A. Rimmed still
- B. Mild steel
- C. Killed steel
- D. Semi-killed steel

In the layout plan for a vacuum distillation unit, operating at 60 mm Hg, supported by a barometric condenser, the appropriate place for the location of vacuum drum for collecting the distillate will be _____ ?

- A. At ground level
- B. 2 metres above the ground
- C. 5 metres above ground
- D. 10 metres above ground

Lead is poured into the joints between two _____ pipes?

- A. Cast iron
- B. Steel
- C. Concrete
- D. Plastic

Blast furnace gas burns with a bluish flame, because of the presence of _____ ?

- A. CO
- B. CH₄
- C. CO₂
- D. S

Work required for compression of a gas contained in a cylinder is 7000 kJ. During compression, heat interaction of 3000 kJ causes the surroundings to be heated. Internal energy change of the gas during the compression is

_____ kJ ?

- A. +4000
- B. -4000
- C. 10000
- D. -10000

Tube pitch is the _____ of tube diameters and the clearances?

- A. Sum
- B. Difference
- C. Ratio
- D. None of these

Catalyst used in catalytic polymerisation which produces polymer gasoline is _____?

- A. H₂SO₄
- B. H₃PO₄
- C. Both A. and B.
- D. AlCl₃

The deflection of the free end of the bimetallic strips in a bimetallic thermometer with temperature is nearly _____?

- A. Linear
- B. Non-linear
- C. Parabolic
- D. Hyperbolic

Which of the following is not a chemical step in a fluid solid catalytic reaction ?

- A. Surface chemical reaction
- B. Adsorption
- C. Desorption
- D. None of these

The most suitable material of construction for a sewer to carry sewage under

high pressure is _____?

- A. Asbestos cement
- B. Steel**
- C. Cement concrete
- D. Stoneware

A lubricant 100 times more viscous than water would have a viscosity (in Pa.s) ?

- A. 0.01
- B. 0.1**
- C. 1
- D. 10

Viscosity of gases _____ with increase in temperature?

- A. Increase very rapidly
- B. Increase slowly**
- C. Decrease slowly
- D. Remain unaffected

Refractories subjected to alternate cycles of heating & cooling are liable to loose their resistance to _____?

- A. Thermal spalling**
- B. Slag attack
- C. Fusion under load
- D. CO attack

A 10 cm dia steam pipe, carrying steam at 180°C , is covered with an insulation (conductivity = $0.6 \text{ W/m}\cdot^{\circ}\text{C}$). It losses heat to the surroundings at 30°C . Assume a heat transfer co-efficient of $0.8 \text{ W/m}^2\cdot^{\circ}\text{C}$ for heat transfer from surface to the surroundings. Neglect wall resistance of the pipe and film resistance of steam. If the insulation thickness is 2 cms, the rate of heat loss from this insulated pipe will be _____?

- A. Greater than that for un-insulated steam pipe

- B. Less than that of the un-insulated steam pipe**
C. Equal to that of the un-insulated steam pipe
D. Less than the steam pipe with 5 cms insulation

The head loss in turbulent flow in a pipe varies _____?

- A. Directly as the velocity
B. Inversely as the square of the velocity
C. Approximately as the square of the velocity
D. Inversely as the square of the diameter

Ceramic recuperators are generally made of _____?

- A. Silicon carbide**
B. Calcium carbide
C. Fireclay bricks
D. High alumina bricks

Setting of plaster of Paris is accompanied with _____?

- A. Hydration**
B. Dehydration
C. Hydrolysis
D. Loss of CO₂

_____ extractor is used for the concentration of radioactive nuclear waste?

- A. Pulsed column**
B. Sieve plate
C. Mixer-settler
D. Bollman

The heating capacity of muffle furnace depends on the _____?

- A. Surface area & emissivity of the stock
B. Properties of the muffle wall (temperature, area, and emissivity)
C. Both A. & B.

D. Neither A. nor B.

Nominal Pipe Size (NPS) of a pipe less than 12 inches in diameter indicates its _____?

- A. Inner diameter
- B. Outer diameter
- C. Thickness
- D. Neither inner nor outer diameter**

Radioactive solid nuclear wastes are disposed off by _____?

- A. High temperature incineration
- B. Pathological incineration
- C. Pyrolysis
- D. Underground burial in concrete containers**

Isentropic process means a constant _____ process ?

- A. Enthalpy
- B. Pressure
- C. Entropy**
- D. None of these

In a furnace operation, which is not preheated ?

- A. Solid fuels
- B. Hydrocarbon containing fuel gases (e.g. coke oven gas, refinery gas etc.)
- C. Both A. and B.**
- D. Neither A. nor B.

Sulphur addition in soap is done to _____?

- A. Improve the soap texture
- B. Cure pimples & dandruff**
- C. Fasten lather formation
- D. Increase its cleansing action

Case hardening of a material is _____?

- A. Followed by tempering or carburising
- B. Preceded by its tempering
- C. Done to get a soft ductile interior with a very hard surface
- D. Carried out to get extreme hardness in its core**

Tube side heat transfer co-efficient for turbulent flow of liquid through tubes is proportional to _____?

- A. $G^{0.2}$
- B. $G^{0.5}$
- C. $G^{0.8}$**
- D. $G^{1.5}$

Frasch process is for _____?

- A. Making oxygen
- B. Producing helium
- C. Mining sulphur**
- D. Making nitrogen

In a pressure vessel containing multiple openings of various dimensions at different parts, stress concentration at the edges of the opening is maximum which becomes negligibly small beyond the area covered by _____ times the hole diameter?

- A. Two**
- B. Five
- C. Ten
- D. Twenty

The mass transfer co-efficient for a solid sphere of radius 'a' dissolving in a large volume of quiescent liquid, in which „D' is the diffusivity of solute, is _____?

- A. D/a

- B. $D/2a$
- C. Proportional to \sqrt{D}
- D. Dependent on the Reynolds number**

Spark plug is provided in a/an _____?

- A. Engine having carburettor**
- B. Diesel engine
- C. Compression ignition engine
- D. Both B. & C.

Pick out the wrong statement ?

- A. A horizontal line on the humidity chart indicates the temperature changes at constant molal humidity
- B. When water is cooled from 80 to 70°C by exposure to the air with a wet bulb temperature of 60°C, then both the approach & the range would be 10°C
- C. For unsaturated air-water vapor mixture at atmospheric conditions, the wet bulb temperature & adiabatic cooling lines are the same
- D. Relative saturation of unsaturated mixture of water vapor & air cannot be increased by either reducing the mixture temperature or by increasing the total pressure**

When the difference between mass number and atomic number of atoms of two or more elements are same, the atoms are termed as _____?

- A. Isomers
- B. Isotopes
- C. Isobars
- D. Isotones**

Which form of silica has the highest specific gravity ?

- A. Quartz
- B. Cristobalite
- C. Tridymite
- D. All have the same specific gravity

Shell side pressure drop in a shell and tube heat exchanger does not depend upon the _____?

- A. Baffle spacing & shell diameter
- B. Tube diameter & pitch
- C. Viscosity, density & mass velocity of shell side fluid
- D. None of these**

The hydroxyl ion (OH⁻) concentration in a solution having pH value 3 will be _____?

- A. 10⁻¹¹**
- B. 10⁻¹⁰
- C. 10⁻³
- D. 10⁻⁴

The metallic aluminium is obtained from pure alumina in the presence of fused cryolite by _____?

- A. Electrolysis
- B. Electrolytic reduction**
- C. Electrolytic oxidation
- D. None of these

The operating velocity in the absorption tower is usually 40-50% of the flooding velocity. Packed absorption towers are normally designed for a pressure drop of about _____ mm of water column per metre height of packing?

- A. 1-5
- B. 20-40**
- C. 100-150

D. 1000-1500

The root mean square speed of molecules of a gas is equal to (where, m = mass of the molecule K = Boltzmann's constant, T = absolute temperature) ?

- A. $\sqrt{2KT/m}$
- B. $\sqrt{3KT/m}$**
- C. $\sqrt{6KT/m}$
- D. $3KT/m$

A typical example of a physical system with under damped characteristic is a _____?

- A. U-tube manometer
- B. Spring loaded diaphragm valve**
- C. CSTR with first order reaction
- D. Thermocouple kept immersed in a liquid filled thermowell

The temperature to which a vapour gas mixture must be cooled (at varying humidity) to become saturated is called the _____ temperature?

- A. Dew point
- B. Wet bulb
- C. Dry bulb
- D. None of these**

_____ joint is usually used for joining cast iron pipes mostly used for temporary pipelines, where it may be necessary to dismantle & reassemble the pipeline very frequently ?

- A. Collar
- B. Flanged**
- C. Bell and Spigot
- D. Expansion

Sizing material is incorporated in paper to _____?

A. Impart resistance to penetration by liquids

- B. Increase its thickness
- C. Increase its flexibility & opacity
- D. Increase its brightness

Dry ice (solidified CO₂) is used for the _____?

A. Storage & shipment of frozen foods and ice-creams

- B. Liquefaction of permanent gases
- C. Liquefaction of natural gas
- D. None of these

The main function of a muffle in the muffle furnace is to _____?

- A. Protect the charge from the effects of the products of combustion
- B. Smooth out temperature inequalities on the combustion side of the muffle wall
- C. Both A. & B.**
- D. Neither A. nor B.

Peptizers like aromatic mercaptans (e.g. thiophenes) are added in rubber to _____?

- A. Protect rubber goods from attack by oxygen & ozone present in the atmosphere
- B. Reduce its viscosity to permit easier processing**
- C. Reduce the time of vulcanisation and quantity of vulcanising agent
- D. Increase its viscosity

The dimensions of rate constant for reaction $3A \rightarrow B$ are (l/gm mole)/min.

Therefore the reaction order is _____?

- A. 0
- B. 1
- C. 2**
- D. 3

Which of the following efficiencies can be greater than 100%?

- A. Overall plate efficiency

B. Murphree plate efficiency

- C. Point efficiency
- D. None of these

Humidity chart is useful for the solution of problems concerning condensation, vaporisation and air conditioning. At a given dry bulb temperature, value of humidity obtained from the humidity chart directly, is in terms of _____ humidity?

A. Molal

- B. Relative
- C. Percentage
- D. None of these

Steam is intermittently admitted into the fuel bed during the production of producer gas to _____?

- A. Convert CO to CO₂
- B. Increase the combustion rate
- C. Increase the gas production rate
- D. Minimise the chances of clinker formation**

_____ property of a material is determined by the Herbert Pendulum device?

A. Hardness

- B. Tensile
- C. Toughness
- D. Compressive

According to Poiseuille's law, the permeability for gas flow through a capillary is proportional to (where, μ = gas viscosity) _____?

- A. μ
- B. $1/\mu$**
- C. $\sqrt{\mu}$

D. μ^2

Diameter of the rivet to be provided on a 20 mm. thick boiler plate will be _____ mm?

- A. 10
- B. 20
- C. 30
- D. 40**

Washing soda is chemically represented by _____?

- A. Na_2CO_3
- B. $\text{Na}_2\text{CO}_3 \cdot \text{H}_2\text{O}$
- C. $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$**
- D. NaHCO_3

Hot metal runner in blast furnace are lined with _____ bricks?

- A. Silica
- B. Carborundum
- C. Fireclay**
- D. Magnesite

Volume of liquid displaced by a floating body is equivalent to its _____?

- A. Own weight**
- B. Submerged weight
- C. Own volume
- D. Submerged volume

Which of the following radiations is the least penetrating ?

- A. α -rays**
- B. β -rays
- C. γ -rays
- D. X-rays

Nickel and molybdenum are the basic constituents of _____?

- A. Hastelloy
- B. German silver
- C. Inconel
- D. Solder

Cemented carbide tools are not suitable for cutting _____?

- A. Aluminium
- B. Brass
- C. Cast iron
- D. Steel

Fireclay bricks is not used for lining the _____?

- A. Cupola
- B. Gas producer
- C. Bottom of hot metal mixer
- D. Roof of open hearth furnace

With decrease in particle size to be fluidised by a particular fluid, the operating range of fluidisation velocity _____?

- A. Widens
- B. Squeezes
- C. Does not change
- D. Unpredictable from the data

Pick out the correct statement pertaining to the flow through a converging-diverging tube ?

- A. The value of Mach number is always unity at the throat
- B. No shock wave develops in the tube when the Mach number at exit is greater than unity
- C. Throughout the converging portion of the tube, the density increases in the downstream direction

D. None of these

Overall tray efficiency of a distillation column is the ratio of the number of _____?

A. Overall gas transfer units to the number of ideal trays required

B. Ideal trays required to the number of real trays required

C. Real trays required to the number of ideal trays required

D. None of these

The drying time between fixed moisture contents within the 'constant rate period' is proportional to (assuming that drying occurs from all surfaces of the solid) (where, T = thickness of the solid) ?

A. \sqrt{T}

B. T

C. $T^{1.5}$

D. T^3

Promoter is added to the catalyst to improve its _____?

A. Porosity

B. Sensitivity

C. Surface area

D. None of these

The amount of compounded interest during 'n' interest periods is _____?

A. $p[(1+i)^n - 1]$

B. $p(1 + i)^n$

C. $p(1 - i)^n$

D. $p(1 + in)$

Steam distillation is not recommended to be used, if the _____?

- A. Azeotropic mixture is to be separated and the final product is miscible with water**
- B. Liquids decompose, if distilled directly at atmospheric pressure
- C. Material cannot be distilled by indirect heating even under low pressure, because of the high boiling temperature
- D. Material to be distilled is thermally unstable or has the tendency to react with other components associated with it, at the boiling temperature

Persons working in cement plants and limestone quarries are more prone to disease like _____?

- A. Cancer
- B. Asthma
- C. Silicosis**
- D. Fluorosis (bone disease)

Contact process of sulphuric acid manufacture _____?

- A. Yields acid of higher concentration than chamber process**
- B. Yields acids of lower concentration than chamber process
- C. Is obsolete
- D. Eliminates absorber

Osmotic pressure of the solution can be increased by _____?

- A. Decreasing its temperature
- B. Increasing the volume of the vessel containing the solution
- C. Diluting the solution
- D. None of these**

For the transportation of ultrafine particles, the equipment used is a _____ conveyor?

- A. Belt
- B. Pneumatic**
- C. Screw
- D. None of these

Closeness of packing is maximum in case of _____ crystal lattice?

- A. Face centred**
- B. Simple cubic
- C. Body centred
- D. None of these

Specific _____ is a dimensionless quantity ?

- A. Heat
- B. Humidity
- C. Weight
- D. None of these**

Cellulose acetate has very high film permeability among all the polymers of the order of 5000 gm/100 m². Which of the following polymers has the maximum film elongation (of the order of 100%) ?

- A. Water impermeable cellophane
- B. Polythene**
- C. Cellulose acetate
- D. Teflon

The difference between isothermal compressibility and adiabatic compressibility for an ideal gas is _____?

- A. 0
- B. +ve**
- C. -ve
- D. ∞

Humidity of air can be determined by a _____?

- A. Chromatograph
- B. Sling psychrometer**

- C. Mass spectrometer
- D. Polarimeter

Minimum safe distance between two liquid fuel storage tanks is equal to (where, H = height of the tank) ?

- A. H
- B. H/2
- C. H/4
- D. H/6**

_____ is used as a flux in the smelting of copper ore like chalcopyrite ?

- A. Coke breeze
- B. Lime powder
- C. Silica/quartz**
- D. Dolomite

Boiling point elevation of a solution of NaOH _____?

- A. Increases rapidly with temperature rise
- B. Is almost independent of temperature
- C. Is almost independent of pressure
- D. Both B. and C**

Insitu theory and drift theory are related to the _____?

- A. Origin of petroleum oil
- B. Origin of coal**
- C. Coalification
- D. Variation of coal quality with depth

Which one contains minimum percentage of SiO₂ ?

- A. Firebrick
- B. Sillimanite**
- C. Semi-silica

D. Aluminous firebrick

Electronic structure of a material is generally studied by _____?

- A. Metallurgical microscope
- B. Electron diffraction
- C. Spectroscopic techniques**
- D. X-ray

Combustion of furnace oil in a furnace (soaking pit) with preheated combustion air at 400°C results in saving of about _____ percent furnace oil as compared to its combustion with atmospheric air, if the flue gas outlet temperature from the soaking pit is 1200°C ?

- A. 5
- B. 60
- C. 20**
- D. 40

For flow through an orifice from a reservoir, the actual velocity at the vena contracta is given by _____?

- A. $\sqrt{2gh}$
- B. C.V. $\sqrt{2gh}$**
- C. $C_d \sqrt{2gh}$
- D. $C_c \sqrt{2gh}$

The generic chemical name for the class of polymers which are commercially known as nylons is _____?

- A. Polyolefins
- B. Polyamide**
- C. Polyacrylate
- D. Polyurethane

The amount of Zn (atomic weight = 65) required to form 224 c.c. of H_2 at N.T.P.

on treatment with dilute H_2SO_4 will be _____ gm?

- A. 0.065
- B. 0.65**
- C. 6.5
- D. 65

Extraction of coffee from its seed is done by _____?

- A. Liquid-liquid extraction
- B. Leaching
- C. Extractive distillation
- D. Steam distillation

Grashoff number is given by _____?

- A. $gD^3 \cdot \beta \cdot \Delta t \rho^2 / \mu^2$**
- B. $gD^2 \beta \Delta t \rho / \mu^2$
- C. $gD^2 \beta \Delta t \rho^2 \mu$
- D. $gD^3 \beta \Delta t \rho^2 / \mu$

Separation of materials into products based on the difference of their sizes is called _____?

- A. Sizing**
- B. Sorting
- C. Classification
- D. Flocculation

Slide gates in teeming laddie used for steel pouring in ingot moulds is lined with _____ bricks?

- A. Bakelite impregnated or fused periclase**
- B. Silica
- C. Semi-silica
- D. Fireclay

Psychrometry deals with the properties of gas-vapor mixture. Humidity can be

determined by the measurement of the _____ of a fibre ?

- A. Electrical resistance**
- B. Thermal conductivity
- C. Strength
- D. None of these

Calorific value of wood gas is about _____ kcal/Nm³?

- A. 1500
- B. 3300**
- C. 5400
- D. 8500

Dissolving a solute in a solvent does not change its _____?

- A. Specific heat
- B. Vapour pressure
- C. Viscosity
- D. None of these**

Rate of a chemical reaction is independent of the concentration of the reactants for a _____ reaction?

- A. Zero order**
- B. Third order
- C. Consecutive
- D. None of these

Smoke point of a good burning kerosene may be around _____ mm?

- A. 0-5
- B. 20-25**
- C. 60-75
- D. 100-120

Epoxy resin _____?

- A. Is a good adhesive
- B. Is an elastomer
- C. Cannot be used for surface coatings
- D. Is a polyester

Which of the following is not a nickel based alloy ?

- A. Inconel
- B. Hastelloys
- C. Nimonics
- D. Babbitt metal**

Pick out the wrong statement?

- A. In process heat exchangers, saturated steam is preferred over the superheated steam
- B. The maximum is the emissive power of a surface at a temperature T_1 occurs at a wavelength of λ_1 . If the surface temperature is halved, the maximum in the emissive power would occur at a wavelength of $0.5 \lambda_1$**
- C. When a vertical plate is heated in infinite air environmental under natural convection conditions, the velocity profile in air, normal to the plate, exhibits a maximum
- D. A body at 925 K emits an energy of $1.42 \times 10^{11} \zeta W/m^2$ (ζ is the Stefan-Boltzmann constant) in the wavelength band between $3 \mu m$ to $4 \mu m$. The fraction of this energy in the total energy emitted over the entire wavelength range is equal to emissivity

The purpose of providing a 'catchall' in the vapor line of an evaporator is to _____?

- A. Create vacuum
- B. Regulate the vapor flow
- C. Vent the non-condensable gases
- D. Arrest the entrained liquid**

Runge-Kutta method is used to solve a/an _____?

- A. Ordinary differential equation of nth order
- B. Simultaneous non-linear equation**
- C. Linear differential equation
- D. None of these

Dew point of an air-water vapor mixture _____?

- A. Decreases with decrease in pressure
- B. At constant humidity & total pressure is fixed
- C. Corresponding to any point on the humidity chart is obtained by projecting a line through this point parallel to the temperature axis and to the saturation curve
- D. All A , B. & C.**

The units of frequency factor in Arrhenius equation _____?

- A. Are the same as those of the rate constant**
- B. Depend on the order of the reaction
- C. Depend on temperature, pressure etc. of the reaction
- D. Are cycles per unit time

Which of the following is the „Blasius equation“, relating friction factor to the Reynolds number ?

- A. $f = 0.079.NRe^{-0.25}$**
- B. $f^{-0.5} = 4.07 \log_e (NRe)^{-0.6}$
- C. Both 'a' and 'b'
- D. None of these

In order to maintain an oxidising atmosphere in a furnace, it should have _____?

- A. More of excess air**
- B. Less of excess air
- C. More of CO in flue gas
- D. More of CO₂ in flue gas

The combustion reaction, $C + O_2 = CO_2$, is _____?

- A. Exothermic
- B. Endothermic
- C. Autocatalytic
- D. None of these

Reduction ratio of crushers is the _____?

- A. Ratio of feed opening to discharge opening
- B. Ratio of discharge opening to feed opening
- C. Determining factor for minimum dia of the feed and the product
- D. None of these

The approximate liquid depth in an agitation tank is equal to (where, d = tank diameter) _____?

- A. $0.5 d$
- B. $0.75 d$
- C. d
- D. $2 d$

The material used in the filament of electric bulbs is _____?

- A. Nichrome
- B. Tungsten
- C. Constantan
- D. German silver

High temperature carbonisation of coal takes place at _____ °C?

- A. 2000
- B. 600
- C. 1100
- D. 1600

Urea (a nitrogenous fertiliser) is produced from carbon dioxide and _____?

- A. Nitric acid
- B. Ammonia**
- C. Ammonium nitrate
- D. Nitric oxide

As complete saturation of an adsorbent is approached, the differential heat of adsorption approaches _____?

A. That of normal condensation

- B. Integral heat of adsorption
- C. Zero
- D. None of these

In a gas-liquid absorption column, for obtaining the maximum absorption efficiency _____?

- A. Liquid stream should be distributed uniformly
- B. Gas stream should be distributed uniformly
- C. Both gas as well as liquid streams should be distributed uniformly**
- D. By passing should be completely avoided

In extractive distillation, solvent is _____?

- A. Added to alter the relative volatility of the mixture**
- B. Of high volatility
- C. Present in overhead stream
- D. Of high viscosity to give high tray efficiency

The dew point temperature lines on psychrometric charts are straight inclined sloping downwards to the right. When relative humidity of moist air is 100%, then _____?

- A. Wet bulb temperature=dry bulb temperature
- B. Wet bulb temperature=dew point temperature
- C. Saturation temperature=dew point temperature
- D. All 'A', 'B' & 'C'**

To get a fine talc powder from its granules, the equipment used is _____?

- A. Roller crusher
- B. Ball mill**
- C. Jaw crusher
- D. Gyratory crusher

The response of two tanks of same size and resistance in series is _____?

- A. Under damped
- B. Critically damped**
- C. Over damped
- D. None of the above

Gobar gas is produced by the _____ of 'gobar' (cow dung) ?

- A. Hydrolysis
- B. Fermentation**
- C. Oxidation
- D. Dehydration

In a forward feed multiple effect evaporator, the pressure is _____?

- A. Highest in last effect
- B. Lowest in last effect**
- C. Same in all effects
- D. Dependent on the number of effects

Flexible plastic pipes are made of _____?

- A. High density polyethylene (HDPE)
- B. Low density polyethylene (LDPE)**
- C. Polypropylene
- D. Unsaturated polyester

The activity of an ideal gas is numerically _____ its pressure?

- A. More than
- B. Less than
- C. Equal to**
- D. Data insufficient, can't be predicted

The specific gravity of coal depends mainly on its _____ content ?

- A. Carbon
- B. Volatile matter
- C. Ash
- D. Moisture**

What is the simplest formula of a compound containing 50% of element A (atomic weight = 10) and 50% of element B (atomic weight = 20) ?

- A. AB3**
- B. A2B3
- C. A2B
- D. AB2

_____ equation applies to diffusivities in liquids?

- A. Gilliland**
- B. Hirschfelder
- C. Wilke and Chang
- D. None of these

In case of an absorber, the operating _____ ?

- A. Line always lies above the equilibrium curve**
- B. Line always lies below the equilibrium curve
- C. Line can be either above or below the equilibrium curve
- D. Velocity is more than the loading velocity

With increase in porosity, the thermal conductivity of a solid

substance _____ ?

- A. Increases
- B. Decreases**
- C. Remains unchanged
- D. May increase or decrease; depends on the solid

The softness or hardness of a grinding wheel depends upon the type & amount of bonding material used. For general purpose cutter grinding

_____ grinding wheel is normally used ?

- A. Hard
- B. Soft
- C. Silicon carbide
- D. Aluminium oxide**

Pick out the wrong statement ?

- A. Plate efficiency increases with increase in superficial vapour velocity till entrainment limit
- B. Increase in depth of the liquid about the slots increases the plate efficiency, particularly if the liquid depth is $< 1''$
- C. Too small a plate spacing can cause a low efficiency, if the vapour velocity is greater than the allowable value
- D. None of these**

pH value of a solution containing equal concentration of hydroxyl and hydrogen ions will be _____ ?

- A. 0
- B. 10
- C. 7**
- D. 14

Absorption (liquid-gas system) with evolution of heat as compared to isothermal absorption results in _____ ?

- A. Decreased solute solubility
- B. Large minimum liquid to gas (L/G) ratio
- C. Large number of trays
- D. All A., B. and C.**

Co-current absorbers are usually used when the gas to be dissolved in the liquid is _____?

- A. Sparingly soluble
- B. Highly soluble
- C. A pure substance**
- D. A mixture

For the reaction as shown in the bellow figure, the rate of formation of Z is 0.2 gm mole/litre.hr. What is the rate of disappearance of X in gm mole/litre.hr ?

- A. 0.4**
- B. 0.1
- C. 0.2
- D. None of these

Minimum number of phases that exists in a system is 1. Number of chemical species in a colloidal system is _____?

- A. 1
- B. 2**
- C. 3
- D. 4

Pick out the wrong statement ?

- A. Superheated steam is preferably not used for process heating because of its low heat transfer film co-efficient
- B. In a shell and tube heat exchanger, the shell pressure drop is maximum for orifice baffles
- C. S.I. unit of fouling factor is Watt/m².°K**
- D. Longitudinal fins are used in extended surface heat exchangers, when the direction of fluid flow is parallel to the axis of the tube

Electro deposition of metals i.e. electroplating is never done on _____?

- A. Metals
- B. Alloys
- C. Refractories**
- D. Non-metals

All analogy equations connecting friction factor and heat transfer co-efficient apply only to _____?

- A. Wall or skin friction**
- B. Form friction
- C. Both A. and B.
- D. Turbulent flow

A measure of toughness of a material is its _____?

- A. Percentage elongation
- B. Yield strength**
- C. Ultimate strength
- D. Area under stress-strain diagram

Non-catalytic fluid-solid reactions are represented by _____ model?

- A. Continuous reaction
- B. Unreacted core
- C. Both A. and B.**
- D. Neither A. and B.

Which of the following fertilisers contains the least percentage of nitrogen ?

- A. Liquid ammonia
- B. Urea
- C. Ammonium phosphate**
- D. Ammonium sulphate

Pick out the wrong statement ?

- A. Enthalpies of all elements in their standard states are assumed to be zero
- B. Combustion reactions are never endothermic in nature
- C. Heat of reaction at constant volume is equal to the change in internal energy
- D. Clausius-Clapeyron equation is not applicable to melting process**

Mild steel is a/an _____ steel?

- A. Low carbon**
- B. Medium carbon
- C. High carbon
- D. High alloy

The catalyst used in shift converter is _____?

- A. Nickel**
- B. Vanadium
- C. Silica gel
- D. Alumina

Evaporator tubes are generally _____?

- A. Horizontal
- B. Vertical**
- C. Inclined
- D. Random

For coarse reduction of hard solids, use _____?

- A. Impact
- B. Attrition
- C. Compression**
- D. Cutting

The pressure intensity is the same in all directions at a point in a fluid _____?

- A. Only when the fluid is frictionless

- B. Only when the fluid is at rest having zero velocity
- C. When there is no motion of one fluid layer relative to an adjacent layer**
- D. Regardless of the motion of one fluid layer relative to an adjacent layer

Which of the following is normally not found in both the S.I. (petrol) & C.I. (diesel) engines ?

- A. Air filter
- B. Fuel injector**
- C. Exhaust silencer
- D. Battery

Main constituent of bone ash is _____?

- A. Ammonium phosphate
- B. Calcium phosphate**
- C. Animal charcoal
- D. Ammonium sulphate

Flue gas obtained on complete combustion of pure acetylene (a hydrocarbon fuel) will contain _____?

- A. CO
- B. CO₂
- C. H₂O
- D. Both B. & C.**

Which one has the maximum tensile strength out of the following ?

- A. Nodular cast iron**
- B. Pig iron
- C. White cast iron
- D. Grey cast iron

Carbon monoxide is a pollutant, which causes _____?

- A. Respiratory disease (e.g. asthma)
- B. Asphyxiation (suffocation) leading to death**

- C. Retardation in crop growth
- D. Damage to building materials like marble

The product of a commercial direct reduction process is _____?

- A. Liquid iron
- B. Solid iron
- C. Sponge iron**
- D. Iron saturated with carbon

Which of the following is not a polymer of two monomers ?

- A. Teflon**
- B. Bakelite
- C. SBR
- D. None of these

Condensation polymerisation is not involved in the manufacture of _____?

- A. Teflon
- B. Polythene**
- C. Terylene
- D. Nylon

Flash point of an oil is determined by the _____?

- A. Pensky Martens apparatus**
- B. Ramsbottom apparatus
- C. Saybolt viscometer
- D. Conradson apparatus

Thickness of stock does not affect the fuel economy of furnaces, if the material to be heated is of _____?

- A. Low emissivity
- B. High thermal conductivity
- C. Both A. and B.**

D. Neither A. nor B.

Normally, the ratio of the total riser area to the tower cross sectional area (for bubble cap towers of diameter more than 3 ft) is around _____?

- A. 0.4-0.6
- B. 0.35-0.75
- C. 0.1-0.2**
- D. 0.55-0.85

Fouling factor for a heat exchanger is given by (where, U_1 = heat transfer co-efficient of dirty surface U_2 = heat transfer co-efficient of clean surface) ?

- A. $U_1 - U_2$
- B. $1/U_1 - 1/U_2$**
- C. $1/U_2 - 1/U_1$
- D. $U_2 - U_1$

Which of the following packing materials provides for maximum mass transfer ?

- A. Raschig rings
- B. Raschig rings
- C. Cross-partition rings**
- D. All give the same value

A material is able to retain the deformation permanently by virtue of its _____?

- A. Elasticity
- B. Plasticity**
- C. Ductility
- D. Malleability

Unit of molal diffusivity is _____?

- A. $\text{cm}^2/\text{sec gm} \cdot \text{mole}$
- B. $\text{gm moles}/\text{cm}^2 \cdot \text{sec}$
- C. gm moles/cm. sec**

D. gm moles/cm². sec

Zeolite is used in the _____ ?

A. Water treatment

B. Glass manufacture

C. Hydrogenation of fatty oil as a catalyst

D. Development of exposed photographic plate

Magnesite refractories are used for the construction of those furnaces, which are _____ ?

A. Not required to resist the corrosive action of basic slag

B. Not subjected to fluctuation in temperature

C. Used for raising & maintaining high temperature

D. Both B. and C.

Which of the following materials has the poorest electrical conductivity ?

A. Carbon

B. Aluminium

C. Silver

D. Stainless steel

Carbon is present in the uncombined (graphitic) form in case of _____ ?

A. Cast iron

B. Steel

C. Ferroalloy

D. None of these

The dew point of an unsaturated gas-vapor mixture does not depend upon the _____ of the mixture?

A. Composition

B. Temperature

C. Total pressure

D. All A., B. and C.

With decrease in the grain size of a material, its creep resistance _____?

A. Increases

B. Decreases

C. Remain constant

D. Either A. or B.; depends on the material

Pick out the wrong statement?

A. The capacity of an evaporator is reduced by the boiling point elevation

B. Corrosive liquid is normally passed through the tubes in a shell and tube heat exchanger

C. Steam jet ejector is used for vapor compression in a thermal recompression evaporator

D. Heat sensitive materials should be concentrated in high pressure evaporators

The rate of the heterogeneous catalytic reaction $A(g) + B(g) \rightarrow C(g)$ is given by $-r_A = k \cdot K_A \cdot p_A \cdot p_B / (1 + K_A \cdot p_A + K_c \cdot p_c)$, where K_A and K_c are the adsorption equilibrium constants. The rate controlling step for this reaction is _____?

A. Absorption of A

B. Surface reaction between absorbed A and absorbed B

C. Surface reaction between absorbed A and B in the gas phase

D. Surface reaction between A in the gas phase and absorbed B

_____ is not a heat treatment process ?

A. Cyaniding

B. Parkerizing

C. Austempering

D. Martempering

Prandtl number is the ratio of _____?

A. Momentum diffusivity to mass diffusivity

B. Momentum diffusivity to thermal diffusivity

- C. Thermal diffusivity to mass diffusivity
- D. Thermal diffusivity to momentum diffusivity

'Spinel', a refractory mineral is chemically represented as _____?

- A. $MgAl_2O_4$**
- B. $MgAl_2O_3$
- C. $MgSO_4$
- D. $MgAl_2O_3 \cdot 2H_2O$

A multiple effect evaporator as compared to a single effect evaporator of the same capacity has _____?

- A. Lower heat transfer area
- B. Lower steam economy
- C. Higher steam economy**
- D. Higher solute concentration in the product

Hydrazine is largely used _____?

- A. As a starting material for 'hypo'
- B. In photographic industry
- C. As rocket fuel**
- D. In printing industry

The change in enthalpy per unit weight of adsorbed gas when adsorbed on gas free or "outgassed" adsorbent to from a definite concentration of adsorbate is called its _____?

- A. Integral heat of adsorption**
- B. Heat of wetting
- C. Differential heat of adsorption
- D. Heat of normal condensation

The main reason for making the copper calorimeter (used in bomb calorimeter) silvery white and shining/polished is to _____?

- A. Minimise its corrosion
- B. Avoid radiation heat loss**
- C. Make it look attractive
- D. None of these

Research reactors are normally meant for _____?

A. Producing high neutron flux 10^{12} - 10^{13} neutrons/cm², sec and studying the effect of neutron

bombardment on different materials

- B. Accelerating the neutrons
- C. Power generation
- D. None of these

For large heat transfer area requirement, shell and tube heat exchanger is preferred, because it _____?

- A. Occupies smaller space
- B. Is more economical
- C. Is easy to operate and maintain
- D. All A., B. and C.**

Prandtl mixing length is _____?

- A. Applicable to laminar flow problems
- B. A universal constant
- C. Zero at the pipe wall**
- D. None of these

Ca(OH)₂ is called _____?

- A. Quicklime
- B. Slaked lime**
- C. Limestone
- D. Gypsum

Reynolds number for water flow through a tube of I.D. 5 cm is 1500. If a liquid of 5 centipoise viscosity and 0.8 specific gravity flows in the same pipe at the same velocity, then the pressure drop will _____?

- A. Increase
- B. Decrease
- C. Remain same
- D. Data insufficient to predict pressure drop

For an ideal fluid flow, Reynolds number is _____?

- A. 2100
- B. 100
- C. 0
- D. ∞

1 torr is equivalent to _____?

- A. 1 mm Hg
- B. 1 Pascal
- C. 1 atm
- D. 1 mm wc

Oceans act as sinks for atmospheric gases including carbon dioxide whose concentration in the atmosphere is increased by the _____?

- A. Forestation
- B. Rain
- C. Green house effect
- D. Vegetation

Quantity of coke produced from metallurgical coal may be around _____ percent?

- A. 30
- B. 50

C. 75

D. 95

The calorific value is the highest out of the following for _____?

A. Producer gas

B. Water gas

C. Coke oven gas

D. Blast furnace gas

In case of evaporators, liquid entrainment results primarily due to _____?

A. High vacuum in the evaporator

B. High evaporation rate

C. Foaming of the solution

D. High heat transfer rate

The softest material just next to talc in the Mho's scale is _____?

A. Quartz

B. Gypsum

C. Feldspar

D. Fluorite

_____ flow means the flow of incompressible fluid with no shear ?

A. Potential

B. Streamline

C. Creep

D. Boundary layer

Light weight metallic alloy used in aircraft industry is _____?

A. Aluminium

B. High silicon (14%) iron

C. Duralumin

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D. Phosphor bronze

Specific rate constant for a second order reaction _____?

- A. Is independent of temperature
- B. Varies with temperature
- C. Depends on the nature of the reactants

D. Both B. and C.

Feed size of ≥ 25 cms can be accepted by _____?

- A. Ball mill
- B. Rod mill
- C. Fluid energy mill

D. Jaw crusher

The operating cost of a distillation column at minimum reflux ratio is _____?

- A. Minimum**
- B. Maximum
- C. Infinite
- D. Zero

Blast furnace gas compared to coke oven gas has _____?

- A. Lower ignition temperature
 - B. Narrower limit of inflammability
 - C. Higher calorific value
- D. Lower theoretical flame temperature**

Which of the following finds the least commercial use ?

- A. Pure iron**
- B. High silicon iron
- C. Low carbon steel
- D. High carbon steel

Urea is a better fertilizer than ammonium sulphate, because _____?

- A. It is cheaper
- B. Nitrogen content is higher**
- C. It is not poisonous
- D. It is easy to manufacture

In the Lurgi coal gasifier _____?

- A. Coking coals cannot be used
- B. Low carbon conversion efficiency is achieved
- C. Entrainment of solids is higher
- D. Large quantity of coal can be processed**

Gold ore concentration is mostly done using _____?

- A. Jigging
- B. Tabling**
- C. Froth floatation
- D. Elutriation

Liquid argon level in a pressurised storage tank (at 3 kg/cm²) is measured by a/an _____?

- A. Gage glass
- B. External float gage
- C. Differential pressure gage**
- D. None of these

SO₂ is bubbled through hot sugar cane juice to _____?

- A. Act as an acidifying agent**
- B. Increase its concentration
- C. Increase the amount of molasses
- D. Increase the crystal size

Molality is defined as the number of gm moles of solute per

_____ of solvent ?

- A. Litre
- B. gm
- C. Kg**
- D. m³

Tar bonded dolomite bricks _____ ?

- A. Are stored under controlled temperature & humidity to avoid hydration
- B. Are used in outer lining of L.D. converters
- C. Have poorer hydration resistance than pitch bonded bricks
- D. All A., B. and C.**

The most stable allotropic form of phosphorous is the _____ phosphorous?

- A. White
- B. Black**
- C. Yellow
- D. Red

The malleability of a material is the property by virtue of which it can be rolled or hammered into thin sheets. Which of the following materials has the maximum malleability ?

- A. Lead**
- B. Copper
- C. Aluminium
- D. Wrought iron

In the case of a shell and tube heat exchanger, the logarithmic mean temperature difference _____ ?

- A. Is always less than arithmetic average value**
- B. Is always more than arithmetic mean value and the geometric mean value
- C. Is always less than arithmetic mean value, but more than geometric mean value

D. May be either more or less than geometric mean and arithmetic mean value depending upon whether the flow of stream is co-current or counter-current

The drying time between fixed moisture content within diffusion controlled 'falling rate period' is proportional to (assuming that drying occurs from all surfaces of the solid) (where, T = thickness of the solid) ?

- A. \sqrt{T}
- B. T
- C. T^2
- D. T^3

Out of the following, the joint produced by _____ has the lowest strength?

- A. Soldering
- B. Welding
- C. Brazing
- D. Riveting

Energy produced in the nuclear fission is of the order of _____ MeV?

- A. 20
- B. 200
- C. 1000
- D. 2000

Co-efficient of performance for a reversed Carnot cycle working between temperatures T_1 and T_2 ($T_1 > T_2$) is _____?

- A. $T_2/(T_1 - T_2)$
- B. $T_1/(T_1 - T_2)$
- C. $(T_1 - T_2)/T_1$
- D. $(T_1 - T_2)/T_2$

Nitrile rubber is produced by the polymerisation of _____?

- A. Acrylonitrile and butadiene**
- B. Acrylonitrile and styrene
- C. Isobutylene and isoprene
- D. None of these

Most of the common metals have _____ crystal structure?

- A. Cubic**
- B. Hexagonal
- C. Orthorhombic
- D. None of these

Vapour actuated pressure spring thermometer does not require ambient temperature compensation. Ambient temperature compensation is provided in gas or liquid expansion pressure spring thermometer by _____?

- A. Making the volume of thermometer bulb as large as conveniently possible
- B. Reducing the volume of the capillary to a minimum
- C. Reducing the volume of the receiving element to a minimum
- D. All A , B & C.**

The refractory brick which has good thermal shock resistance at high temperature but cracks on cooling below 400°C is _____?

- A. Magnesite
- B. Chrome
- C. Silica**
- D. Fireclay

Pulverised coal passing through 200 mesh screen has a diameter of 0.074 mm (74 micron). The same passing through 50 mesh screen will have a dia of _____ mm?

- A. 0.007
- B. 0.30**

- C. 50
- D. 0.014

If the absolute temperature of an ideal gas is tripled and simultaneously the pressure is reduced to one third; then the volume of gas will _____?

- A. Remain unaltered
- B. Increase nine fold**
- C. Increase three fold
- D. Decrease three fold

Widely used method for the conditioning of boiler feed water is the _____?

- A. Cold lime process
- B. Coagulation
- C. Hot-lime soda process**
- D. Sequestration

Mass transfer co-efficient (K) and diffusivity D. are related according to film theory as _____?

- A. $K \propto D$**
- B. $K \propto \sqrt{D}$
- C. $K \propto D^{1.5}$
- D. $K \propto D^2$

Pick out the wrong statement?

- A. Loamy soil is the best soil for vigorous plant growth, while the clayey soil is solid and hence the plant roots penetrate with difficulty
- B. Large excess use of nitrogenous fertiliser in land causes the problem of diarrhoea and cyanosis
- C. Application of large excess of Potassic fertiliser in soil increases the valuable carotene in fruits and vegetables**

D. Cereal crops grown on alkaline soil absorb higher amount of fluorides thereby spreading fluorosis

Boundary layer separation is caused by the _____?

- A. Reduction of pressure to vapour pressure
- B. Boundary layer thickness reducing to zero
- C. Adverse pressure gradient
- D. Reduction of pressure gradient to zero**

Absorption factor method is used to calculate the number of ideal stages, when _____?

- A. Operating line lies above the equilibrium line
- B. Operating line lies below the equilibrium line
- C. Both operating and equilibrium lines are parallel**
- D. Pressure drop in the column is very high

The efficiency of an Otto engine compared to that of a diesel engine, for the same compression ratio will be _____?

- A. More**
- B. Less
- C. Same
- D. Data insufficient to predict

Except for monatomic gases, the molal heat capacity at constant volume for all gases is _____ Kcal/Kg mole. $^{\circ}$ K?

- A. 3
- B. > 3**
- C. < 3
- D. < 1

Double pipe heat exchangers are used _____?

- A. When heat transfer area required is very high
- B. When heat transfer area required is very low, i.e. (100-200 ft²).**

- C. Because it occupies less floor area
- D. Because it is less costly

100% H₂SO₄ at 30°C can't be stored in a vessel made/lined with _____?

- A. Cast iron and high silicon iron
- B. Mild steel and stainless steel
- C. Aluminium, tin and rubber**
- D. Teflon, glass and porcelain

What is the dispersion number for a CSTR ?

- A. 0
- B. 1
- C. < 1
- D. ∞**

In case of supersonic flow of a fluid through pipeline, the 'Mach number' is _____?

- A. 0
- B. 1
- C. < 1
- D. > 1**

What is the ratio of total kinetic energy of fluid passing per second to the value obtained on the basis of average velocity (for laminar flow through a circular pipe) ?

- A. 0.5
- B. 1
- C. 1.5
- D. 2**

Vapor pressure of water at 100°C is about _____ bar?

- A. 0.1013
- B. 1.013**
- C. 10.13
- D. 101.3

_____ functions are exemplified by heat and work ?

- A. Path**
- B. Point
- C. State
- D. None of these

Flue gas from the heating chamber of by product coke ovens is removed by _____ ?

- A. Forced draft fan
- B. Induced draft fan
- C. Steam ejector
- D. Natural draft**

Which is not an acidic refractory ?

- A. Silica
- B. Fireclay
- C. High alumina refractory
- D. Carbon black**

The heat of solution depends upon the _____ ?

- A. Nature of solvent
- B. Concentration of solution
- C. Nature of solute
- D. All A., B. & C.**

The irreversible reaction, $X \rightarrow Y$, is the special case of the reversible reaction, $X \rightleftharpoons Y$, in which the _____ ?

- A. Equilibrium constant is infinite

- B. Fractional conversion of 'A' at equilibrium is unity
- C. Concentration of 'A' at equilibrium is zero
- D. All A., B. and C.**

Common house hold glass (i.e., soda-lime glass) is a/an _____ material?

- A. Fully crystalline
- B. Partly crystalline**
- C. Amorphous
- D. None of these

The heat capacities for the ideal gas state depend upon the _____?

- A. Pressure
- B. Temperature**
- C. Both A. & B.
- D. Neither A. nor B.

Milk is dried usually in a _____ dryer?

- A. Freeze
- B. Spray**
- C. Tray
- D. Rotary

Unit of radioactivity is _____?

- A. Barn
- B. Fermi
- C. Angstrom
- D. Curie**

Working principle of radiation pyrometer is based on the _____?

- A. Wien's law
- B. Kirchoff's law

C. Stefan-Boltzmann law

D. Seebeck effect

Maximum heat transfer rate can be expected in case of _____?

A. Laminar flow

B. Co-current flow

C. Turbulent flow

D. Heat flow rate is independent of nature of flow

In a ball mill, the volume occupied by the balls (when the mill is stopped) is about _____ percent of the volume of the mill?

A. 35

B. 50

C. 70

D. 85

A gas mixture contains 6 moles of H_2 and 2 moles of N_2 . If the total pressure of the gaseous mixture is 4 kgf/cm^2 ; then the partial pressure of N_2 in the mixture will be _____ kgf/cm^2 ?

A. 1

B. 2

C. 4

D. 8

A chemical reaction will occur spontaneously at constant pressure and temperature, if the free energy is _____?

A. Zero

B. Positive

C. Negative

D. None of these

Mass transfer co-efficient is directly proportional to DAB according to the

_____ theory?

- A. Film
- B. Penetration
- C. Surface-renewal
- D. None of these

Cyclones are used primarily for separating_____?

- A. Solids
- B. Solids from fluids**
- C. Liquids
- D. Solids from solids

Which of the following is a measure of the agglutinating (i.e., binding) property of coal ?

- A. Thickness of plastic layer
- B. Caking index**
- C. Swelling index
- D. Gray-king index

Yield of urea can be increased with excess ammonia and higher pressure & temperature, but because of _____ this is normally not done?

- A. Increased biuret formation
- B. High corrosion rate
- C. Increased cost of equipment
- D. All A., B. & C.**

Which of these columns incurs the lowest pressure drop ?

- A. Packed column (with stacked packing)**
- B. Packed column (with dumped packing)
- C. Bubble plate column
- D. Pulse column

Polar organic compounds are normally used as separating agents for the

azeotropic and extractive distillation. Which of the following is the most important factor to be considered for the choice of the separating agent for extractive distillation ?

- A. Cost
- B. Availability
- C. Toxicity
- D. Selectivity**

With increase in the porosity, thermal spalling resistance of fireclay brick_____?

- A. Increases**
- B. Decreases
- C. Remain same
- D. May increase or decrease

When an exothermic reversible reaction is conducted adiabatically, the rate of reaction_____?

- A. Continuously increases
- B. Continuously decreases
- C. Passes through a maximum**
- D. Passes through a minimum

For a constant volume process _____ by the system is used only to increase the internal energy?

- A. Heat absorbed**
- B. Work done
- C. Both A. & B
- D. Neither A. nor B

The recovery of penicillin from the acidified fermentation broth is done by_____?

- A. Distillation

- B. Evaporation
- C. Absorption
- D. Liquid extraction**

The most economical range of absorption factor is _____?

- A. 0 to 0.5
- B. 0 to 3
- C. 1.25 to 2**
- D. 5 to 15

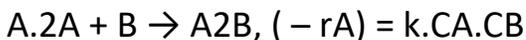
β -rays emission in radioactive disintegration is always accompanied by the emission of _____?

- A. γ -rays**
- B. α -rays
- C. Neutrons
- D. None of these

Carbon is present in the combined form (carbide) in case of _____?

- A. Pig iron
- B. Steel
- C. Ferroalloys
- D. All A., B. & C.**

Find a mechanism that is consistent with the rate equation and reaction given below



- A. $A + B \rightleftharpoons AB; AB + A \rightarrow A_2B$
- B. $A + B \rightarrow AB; AB + A \rightarrow A_2B$
- C. $A + A \rightarrow AA; AA + B \rightarrow A_2B$
- D. $A + A \rightleftharpoons AA; AA + B \rightarrow A_2B$**

Which of the following has the minimum thermal conductivity ?

A. Nitrogen

- B. Steel
- C. Carbon black
- D. Tar

Internal energy is equal to the heat absorbed in case of a/an _____ process?

A. Constant volume

- B. Polytropic
- C. Adiabatic
- D. Constant pressure

Heat transfer by _____ is almost absent in case of fluidised bed drying operation?

A. Radiation

- B. Conduction
- C. Convection
- D. Both B. & C.

Pick out the wrong statement ?

- A. In a multistep reaction, the slowest step is the rate determining step
- B. In general, the rate of a reaction becomes triple for every 10°C rise in temperature**
- C. Slow chemical reactions have generally high values of activation energy
- D. Molecularity of a reaction cannot be zero but the order of a reaction can be zero

A batch reactor suffers from following disadvantage ?

- A. Poor product quality control
- B. High labour and handling cost
- C. High shutdown time requirement for emptying, cleaning and refilling
- D. All A., B. and C.**

Which of the following alloy steels has the energy saving properties making it suitable for use in electrical machines ?

- A. Silicon steel
- B. Chromium steel
- C. Molybdenum steel
- D. None of these

Ultracentrifuges running at speeds upto 100000 rpm is normally used for the _____?

- A. Separation of isotopes based on their density or molecular weights difference
- B. Concentration of rubber latex
- C. Separation of cream from milk
- D. Dewaxing of lubricating oil

Pick out the wrong statement?

- A. Ductile fracture of a stressed material, which exhibits a large plastic deformation is commonly caused by the formation and coalescence of voids in the necked region
- B. Brittle fracture is caused by the propagation of pre-existing cracks in the material and involves minimum plastic deformation
- C. Fatigue fracture of a material is always brittle in nature and takes place due to the existence of line imperfections
- D. Brittle materials are generally tested in tension

A catalyst in a chemical reaction _____ free energy change in the reaction?

- A. Increases
- B. Decreases
- C. Either A. or B.; depends on the type of catalyst
- D. Neither A. nor B.

At 100°C, water and methylcyclohexane both have vapour pressures of 1 atm. Also at 100°C, the latent heats of vaporisation of these compounds are 40.63 kJ/mole for water and 31.55 kJ/mole for methylcyclohexane. The vapour

pressure of water at 150°C is 4.69 atm. At 150°C, the vapour pressure of methylcyclohexane would be expected to be _____?

- A. Significantly less than 4.69 atm
- B. Nearly equal to 4.69 atm
- C. Significantly more than 4.69 atm**
- D. Indeterminate due to lack of data

An annuity is a series of equal payments occurring at equal time intervals, and this amount includes the sum of all payments plus interest, if allowed to accumulate at a definite rate of interest from the time of initial payment to the end of annuity term. Ordinary annuity is used in the calculation of the _____?

- A. Manufacturing cost
- B. Depreciation by sinking fund method**
- C. Discrete compound interest
- D. Cash ratio

Petroleum _____ ?

- A. Is optically active**
- B. Constitutes mainly of olefins
- C. Does not contain asphalt
- D. Does not contain aromatics

Kinetic theory of gases stipulates that, the _____?

- A. Energy is lost during molecular collisions
- B. Molecules possess appreciable volume
- C. Absolute temperature is a measure of the kinetic energy of molecules**
- D. None of these

Tar yield in the low temperature and high temperature carbonisation of dry coal may be respectively _____ percent?

- A. 3 & 10

- B. 10 & 3**
- C. 10 & 20
- D. 15 & 8

A simple pitot tube measures the _____?

- A. Average velocity
- B. Maximum velocity
- C. Point velocity
- D. Static pressure**

Rittinger number which designates the new surface produced per unit of mechanical energy absorbed by the material being crushed, depends on the _____?

- A. State or manner of application of the crushing force
- B. Ultimate strength of the material
- C. Elastic constant of the material
- D. All A., B. and C.**

Reduction in the grain size reduces the _____ of the material?

- A. Fatigue resistance
- B. Tensile strength
- C. Creep resistance
- D. All A, B. & C**

Which of the following is the costliest method for commercial production of hydrogen for ammonia synthesis ?

- A. H₂ separation from coke oven gas
- B. Steam reforming of naphtha
- C. Cracking of natural gas
- D. Electrolysis of water**

Normalising does not _____ of a metal ?

- A. Improve machinability & tensile strength

B. Remove internal stresses

- C. Refine the structure
- D. Remove strains caused by cold working

The reactions with low activation energy are _____?

- A. Always spontaneous
- B. Slow
- C. Fast**
- D. Non-spontaneous

Deaeration (removal of O₂) of water is done by _____?

- A. Rectification
- B. Absorption
- C. Ion-exchange**
- D. Adsorption

The characteristic equation for the control system with a closed loop transfer function $G_1/(1 + G_2)$ is given by $1 + G_2 = 0$. The characteristic equation for the control system _____?

- A. Depends only upon the open loop transfer function
- B. Determines its stability
- C. Is the same for set point or load changes
- D. All A , B & C.**

Radioactive nuclear waste is treated in _____?

- A. Mixer-settler extractor
- B. Rotating-disc contactor
- C. Pulsed column extractor**
- D. Bollman extractor

Styrene butadiene rubber (SBR) is never used for making _____?

- A. Coated fabrics
- B. Front wheel tyres of aeroplanes (i.e., heavy duty tyres)**

- C. Gaskets
- D. Soles of shoes

Molecular sieves are porous _____?

- A. Alumina
- B. Silica
- C. Synthetic zeolites crystals/metal alumino-silicates**
- D. None of these

When the pipe Reynold's number is 6000, the flow is generally _____?

- A. Viscous
- B. Laminar
- C. Turbulent**
- D. Transition

Shatter index of metallurgical coke on 2 inches and 0.5 inch screen should be respectively around _____ percent?

- A. 80 and 97**
- B. 95 and 100
- C. 40 and 70
- D. 25 and 97

Permissible safe limit (TLV) of _____ toxic gas is 100-1000 parts per million (ppm)?

- A. Highly
- B. Moderately**
- C. Extremely
- D. Very extremely

Change in volume of metals from absolute zero temperature to their melting points is _____?

- A. Almost same for all metals**
- B. Different for different metals
- C. Less for low melting point metals
- D. Less for high melting point metals

Hold up of material in a operating rotary drier is in the range of _____?

- A. 0.05 to 0.15**
- B. 0.25 to 0.50
- C. 0.5 to 0.8
- D. 0.8 to 0.9

The behaviour of visco-elastic material is time dependent. This behaviour is common in _____ materials?

- A. Non-crystalline solid
- B. Crystalline
- C. Rubbery
- D. Non-crystalline organic polymeric**

Thermal efficiency of an internal combustion engine is around _____ percent?

- A. 8
- B. 35**
- C. 65
- D. 80

The valve commonly used in pipes larger than 2" dia is a _____?

- A. Globe valve
- B. Plug-cock
- C. Gate valve**
- D. Check valve

The fluid jet discharging from a 2" diameter orifice has a diameter of 1.75" at its

venacontracta. The co-efficient of contraction is _____?

- A. 1.3
- B. 0.766**
- C. 0.87
- D. None of these

The amount of different substances produced, when the same quantity of electricity is passed through different solutions are proportional to their _____?

- A. Equivalent weight**
- B. (Equivalent weight)²
- C. Molecular weight
- D. (Molecular weight)²

The Sieder-Tate correlation for heat transfer in turbulent flow in pipe gives $Nu \propto Re^{0.8}$, where, Nu is the Nusselt number and Re is the Reynolds number for the flow. Assuming that this relation is valid, the heat transfer co-efficient varies with the pipe diameter D . as _____?

- A. $D^{-1.8}$
- B. $D^{-0.2}$**
- C. $D^{0.2}$
- D. $D^{1.8}$

During a phase change process like sublimation, vaporisation, melting etc., the specific _____ does not change?

- A. Enthalpy
- B. Gibbs free energy**
- C. Internal energy
- D. Entropy

Differential manometer measures the _____?

- A. Atmospheric pressure

- B. Sub-atmospheric pressure
- C. Pressure difference between two points**
- D. None of these

Commercial power generation from fusion reactor is not yet possible, because _____?

- A. It is difficult to control fusion reaction**
- B. The fuel required (e.g. deuterium and tritium) is scarce
- C. It is difficult to initiate fusion reaction
- D. Quantity of fuel required for initiating fusion reaction is prohibitively high

In case of parallel flow heat exchanger, the lowest temperature theoretically attainable by the hot fluid is _____ the outlet temperature of the cold fluid?

- A. Equal to**
- B. More than
- C. Less than
- D. Either more or less than (depending upon the fluid)

Kinetics of a solid catalysed reaction can best be studied in a _____ reactor?

- A. Batch
- B. Plug-flow
- C. Mixed**
- D. None of these

The ratio of kinematic viscosity to thermal diffusivity is called the _____ number?

- A. Peclet
- B. Prandtl**
- C. Stanton
- D. Nusselt

Pick out the correct statement?

- A. Reaction of NH_3 with HNO_3 to produce $(\text{NH}_4)_2\text{NO}_3$ is endothermic
- B. With increase in NH_3/CO_2 ratio, urea yield decreases for a given temperature, pressure and total feed rate**
- C. Biuret (an intermediate during urea manufacture) is toxic to seeds and animals
- D. Both B. and C.

Which has the maximum melting point out of the following ?

- A. Steel
- B. Cast iron
- C. Stainless steel
- D. Wrought iron**

The head developed by a centrifugal pump is largely determined by the _____?

- A. Power of the pump
- B. Nature of the liquid being pumped
- C. Angle of the vanes and the speed of the tip of the impeller**
- D. Vapour pressure of the liquid

The co-efficient of drag and lift for an incompressible fluid depends on the _____?

- A. Reynolds number**
- B. Froude number
- C. Mach number
- D. All A., B. and C.

Which of the following is not a component of working capital ?

- A. Raw materials is stock
- B. Finished products in stock
- C. Transportation facilities**

D. Semi-finished products in the process

Out of the following, which will fracture most readily, when hit with a hard hammer ?

- A. Brass
- B. Bronze
- C. German silver
- D. Cast iron**

Coke oven gas constitutes mainly of _____ ?

- A. H₂ & CO
- B. H₂ & CH₄**
- C. CH₄ & CO
- D. H₂ & CO₂

Which of the following is not an equation of state ?

- A. Bertholet equation
- B. Clausius-Clapeyron equation**
- C. Beattie-Bridgeman equation
- D. None of these

Presence of nitrogen in combustion air does not reduce the _____ ?

- A. Amount of heat liberated**
- B. Flame temperature
- C. Flue gas temperature
- D. Any of the above

_____ acid is an unsaturated fatty acid ?

- A. Palmitic
- B. Oleic**
- C. Stearic
- D. Oxalic

($NSh/NRe.NSc$) is termed in mass transfer operation as the _____?

- A. Stanton number**
- B. Peclet number
- C. Thermal diffusivity
- D. Momentum diffusivity

Furfural solvent extraction is used for upgrading (by dissolving aromatics) ?

- A. Naphtha
- B. Lubricating oils**
- C. Wax
- D. Cracking feedstock

$(\partial H/\partial T)_P$ is the mathematical expression for _____?

- A. CV
- B. Entropy change
- C. Gibbs free energy
- D. None of these**

A solution having a pH value of 5 is less acidic than the one having a pH value of 2 by a factor of _____?

- A. 3
- B. 100
- C. 1000**
- D. None of these

A proportional controller with a gain of K_c is used to control a first order process. The offset will increase, if _____?

- A. K_c is reduced
- B. K_c is increased**
- C. Integral control action is introduced
- D. Derivative control action is introduced

For flow past a flat plate, if „x“ is the distance along the plate in the direction of flow, the boundary layer thickness is proportional to _____?

- A. \sqrt{x}
- B. $1/\sqrt{x}$
- C. x
- D. $1/x$

Paper industry employs _____ driers?

- A. **Cylinder**
- B. Rotary
- C. Spray
- D. Fluidised bed

For laminar flow of Newtonian fluids through a circular pipe, for a given pressure drop and length & diameter of pipe, the velocity of fluid is proportional to (where, μ = fluid viscosity) ?

- A. μ
- B. **$1/\mu$**
- C. $\sqrt{\mu}$
- D. $1/\sqrt{\mu}$

If a force greater than that of gravity is used to separate solids & fluids of different densities, the process is termed as the _____?

- A. Sedimentation
- B. Flocculation
- C. Dispersion
- D. **Centrifugation**

The _____ of a vapor pressure thermometer is a primary element?

- A. Pointer
- B. Bourdon tube

C. Bulb

D. None of these

The transfer function of a first order system is _____?

A. $1/(Ts + 1)$

B. $1/Ts$

C. $s/(Ts + 1)$

D. None of these

Which of the following is not a high alumina refractory material ?

A. Kyanite

B. Sillimanite

C. Diaspore

D. Periclase

Pick out the wrong statement.

A. The conversion for a gas phase reaction increases with decrease in pressure, if there is an increase in volume accompanying the reaction _____?

B. With increase in temperature, the equilibrium constant increases for an exothermic reaction

C. The equilibrium constant of a reaction depends upon temperature only

D. The conversion for a gas phase reaction increases with increase in pressure, if there is a decrease in volume accompanying the reaction

Methyl orange indicator turns _____?

A. Orange yellow in alkaline medium

B. Orange yellow in acidic medium

C. Colourless in acidic medium

D. Colourless in basic medium

The necessary wall thickness for a metallic storage vessel is a function of the _____?

A. Ultimate tensile strength (or yield point) of the material and operating temperature

- B. Operating pressure and welding/joint efficiency
- C. Diameter of the vessel
- D. All A., B. and C.**

_____ is a cohesive solid ?

- A. Wheat
- B. Sand
- C. Wet clay**
- D. None of these

For the liquid phase zero order irreversible reaction $A \rightarrow B$, the conversion of A in a CSTR is found to be 0.3 at a space velocity of 0.1 min^{-1} . What will be the conversion for a PFR with a space velocity of 0.2 min^{-1} ? Assume that all the other operating conditions are the same for CSTR and PFR ?

- A. 0.15
- B. 0.30
- C. 0.60**
- D. 0.90

Salt cake is chemically represented by _____ ?

- A. Na_2SO_4**
- B. $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$
- C. MgSO_4
- D. BaSO_4

The only suitable method for hardening the low carbon steel is case hardening. Which of the following is a case hardening process ?

- A. Cyaniding**
- B. Sherardizing
- C. Spheroidising
- D. None of these

_____ is an indirectly heated furnace?

- A. Open hearth furnace
- B. Muffle furnace**
- C. Soaking pit
- D. Reheating furnace

Temperature and pressure in urea autoclave is _____?

- A. 120°C and 300 atm
- B. 190°C and 200 atm**
- C. 400°C and 550 atm
- D. 200°C and 10 atm

Probability of cavitation occurring becomes very high, when the local _____ resulting in water bubbles formation, which on rupture cause cavitation

- A. Pressure falls below the vapour pressure
- B. Pressure becomes very high
- C. Temperature becomes low
- D. All A, B & C**

Isotonic solutions must have the same _____?

- A. Viscosity
- B. Molar concentration**
- C. Normality
- D. Critical temperature

A reduction process is accompanied with increase in the _____?

- A. Number of electrons**
- B. Oxidation number
- C. Both A. & B.
- D. Neither A. nor B.

_____ acid is the main constituent of cotton seed oil ?

- A. Acetic
- B. Linoleic**
- C. Palmitic
- D. Oleic

Which of the following is used for the concentration of rubber latex ?

- A. Agitated film evaporator**
- B. Long tube vertical evaporator
- C. Short tube evaporator
- D. Calandria

Unit of viscosity in CGS system is _____ ?

- A. gm .cm-1 sec-1**
- B. gm . cm² . sec-2
- C. gm .cm-2, sec-1
- D. gm . cm . sec-1

The dew point of moist air becomes _____ with decrease in its relative humidity ?

- A. Less than the wet bulb temperature**
- B. More than the wet bulb temperature
- C. More than the dry bulb temperature
- D. Equal to wet bulb temperature

Entropy change for an irreversible isolated system is _____ ?

- A. ∞
- B. 0
- C. < 0
- D. > 0**

Acetaldehyde is shipped in _____ drums?

- A. Cast iron
- B. Steel

- C. Aluminium
- D. Either B. & C.**

The _____ of a vapor pressure thermometer is a secondary element ?

- A. Pointer
- B. Bourdon tube**
- C. Bulb
- D. None of these

For flow through a venturi at a particular discharge, the correct relationships among velocities at point X, Y and Z would be _____?

- A. $V_1 < V_2 < V_3$
- B. $V_2 > V_1$ and $V_2 > V_3$**
- C. $V_1 > V_2 > V_3$
- D. None of these

Chilled iron castings are _____?

- A. Easily machinable
- B. Soft on surface
- C. Highly wear resistant**
- D. None of these

An ideal material for making cooking vessels should have _____?

- A. High heat capacity
- B. Low heat capacity
- C. High thermal conductivity
- D. Both B. and C.**

Out of the following thermocouple wire insulating material, the highest temperature rating is for _____?

- A. Teflon
- B. Ceramic fibre**

- C. Asbestos
- D. Fibre glass

Vacuum maintained in the vacuum distillation column in oil refinery is in the range of about _____ mm Hg absolute?

- A. 1 to 5
- B. 30 to 80**
- C. 250 to 350
- D. 450 to 500

For the reaction, $A + B \rightarrow 2B + C$, _____?

- A. $r_A = r_B$
- B. $r_A = -r_B$**
- C. $r_A = 2r_B$
- D. $r_A = r_B/2$

An ideal coolant for a nuclear reactor should _____?

- A. Be a good absorber of neutrons
- B. Be capable of attaining high temperature, only when it is pressurised
- C. Have high density, but low heat transfer co-efficient
- D. Be free from radiation damage and non-corrosive**

The reason for preferring packed towers over plate towers in distillation practice is that the packed tower operation gives _____?

- A. Low pressure drop and high hold up
- B. High pressure drop and low hold up
- C. Low pressure drop and low hold up**
- D. High pressure drop and high hold up

The irreversible reaction is a special case of reversible reaction, if the _____?

- A. Equilibrium constant is 1
- B. Conversion of the reactant at equilibrium condition is zero

C. Reactant concentration at equilibrium condition is zero

D. All A., B. and C.

Raw materials used for producing _____ cement does not contain iron oxide?

A. Waterproof

B. Slag

C. White

D. Pozzolan

For platinum thermocouples, lead wires are made of _____ ?

A. Copper & copper-nickel alloys

B. Copper & iron

C. Iron & nickel

D. Tin & nickel

_____ is the major constituent of the Portland cement?

A. Calcium carbonate

B. Calcium oxide

C. Tricalcium silicate

D. Calcium sulphate

Hardest materials so far found is _____ ?

A. Diamond

B. Graphite

C. Carborundum

D. Pumice stone

Which of the following is not produced commercially from sea water ?

A. Magnesium & potassium compounds

B. Common salt

C. Bromine

D. Iodine

Which of the following plays an important role in problems of simultaneous heat and mass transfer ?

- A. Lewis number
- B. Schmidt number
- C. Prandtl number
- D. Sherwood number

For a particle settling in water at its terminal settling velocity, which of the following is true ?

- A. Buoyancy = weight + drag
- B. **Weight = buoyancy + drag**
- C. Drag = buoyancy + weight
- D. Drag = weight

Temperature attained in soldering of metals is about _____ °C?

- A. **150-300**
- B. 400-500
- C. 650-800
- D. 1000-1100

Analgesic drugs are _____?

- A. **Pain relievers**
- B. Antibiotics
- C. Used in the treatment of T.B.
- D. Used in the treatment of typhoid

‘Dikes’ are low height walls made around the storage vessels meant for storing hazardous & inflammable material (e.g., petroleum products). Volume of dikes is equal to (where, V = volume of the storage vessel) ?

- A. **V**
- B. $V/2$

- C. 2V
- D. 3V

Phenols are added in gasoline to _____?

- A. Improve the octane number
- B. Act as an antioxidant**
- C. Reduce its viscosity
- D. Increase its pour point

Tube expansion allowances exist in _____ heat exchanger?

- A. Multipass fixed tube sheet
- B. U-tube**
- C. Single pass fixed tube sheet
- D. None of these

In an ideal tubular-flow reactor _____?

- A. There is no mixing in longitudinal direction
- B. Mixing takes place in radial direction
- C. There is a uniform velocity across the radius
- D. All A., B. and C.**

The study on washability of coal is done by using the _____ technique?

- A. Tabling
- B. Elutriation
- C. Heavy media separation**
- D. None of these

With increase in the ratio of orifice diameter to pipe diameter in case of an orificemeter, the overall pressure loss _____?

- A. Decreases
- B. Increases
- C. Remain constant**

D. Increases linearly

For a turbine agitated and baffled tank, operating at low Reynold's number (based on impeller diameter), the power number (N_p) varies with NRe as _____?

- A. $N_p \propto NRe$
- B. $N_p \propto \sqrt{NRe}$
- C. $N_p \rightarrow \text{constant}$
- D. $N_p \propto 1/NRe$**

Which of the following is not a unit of pressure ?

- A. Torr
- B. Newton/m²
- C. Parsec**
- D. Ata, bar or Pascal**

One dimensional flow implies _____?

- A. Flow in a straight line
- B. Steady uniform flow
- C. Unsteady uniform flow
- D. A flow which does not account for changes in transverse direction**

The material of construction of bearings is _____?

- A. Cast iron
- B. Babbitt metal**
- C. Pig iron
- D. Steel

Fluid flow at increasing rate through a diverging pipe is an example of _____ flow?

- A. Steady uniform
- B. Non-steady uniform
- C. Steady non-uniform

D. Non-steady non-uniform

“Micum Index” of a coke is a measure of its _____?

- A. Reactivity
- B. Porosity
- C. Bulk density

D. Hardness & strength

As the reflux ratio in a distillation column is increased from the minimum, the _____?

- A. Slope of the operating line in stripping section decreases
- B. Number of plates decreases very slowly first and then more and more rapidly
- C. Total cost first decreases and then increases**
- D. Liquid flow increases while the vapor flow decreases for a system

Removal of activated carbon from glycerine is done by _____?

- A. Plate and frame filter**
- B. Rotary vacuum filter
- C. Batch basket centrifuge
- D. None of these

Largest constituent of coke oven gas is _____?

- A. N₂
- B. H₂**
- C. CH₄
- D. CO₂

Enthalpy change resulting, when unit mass of solid is wetted with sufficient liquid, so that further addition of liquid produces no additional thermal effect, is called the heat of _____?

- A. Mixing
- B. Adsorption
- C. Wetting

D. Complete wetting

The bulk modulus of elasticity of a liquid _____?

- A. Is zero for incompressible liquid
- B. Decreases with pressure
- C. Is independent of temperature & pressure

D. Increases with pressure

A coal with high ash content is undesirable, as _____?

- A. It is abrasive to the coal pulveriser (i.e. ball mill) and the combustion chamber
- B. The ash in molten condition gets absorbed in the pores of the refractory lining of the furnace and causes its spalling due to different co-efficient of expansion/contraction of the refractory and the ash
- C. The ash retains the sulphur & phosphorus and thus affects the quality of products in metallurgical furnace apart from increasing the slag volume. Besides, it may fuse and stick to the boiler tubes thereby reducing the heat transfer

D. All A., B. and C.

For a stable phase at constant pressure and temperature, the fugacity of each component in a binary system _____ as its mole fraction increases?

- A. Decreases
- B. Increases**
- C. Remain same
- D. Decreases linearly

Refractory bricks with lower permeability is produced by using _____?

- A. Higher firing temperature
- B. Higher moulding pressure
- C. Finer grog size

D. All A., B. and C.

Cannel coal and boghead coal are the examples of _____?

- A. Humic coals
- B. Liptobiolites
- C. Sapropelic coals**
- D. None of these

Nickel and copper are the basic constituents of _____?

- A. Hastelloy
- B. Monel metal**
- C. German silver
- D. Inconel

As the impurities are oxidised, the melting point of iron _____?

- A. Decreases
- B. Remains unchanged
- C. Increases**
- D. May increase or decrease; unpredictable

Typical specifications for design stipulates the gain margin and phase margin to be respectively _____?

- A. > 1.7 and $> 30^\circ$**
- B. 30°
- C. < 1.7 and 1.7 and $< 30^\circ$

Liquor poisoning generally occurs due to the presence of _____ in it?

- A. Ethyl alcohol
- B. Impurities
- C. Methyl alcohol**
- D. Carbonic acid

The earth's atmosphere is an envelope of gases present upto a height of about _____ kms?

- A. 10
- B. 200**
- C. 1000
- D. 2000

The pressure sensing element of elastic type pressure gauge is never made in the form of a _____?

- A. Bellow
- B. Diaphragm
- C. Strip**
- D. Bourdon tube

Magnesite refractories have low resistance to _____?

- A. Attack by basic slag
- B. Abrasion
- C. Disintegration on sudden change of temperature
- D. Both B. and C.**

For a first order reaction carried out in a plug flow reactor, the space time is _____?

- A. $(1/k) \ln C_0/C$**
- B. $(1/k) \ln C/C_0$
- C. $k \ln C_0/C$
- D. $k \ln C/C_0$

Routh test _____?

- A. Criterion provides information about the actual location of roots
- B. Cannot be used to test the stability of a control system containing transportation lag**
- C. Criterion is not applicable to systems with polynomial characteristic equation
- D. Cannot determine as to how many roots of the characteristics equation have positive real roots

Catalyst used in desulphurisation of naphtha is _____?

- A. Co-Mo
- B. Pt-Rh
- C. Silica gel
- D. Nickel

Pick out the wrong statement ?

- A. Lug supports are less expensive than other type of supports
- B. A pipe is differentiated from a tube by the fact that a pipe has a greater wall thickness compared to the tube
- C. **A reducer is used to change the direction of a pipe in a straight run**
- D. The method of fixing tubes to a tube sheet by expanding is called 'tube rolling'

Compressibility factor for almost all the gases are approximately same at the same _____?

- A. Pressure and temperature
- B. **Reduced pressure and reduced temperature**
- C. Critical pressure and critical temperature
- D. None of these

Which of the following is the softest material ?

- A. Quartz
- B. **Calcite**
- C. Corundum
- D. Fluorite

For separation of sugar solution from settled out mud, we use a _____ filter?

- A. Sparkler
- B. Plate and frame
- C. **Centrifugal**
- D. Rotary drum vacuum

The most important consideration in value engineering is the _____?

- A. Profit maximisation
- B. Customer satisfaction**
- C. Cost reduction
- D. Process improvement

For ideally incompressible fluid, the Mach number will be _____?

- A. 1.5
- B. 1**
- C. 0
- D. 5

Dome temperature of blast furnace stove is most accurately measured by a _____?

- A. Radiation pyrometer
- B. platinum-platinum/rhodium thermocouple**
- C. Iron-constantan thermocouple
- D. Platinum resistance thermometer

Nylon-6 is manufactured from _____?

- A. Caprolactam**
- B. Adipic acid and Hexamethylenediamine
- C. Maleic anhydride and Hexamethylenediamine
- D. Sebacic acid and Hexamethylenediamine

Which of the following is a fuel for a fusion reactor (thermonuclear reactor)?

- A. Deuterium and tritium**
- B. U-233
- C. Thorium
- D. Heavy water

Which of the following is the most suitable for handling fibrous and dense slurries ?

- A. Propeller agitator
- B. Cone type agitator**
- C. Turbine agitator
- D. Radial propeller agitator

Power required for agitation depends upon the _____?

- A. Height & properties of the liquid
- B. Agitator type & speed of agitation
- C. Size of agitator & the tank
- D. All A., B. and C.**

Euler number is defined as the ratio of inertia force to _____ force?

- A. Pressure**
- B. Elastic
- C. Gravity
- D. Viscous

Variation of vapor pressure with temperature can be calculated using Clausius-Clapeyron equation, which assumes that the _____?

- A. Vapor follows the ideal gas law
- B. Molal latent heat of vaporisation is constant within the limited temperature range
- C. Volume in the liquid state is negligible compared with that in the vapor state
- D. All A., B. & C.**

Which of the following is a detergent ?

- A. Fatty alcohol
- B. Alkyl benzene sulphonate (ABS)**
- C. Fatty acids
- D. Methylene chloride

Bourdon tube is never made of _____?

- A. Phosphor bronze
- B. Monel metal
- C. Stainless steel
- D. Cast iron**

If the demand for an item is trebled and the order cost is reduced to one third, then the economic order quantity _____?

- A. Is trebled
- B. Remains unchanged**
- C. Decreases by a factor of 3
- D. Decreases by a factor of 1/3

In fluid flow, the stagnation point is defined as a point, where the _____ is zero?

- A. Flow velocity**
- B. Pressure
- C. Total energy
- D. All A., B. and C.

Bio-degradable detergents _____?

- A. Can be readily oxidised**
- B. Pose problem in sewerage plant
- C. Have an isoparaffinic structure
- D. Should not be used as it spoils the cloth

Holes for riveting purposes should be preferably made by _____?

- A. Cutting torch
- B. Drilling**
- C. Punching
- D. None of these

Petroleum is believed to have originated from _____ sources?

- A. Vegetable
- B. Animal
- C. Both A. and B.**
- D. Neither A. nor B.

Slow and progressive deformation of a material with time under constant stress is called _____?

- A. Creep**
- B. Erosion
- C. Resilience
- D. None of these

The fractional volume change of the system for the isothermal gas phase reaction, $A \rightarrow 3B$, between no conversion and complete conversion is _____?

- A. 0.5
- B. 1
- C. 2**
- D. 3

Temperature profile in steady state heat transfer is _____?

- A. Asymptotic
- B. Hyperbolic
- C. Parabolic
- D. Linear**

A compressible cake has the _____?

- A. Maximum porosity at the upstream side**
- B. Maximum porosity at the filter medium
- C. Same porosity throughout the cake thickness
- D. None of these

Liquid gradient over the tray results due to the _____?

A. Resistance offered to flow of liquids by caps & risers and the flow of gas

- B. Low gas velocity
- C. Large plate spacing
- D. Large reflux ratio

A vapor that exists above its critical temperature is termed as a _____ vapor?

- A. Saturated
- B. Unsaturated
- C. Gaseous**
- D. Sub-cooled

At equal mass velocities, the values of film co-efficients for gases as compared to that for liquids are generally ?

- A. Higher
- B. Lower**
- C. Same
- D. Unpredictable

At what value of reflux ratio, number of theoretical plates in a distillation column is minimum ?

- A. 0
- B. 1
- C. ∞**
- D. < 1

Babbitt lining is used on brass/bronze bearings to increase the _____?

- A. Antifriction properties
- B. Compressive strength
- C. Bearing resistance
- D. Wear resistance**

Emf developed by a thermocouple while measuring a temperature of 800°C is about 31 mV. The type of thermocouple used is _____?

- A. Chromel-alumel
- B. Iron-constantan
- C. Platinum-platinum + rhodium
- D. None of these

Stamp mills are generally used for crushing _____?

- A. Iron ores
- B. Gold ores
- C. Talc
- D. Diamond

Synthetic rubber _____?

- A. Deforms, if stretched to double of its original dimension
- B. Is brittle at low temperature
- C. Is softer at higher temperature
- D. Is highly permeable to air & water and is readily attacked by chemicals & atmospheric gases

A coal having higher volatile matter content, has lower _____?

- A. Smoking tendency on burning
- B. Coke oven gas yield on carbonisation
- C. Chance of catching fire during storage in open space
- D. Ignition temperature

Which of the following is the most suitable material of construction for the condenser tubes, where the cooling medium is brine (salty water) ?

- A. Aluminium
- B. Copper
- C. Titanium
- D. Stainless steel

In a liquid-liquid extraction, 10 kg of a solution containing 2 kg of solute C and 8 kg of solvent A is brought into contact with 10 kg of solvent B. Solvent A and B are completely immiscible in each other whereas solute C is soluble in both the solvents. The extraction process attains equilibrium. The equilibrium relationship between the two phases is $Y^* = 0.9X$, where Y^* is the kg of C/kg of B and X is kg of C/kg of A. Choose the correct answer?

- A. The entire amount of C is transferred to solvent B**
- B. Less than 2 kg but more than 1 kg of C is transferred to solvent B
- C. Less than 1 kg of C is transferred to B
- D. No amount of C is transferred to B

Optical activity is a/an _____ property ?

- A. Additive
- B. Constitutive
- C. Both A. & B.**
- D. Neither A. nor B.

Even though bubble cap towers are very effective for humidification operation, they are not used commonly in industries, because of the _____?

- A. High evaporation losses of water
- B. High pressure drop of the gas**
- C. Difficulty in its fabrication
- D. None of these

Magnesium is present in _____?

- A. Haemoglobin
- B. Chlorophyll**
- C. Hypo solution
- D. None of these

The statement that “maximum wavelength of radiation is inversely proportional to the temperature” is _____ law?

- A. Stefan-Boltzmann's
- B. Planck's
- C. Wien's displacement**
- D. None of these

While the thermosetting polymers are amorphous in nature, the thermoplastic polymers are either amorphous or crystalline. The crystalline polymers are characterized by the ?

- A. Low impact strength**
- B. High flexibility
- C. Better finish and surface appearance
- D. High plastic deformation

Pick out the wrong statement?

- A. Gross margin = net income – net expenditure
- B. Net sales realisation (NSR) = Gross sales – selling expenses
- C. At breakeven point, NSR is more than the total production cost**
- D. Net profit = Gross margin – depreciation – interest

For a cyclone of diameter 0.2 m with a tangential velocity of 15 m/s at the wall, the separation factor is _____?

- A. 2250
- B. 1125
- C. 460
- D. 230**

Pipes having diameter 14 inches or more are designated by their _____?

- A. Outside diameter**
- B. Inside diameter
- C. Schedule number
- D. None of these

Pick out the wrong statement about distillation operation _____?

- A. Distillation under vacuum is a substitute for steam distillation
- B. In differential (simple) distillation, the vapour is removed as soon as it is formed without appreciable condensation
- C. In flash (equilibrium) distillation, a definite fraction of liquid is vaporised in such a way that the evolved vapour & residual liquids are in equilibrium with each other
- D. Flash distillation, differential distillation & steam distillation are all continuous distillation processes**

The 'total capital investment' for a chemical process plant comprises of the fixed capital investment and the _____?

- A. Overhead cost
- B. Working capital**
- C. Indirect production cost
- D. Direct production cost

As the reflux ratio decreases, the _____?

- A. Separation becomes more efficient
- B. Number of plates increases**
- C. Column diameter increases
- D. None of these

Atomic _____ of an element is a whole number?

- A. Weight
- B. Number**
- C. Volume
- D. Radius

The absorptivity of a grey body at a given temperature _____ with increasing wavelength of radiation?

- A. Increases
- B. Decreases

- C. Remain constant
D. May increase or decrease; depends on the material

In case of constant underflow extraction operation, the _____ at all solute concentration?

- A. Solids are drained to the same extent
B. Ratio of the insoluble to solution is constant
C. Both A. & B.
D. Neither A. nor B.

In fluid flow, cavitation is caused, if the _____?

- A. Fluid velocity decreases to zero
B. Total energy decreases
C. Both A. and B.
D. Flow pressure approaches its vapor pressure at the prevailing temperature

Large scale drying of sugar is done in a _____ dryer?

- A. Spouted bed
B. Tray
C. Rotary
D. Truck

Mullite is chemically represented by _____?

- A. $Al_2O_3 \cdot 2SiO_2$
B. $3Al_2O_3 \cdot 2SiO_2$
C. $Al_2O_3 \cdot SiO_2$
D. $2Al_2O_3 \cdot 3SiO_2$

Pick out the wrong statemen?

- A. Hardening makes the steel more brittle
B. High alloy steels contain more than 50% alloying element
C. 18/8 stainless steel is a magnetic steel
D. Both B. and C.

Color of nitric acid is light yellow due to the presence of _____?

- A. NO
- B. NO₂**
- C. N₂H₅
- D. NH₃

Heat capacity of air can be approximately expressed as, $C_p = 26.693 + 7.365 \times 10^{-3} T$, where, C_p is in J/mole.K and T is in K. The heat given off by 1 mole of air when cooled at atmospheric pressure from 500°C to – 100°C is

_____?

- A. 10.73 kJ
- B. 16.15 kJ
- C. 18.11 kJ**
- D. 18.33 kJ

High speed steel tools retain their hardness upto a temperature of _____ °C?

- A. 500
- B. 750
- C. 900**
- D. 1100

The vent valve provided in a liquid handling centrifugal pump is _____?

- A. Generally a needle valve
- B. Used to release any gases that might be vapour locking the pump
- C. Helpful in easy removal of samples
- D. All A., B. and C.**

Which of the following is not a non-metalliferous mineral ?

- A. Calcite

- B. Fluorspar
- C. Quartz
- D. Cassiterite**

The molar excess Gibbs free energy, g^E , for a binary liquid mixture at T and P is given by, $(g^E/RT) = A \cdot x_1 \cdot x_2$, where A is a constant. The corresponding equation for $\ln y_1$, where y_1 is the activity co-efficient of component 1, is _____?

- A. $A \cdot x_2^2$**
- B. Ax_1
- C. Ax_2
- D. Ax_1^2

Nickel made/clad equipments are suitable for handling _____?

- A. Ammonia (both aqueous & anhydrous)
- B. Fruit juices, milk & its products and caustic soda solution**
- C. Nitric acid & hydrochloric acid (concentrated)
- D. Sulphuric acid (concentrated)

For a binary mixture with low relative volatility _____?

- A. Use steam distillation
- B. Use molecular distillation
- C. Use high pressure distillation
- D. An azeotrope may be formed during distillation**

Supporting legs of a plate and frame filter is normally made of _____?

- A. Stainless steel
- B. Cast iron**
- C. High speed steel
- D. Wooden plank

CaCl(OCl) is the chemical formula of _____?

- A. Hypo
- B. Bleaching powder**
- C. Plaster of Paris
- D. Aqua regia

Methane is mixed with stoichiometric proportion of oxygen and completely combusted. The number of additional specifications required to determine the product flow rate and composition is _____?

- A. 0**
- B. 1
- C. 2
- D. 3

A non-catalytic chemical reaction of the type as shown in the bellow figure is called a _____ reaction?

- A. Parallel
- B. Series
- C. Series-parallel**
- D. None of these

Steam side heat transfer co-efficient for design consideration under ordinary condition can be assumed to be about _____ kcal/hr.m².°C?

- A. 1250
- B. 2500
- C. 7500**
- D. 15000

The difference between gross & net calorific values of fuel is due to the _____?

- A. Sensible heat carried away by the flue gases
- B. Heat carried away by the steam from the moisture content of the fuel

C. Heat lost by radiation

D. Heat carried away by steam from the combustion of hydrogen in the fuel

For beneficiation of iron ore, the most commonly used method is _____?

A. Flocculation

B. Froth floatation

C. Jigging & tabling

D. None of these

A streamline is _____?

A. The line connecting the mid-points of flow cross-sections

B. Defined for uniform flow only

C. Drawn normal to the velocity vector at every point

D. Always the path of a particle

Sucrose content in the raw juice extracted from sugar cane is about _____ percent?

A. 1 – 2

B. 15 – 20

C. 50 – 60

D. 80 – 85

The electric furnace in which heat is produced by a combination of induced current and skin effect is called _____ furnace?

A. Arc

B. Resistance

C. Low frequency induction

D. High frequency induction

Steel pipes are normally manufactured by _____ process?

A. Extrusion

B. Cold working

- C. Forging
- D. Electroforming

Cold shot cooling is only practical when the feed temperature is _____ than the reaction temperature?

- A. Higher
- B. Much higher
- C. Lower
- D. Much lower**

The ratio of Murphree plate efficiency to point efficiency is 1 in a _____ flow model?

- A. Plug
- B. Perfectly mixed**
- C. Both A. & B.
- D. Neither A. nor B.

Which is required in an insulating refractory ?

- A. High thermal conductivity
- B. Low porosity
- C. Both A. and B.
- D. Neither A. nor B.**

For a tubular reactor with space time ' η ' and residence time ' ζ ', the following statement holds good ?

- A. η and θ are always equal
- B. $\eta = \theta$, when the fluid density changes in the reactor
- C. $\eta = \theta$, for an isothermic tubular reactor in which the density of the process fluid is constant**
- D. $\eta = \theta$, for a non-isothermal reactor

Compressed dry air is used as the cutting fluid, while

machining _____ ?

- A. Steel
- B. Cast iron**
- C. Aluminium
- D. None of these

A rectangular surface $3' \times 4'$, has the lower 3 edge horizontal and $6'$ below a free oil surface (sp. gr. 0.8). The surface inclination is 30° with the horizontal. The force on one side of the surface is (where, γ = specific weight of water) ?

- A. 39.6γ
- B. 48γ**
- C. 49.2γ
- D. 58γ

Scale up of agitator design requires _____ ?

- A. Geometrical similarity only
- B. Dynamic similarity only
- C. Both geometrical and dynamic similarity
- D. All geometrical, dynamic and kinematic similarity**

Maximum water percentage in refractory mix meant for hand moulding may be as high as _____ percent?

- A. 2-3
- B. 5-7
- C. 7-12
- D. 14-20**

The ratio of oxygen available to the oxygen required for stabilisation of sewage is called the _____ ?

- A. Bacterial stability factor
- B. Relative stability**
- C. Biological oxygen demand (BOD)

D. Oxygen ion concentration

In catalytic cracking, the _____?

- A. Gasoline obtained has a very low octane number
- B. Pressure & temperature is very high
- C. Gasoline obtained has very high aromatic content**
- D. Gasoline obtained has very high amount of gum forming compounds

The ratio of the depth of flow to the hydraulic radius for the most economical trapezoidal section, in open channel flow is _____?

- A. 0.5
- B. 1
- C. 1.5
- D. 2**

Presence of predominantly large quantity of aromatics (polynuclear) is not desirable in aviation fuel, because it has _____?

- A. High pour point and low smoke point
- B. Low viscosity index**
- C. High self-ignition temperature
- D. All A., B. and C.

Temperature of coke oven gas just before entering into saturator (for recovery of NH₃) is about _____ °C?

- A. 30
- B. 65**
- C. 120
- D. 180

Phosphate rock is a raw material for the manufacture of _____?

- A. Phosphoric acid

- B. Phosphorous
- C. Superphosphates
- D. All A , B. and C**

Pick out the wrong statement ?

- A. Surface tension of a liquid is because of the difference in magnitude of adhesive & cohesive forces
- B. A hydrometer used for the determination of specific gravities of liquids works on the principle of buoyant forces
- C. In case of unsteady fluid flow, the velocity at any given point does not change with time**
- D. Turbulent fluid flow is characterised by the rapid fluctuation of instantaneous pressure & velocity at a point

Periclase refractory contains mainly _____ ?

- A. CaO
- B. MgO**
- C. Al₂O₃
- D. SiO₂

Power required to drive a ball mill with a particular ball load is proportional to (where, D = diameter of ball mill.) ?

- A. D
- B. 1/D
- C. D^{2.5}**
- D. 1/D^{2.5}

Pick out the wrong statement?

- A. Insulating refractories used in place of regular refractory bricks are usually called light weight refractories, and they have similar composition as heavy bricks
- B. Graphite refractories are also called plumbago refractories

C. Superduty fireclay bricks correspond to a pyrometric cone equivalent of 26-28

D. Calcined magnesite is also called dead burnt magnesite

Bleaching action of bleaching powder is due to its _____ properties ?

A. Reducing

B. Oxidising

C. Disinfecting

D. None of these

'Giga' stands for _____ ?

A. 10⁹

B. 10-12

C. 10¹²

D. 10¹⁵

Absorption factor is defined as (where, S_1 = slope of the operating line S_2 = slope of the equilibrium curve) _____ ?

A. S_2/S_1

B. S_1/S_2

C. $S_1 - S_2$

D. $S_1 \times S_2$

The Laplace transform of $\exp(at)$, where $a > 0$, is defined only for the Laplace parameter, $s > a$ since _____ ?

A. The function is exponential

B. The Laplace transform of integral of $\exp(at)$ has finite values only for $s > a$

C. The Laplace transform integral of $\exp(at)$ has initial values only for $s > a$

D. The function $\exp(at)$ is piece-wise continuous only for $s > a$

Pick out the wrong statement?

A. The operating line always lies above the equilibrium solubility curve in case of a single component absorber

B. The operating line always lies below the equilibrium solubility curve in case of a single

component stripper

C. The operating pressure in solvent extraction system should be below vapor pressures of all components

D. The solubility of a particular gas in ideal solution in any solvent is always the same

Nusselt number is related to the Reynolds number (Re) in turbulent & laminar flow respectively as _____?

A. $Re^{0.5}$, $Re^{0.8}$

B. $Re^{0.8}$, $Re^{-0.5}$

C. $Re^{0.8}$, $Re^{0.5}$

D. $Re^{-0.8}$, $Re^{0.5}$

Heat is added at constant temperature in an ideal _____ cycle?

A. Stirling

B. Brayton

C. Rankine

D. None of these

The reflux to a distillation column is 100 moles/hr, when the overhead product rate is 50 moles/hr. The reflux ratio is _____?

A. 2

B. 0.5

C. 50

D. 150

The shift conversion reaction taking place during water gas manufacture is given by _____?

A. $C + H_2O \leftrightarrow CO + H_2$

B. $C + 2H_2O \leftrightarrow CO_2 + 2H_2$

C. $CO + H_2O \leftrightarrow CO_2 + H_2$

D. None of these

Choose the correct set of dimensions of viscosity that are equivalent (where, F, M, L, T are dimensions for force, mass, length and time respectively) ?

- A. FL-2T, ML-1T-1
- B. FLT, ML-1T-1
- C. ML-1T-3, F-1L2T
- D. F-1L2T-1, MLT-3

Fuel consumption in coke making can be reduced by _____ ?

- A. Preheating, blending and de-ashing the coal
- B. Stamped charging of coal
- C. Dry quenching of coke
- D. All A., B. and C.

Magnesite chrome refractories _____ ?

- A. Have better spalling resistance than chrome magnesite refractories
- B. Have very low thermal co-efficient of expansion
- C. Are not at all resistant to the corrosive action of iron oxide
- D. Have very low (50 kg/cm²) cold crushing strength (C.C.S.), and cannot be used in metalcase form

Carborundum used for making crucibles for melting non-ferrous metals is chemically _____ ?

- A. Silicon carbide
- B. Silicon nitride
- C. Crystalline magnesia
- D. Zirconium sulphate

Coking time in a commercial high temperature coal carbonisation plant is about _____ hours?

- A. 6
- B. 18
- C. 28

D. 36

Cementite is in the lamellar form in the _____ phase of steel ?

- A. Martenitic
- B. Bainitic
- C. Pearlitic**
- D. Ferritic

Transition from laminar flow to turbulent flow in fluid flow through a pipe does not depend upon the _____ ?

- A. Length of the pipe**
- B. Diameter of the pipe
- C. Density of the fluid
- D. Velocity of the fluid

Solid particles of different densities are separated by _____ ?

- A. Filters
- B. Thickness
- C. Cyclones
- D. Sorting classifier**

Polypropylene is preferred to polythene, because the former is _____ ?

- A. Non-inflammable
- B. Harder
- C. Stronger
- D. Both B. & C.**

Suitability of steel for its use in cable is judged by its strength in _____ ?

- A. Tension**

- B. Compression
- C. Torsion
- D. Shear

Presence of dissolved impurities of _____ is responsible for the red brownish color of water?

- A. Carbonates
- B. Bi-carbonates
- C. Iron & manganese**
- D. Arsenic

Fumigant insecticides _____?

- A. Kill insects, when they eat it
- B. Emit poisonous vapour
- C. Are absorbed throughout the plant
- D. None of these**

Colebrook equation for friction factor in turbulent flow is given by, $f^{-0.5} = -4 \log_e [(\epsilon/D) + (1.26/NRe \sqrt{f})]$. It reduces to Nikuradse equation for a value of (ϵ/D) equal to _____?

- A. 0
- B. 1**
- C. ∞
- D. 0.5

1 kg of a saturated aqueous solution of a highly soluble component A at 60°C is cooled to 25°C. The solubility limits of A are (0.6 kgA/kg water) at 60°C and (0.2 kgA/kg water) at 25°C. The amount in kg of the crystals formed is _____?

- A. 0.4
- B. 0.25
- C. 0.2**

D. 0.175

The type of pump used for lifting large quantity of sewage is a _____ pump ?

- A. Gear
- B. Centrifugal**
- C. Reciprocating
- D. Plunger

Thermal conductivity of refractory bricks _____ ?

- A. Increases with decrease in porosity**
- B. Decreases with decreases in porosity
- C. Is independent of its porosity and is maximum for insulating bricks
- D. Increases with the amount of air entrapped in pores

In the manufacture of H_3PO_4 (ortho); strong H_2SO_4 leaching wet process as compared to electric furnace process _____ ?

- A. Uses lower grade phosphate rock
- B. Requires lower capital investment in the plant
- C. Produces lower purity acid**
- D. Is very costly

Octane number (unleaded) of reformed gasoline may be upto _____ ?

- A. 60
- B. 70
- C. 80
- D. 90**

Net positive suction head (NPSH) of a centrifugal pump must be _____ ?

- A. Greater than the vapour pressure of the liquid**

- B. Less than the vapour pressure of the liquid
- C. Equal to the vapour pressure of the liquid
- D. Less than barometric pressure

In a packed bed absorption column, the channelling will be noted by the _____?

- A. Increase in flow rate
- B. Sharp drop in pressure drop**
- C. Sharp rise in pressure drop
- D. None of these

The minimum number of phases that can exist in a system is _____?

- A. 0
- B. 1**
- C. 2
- D. 3

If more than two branches of pipes are to be connected at the same point, then use a/an _____?

- A. Elbow
- B. Union
- C. Tee**
- D. None of these

Liquid flow rate in a small channel is best measured by a/an _____?

- A. Weir
- B. Pitot tube**
- C. Vane meter
- D. Venturimeter

In a chemical reaction, _____ are conserved?

- A. Ions
- B. Masses
- C. Atoms
- D. Both B. & C.**

For a cylindrical shell, (subject to the thickness of uppermost course being more than the minimum for dia of the tank in question), the thickness of the courses of shell _____?

- A. Decreases upwards**
- B. Increases upwards
- C. Remains same throughout
- D. May decrease or increase upwards depending upon whether vacuum or positive pressure would be maintained inside the shell

Raschig ring made of porcelain cannot be used for treating concentrated _____?

- A. Hydrochloric acid
- B. Nitric acid
- C. Alkalis**
- D. Sulphuric acid

With increase in the shear rate, the apparent viscosity of pseudo-plastic fluids _____?

- A. Increases
- B. Decreases**
- C. Remain same
- D. May increase or decrease; depends on the magnitude of shear rate

Each term of the Bernoulli's equation written in the form, $(p/\rho) + (g/gc). Z + (v^2/2gc) = \text{constant}$, represents the total energy per unit _____?

- A. Mass
- B. Volume
- C. Specific weight
- D. None of these

Which of the following performance characteristics of a S.I engine is not affected by the front end volatility of the petrol used ?

- A. Vapour locking
- B. Hot starting
- C. Spark plug fouling
- D. All A, B & C

Moist atmospheric air at high temperature (e.g., in summer) having high concentration of sulphur dioxide causes_____?

- A. Fading of dyes on textiles
- B. Corrosion, tarnishing & soiling of metals
- C. Reduced strength of textiles
- D. All A., B. and C.

A head comprises of straight flange section, corner torus, section and central dished section. Crown radius and knuckle radius in a head is related respectively to the_____?

- A. Central dished section and corner torus section
- B. Corner torus section and central dished section
- C. Central dished section and straight flange section
- D. Straight flange section and corner torus section

A first order reaction requires two equal sized CSTR. The conversion is_____?

- A. Less when they are connected in series
- B. More when they are connected in series
- C. More when they are connected in parallel

D. Same whether they are connected in series or in parallel

Height equivalent to a theoretical plate (HETP) is the height of packing that will give the same separation as one theoretical plate in gas-liquid mass transfer operations like distillation, absorption/stripping and humidification/dehumidification. HETP which is experimentally determined, depends upon the _____?

- A. Flow rates of each fluid
- B. Type and size of packing
- C. Concentration of each fluid
- D. All A, B. & C.**

Very high sulphur in pig iron makes _____?

- A. Its casting unsound**
- B. Its hard and machinable
- C. Its brittle and malleable
- D. All A., B. & C.

Out of the following fuels, the difference between gross and net calorific value will be minimum in case of _____?

- A. Coke oven gas
- B. Water gas
- C. Natural gas
- D. Blast furnace gas**

A hydraulic press has a ram of 10 cms in diameter and a plunger of 1 cm in diameter. The force required on the plunger to raise a weight of 10 tons on the ram is _____ kg?

- A. 10
- B. 100**
- C. 1000
- D. 10000

_____ is a polysaccharide?

- A. Maltose
- B. Starch**
- C. Sucrose
- D. Glucose

_____ explains the mechanism of catalysis?

- A. Activated complex theory**
- B. Collision theory
- C. Thermodynamics
- D. None of these

A cyclic engine exchanges heat with two reservoirs maintained at 100 and 300°C respectively. The maximum work (in J) that can be obtained from 1000 J of heat extracted from the hot reservoir is _____?

- A. 349**
- B. 651
- C. 667
- D. 1000

Ribbon blenders are exclusively meant for _____?

- A. Blending miscible liquids
- B. Non-flowing powder and thin pastes**
- C. Bath mixing
- D. Continuous mixing

_____ paint has the maximum absorption coefficient ?

- A. Black**
- B. Yellow
- C. White
- D. Grey

Saponification value/number of an oil or fat is a measure of its _____?

- A. Fatty acid content
- B. Degree of unsaturation of the fatty acids present in it
- C. Average molecular weight**
- D. Insoluble fatty acid content

Buna-S is a _____ material?

- A. Fibrous
- B. Plastic
- C. Resinous
- D. Rubbery**

Auto collimator is used to check _____?

- A. Flatness
- B. Angle**
- C. Rotor balancing
- D. Roughness

About _____ Nm³ of air will be required for the complete combustion of 2Nm³ of CO?

- A. 2
- B. 3
- C. 4
- D. 5**

Polymerisation product of C₂F₄ (carbon tetrafluoride) is called P.T.F.E (poly chloro tetra fluoro ethylene). It is also called _____?

- A. Polyurethane
- B. Silicone
- C. Teflon**
- D. Epoxy resin

Steel rods are normally used for concrete reinforcement because concrete and steel have almost equal _____?

- A. Tensile strength
- B. Compressive strength
- C. Young's modulus
- D. Thermal co-efficient of expansion**

The energy consumed by a ball mill depends on _____?

- A. Its speed
- B. Its ball load
- C. The density of the material being ground
- D. All A., B. and C.**

Pick out the wrong statement ?

- A. Activity co-efficient is dimensionless.
- B. In case of an ideal gas, the fugacity is equal to its pressure.
- C. In a mixture of ideal gases, the fugacity of a component is equal to the partial pressure of the component.
- D. The fugacity co-efficient is zero for an ideal gas**

The sequence in which three CSTR's of volumes 5, 10 and 15 m³ will be connected in series to obtain the maximum production in a second order irreversible reaction is _____?

- A. 15, 10, 5**
- B. 5, 10, 15
- C. 10, 5, 15
- D. 10, 15, 5

A body cools down from 75°C to 70°C in 10 minutes. It will cool down from 70°C to 65°C in _____ minutes?

- A. 10

- B. > 10
- C. < 10
- D. Either B. or C., depends on the mass of the body

Pick out the wrong statement?

- A. Hard glass which is used for making laboratory glass wares is a mixture of sodium borosilicate and aluminium borosilicate
- B. Glass is decolorized during its manufacture by adding antimony oxide, manganese dioxide or arsenic oxide
- C. Ordinary glass is represented chemically by $\text{Na}_2\text{O} \cdot \text{CaO} \cdot 6\text{SiO}_2$
- D. Red color is imparted to glass by addition of arsenic oxide**

With increase in temperature, the internal energy of a substance _____?

- A. Increases**
- B. Decreases
- C. Remains unchanged
- D. May increase or decrease; depends on the substance

Velocity of a reaction depends upon the _____?

- A. Nature of the reactants
- B. Concentration of the reactants
- C. Temperature at which the reaction is carried
- D. All A., B. and C.**

For a fixed number of ideal stages in a distillation column, as the reflux ratio is increased, the difference in composition between the top and bottom product streams _____?

- A. Increases**
- B. Decreases
- C. Remain unaffected
- D. Passes through a maximum

A trickle bed reactor is the one, which _____?

- A. Has altogether three streams either entering or leaving
- B. Processes three reactants at different flow rates
- C. Processes three reactants with same flow rate
- D. Employs all the three phases (i.e. solid, liquid and gas)**

For turbulent flow ($N_{Re} > 2100$) of low viscosity fluid ($\mu > 20\text{cp}$) in steel pipes, the optimum inside pipe diameter is given by (where, Q = fluid flow rate, ft^3/sec , ρ = fluid density, lb/ft^3 μ = fluid viscosity, centipoise D_i = optimum inside pipe diameter, inches) ?

- A. $D_i, \text{opt} = 3.9 Q^{0.45} \rho^{0.13}$**
- B. $D_i, \text{opt} = 3.9 Q^{0.45} \mu^{0.95}$
- C. $D_i, \text{opt} = 4.7 Q^{0.36} \mu^{3.2} \rho^{0.13}$
- D. $D_i, \text{opt} = 3 Q^{0.36} \mu^{0.88}$

Nylon-66 is manufactured from _____?

- A. Hexamethylene diamine and adipic acid**
- B. Hexamethylene diamine and Maleic anhydride
- C. Caprolactam
- D. Dimethyl terephthalate and ethylene glycol

The opening of a 200 mesh screen (Taylor series) is _____?

- A. 0.0074 cm**
- B. 0.0074 mm
- C. 0.0047 cm
- D. 74 milli-microns

A second order liquid phase reaction, $A \rightarrow B$, is carried out in a mixed flow reactor operated in semi batch mode (no exit stream). The reactant A at concentration C_{AF} is fed to the reactor at a volumetric flow rate of F . The volume of the reacting mixture is V and the density of the liquid mixture is

constant. The mass balance for A is _____?

- A. $d(VCA)/dt = -F(CAF - CA) - kCA^2V$
- B. $d(VCA)/dt = F(CAF - CA) - kCA^2V$
- C. $d(VCA)/dt = -FCA - kCA^2V$
- D. $d(VCA)/dt = FCAF - kCA^2V$**

Pick out the wrong statement ?

- A. 'Green acid' is the other name of phosphoric acid produced by the reaction of phosphate rock & sulphuric acid
- B. Chemically unreactive nature of red phosphorous is due to its polymeric structure
- C. Red phosphorous is the most reactive allotropic form of phosphorous**
- D. Red phosphorous, which is used in the manufacture of safety matches, is converted into white phosphorous by vaporisation followed by condensation

Cylindrical storage tanks used for the storage of volatile liquids (e.g., naphtha) have _____ roofs?

- A. Conical
- B. Flat
- C. Floating**
- D. Fixed

The binary diffusivity in gases at atmospheric conditions is about _____?

- A. 10^{-9} cm/sec
- B. 10^{-1} cm²/sec**
- C. 10^{-3} sec/cm
- D. 10^{-4} cm²/sec²

Coolant used in a boiling water reactor is _____?

- A. Hydrogen gas
- B. Water

C. Steam

D. A mixture of water & steam

In constant pressure filtration ?

A. Resistance decreases with time

B. Rate of filtration is constant

C. Rate of filtration increases with time

D. Rate of filtration decreases with time

The overall mass transfer co-efficient for the absorption of SO₂ in air with dilute NaOH solution can be increased substantially by _____?

A. Increasing the gas film co-efficient

B. Increasing the liquid film co-efficient

C. Increasing the total pressure

D. Decreasing the total pressure

In a forward feed multiple effect, the pressure build up will be _____?

A. Least at the inlet of the first effect

B. Least at the outlet of the last effect

C. Highest at the inlet of the last effect

D. Highest at the outlet of the last effect

Which of the following represents the plot of filtrate volume versus time for constant pressure filtration ?

A. Parabola

B. Straight line

C. Hyperbola

D. Exponential curve

The inner wall of a furnace is at a temperature of 700°C. The composite wall is made of two substances, 10 and 20 cm thick with thermal conductivities of 0.05

and $0.1 \text{ W.m}^{-1}\text{.}^{\circ}\text{C}^{-1}$ respectively. The ambient air is at 30°C and the heat transfer co-efficient between the outer surface of wall and air is $20 \text{ W.m}^{-2}\text{.}^{\circ}\text{C}^{-1}$. The rate of heat loss from the outer surface in W.m^{-2} is _____?

- A. **165.4**
- B. 167.5
- C. 172.5
- D. 175

The equilibrium liquid composition compared to the vapor composition in case of _____ Azeotropic mixture is

- A. More
- B. Less
- C. **Same**
- D. Either more or less; depends on the system

Candu reactor is a _____ nuclear reactor?

- A. **Natural uranium fuelled heavy water cooled & moderated**
- B. Highly enriched uranium (85% U-235) fuelled
- C. Homogeneous
- D. Fast breeder

Hot wire anemometer is used to measure the _____?

- A. Velocity of liquids
- B. Temperature of liquids
- C. **Velocity of gases**
- D. Pressure of liquids

Which of the following is not used as filter aid ?

- A. Asbestos
- B. Diatomaceous earth
- C. Purified wood cellulose
- D. **Rice husk**

Neutralisation of nitric acid with ammonia to produce ammonium nitrate is a/an _____ reaction?

- A. Catalytic
- B. Endothermic
- C. Exothermic**
- D. Autocatalytic

The ratio of tube length to shell diameter in case of liquid shell and tube heat exchanger ranges from _____?

- A. 2 to 3
- B. 3 to 5
- C. 4 to 8**
- D. 6 to 12

In distillation columns, the number of bubble caps per tray primarily depends upon the _____?

- A. Allowable liquid velocity
- B. Allowable gas velocity
- C. Allowable gas and liquid velocities**
- D. Feed composition

Basic slag is not ground in _____?

- A. Jaw crushers**
- B. Ball mills
- C. Compartment mills
- D. Tube mills

Which of the following, when pyrolysed, produces Perchloroethylene ?

- A. Ethylene dichloride
- B. Chlorobenzene
- C. Carbon tetrachloride**
- D. Chlorinated paraffin

The value of fouling factor depends upon the _____?

- A. Characteristic of process fluid
- B. Velocity of process fluid containing suspended solids
- C. Suspended solids in the fluid
- D. All A., B. and C.**

_____ are produced by reacting polybasic acid (e.g. Phthalic anhydride) with polyhydric alcohol (e.g., glycerol) ?

- A. Unsaturated polyester
- B. Alkyd resins**
- C. Saturated polyester
- D. Amino resins

Which of the following has the lowest flash point of all ?

- A. Diesel
- B. Kerosene
- C. Petrol**
- D. Furnace oil

The ratio of volume of an atom to that of its nucleus is _____?

- A. 10¹²**
- B. 10⁻¹²
- C. 10⁻⁸
- D. 10⁸

For a given fluid flow rate, which of the following incurs maximum head loss ?

- A. Orificemeter**
- B. Venturimeter
- C. Flow nozzle
- D. All of them incur the same head loss

Fast breeder nuclear reactors using enriched uranium as fuel may contain upto a maximum of _____ percent of U-235 (i.e. fissile material)?

- A. 15
- B. 45
- C. 65
- D. 85**

A material capable of undergoing large permanent deformation, when subjected to tension is termed as _____?

- A. Friable
- B. Ductile**
- C. Brittle
- D. None of these

With increase in temperature, the thermal conductivity of most liquids _____?

- A. Increases
- B. Decreases**
- C. Remain same
- D. First increases upto a certain temperature and then becomes constant

Entropy change of mixing two liquid substances depends upon the _____?

- A. Molar concentration
- B. Quantity (i.e. number of moles)
- C. Both A. and B**
- D. Neither A. nor B

A first order irreversible reaction, $A \rightarrow B$ is carried out separately in a constant volume as well as in a variable volume reactor for a particular period. It signifies that _____ in the two reactors?

- A. Both conversion as well as concentration are same
- B. Conversion in both will be the same but concentrations will be different**
- C. Both the conversion as well as concentrations will be different

D. None of these

In case of a desorber (stripper), the _____?

A. Operating line always lies above the equilibrium curve

B. Operating line always lies below the equilibrium curve

C. Temperature remains unaffected

D. Temperature always increases

Pick out the wrong statement?

A. The ratio of the density of the 'nucleus' to that of the 'atom' is 10¹²

B. α -particle is identical with a doubly charged helium ion

C. The mass of deuterium atom is half that of helium atom

D. Gamma rays are high energy electrons

White cast iron as compared to grey cast iron is _____?

A. More durable

B. Very brittle

C. Very hard

D. All A., B. & C.

Overall thermal resistance for conductive heat transfer through a series of flat resistances is equal to the _____?

A. Maximum resistance in the series

B. Sum of all resistances

C. Average of all resistances

D. Minimum resistance presents in the series

A material is capable of resisting softening at high temperature, because of its property termed as _____?

A. Hot temper

B. Hot hardness

C. Fatigue

D. Creep

Highest quality bitumen is produced from the _____ crude oil?

- A. Paraffinic
- B. Naphthenic**
- C. Intermediate
- D. Mixed

Which of the following is desirable in diesel and kerosene but is undesirable in gasoline ?

- A. Aromatics**
- B. Mercaptans
- C. Paraffins
- D. Naphthenic acid

The elevation in boiling point of a solution is proportional to the _____ of the solution?

- A. Molal concentration**
- B. Reciprocal of the molal concentration
- C. Normality
- D. Molarity

In a distillation operation, what is the effect of the temperature of the reflux stream (given below) on the condenser and reboiler loads? Reflux conditions: (i) Reflux stream is completely liquid and is at its bubble point. (ii) Reflux stream is below its bubble point ?

- A. Condenser and reboiler loads are the same in both the cases
- B. Reboiler load is the same in both the cases but condenser load is higher in case (ii)
- C. Condenser load is the same in both the cases but reboiler load is higher in case (ii)
- D. Both condenser and reboiler loads are higher in case (ii) as compared to case (i)**

Danckwerts developed the _____ theory?

- A. Penetration

B. Surface renewal

- C. Film
- D. None of these

Calcareous & argillaceous materials are used in the manufacture of _____?

- A. Lead
- B. Cement**
- C. Carbon disulphide
- D. None of these

Which of the following is a non-magnetic material ?

- A. Cobalt
- B. Zinc**
- C. Nickel
- D. None of these

Mechanical recompression evaporation is used in the production of _____?

- A. Alcohol
- B. Distilled water**
- C. Salt
- D. Fruits jam

Solvent used for dewaxing of petroleum products are _____?

- A. Furfural
- B. Methyl ethyl ketone (MEK)
- C. Propane**
- D. Both B. & C.

The resistance furnace produces heat by the _____?

- A. Electric arc struck between electrodes and the charge
- B. Flow of current through a heating element**

- C. Combination of induced current and skin effect
- D. None of these

Heavy water used in the nuclear reactors to slow down the speed of neutrons is _____?

- A. Highly purified water
- B. A compound of oxygen and deuterium**
- C. Water having dissolved salts of heavy metals
- D. None of these

The repeating units of PTFE are _____?

- A. $\text{Cl}_2\text{CH}-\text{CH}_3$
- B. $\text{F}_2\text{C}=\text{CF}_2$**
- C. $\text{F}_3\text{C}-\text{CF}_3$
- D. $\text{FCIC}=\text{CF}_2$

Ceramic recuperators used for waste heat recovery from high temperature flue gas going out of the furnace is made of _____?

- A. Fireclay
- B. Silicon carbide**
- C. Corundum
- D. Siliceous fireclay

Cast iron detachable joint is used in _____ pipes.

- A. Steel**
- B. Cast iron
- C. Asbestos cement
- D. Reinforced cement concrete

Flash distillation is suitable for the separation of components _____?

- A. Having very close boiling points
- B. Which form maximum boiling azeotrope

C. Having very wide boiling points

D. Which form minimum boiling azeotrope

Which of the following crystal structures characterises the ferritic stainless steel?

A. Face centred cubic

B. Body centred cubic

C. Simple hexagonal

D. None of these

Which of the following has the lowest viscosity (at a given temperature) of all?

A. Naphtha

B. Kerosene

C. Diesel

D. Lube oil

Phosphoric acid is produced in wet process from phosphate rock and _____?

A. Dilute H₂SO₄

B. Concentrated H₂SO₄

C. Concentrated HNO₃

D. Concentrated HCl

Reactions with high activation energy are _____?

A. Very temperature sensitive

B. Temperature insensitive

C. Always irreversible

D. Always reversible

Steel rods are used in reinforced concrete to increase its _____ strength?

A. Shear

B. Tensile

- C. Compressive
- D. None of these

Commercial production of soda ash by Solvay process requires limestone, _____ as raw materials?

- A. Coke and sand
- B. Brine and coal**
- C. Coke and caustic soda
- D. None of these

. In the converter of the contact process for the manufacture of H_2SO_4 the equilibrium conversion of SO_2 _____ (i) _____ with increase in temperature and _____ (ii) _____ with increase in the mole ratio of SO_2 to air?

- A. (i) increases (ii) decreases
- B. (i) decreases (ii) increases**
- C. (i) increases (ii) increases
- D. (i) decreases (ii) decreases

Narrow coke ovens as compared to wider coke ovens _____?

- A. Produce smaller coke
- B. Produce stronger coke
- C. Require less time of carbonisation
- D. All A., B. and C.**

Hollow refractory bricks are made by _____?

- A. Slip casting**
- B. Hand moulding
- C. pressing/machine moulding
- D. Extrusion

Two substances are in equilibrium in a reversible chemical reaction. If the

concentration of each substance is doubled, then the value of the equilibrium constant will be _____?

- A. Same
- B. Doubled
- C. Halved
- D. One fourth of its original value

The order of a chemical reaction is _____?

- A. An experimentally determined quantity
- B. Always equal to the total stoichiometric number of reactants
- C. Never fractional
- D. None of these

In the layout plan for a vacuum distillation unit, operating at 60 mm Hg, supported by a barometric condenser, the appropriate place for the location of vacuum drum for collecting the distillate will be _____?

- A. At ground level
- B. 2 metres above the ground
- C. 5 metres above ground
- D. 10 metres above ground

Which of the following can be most effectively used for clarification of lube oil and printing ink ?

- A. Sparkler filter
- B. Pre-coat filter
- C. Disc-bowl centrifuge
- D. Sharpies super-centrifuge

Pick out the wrong statement?

- A. Swenson-Walker crystalliser is a batch crystalliser
- B. Super saturation of the solution is the driving potential for a crystal growth
- C. The liquor left after the removal of crystals from a solution is called mother liquor

D. The first stage of crystal formation is called nucleation

Maxwell's relation corresponding to the identity, $dH = dS = Vdp + \sum \mu_i dn_i$ is _____?

- A. $(\partial T / \partial V)_{S, n_i} = -(\partial P / \partial S)_{V, n_i}$
- B. $(\partial S / \partial P)_{T, n_i} = (\partial V / \partial T)_{P, n_i}$
- C. $(\partial S / \partial V)_{T, n_i} = (\partial P / \partial T)_{V, n_i}$
- D. $(\partial T / \partial P)_{S, n_i} = (\partial V / \partial S)_{P, n_i}$**

Reaction of calcium carbide with water produces a gas, which is used _____?

- A. As an illuminant
- B. For metal cutting/welding
- C. Both A. & B.**
- D. Neither A. nor B.

The critical moisture content in case of drying indicates the _____ rate period?

- A. Beginning of falling**
- B. Beginning of constant
- C. End of falling
- D. None of these

Time required for 50% decomposition of a liquid in an isothermal batch reactor following first order kinetics is 2 minutes. The time required for 75% decomposition will be about _____ minutes?

- A. 3
- B. 4**
- C. 6
- D. 10

Which of the following radioactive wastes emits all α , β & γ rays and hence is

the most hazardous of all radioactive emitters ?

- A. I-131
- B. Sr-90
- C. Au-198
- D. Ra-226**

Neoprene is a _____ ?

- A. Monomer
- B. Synthetic rubber**
- C. Polyester
- D. None of these

Mechanism of moisture removal in case of freeze drying of food stuff is by _____ ?

- A. Evaporation
- B. Sublimation**
- C. Dehydration
- D. Adsorption

Which of the following relates the absorption & evolution of heat at the junctions of a thermocouple to the current flow in the circuit ?

- A. Seebeck effect
- B. Peltier effect**
- C. Joule heating effect
- D. Thomson effect

Diameter of rivet hole (d, mm) and the plate thickness (t, mm) are related by Unwin's formula as _____ ?

- A. $d = 1.1 t$
- B. $d = 1.6 \sqrt{t}$**
- C. $d = 1.5 t$
- D. $d = 3 \sqrt{t}$

Carbon percentage in medium carbon steel is around _____?

- A. 0.1 to 0.35
- B. 0.35 to 0.5**
- C. 0.8 to 1.4
- D. 1 to 1.5

Iron rust is _____?

- A. Ferrous oxide
- B. Hydrated ferric oxide**
- C. Powdered iron
- D. Ferric sulphide

Filtration rate through a filter cake is proportional to (where, S = filtering surface R = specific cake resistance μ = viscosity of the filtrate) ?

- A. S
- B. $1/R$
- C. $1/\mu$
- D. All A., B. & C.**

The term analogous to voltage in a single tank system is the _____?

- A. Heat content of the system
- B. Liquid volume in the tank
- C. Flow rate
- D. Level of liquid**

Choose the correct statement regarding thermal cracking ?

- A. Moderate changes in operating temperature does not change the depth of cracking
- B. Increased residence time results in the decreased severity of cracking
- C. At low pressure, the yield of lighter hydrocarbons are more
- D. Greater depth of cracking gives lower octane number gasoline**

The four properties of a system viz. P , V , T , S are related by _____ equation?

- A. Gibbs-Duhem
- B. Gibbs-Helmholtz
- C. Maxwell's**
- D. None of these

Priming in a distillation column _____?

- A. Results from very low gas velocity
- B. Is desirable from point efficiency consideration
- C. Is characterised by the presence of foam throughout the space between trays**
- D. Reduces the overall pressure drop

An Azeotropic mixture is a _____ mixture?

- A. Binary
- B. Ternary
- C. Constant boiling point**
- D. None of these

Speed of the drum of the rotary vacuum filter normally ranges from _____ rpm?

- A. 0.1 to 2**
- B. 5 to 7
- C. 3 to 8
- D. 8 to 15

Lithophane is _____?

- A. Explosive
- B. White lead
- C. Filter aid
- D. ZnS (white pigment)**

Tin base and lead base alloys are used for bearing materials. Tin compared to lead has lower _____?

- A. Price

- B. Corrosion resistance
- C. Thermal conductivity
- D. Abundant availability**

Penicillin is separated from fermented broth by _____?

- A. Extraction with amyl or butyl acetate**
- B. Ternary Azeotropic distillation
- C. Evaporator in calandria
- D. Extractive distillation

Silica bricks are never used for lining the _____?

- A. Beehive coke ovens**
- B. By-product coke ovens
- C. Dome of blast furnace stoves
- D. Roof of open hearth furnace

_____ increases with increase in pressure?

- A. The melting point of wax
- B. The boiling point of a liquid
- C. Both A. and B**
- D. Neither A. nor B

Which is a fertile nuclear fuel ?

- A. U-233
- B. U-235
- C. Pu-239
- D. Th-232**

Emission of β -particles during radioactive decay of a substance is from _____?

- A. Innermost shell
- B. Nucleus**
- C. Outermost shell

D. None of these

The level of a liquid under pressure can be determined using _____?

- A. Bubbler system
- B. Differential pressure manometer**
- C. Diaphragm box system
- D. Air-trap system

What is the number of degree of freedom for a system of two miscible non-reacting species in vapor-liquid equilibrium forming an azeotrope ?

- A. 0
- B. 2
- C. 1**
- D. 3

Fusion point of coal ash increases with increase in its _____ content?

- A. Iron sulphate
- B. Iron silicate
- C. Lime and magnesia
- D. All A., B. and C.**

Laminar flow is characterised by the nonexistence of _____?

- A. Pressure fluctuation
- B. Eddies
- C. Deviating velocities
- D. All A., B. & C.**

For spheres, volume shape factor is given by _____?

- A. $\pi = (A/D^2)$
- B. $2\pi = (2A/D^2)$
- C. $\pi/6 = (V/D^3)$**
- D. AD/V

_____ centrifuge is the most suitable for separation of non-friable crystals?

- A. Tubular bowl
- B. Disc-bowl
- C. Perforated horizontal basket continuous**
- D. Suspended batch basket

Both white phosphorous as well as red phosphorous _____?

- A. Are soluble in CS₂
- B. Burns when heated in air**
- C. Reacts with hot caustic soda solution to give Phosphine
- D. All A., B., and C.

Pick out the correct statement?

- A. Human blood is a Newtonian fluid
- B. A Newtonian fluid obeys Newton's law of cooling**
- C. For a non-Newtonian fluid, a straight line passes through the origin in a plot between shear stress and shear gradient
- D. Thin lubricating oil is an example of a non-Newtonian fluid

If the baffle spacing in a shell and tube heat exchanger increases, then the Reynolds number of the shell side fluid _____?

- A. Remains unchanged
- B. Increases
- C. Increases or decreases depending on number of shell passes
- D. Decreases**

An example of elution is _____?

- A. Separation of uranium oxide from its ore by H₂SO₄ in a Pachuca tank**
- B. Separation of sugar from sugar beet by hot water
- C. Dissolution of tannin out of tree barks by water

D. Recovery of vegetable oils from seeds

In case of Couette flow, the fluid flow is between two large flat parallel plates with _____?

- A. Top plate moving and the bottom plate fixed
- B. Bottom plate moving and the top plate fixed
- C. Both the plates fixed
- D. Both the plates moving

The most abundant isotope of natural uranium is _____?

- A. $^{92}\text{U}238$
- B. $^{92}\text{U}235$
- C. $^{92}\text{U}234$
- D. None of these

The shell side pressure drop in a shell and tube heat exchanger is maximum for _____ baffle?

- A. Disk and ring
- B. Segmental
- C. Orifice
- D. Independent of the type of

Use of packed towers for distillation is generally limited to the _____?

- A. Small sizes
- B. Multi-component distillation
- C. High pressure operation
- D. Vacuum distillation

Asphalts are _____?

- A. Low molecular weight & low boiling point compounds present in petroleum
- B. Desirable in catalytic cracking feedstock, because they produce coke
- C. Readily oxidisable and form carbonaceous sludge

D. All A., B. & C.

Sulphur content in lighter and heavier petroleum products is generally determined respectively by _____?

- A. Lamp method and bomb method
- B. Bomb method and lamp method**
- C. Bomb method and quartz tube method
- D. Quartz tube method and lamp method

Which is not a variable head meter _____?

- A. Venturimeter
- B. Pitot tube
- C. Rotameter**
- D. None of these

Which of the following is not a dimension-less group used in catalysis? (Where, D = dispersion co-efficient, cm^2/sec . D_1 = diffusion co-efficient; cm^2/sec L = length of the reactor, cm t = time, sec , v = volumetric flow rate, cm^3/sec . V = volume, cm^3 .) ?

- A. Reactor dispersion number (D/vL)
- B. Reduced time (vt/V)
- C. Thiele modulus $L\sqrt{k/D_1}$
- D. None of these**

Eschka mixture, which is used for the determination of sulphur in coal, is a mixture of _____?

- A. MgO & Na_2CO_3**
- B. MgSO_4 & BaCl_2
- C. BaSO_4 & NaCl
- D. MgCO_3 & NaCl

A jet engine turbine blade is normally manufactured

by _____?

- A. Forging
- B. Shell moulding
- C. Investment casting**
- D. Pressure die casting

The average molecular weight of a flue gas having the composition by volume as $\text{CO}_2 = 25\%$, $\text{O}_2 = 25\%$, $\text{N}_2 = 50\%$ will be _____?

- A. 27.6
- B. 23**
- C. 47.3
- D. 42.9

Ammonium nitrate (is mixed with limestone) is not used as fertiliser as such, because _____?

- A. It is hygroscopic and explosive in nature**
- B. It is highly acidic in nature
- C. It is a liquid at room temperature
- D. Its nitrogen content is very less

Molecular weights of plastics ranges from _____?

- A. 1000 to 5000
- B. 5000 to 1000
- C. 20000 to 25000**
- D. 109 to 1011

Volumetric ratio of N_2 to O_2 in dry atmospheric air is _____?

- A. 0.21
- B. 3.76**
- C. 4.76
- D. 0.79

The chemical nature of an element is independent

of _____?

- A. Its atomic number
- B. The number of protons or electrons present in it
- C. The number of neutrons present in it**
- D. None of these

Copper has very low _____?

- A. Malleability
- B. Ductility
- C. Tensile strength**
- D. Thermal & electrical conductivity

Process conditions in fermentator used for production of penicillin is _____?

- A. 25°C, 2 atm**
- B. 50°C, 10 atm
- C. 30°C, 200 mm Hg (absolute)
- D. 90°C, 45 atm

Production of a hollow product by inflation of a tube or parison is called the _____ process?

- A. Blow moulding**
- B. Calendaring
- C. Extrusion
- D. Injection

Steel will respond to hardening by heat treatment processes, only when the minimum carbon content in it is _____ percent?

- A. 0.02
- B. 0.2**
- C. 0.35
- D. 0.5

Which of the following contributes maximum as main source of sulphur in the blast furnace charge ?

- A. Sinter
- B. Coke**
- C. Iron ore
- D. Limestone

Linde gas liquefaction process employs cooling _____?

- A. By throttling**
- B. By expansion in an engine
- C. At constant pressure
- D. None of these

An ideal fluid is _____?

- A. Frictionless & incompressible**
- B. One, which obeys Newton's law of viscosity
- C. Highly viscous
- D. None of these

Which of the following is not a unit of mass transfer co-efficient ?

- A. Moles transferred/ [(time) (area) (mole fraction)]
- B. Moles transferred/ [(time) (area) (mass A/mass B)]
- C. Moles transferred/ [(time) (area) (pressure)]
- D. None of these**

Out of the following, nucleus of _____ atom contains the largest number of neutrons?

- A. U-235
- B. U-238
- C. U-239**
- D. Pu-239

A hydraulic accumulator comprises of _____?

- A. A storage device and a control valve
- B. A cylinder and a plunger**
- C. Two pistons and two cylinders
- D. A storage tank and a ram pump

Equal volumes of aniline and diesel oil when mixed at room temperature (during summer) was found to be completely miscible. It means that the aniline point of the diesel is _____ the room temperature?

- A. More than
- B. Less than
- C. Same as**
- D. Either more or less; depends on the room temperature

Means for giving direction to the circulation of gases in furnaces are _____?

- A. Fans
- B. Arrangement of heating stock in the furnaces
- C. Location of outlet ports and heating & combustion devices
- D. All A., B. and C.**

With increase in density, the viscosity of petroleum products _____?

- A. Increases**
- B. Decreases
- C. Remain same
- D. Either A. or B.

Load cells are used for the measurement of _____?

- A. Stress
- B. Weight**
- C. Strain
- D. Velocity

Constituents of stellite are _____?

- A. Zinc, copper & nickel
- B. Cobalt, chromium & tungsten**
- C. Zinc, aluminium & nickel
- D. Nickel, cobalt & vanadium

Which of the following fuels is the best for burning on chain grate stoker ?

- A. Non-caking coal**
- B. Caking coal
- C. Coking coal
- D. Pulverised coal

Catalyst used in isomerisation process is _____ ?

- A. H₂SO₄
- B. H₃PO₄
- C. HF
- D. AlCl₃**

A black body when hot, emits heat radiation of _____ wavelengths?

- A. Small
- B. Large
- C. All**
- D. One fixed

_____ process is used for producing soda ash?

- A. Chamber
- B. Chance
- C. Tromp
- D. Solvay**

Out of the following, which is the most important parameter for the blast furnace grade coke ?

- A. CSR & CRI**

- B. Ash content
- C. Moisture content
- D. Volatile matter content

Dittus-Boelter equation used for the determination of heat transfer co-efficient is valid _____?

- A. For fluids in laminar flow
- B. For fluids in turbulent flow**
- C. When Grashoff number is very important
- D. For liquid metals

Rotary vacuum pumps can reduce the absolute pressure to as low as _____ mm Hg ?

- A. 1
- B. 0.1
- C. 0.01**
- D. 0.001

Which of the following is a thermodynamic property of a system ?

- A. Concentration
- B. Mass
- C. Temperature
- D. Entropy**

An adequate clearance between the tray and the shell wall of a distillation column is provided to _____?

- A. Drain the liquid from the tray when the unit is not in operation
- B. Allow for thermal expansion and facilitate installation**
- C. Avoid back-trapping
- D. None of these

Which of the following is not a dielectric material ?

- A. Cotton, silk and paper

- B. Asbestos, glass, porcelain and mica
- C. Rubber and polymeric resins**
- D. All refractory materials

Absorption/scattering cross-section of an element is expressed in “barn”, which is equivalent to _____?

- A. 10-24 cm²**
- B. 10-12 cm
- C. 1 Angstrom
- D. 10-24 cm

Metallic soap (e.g. aluminium or calcium salts of fatty acids) can be used _____?

- A. As a lubricant**
- B. As a rust preventive
- C. In hard water for cleaning of cloth
- D. As a foam depressant in distillation column

In calcium ammonium nitrate (CAN) fertiliser _____?

- A. Nitrate nitrogen is quick acting**
- B. Ammoniacal nitrogen is quick acting
- C. Nitrate nitrogen is slower acting
- D. None of these

Fireclay bricks are not used in the _____?

- A. Beehive coke oven
- B. By-product coke oven walls**
- C. Combustion chamber of B.F. stoves
- D. Coke oven regenerators

DDT stands for _____?

- A. Diethyl-diphenyl-trichloromethane
- B. Dichloro-diphenyl-trichloromethane**

C. diphenyl-dichloro-trichloromethane

D. Dichloro-diphenyl-trichloroethane

Absorptivity of a perfect black body is unity. Which of the following has maximum absorptivity ?

A. Aluminium foil

B. Refractory bricks

C. Iron plate

D. Coke breeze

_____ process is used for the manufacture of sodium carbonate by ammonia soda process?

A. Ostwald's

B. Bosch

C. Solvay

D. Haber's

dW and dq are not the exact differential, because q and W are _____?

A. State functions

B. Path functions

C. Intensive properties

D. Extensive properties

The best guide to judge the general quality of water is the measurement of its _____?

A. pH value

B. Electrical conductivity

C. Turbidity

D. Dissolved oxygen content

Ganister contains maximum percentage of _____?

- A. FeO
- B. SiO₂**
- C. MgO
- D. MnO₂

Which of the following petrographic constituents of coal is non-coking ?

- A. Vitrain
- B. Clarain
- C. Durain
- D. Fussain**

In a closed loop system, the process to be controlled is an integrating process with transfer function $1/2s$. The controller proposed to be used is an integral controller with transfer function $1/T_1s$. When a step change in set point is applied to such a closed loop system, the controlled variable will exhibit _____?

- A. Overdamped response
- B. Underdamped response**
- C. Undamped response
- D. Unstable response

Experiments were conducted to determine the flux of a species A in a stagnant medium across a gas-liquid interface. The overall mass transfer coefficient based on the liquid side for dilute systems for the above was estimated to be 4×10^{-3} kg mole/m².s. The equilibrium data for the system is given as $y = 2x$. The flux across the interface (in kg mole/m² .s) for bulk concentrations of A in gas phase and liquid phase as $y = 0.4$ and $x = 0.01$ respectively is _____?

- A. 5.6×10^{-4}
- B. 8.5×10^{-4}**
- C. 5.6×10^{-3}
- D. 8.5×10^{-3}

For continuous drying of granular or crystalline material, the dryer used is the _____ dryer?

- A. Tunnel
- B. Tray
- C. Rotary**
- D. None of these

Polycaprolactam is nothing but _____?

- A. Orlon
- B. Nylon-66
- C. Nylon-6**
- D. Saran

Which of the following varies as the square root of oil pressure during atomisation of fuel oil through a pressure jet burner ?

- A. Output & fineness
- B. Velocity
- C. Both A. & B.**
- D. None of these

Refluxing of part of the distillate in a fractionating column is a 'recycling operation', aimed primarily at _____?

- A. Heat conservation
- B. Yield enhancement
- C. Product enrichment**
- D. None of these

Addition polymerisation is not involved in the manufacture of _____?

- A. Low density polythene
- B. Poly vinyl chloride

C. Polystyrene

D. Polyhexamethylene adipamide

Rubber lined pumps can be used to pump _____?

A. Caustic soda

B. Chlorinated brine

C. Hypochlorous acid

D. All A., B. and C.

Steady flow occurs, when the _____?

A. Conditions change steadily with time

B. Conditions are the same at the adjacent points at any instant

C. Conditions do not change with time at any point

D. Rate of the velocity change is constant

Helium gas constant volume thermometer is suitable for the measurement of a temperature of _____ °C?

A. < 100

B. < 0

C. > 0

D. > 800

According to the Fenske equation, what will be the minimum number of plates required in a distillation column to separate an equimolar binary mixture of components A and B into an overhead fraction containing 99 mol% A and a bottom fraction containing 98 mol% B ? Assume that relative volatility ($\alpha_{AB} = 2$) does not change appreciably in the column ?

A. 5

B. 9

C. 12

D. 28

Pick out the correct statement ?

- A. Materials exhibiting high elasticity obey Hooke's law
- B. The elastic behaviour of rubber under compression is the same as its behaviour under tension**
- C. The damping capacity of a material is due to its plastic deformation
- D. The stress required to cause plastic flow in polycrystalline material is higher as compared to monocrystalline materials due to the presence of grains of different orientations

Volume occupied by one gm mole of a gas at S.T.P. is _____?

- A. 22.4 litres**
- B. 22400 litres
- C. 22.4 c.c
- D. 359 litres

Production of alcohol by fermentation of molasses is a/an _____ process?

- A. Anaerobic
- B. Aerobic**
- C. Endothermic
- D. Both B. and C.

Addition of tungsten to steel imparts _____?

- A. Magnetic properties
- B. Cutting hardness**
- C. Corrosion resistance
- D. Ductility

Wet bulb and dry bulb temperatures becomes identical at _____ percent saturation curve?

- A. 100**
- B. 50
- C. 78

D. None of these

Slope of counter-current flow rotary drier is in the range of _____ meter/metre?

A. 0 to 0.08

B. 0 to 0.8

C. 0 to 1.5

D. 0 to 2.2

The drying time between fixed moisture content within diffusion controlled 'falling rate period' is proportional to (assuming that drying occurs from all surfaces of the solid) (where, T = thickness of the solid) ?

A. \sqrt{T}

B. T

C. T²

D. T³

A photochemical reaction is _____ light?

A. Initiated by

B. Accompanied with emission of

C. Catalysed by

D. Used to convert heat energy into

Needle valves are generally not used for _____ ?

A. Very large diameter pipes

B. High pressure throttling service

C. Very accurate flow control

D. Smaller sizes of pipe

Fresh orange juice contains 12% (by weight) solids and the rest water 90% of the fresh juice is sent to an evaporator to remove water and subsequently mixed with the remaining 10% of fresh juice. The resultant product contains 40%

solids. The kg of water removed from 1 kg fresh juice is _____?

- A. 0.4
- B. 0.5
- C. 0.6
- D. 0.7**

Pick out the wrong statement ?

- A. Wine, rum & Vodka are prepared by the formulation of fruit juice, sugar beet & rye respectively
- B. Protein catalysts are called enzymes
- C. The rate of chemical reaction is independent of the concentration of reactants at high concentration of enzymes
- D. Total sugar content in molasses is about 10%**

Which of the following rays has the least wavelength ?

- A. Ultraviolet rays
- B. Infrared rays
- C. Cosmic rays**
- D. X-rays

Size reduction of asbestos and mica is done by _____?

- A. Hammer mills**
- B. Rod mills
- C. Gyratory crushers
- D. Crushing rolls

For the same terminal conditions and fitting size, the least friction loss is incurred in a/an ?

- A. T-joint
- B. Union**
- C. 45° elbow
- D. 90° bend

The widest explosive limit is of _____, thereby making it the most explosive gas?

- A. Acetylene
- B. Petrol vapor
- C. Hydrogen
- D. Carbon monoxide

Half-life period for a first order reaction is _____ the initial concentration of the reactant?

- A. Directly proportional to
- B. Inversely proportional to
- C. Independent of
- D. None of these

In sewage treatment, the detention period allowed for oxidation ponds ranges from _____ weeks?

- A. 1 to 2
- B. 4 to 5
- C. 9 to 10
- D. 15 to 20

Use of baffles in agitators help in minimising the _____ tendency?

- A. Swirling
- B. Vortexing
- C. Both A. & B.
- D. Neither A. nor B.

A magnetic material becomes _____ above the Curie temperature?

- A. Ferromagnetic
- B. Diamagnetic
- C. Paramagnetic
- D. None of these

Oilish impurities present the effluent discharged from the electroplating industry is normally not removed by _____?

- A. Chemical coagulation
- B. Flootation & skimming
- C. Centrifugation
- D. Ultra filtration

During Joule-Thomson expansion of gases _____?

- A. Enthalpy remains constant
- B. Entropy remains constant
- C. Temperature remains constant
- D. None of these

Reflux ratio variation in a distillation column is between _____?

- A. Zero and infinity
- B. Zero and one
- C. Minimum and infinity
- D. None of these

When the temperature and humidity of air is low, we usually use _____ draft cooling tower?

- A. Natural
- B. Forced
- C. Induced
- D. None of these

In nuclear reactions, _____ number is conserved?

- A. Mass
- B. Atomic
- C. Both A. & B.
- D. Neither A. nor B.

Though tin occurs lower than iron in the electrochemical series, yet it is coated

on steel for corrosion protection, because of its _____?

- A. Lower cost
- B. Abundant availability
- C. Resistance to vegetable acids as the tin plate are commercially used in 'canning' industry**
- D. None of these

Yield strength of a material is determined by the _____ test?

- A. Creep
- B. Tension**
- C. Compression
- D. Endurance

Which of the following ceramic packing materials is the costliest of all ?

- A. Berl saddles**
- B. Raschig rings
- C. Pall rings
- D. Intalox saddles

Half life of a radioactive isotope corresponds to the time required for half of the _____ to decay ?

- A. Atoms**
- B. Neutrons
- C. Nucleons
- D. Electrons

Materials having _____ lattice structure are usually most ductile?

- A. FCC**
- B. BCC
- C. HCP
- D. Cubic

Sound waves propagation in air exemplifies an _____ process?

- A. **Adiabatic**
- B. Isothermal
- C. Isometric
- D. None of these

Pick out the correct statement ?

- A. For identical gas flow rates, less pressure drop occurs through a plate tower than through a packed tower
- B. Plate column can handle greater liquid loads without flooding than packed column, but the liquid hold up is more in the case of plate column
- C. For the same duty, plate columns weigh less than packed columns
- D. **All A., B. and C.**

Grinding characteristic of a material is given by its _____?

- A. **HGI**
- B. Angle of repose
- C. Shatter index
- D. Abrasion index

H₂ is a better coolant than CO₂, due to its relatively _____?

- A. Lower density
- B. **Higher specific heat**
- C. Non-reactivity to uranium
- D. Lower neutron capture cross-section

The progressive warming up of the earth's surface is mainly due to the _____?

- A. Automobile exhaust
- B. **Blanketing effect of CO₂ in the atmosphere**
- C. De-forestation
- D. Thickening of ozone layer

Which of the following has the highest thermal conductivity ?

- A. Brick
- B. Air
- C. Water
- D. Silver**

Space time equals the mean residence time _____?

- A. When the density of the reaction mixture is constant**
- B. For large diameter tubular reactor
- C. For narrow diameter tubular reactor
- D. For CSTR

Refractoriness/fusion points of 'Superduty' refractories is _____ °C?

- A. 1520-1630
- B. 1630-1670
- C. > 1730**
- D. > 2000

Peclet number (Pe) is given by _____?

- A. $Pe = Re.Pr$**
- B. $Pe = Re/Pr$
- C. $Pe = Pr/Re$
- D. $Pe = Nu.Re$

Primary designation of steel is based on its _____?

- A. Hardness & tensile strength
- B. Carbon content
- C. Iron content
- D. Alloying elements content**

Shaving soaps are _____?

- A. Soft potassium soaps (potassium salt of fatty acid) with free Stearic acid to give lather**

a

lasting property

- B. Metallic soaps compounded with frothing agents
- C. High free alkali soaps having excess of cane sugar and alcohol
- D. None of these

Prussian blue is chemically represented by _____?

- A. $\text{FeO} \cdot \text{TiO}_2$
- B. $\text{Ca SO}_4 \cdot 2\text{H}_2\text{O}$
- C. $\text{Fe}_4 [\text{Fe} (\text{CN}_6)_3]$**
- D. $\text{AlF}_3 \cdot 3\text{NaF}$

As the velocity V and thus the Reynolds number of a flow past a sphere increases from very low value, the drag force for $\text{Re} \ll 1$?

- A. Increases linearly with V**
- B. Decreases linearly with V
- C. Decreases as V^2
- D. None of these

Quartz is a _____ material ?

- A. Diamagnetic
- B. Ferromagnetic
- C. Ferroelectric
- D. Piezoelectric**

Which of the following has the least carbon percentage ?

- A. Low carbon steel
- B. Mild steel
- C. Wrought iron**
- D. White cast iron

Refractoriness of a typical silica brick corresponds to Segar cone number, '32', which is equivalent to a temperature of _____ °C?

- A. 1380
- B. 1520
- C. 1710**
- D. 1915

Heat penetration rate in narrow coke ovens in high temperature carbonisation of coal is around _____ cm/hr?

- A. 2.5**
- B. 0.5
- C. 10
- D. 20

Pick out the wrong statement ?

- A. Angle of repose of coal increases with its increasing size
- B. Specific gravity of coal increases with its increasing maturity
- C. Refractive index and reflectance of coal increases with the increasing rank of coal
- D. Specific heat of coal decreases with increases in the volatile matter and decrease in the C/H ratio of coal**

Catalyst used in steam reforming of naphtha is _____?

- A. Nickel**
- B. Platinum
- C. Silica gel
- D. Rhodium

Hydrogenation of edible vegetable oils _____?

- A. Is an exothermic reaction
- B. Increases their melting point
- C. Is done in presence of nickel catalyst
- D. All A , B. and C.**

Radiation thermometer cannot measure the temperature

_____?

- A. Inside a pressure vessel
- B. Of an object without coming in contact with it
- C. Of liquid oxygen**
- D. Of moving objects at high temperature

Prandtl number is the reciprocal of _____?

- A. Thermal diffusivity/Momentum diffusivity**
- B. Thermal diffusivity \times Momentum
- C. Thermal diffusivity \times Mass diffusivity
- D. Mass diffusivity \times Momentum diffusivity

Rod mills employed for grinding _____?

- A. Employ a steel shell having L/D ratio of 1.5 to 3.0
- B. Is useful for handling sticky materials
- C. Employ steel rods of 2-12 cms diameter extending over full length of the mill
- D. All A , B & C**

Firing temperature is minimum (1250-1400 °C) for _____ bricks?

- A. Fireclay**
- B. Direct bonded basic
- C. Silica
- D. Magnesite

Effectiveness of a fertiliser is independent of the _____?

- A. Nature of soil
- B. Type of crop
- C. pH of soil
- D. None of these**

Presence of bacteria in potable (drinking) water causes _____?

- A. Turbidity
- B. Disease**

- C. Bad odour
- D. Bad taste & colour

Oil produced by solvent extraction _____?

- A. Has low free fatty acid content
- B. Is odourless
- C. Both A. & B.
- D. Neither A. nor B.**

Measurement of sub-zero Celsius temperature in industry is done most commonly by _____?

- A. Thermocouples
- B. Resistance thermometers**
- C. Gas thermometers
- D. Bi-metallic thermometers

Which of the following is a type of sedimentary rock?

- A. Organic rock
- B. Chemical rock
- C. Clastic rock
- D. All of the above**

Dacron is a/an _____?

- A. Addition polymer
- B. Condensation polymer
- C. Polyester
- D. Both B. and C.**

Mercury is transported in metal containers made of _____?

- A. Aluminium
- B. Iron**
- C. Lead
- D. Nickel

Pick out the wrong statement?

- A. The binary diffusivity in liquids is of the order of 10^{-5} cm²/sec
- B. Molecular diffusion in solid is much faster than that in liquids**
- C. Particles movement from higher concentration to lower concentration takes place in diffusion process
- D. According to Poiseuille's law, the permeability decreases with increase in temperature for flow of a gas through a given capillary

Which of the following materials has the least scrap value ?

- A. Aluminium
- B. Stainless steel**
- C. Brass
- D. Copper

In liquid extraction, if the selectivity is unity, then _____ ?

- A. Separation of the constituents is the most effective
- B. No separation will occur**
- C. Amount of solvent required will be minimum
- D. Solvent flow rate should be very low

Composition of alloys can be determined by _____ ?

- A. Polarograph**
- B. Chromatograph
- C. Refractometer
- D. None of these

Steam trap is used to _____ ?

- A. Condense the steam flowing in the pipeline
- B. Remove water resulting from partial condensation of steam**
- C. Stop the supply of steam

D. None of these

Which of the following will generate maximum volume of product of complete combustion (Nm^3/Nm^3 of fuel) ?

- A. Carburetted water gas
- B. Blast furnace gas
- C. Natural gas**
- D. Producers' gas

Solar energy results from _____ reaction?

- A. Fission
- B. Combustion
- C. Thermonuclear**
- D. None of these

Lavatory cisterns are normally made of _____?

- A. Expanded polystyrene**
- B. Saturated polyester
- C. Perspex
- D. PVC

_____ iron is produced, when molten pig iron is allowed to cool gradually?

- A. White cast
- B. Grey cast**
- C. Wrought
- D. None of these

Collision theory gives the rate constant for bimolecular reaction as _____?

- A. $K \propto \sqrt{T} \cdot e^{-E/RT}$
- B. $K \propto e^{E/RT}$
- C. $K \propto e^{-E/RT}$**

D. None of these

The main purpose of recycling the byproduct hydrogen gas in the reformer reactor is to _____?

- A. Obviate catalyst poisoning
- B. Maintain the reaction temperature
- C. Sustain the reactor pressure**
- D. Hydrogenate the feed stock

In a P-V diagram (for an ideal gas), an isothermal curve will coincide with an adiabatic curve (through a point), when _____?

- A. $C_p < C_v$
- B. $C_p = C_v$**
- C. $C_p > C_v$
- D. $C > C_v$

The reaction $A + B \rightarrow C$ has been conducted in a reactor as shown below. The number of boundaries around which material balance can be written, are _____?

- A. 1
- B. 6
- C. 3
- D. 4**

Pick out the correct equation relating 'F' and 'A' _____?

- A. $F = A + PV$**
- B. $F = E + A$
- C. $F = A - TS$
- D. $F = A + TS$

For the air water system under ambient conditions, the adiabatic saturation temperature and the wet bulb temperature are nearly equal,

because _____ ?

- A. Water has a high latent heat of evaporation
- B. Lewis number is close to unity
- C. They are always equal under all circumstances
- D. Solubility of the components of air in water is very small

Calorific value of coal middling generated in coal washeries during washing of coal may be around _____ Kcal/kg?

- A. 1000
- B. 4000
- C. 6000
- D. 8000

During dehumidification of unsaturated air wet bulb temperature & partial pressure of vapor are not constant. However, during evaporative cooling process with recirculated water supply, the _____ remains constant ?

- A. Wet bulb temperature
- B. Partial pressure of water vapor
- C. Relative humidity
- D. None of these

_____ tray arrangement is recommended for distillation column having diameter upto 4 ft ?

- A. Radial flow
- B. Cross flow
- C. Split flow
- D. Cascade

Air used in aerobic fermentation must be sterilized, otherwise the _____ ?

- A. Recovery of product will be difficult

B. Contamination of pure culture would result

- C. Uniformity of product cannot be achieved
- D. None of these

In the manufacture of sulphuric acid from elemental sulphur, the following sequence of major operations is followed ?

A. Furnace → converter → absorber

- B. Furnace → evaporator → absorber
- C. Furnace → converter → evaporator
- D. Converter → furnace → absorber

Sand and _____ is fused at 1300°C, to produce sodium silicate ?

- A. Limestone
- B. Soda ash**
- C. Coke
- D. Sodium sulphate

The ratio of maximum adiabatic flame temperature in air to that in pure oxygen is always _____ ?

- A. 1
- B. < 1**
- C. > 1
- D. Unpredictable

A refractory wall separating the stock and the source of heat is provided in a _____ ?

- A. Updraft kiln
- B. Muffle furnace**
- C. Continuous furnace
- D. None of these

The molecules of a liquid which is in equilibrium with its vapor at its boiling

point on an average have equal _____ in the two phases?

- A. Potential energy
- B. Intermolecular forces
- C. Kinetic energy**
- D. Total energy

A control rod _____?

- A. Should have small absorption cross-section
- B. Is generally made of boron, hafnium or cadmium
- C. Should have large absorption cross-section
- D. Both B. and C.**

A bimetallic thermometer as compared to industrial mercury in glass thermometer has almost the same _____?

- A. Temperature measuring range (- 40°C to 450°C)
- B. Accuracy ($\pm 1\%$ of span)
- C. Speed of response
- D. All a, b & c**

Wavelength corresponding to the maximum energy is inversely proportional to the absolute temperature. This is _____ law?

- A. Stefan's
- B. Dalton's
- C. Wien's**
- D. Kirchoff's

Which of the following low molecular weight (<104), soft & waxy polymer is used in „chewing gum“ ?

- A. Cellulose acetate
- B. Polyvinyl acetate**
- C. Thiokol
- D. PVC

Water flow rate in a pipe of 3.5 metres diameter can be most economically and conveniently measured by a/an _____?

- A. Pitot tube
- B. Venturimeter
- C. Orificemeter
- D. Rotameter

In case of _____ distillation, a solvent is added to alter the relative volatility of the mixture to be separated?

- A. Molecular
- B. Azeotropic
- C. Extractive
- D. Flash

The calorific value of natural gas is about _____ kcal/Nm³?

- A. 10,000
- B. 2,500
- C. 25,000
- D. 35,000

Liquefaction of gases cannot be done by _____?

- A. Exchange of heat with colder stream
- B. Adiabatic expansion through a throttle valve (Joule-Thomson expansion)
- C. Merely compressing it beyond critical pressure
- D. Adiabatic expansion against a piston or in a turbine

Which catalyst is used in the manufacture of ethylene oxide by oxidation of ethylene ?

- A. AgO
- B. Al₂O₃
- C. ZnCl₂
- D. Fe₂O₃

Phosphatic fertilisers _____?

- A. Are useful during early stage of the plant growth
- B. Accelerate fruit formation in later stages of growth**
- C. Lessen the effect of excessive nitrogen application
- D. None of these

Cumene is the starting material for the production of _____?

- A. Benzoic acid
- B. Phenol and acetone**
- C. Isoprene
- D. Styrene

80 kg of Na_2SO_4 (molecular weight = 142) is present in 330 kg of an aqueous solution. The solution is cooled such that 80 kg of $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$ crystals separate out. The weight fraction of Na_2SO_4 in the remaining solution is _____?

- A. 0.00
- B. 0.18**
- C. 0.24
- D. 1.00

The evaporation of aqueous solution of sugar causes its molarity to _____?

- A. Decrease
- B. Increase
- C. Remain unchanged**
- D. Either A. or B.; depends on the concentration of the solution

In case of a centrifugal pump, the ratio of total delivered pressure to pressure developed with the impeller is called the _____ efficiency?

- A. Manometric**
- B. Mechanical

- C. Volumetric
- D. Overall

Brass container is suitable for storing_____?

- A. Aqueous ammonia
- B. Beer**
- C. H₂SO₄ (95%)
- D. Phosphoric acid (95%)

Natural rubber is obtained from latex, which is a colloidal dispersion of rubber in water. Which of the following is used as a coagulant in latex ?

- A. Ammonium alum
- B. Potassium alum
- C. Both A. & B.**
- D. Neither A. nor B.

Stainless steel is welded with difficulty because of_____?

- A. Its high melting temperature
- B. Chances of cracking
- C. Oxide film formation**
- D. Chromium carbide formation

Anthracite coal _____?

- A. Contains more volatile matter than bituminous coal
- B. Ignites more easily than bituminous coal
- C. Is essentially a coking coal
- D. Burns with short, bluish, yellow-tipped flame producing very little smoke**

°API gravity of water at N.T.P. is about_____?

- A. 0
- B. 1
- C. 10**
- D. 100

Pick out the wrong statement?

- A. Conversion of SO_2 to SO_3 in Monsanto-4 pass converter is about 98%
- B. The chemical formula of oleum is $\text{H}_2\text{S}_2\text{O}_7$, which is formed by saturating sulphuric acid with sulphur trioxide
- C. Vitriol oil is nothing but technical sulphuric acid
- D. Decomposition of sulphuric acid on heating does not start before its boiling**

With increase in the temperature of carbonisation of coal

_____?

- A. Hydrogen content of coke oven gas increases due to cracking of hydrocarbons
- B. Methane content in the coke oven gas decreases and carbon monoxide content increases
- C. Calorific value of the coke oven gas decreases due to cracking of hydrocarbons which is not compensated by increase in CO & H_2 content
- D. All A., B. and C.**

The most matured coal out of the following is _____?

- A. Lignite
- B. Semi-anthracite**
- C. Sub-bituminous
- D. Bituminous

Pick out the wrong statement?

- A. The values of $(\partial P/\partial V)_T$ and $(\partial^2 P/\partial V^2)_T$ are zero for a real gas at its critical point
- B. Heat transferred is equal to the change in the enthalpy of the system, for a constant pressure, non-flow, mechanically reversible process
- C. Thermal efficiency of a Carnot engine depends upon the properties of the working fluid besides the source & sink temperatures**
- D. During a reversible adiabatic process, the entropy of a substance remains constant

Absorption accompanied by heat evolution results in _____?

- A. Increased capacity of the absorber
- B. Increase in equilibrium solubility
- C. Decrease in equilibrium solubility**
- D. None of these

The swift cup test evaluates the following property of a sheet metal ?

- A. Stretchability
- B. Drawability**
- C. Bendability
- D. None of these

The ratio of average fluid velocity to the maximum velocity in case of laminar flow of a Newtonian fluid in a circular pipe is _____?

- A. 0.5**
- B. 1
- C. 2
- D. 0.66

The number of neutrons in the nucleus of Uranium-233 (${}_{92}\text{U}233$) is _____?

- A. 141**
- B. 92
- C. 233
- D. 325

The equation, $NA = (DAB \cdot Pt / RTZ) (y_1 - y_2)$ is for _____?

- A. Steady state equimolar counter diffusion**
- B. Fick's first law of diffusion
- C. Steady state diffusion for stagnant case
- D. Liquid M.T.C. by penetration theory

In a multipass shell and tube heat exchanger, the baffles on shell side is primarily provided for _____?

- A. Reducing scale deposition
- B. Increasing pressure drop
- C. Fixing the tubes
- D. Creating turbulence**

In case of brasses, with decreasing zinc percentage and increasing copper percentage, its _____ increases ?

- A. Percentage elongation**
- B. Brinell hardness
- C. Tensile strength
- D. All A, B & C

For _____ Prandtl number values, the heat conduction will be negligible in the buffer zone?

- A. Extremely low
- B. Low
- C. High**
- D. No

Arrange the following size reduction equipment in the decreasing order of the average particle size produced by each of them ?

- A. Jaw crusher, Ball mill, Fluid energy mill**
- B. Ball mill, Jaw crusher, Fluid energy mill
- C. Fluid energy mill, Jaw crusher, Ball mill
- D. Fluid energy mill, Ball mill, Jaw crusher

Which has the lowest Prandtl number ?

- A. Liquid metal**
- B. Aqueous solution
- C. Water

D. Lube oil

Which of the following metals is not used for coating of the base metal to guard it against corrosion ?

- A. Lead
- B. Cadmium
- C. Magnesium**
- D. Aluminium

When does the heat generated by fluid friction become appreciable compared to the heat transferred between the fluids ?

- A. At high fluid velocity**
- B. At low velocity
- C. When fluid flows past a smooth surface
- D. None of these

_____ diffusion is used for separating the isotopes of methane ?

- A. Thermal**
- B. Pressure
- C. Concentration
- D. Force

Hydrogen content in petroleum products varies from 12 to 15% (by weight). As a result the difference between gross and net heating value of petroleum fuels varies in the range of _____ kcal/kg?

- A. 600-750**
- B. 250-350
- C. 1000-1500
- D. 2000-2500

On a P-V diagram of an ideal gas, suppose a reversible adiabatic line intersects a reversible isothermal line at point A. Then at point A, the slope of the

reversible adiabatic line $(\partial P/\partial V)_S$ and the slope of the reversible isothermal line $(\partial P/\partial V)_T$ are related as (where, $\gamma = C_p/C_v$) ?

- A. $(\partial P/\partial V)_S = (\partial P/\partial V)_T$
- B. $(\partial P/\partial V)_S = [(\partial P/\partial V)_T]^\gamma$
- C. $(\partial P/\partial V)_S = \gamma(\partial P/\partial V)_T$**
- D. $(\partial P/\partial V)_S = 1/\gamma(\partial P/\partial V)_T$

CO & H₂ are the constituents of _____ ?

- A. Producer gas
- B. Water gas
- C. Coke oven gas
- D. All A., B. and C.**

Which of the following is a detergent ?

- A. Benzene hexachloride
- B. Alkyl benzene sulphonate**
- C. Polytetrafluoroethylene
- D. Cellulose nitrate

The percentage humidity is less than the relative humidity only at _____ percent humidity?

- A. Zero
- B. Hundred
- C. Both zero and hundred**
- D. None of these

In a packed tower, the value of HETP equals HTUOG, when the equilibrium and the operating lines are (where, HETP = height equivalent to a theoretical plate HTUOG = overall gas phase height of a transfer unit) ?

- A. Straight
- B. Parallel
- C. Both A. & B.**

D. Neither A. nor B.

Fermentator temperature during production of alcohol from molasses is around _____ °C?

- A. 5
- B. 30**
- C. 130
- D. 300

Velocity at a certain point in case of streamline flow is _____?

- A. Constant
- B. Independent of time
- C. Both A. & B.**
- D. Neither A. nor B.

True boiling point apparatus is used for the _____?

- A. Determination of characterisation factor
- B. Evaluation of oil stocks
- C. Determination of true vapour pressure
- D. None of these**

One dimensional fluid flow implies the _____?

- A. Flow in straight lines only
- B. Uniform flow
- C. Steady uniform flow
- D. Flow in which transverse components are zero**

Working principle of disappearing filament type optical pyrometer is based on the _____?

- A. Wien's law**
- B. Seebeck effect
- C. Kirchoff's law
- D. Peltier effect

In case of heat flow by conduction for a cylindrical body with an internal heat source, the nature of temperature distribution is _____?

- A. Linear
- B. Hyperbolic
- C. Parabolic**
- D. None of these

Nitrogen gas constant volume thermometer is suitable for measuring a temperature of _____ °C?

- A. 0-100
- B. < 0
- C. > 100**
- D. > 50

In case of an ideal solution, the total vapor pressure varies _____ with the composition expressed as mole fraction?

- A. Inversely
- B. Linearly**
- C. Exponentially
- D. None of these

Heat in BTU necessary to increase the temperature of 1 lb of gas and its accompanying vapour by 1°F is called the _____?

- A. Latent heat
- B. Humid heat
- C. Specific heat**
- D. Sensible heat

Conversion of silica mineral to Cristobalite is accompanied by reduction in its _____?

- A. Volume

B. Specific gravity

- C. Both A. & B.
- D. Neither A. nor B.

Tempering of steel is done to make it _____?

- A. Brittle
- B. Hard
- C. Rollable
- D. Soft**

In case of a Rotameter, the density of the float material is _____ that of the liquid it replaces?

- A. More than**
- B. Less than
- C. Equal to
- D. Either A. or B.

The term analogous to the electrical current in a thermal system is the _____?

- A. Temperature difference
- B. Heat flow rate**
- C. Heat content in the system
- D. None of these

Pressure drop in a packed bed for laminar flow is given by the _____ equation?

- A. Kozeny-Carman**
- B. Blake-Plummer
- C. Leva's
- D. Fanning friction factor

What is the normal range of exit cone angle of a Venturimeter ?

- A. 2 to 5

B. 7 to 15

C. 15 to 25

D. >25

Size reduction of moulding powders, waxes, resins & gums are done in a _____ mill?

A. Cage

B. Hammer

C. Both A. & B.

D. Neither A. nor B.

Desirable "Micum Index" values of metallurgical coke are _____?

A. M40 > 78% and M10 < 10%

B. M40 > 4% and M10 10% and M10 98% and M10 < 2%

A coal with high _____ content, would ignite most easily?

A. Fixed carbon

B. Volatile matter

C. Ash

D. Oxygen

Hot extrusion of aluminium is done in the temperature range of _____ °C?

A. 550-600

B. 450-500

C. 350-400

D. 250-300

Mercaptans are added to liquefied petroleum gas (LPG) to _____?

A. Reduce its cost

- B. Narrow down its explosion limit
- C. Assist in checking its leakage from cylinder**
- D. Increase its calorific value

Commercial production of calcium carbide requires limestone and _____ as raw materials?

- A. Coke
- B. Sand**
- C. Soda ash
- D. Fuel oil

The Graetz number is concerned with the _____

- A. Mass transfer between a gas and a liquid
- B. Absorption with chemical reaction
- C. Heat transfer in turbulent flow
- D. Heat transfer in laminar flow**

Which of the following is not a variable area flow meter ?

- A. Piston type meter
- B. Rotameter
- C. Magnetic flow meter**
- D. Orifice and tapered plug meter

In step growth polymerisation, generally only one type of reaction & some basic mechanism is involved. Step growth polymerisation reaction is not involved in the manufacture of _____?

- A. Cross linked polystyrene**
- B. Phenol formaldehyde resins
- C. Polyesters
- D. Polyamides

Fish contains about _____ percent oil ?

- A. 5

- B. 10
- C. 20**
- D. 35

Sewage sludge is an example of the _____ fluid?

- A. Bingham plastic**
- B. Newtonian
- C. Pseudo plastic
- D. Dilatent

Hot working of lead is carried out at _____?

- A. 75°C
- B. 373°K**
- C. 150°C
- D. Room temperature

Hoop (circumferential) stress induced in a thin walled 'Horton Sphere' used for the storage of liquid ammonia under pressure is _____?

- A. $pD/2T$**
- B. $pD/4T$
- C. $pD/3T$
- D. $pD/6T$

The range of electromagnetic spectrum important in heat transfer by radiation is _____ microns?

- A. 0.38-0.78
- B. 0.5-50**
- C. 100-1000
- D. 5-50

Channelling in a packed tower results from the _____?

- A. High pressure drop
- B. Maldistribution of liquid

C. Non-uniformity of packing

D. Both B. and C.

Equilibrium moisture of a solid is equal to the total moisture minus free moisture. Which of the following substances will have maximum equilibrium moisture ?

A. Anthracite coal

B. Rag paper

C. Bamboo

D. Inorganic solids

The speed of sound in an ideal gas varies as the _____?

A. Temperature

B. Pressure

C. Density

D. None of these

In Orsat's apparatus, ammoniacal cuprous chloride is used for selectivity absorbing _____?

A. CO

B. CO₂

C. O₂

D. H₂O

A suitable material of construction to use with fuming sulphuric acid is _____?

A. Carbon steel

B. Stainless steel type 304

C. Nickel

D. Monel

Which of the following crushing laws is most accurately applicable to the fine

grinding of materials ?

- A. Bond's crushing law
- B. Kick's law
- C. Rittinger's law**
- D. None of these

Tubes are held between top and bottom tube sheets in Calandria type evaporator by keeping_____?

- A. Both the tube sheets fixed**
- B. Both the tube sheets floating
- C. The top tube sheet floating and bottom tube sheet fixed
- D. The top tube sheet fixed and the bottom tube-sheet floating

Fireclay bricks are not used in the_____?

- A. Blast furnace
- B. Hot blast stove
- C. Cupola
- D. Wall of coke oven**

Plasticisers are added to paints to_____?

- A. Make it corrosion resistant
- B. Make glossy surface
- C. Give elasticity & prevent cracking of the film**
- D. Increase atmospheric oxidation

Pick out the wrong statement ?

- A. Seam welding, projection welding & spot welding are the classification of electrical resistance welding
- B. Electrode tip in spot welding is of copper and the tip diameter should be equal to t (where, t = plate thickness to be welded)
- C. In spot welding, two pieces to be joined are overlapped and placed between two

electrodes

D. Mild steel sheet cannot be spot welded

_____ glass is used in the mercury in glass thermometer meant for measuring a temperature of 500°C ?

- A. Borosilicate
- B. High silica
- C. Supermax**
- D. Lead

The crystallisation of a solute from a solution may be done by _____ ?

- A. Removal of pure solvent by evaporation
- B. Change of temperature thereby causing super-saturation
- C. Changing the nature of the system by the addition of a more soluble material
- D. All A., B. & C.**

The Prandtl Pitot tube measures the _____ ?

- A. Velocity at a point in the flow**
- B. Pressure at a point
- C. Average flow velocity
- D. Pressure difference in pipe flow

Lignite is _____ ?

- A. A high rank coal
- B. A coking coal
- C. Can be used for gasification and steam generation**
- D. A black banded coal which burns with a non-smoky yellowish flame

The main product of high temperature carbonisation of coal is _____ ?

- A. Coke**
- B. Ammonia

- C. Tar
- D. Coke oven gas

For measuring the temperature of a red hot furnace, which is the most suitable instrument ?

- A. Platinum resistance thermometer
- B. Thermocouple
- C. Optical pyrometer**
- D. Bimetallic thermometer

Blast furnace coke is made from coal by _____ ?

- A. Low temperature carbonisation
- B. High temperature carbonisation**
- C. Medium temperature carbonisation
- D. Heating the coal in an oven in presence of air

The optimum size of the ammonia plant is _____ tons/day?

- A. 10
- B. 100
- C. 1000**
- D. 1000

Two piping system are said to be equivalent, when the _____ are same?

- A. Fluid flow rate & friction loss**
- B. Length & friction factor
- C. Diameter & friction factor
- D. Length & diameter

Carbon percentage is the same in cast iron and _____ ?

- A. Wrought iron
- B. Pig iron**
- C. Mild steel

D. High silicon (14%) iron

Sand used to stop the green sand from sticking to the pattern is termed as the _____ sand?

- A. Parting
- B. Synthetic
- C. Loam
- D. Dry

Higher viscosity index of a lubricating oil denotes _____?

- A. Less changes in fluidity of oil with temperature
- B. Substantially high change in fluidity of oil with temperature
- C. Its unsuitability under varying temperature conditions
- D. None of these

High endurance limit of carburised machine parts is because of the fact that carburisation _____?

- A. Suppresses any stress concentration produced in the parts
- B. Enhances the yield point of the material
- C. Introduces a compressive layer on the surface
- D. Produces a better surface finish

Carborundum used for making crucibles for melting non-ferrous metals is chemically _____?

- A. Silicon carbide
- B. Silicon nitride
- C. Crystalline magnesia
- D. Zirconium sulphate

M10 index of coke indicates its _____?

- A. Compressive strength
- B. Hardness
- C. Abrasion resistance

D. Impact strength

COD of raw municipal sewage may be in the range of about _____ mg/litre?

- A. 1-2
- B. 5-10
- C. 90-120**
- D. 1500-2500

Pirani gauge is used for the measurement of _____?

- A. Very high pressure
- B. High vacuum**
- C. Liquid level under pressure
- D. Liquid level at atmospheric pressure

Explosion limit of blast furnace gas is 37 to 71% gas in gas-air mixture. It means that the blast furnace gas will explode when burnt in a confined space, if its concentration in the gas-air mixture is _____ percent?

- A. 71%
- C. In between 37 & 71%**
- D. None of these

Introduction of slurry in a plate and frame filter press is done through a plate in each frame. The plate of this filter has a _____ surface?

- A. Plane
- B. Curved
- C. Ribbed**
- D. Either A. or B.

Condensation of a vapour-gas mixture just begins, when (where, p = partial pressure of the vapour P = vapour pressure of the liquid) ?

- A. $p = P$**

- B. $p \gg P$
- C. $p < P$
- D. $p \ll P$

Which of the following is not a common refrigerant ?

- A. Freon-12
- B. Ethylene**
- C. Ammonia
- D. Carbon dioxide

Primary purpose of a _____ nuclear reactor is to supply a high neutron flux of the order of 10^{13} to 10^{14} neutrons/cm² second?

- A. Research**
- B. Power
- C. Breeder
- D. Homogeneous

Which of the following has the highest theoretical flame temperature ?

- A. Blast furnace gas
- B. Hydrogen
- C. Acetylene**
- D. Coke oven gas

Refractory bricks with lower permeability is produced by using _____?

- A. Higher firing temperature
- B. Higher moulding pressure
- C. Finer grog size
- D. All A., B. and C.**

A solid is transformed into vapour without going to the liquid phase at _____?

- A. Triple point**

- B. Boiling point
- C. Below triple point
- D. Always

Pick out the wrong statement ?

A. Heat transfer by radiation cannot occur across an absolute volume

- B. In case of a shell and tube heat exchanger, the pressure drop through the shell is proportional to the number of times the fluid crosses the bundle between baffles
- C. Propagation velocity for travel of heat radiation through vacuum is equal to the velocity of the light
- D. The amount of heat involved in the condensation or vaporisation of 1 kg of a fluid is the same

A petroleum well is called 'dry', if it contains _____?

- A. Very little oil
- B. No natural gas
- C. Only natural gas**
- D. All A., B. and C.

Hydrogen ion concentration in distilled water is _____?

- A. 10^{-7}**
- B. 7×10^{-7}
- C. 107
- D. 7×10^7

Optimum preheating temperature for pitch creosote mixture (PCM) which is also termed as C.T.F-200, before atomisation through burners

is _____?

- A. 200 °F**
- B. 200 °C
- C. 200 °K
- D. 200 °R

Alcohol is dehydrated using _____ distillation?

- A. Extractive
- B. Azeotropic**
- C. Steam
- D. Molecular

When the coal is heated in absence of air, it is called its _____?

- A. Deoxidation
- B. Gasification
- C. Coalification
- D. Carbonisation**

Two solutions A1 & A2 have pH value of 2 & 6 respectively. It implies that the solution ?

- A. A1 is more alkaline than solution A2
- B. A1 is highly acidic
- C. A2 is very slightly acidic
- D. Both B. & C.**

In Bode plot, A.R. vs. ω is plotted on a/an _____ graph paper?

- A. Log-lag**
- B. Triangular
- C. Ordinary
- D. Semi-log

In autocatalytic reactions ?

- A. One of the reactants acts as a catalyst
- B. One of the products acts as a catalyst**
- C. Catalysts have very high selectivity
- D. No catalyst is used

The co-efficient of performance (COP) of a refrigerating system, which is its index of performance, is defined as the ratio of useful refrigeration to the net

work. The units of _____ and COP are the same?

- A. Kinematic viscosity
- B. Work
- C. Temperature
- D. None of these**

For turbine agitator, the impeller diameter is about _____?

- A. 0.3 to 0.5 d**
- B. 0.1 to 0.2 d
- C. 0.65 to 0.85 d
- D. 0.95 d

In a mixture of benzene vapor and nitrogen gas at a total pressure of 900 mm Hg, if the absolute humidity of benzene is 0.2 kg benzene/kg nitrogen, the partial pressure of benzene in mm Hg is _____?

- A. 180
- B. 60.3**
- C. 720
- D. 200

An example of a periodic furnace is the _____?

- A. Blast furnace stoves**
- B. Blast furnace
- C. Coke oven heating chamber
- D. Rotary kilns

The equation, $(d \log_e P_A / d \log_e x_A) = (d \log_e P_A / d \log_e x_B)$ applicable to a binary solution of components. A and B in equilibrium with their vapors at constant temperature and pressure is called the _____ equation?

- A. Van Laar
- B. Margules
- C. Gibbs-Duhem

D. Gibbs-Duhem-Margules

Maximum permissible limit of industrial noise as recommended by World Health Organisation (WHO) is _____ decibels?

- A. 35
- B. 75**
- C. 95
- D. 105

Cd is always _____ Cc?

- A. Greater than**
- B. Less than
- C. Equal to
- D. Either more or less than

Cox chart, which is useful in the design of distillation column particularly for petroleum hydrocarbons, is a plot of (where, P = vapor pressure, T = temperature) ?

- A. log P vs. T**
- B. log P vs. log T
- C. T vs. P
- D. P vs. log T

In a single tank system, the transfer function of level to inlet flow rate is _____?

- A. R/TS
- B. $R/(TS + 1)$**
- C. $1/TS$
- D. None of these

Pick out the wrong statement?

- A. A particular chemical reaction is more temperature sensitive at low temperatures

B. A very high value of equilibrium constant, K ($K \gg 1$) indicates that the reaction is practically irreversible in nature

C. The intercept of the Arrhenius plot is called the 'activation energy'

D. Non-ideal flow takes place in reactors due to recycling, channeling or by creation of stagnant regions

In order to be called steel, an alloy should have iron percentage greater than _____?

- A. 80
- B. 70
- C. 90
- D. 50

Stabilisation of gasoline (petrol) means _____?

- A. Removal of dissolved gases from it**
- B. Increasing its oxidation stability
- C. Improving its lead susceptibility
- D. Increasing its vapour pressure

Equilibrium-moisture curves of different solids _____?

- A. Are different**
- B. Are same
- C. Depend on the humidity of the gas
- D. None of these

Litharge is _____?

- A. Lead oxide**
- B. Zinc oxide
- C. Zinc sulphide
- D. Cellulosic photographic material

_____ chart is known as transient heat conduction chart?

- A. Dirhing's**
- B. Heisler's
- C. Mollier's
- D. Cox

Nylon-6 is manufactured from _____ ?

- A. Caprolactam**
- B. Hexamethylene diamine and adipic acid
- C. Hexamethylene diamine and Maleic anhydride
- D. Hexamethylene diamine and Sebacic acid

Check valve is used for _____ flow?

- A. Very precise control of
- B. Unidirectional**
- C. Multidirectional
- D. None of these

The conversion of caprolactam in the above case is about _____ percent?

- A. 25
- B. 50
- C. 70
- D. 90**

Which of the following fractions of a crude oil will have the maximum gravity API (i.e. °API) ?

- A. Diesel
- B. Gasoline
- C. Atmospheric gas oil**
- D. Vacuum gas oil

In case of _____ reactions, the reaction rate does not decrease

appreciably as the reaction proceeds?

- A. Catalytic
- B. Parallel
- C. Series
- D. Auto catalytic**

In a size reduction crushing operation, the feed size is 10 to 50 mm, while the product size is 2 to 10 mm. This is a case of _____ crushing?

- A. Primary
- B. Secondary
- C. Fine**
- D. Ultrafine

Flights in a rotary dryer are provided to _____?

- A. Lift and shower the solids thus exposing it thoroughly to the drying action of the gas**
- B. Reduce the residence time of solid
- C. Increase the residence time of the solid
- D. None of these

The quantitative effect of temperature on chemical equilibrium is given by the _____?

- A. Van't-Hoff equation**
- B. Le-Chatelier's principle
- C. Arrhenius equation
- D. None of these

Lead alone is not used in storing equipment, because it _____?

- A. Is very costly
- B. Corrodes easily
- C. Is having low creep strength**
- D. None of these

Polythene is a/an _____?

- A. Addition polymerisation product**
- B. Condensation polymerisation product
- C. Thermosetting material
- D. None of these

For nearly isothermal operation involving large reaction time in a liquid-phase reaction, the most suitable reactor is a _____ reactor?

- A. Stirred tank**
- B. Tubular flow
- C. Batch
- D. Fixed bed

In the manufacture of H_2SO_4 , vanadium catalyst as compared to platinum catalyst _____?

- A. Gives higher conversion efficiency
- B. Has a longer life and is not poisoned by arsenic
- C. Handles lower SO_2 content gas (7 -10% SO_2), thus increasing the capital cost of the plant
- D. All A , B. and C.**

Which of the following temperature measuring instruments need not touch the object whose temperature is being measured ?

- A. Radiation/infrared pyrometer**
- B. Filled system thermometer
- C. Mercury in glass thermometer
- D. Thermo electric pyrometer

Fermentation of molasses to produce ethyl alcohol is done at _____ °C?

- A. 20 – 30**
- B. < – 5
- C. 100 – 150
- D. 250 – 300

The following gas phase reaction is taking place in a plug flow reactor. A stoichiometric mixture of A and B at 300 K is fed to the reactor. At 1 m along the length of the reactor, the temperature is 360 K. The pressure drop is negligible and an ideal gas behaviour can be assumed. Identify the correct expression relating the concentration of A at the inlet (CA_0), concentration of A at 1m (CA) and the corresponding conversion of A (X) ?

- A. $CA = 1.2 CA_0 (1 - X)/(1 - 0.33X)$
- B. $CA = 1.2 CA_0 (1 - X)/(1 - 0.5X)$
- C. $CA = 0.83 CA_0 (1 - X)/(1 - 0.33X)$**
- D. $CA = 0.83 CA_0 (1 - X)/(1 - 0.5X)$

Surface renewal model of mass transfer was enunciated by _____ ?

- A. Toor and Marcello
- B. Fick
- C. Danckwerts**
- D. Stefan

Nitrogenous fertiliser is required _____ ?

- A. During the early stage of growth to promote development of stem and leaves**
- B. For accelerating fruit formation in later stage of growth
- C. To lessen the effect of excessive potash application
- D. None of these

Pascal's law is valid, only when the fluid is _____ ?

- A. Frictionless and at rest
- B. At rest**
- C. At rest and when the frictionless fluid is in motion
- D. None of these

Cupola produces _____ iron?

- A. Pig

B. Cast

C. Wrought

D. Carbon free

Spray test determines the _____ of refractories?

A. Resistance to slag penetration

B. Resistance to CO attack

C. RUL

D. Permanent linear change

Which of the following types of polymers has the strongest inter particle forces ?

A. Elastomers

B. Fibres

C. Thermoplastics

D. Thermosetting polymers

For pipe flows, head is proportional to _____ at constant capacity (where D = pipe diameter) ?

A. 1/D

B. 1/D²

C. 1/D⁵

D. D²

Pick out the wrong conversion of absolute & kinematic viscosities ?

A. 1 stoke = 1 cm²/sec

B. 1 N.sec/m² = 10 paise

C. 1 stoke = 1 m²/sec

D. 1 m²/sec = 10⁴ stokes

The transfer function for a PID controller is (where, η_i is the integral (reset) time and η_D is the derivative time.) ?

A. $K_c(1 + \eta_i s + \eta_D s^{-1})$

B. $K_c[1 + (1/\eta_{is}) + \eta_D \cdot s]$

C. $K_c(1 + \eta_{is} + (1/\eta_D) \cdot s)$

D. None of these

Coking time in beehive coke oven is about _____?

A. 12 hours

B. 2-3 days

C. One week

D. Two weeks

Producer gas containing least amount of tar is produced by the _____?

A. Partial combustion of coal

B. Partial combustion of large size (< 50 mm) coke

C. High pressure gasification of coal (e.g. in Lurgi gasifier)

D. Atmospheric pressure gasification of coal (e.g., in Kopper-Totzek gasifier)

During nitric acid manufacture, catalytic oxidation of ammonia at 800°C in presence of platinum catalyst produces nitrogen oxide. Conversion of NH_3 to NO is about _____ percent?

A. 38

B. 68

C. 82

D. 98

Sulphur removal by heating of pyrite ore in presence of air is called its _____?

A. Reduction

B. Roasting

C. Calcination

D. Smelting

In solid catalysed reactions the diffusional effects are more likely to affect the overall rate of reaction for _____?

- A. Fast reactions in catalyst of small pore diameter
- B. Fast reaction in catalyst of large pore diameter
- C. Slow reactions in catalyst of small pore diameter**
- D. Slow reactions in catalyst of large pore diameter

Steady fluid flow occurs, when the derivative of flow variables satisfy the following condition.

- A. $\partial/\partial s = 0$
- B. $\partial/\partial t = 0$**
- C. $\partial/\partial s = \text{constant}$
- D. $\partial/\partial t = \text{constant}$

Moh's scale of hardness, which consists of 10 standard minerals is used for the measurement of _____ hardness?

- A. Scratch**
- B. Indentation
- C. Dynamic
- D. Rebound

Impurities present in brine is normally removed by treatment with ?

- A. NH_3 and CO_2
- B. Lime and soda ash
- C. Lime, ammonia and carbon
- D. All A , B. and C.**

Potential flow is the flow of _____?

- A. Compressible fluids with shear
- B. Compressible fluids with no shear
- C. Incompressible fluids with shear
- D. Incompressible fluids with no shear**

Viscosity of water at 40°C lies in the range of _____?

- A. 1×10^{-3} to 2×10^{-3} kg/m.s
- B. 0.5×10^{-3} to 1×10^{-3} kg/m.s**
- C. 1 to 2 kg/m.s
- D. 0.5 to 1 kg/m.s

For a given ambient air temperature with increase in the thickness of insulation of a hot cylindrical pipe, the rate of heat loss from the surface would ?

- A. Decrease
- B. Increase
- C. First decrease and then increase
- D. First increase and then decrease**

The function of neutral flux used in the pyrometallurgy of metal extraction is to increase the _____ of the slag ?

- A. Fluidity**
- B. Basicity
- C. Acidity
- D. Viscosity

The capacity of a spring to store energy is called the spring form co-efficient.

Stiffness of a spring is measured by the _____?

- A. Ability to absorb shock
- B. Capacity to store energy
- C. Ratio of the wire & coil diameters
- D. Load to produce unit deflection**

A gas at 0°C was subjected to constant pressure cooling until its volume became half the original volume. The temperature of the gas at this stage will be _____?

- A. 0°C
- B. 0°K

C. -136.5°C

D. -136.5°K

Manganese in steel affects its _____?

A. Ductility

B. Tensile strength

C. Hardness

D. None of these

Which of the following is not a colligative property ?

A. Osmotic pressure

B. Depression of freezing point

C. Lowering of vapor pressure

D. None of these

Use of preheated air for combustion of fuel in the furnace, increases the _____?

A. Scale losses of the furnace stock

B. Calorific value of the fuel

C. Flame temperature

D. None of these

When the psychometric ratio is _____ then the adiabatic saturation temperature and wet bulb temperature becomes equal?

A. 1

B. 1

D. ∞

Which of the following exemplifies an adiabatic process ?

A. Melting of ice

B. Condensation of alcohol vapor

C. Sudden bursting of a cycle tube

D. Evaporation of water

'N' plug flow reactors in series with a total volume 'V' gives the same conversion as a single plug flow reactor of volume 'V' for _____ order reactions?

- A. First
- B. Second
- C. Third
- D. Any**

When the head pumped against is less than the head of the fluid used for pumping, the usual device is a/an _____?

- A. Ejector
- B. Blower
- C. Injector
- D. Airlift**

The velocity profile for a Bingham plastic fluid flowing (under laminar conditions) in a pipe is _____?

- A. Parabolic
- B. Flat
- C. Flat near the wall and parabolic in the middle
- D. Parabolic near the wall and flat in the middle**

Pick out the wrong statement?

- A. Pure rubber is as useless as pure gold as a material of construction
- B. Thermal conductivity of aluminium is higher than that of copper; hence it is increasingly used for utensil making**
- C. Copper has poor weldability
- D. Reinforced plastics are made from both thermoplastic as well as thermosetting plastics

Massecuite is _____?

- A. Used for paper making

- B. Used as a cattle feed
- C. Highly acidic in nature
- D. None of these**

Flue gas discharge velocity through chimney of a big thermal power plant may be around _____ m/sec?

- A. 0.5
- B. 10**
- C. 50
- D. 500

Pick out the correct statement pertaining to Venturimeter ?

- A. A Venturimeter with a fixed pressure drop discharges more, when the flow is vertically downward, than when the flow is vertically upward
- B. The co-efficient of contraction of a Venturimeter is always unity
- C. For a fixed pressure drop, the discharge of a gas through a Venturimeter is greater, when compressibility is taken into account, than when it is neglected
- D. None of these**

Pick out the wrong statement?

- A. The form drag is dependent upon the occurrence of a wake
- B. The shear stress at any given cross-section of a pipe for steady flow (either laminar or turbulent) varies linearly as the radial distance
- C. An ideal fluid is the one, which has negligible surface tension and obeys the Newton's law of viscosity**
- D. Existence of the boundary layer in fluid flow is because of viscosity of the fluid.

Wet chlorine gas produced during electrolysis of brine is dehydrated by _____?

- A. Spraying 66° Be H₂SO₄ counter current to the flow of the gas**
- B. Passing it through a bed of diatomaceous earth
- C. Passing it through a bed of silica gel
- D. None of these

Prandtl and Reynolds analogy are same, when Prandtl number is _____?

- A. 0.5
- B. 1**
- C. > 2
- D. 1.5

A chemical reaction, $A \rightarrow 3B$, is conducted in a constant pressure vessel. Starting with pure A, the volume of the reaction mixture increases 3 times in 6 minutes. The fractional conversion is _____?

- A. 0.33
- B. 0.5
- C. 1**
- D. Data insufficient, can't be predicted

Thermal wells used in temperature measurements should have _____?

- A. Very thick walls
- B. Low emissivity
- C. Polished surface
- D. High transmissivity of radiation**

Which of the following is the most suitable abrasive for grinding high tensile strength materials ?

- A. Silicon carbide
- B. Corundum
- C. Aluminium oxide**
- D. Boron carbide

Specific gravity on API scale is given by the relation (where, G = specific gravity at 15.5°C) ?

- A. $^{\circ}\text{API} = 200(\text{G} - 1)$
- B. $^{\circ}\text{API} = (141.5/\text{G}) - 131.5$**
- C. $^{\circ}\text{API} = (140/\text{G}) - 130$
- D. $^{\circ}\text{API} = 145 - (145/\text{G})$

Which of the following solvents is used for the extraction of H_3PO_4 from CaCl_2 solution during manufacture of ortho-phosphoric acid by wet process employing hydrochloric acid leaching ?

- A. Isopropyl alcohol
- B. Butyl alcohol**
- C. Toluene
- D. Hexane

For a given substance at a specified temperature, activity is _____ to fugacity?

- A. Directly proportional**
- B. Inversely proportional
- C. Equal
- D. None of these

Critical speed of rotation, N (in rps – rotation per second) of a trammel is equal to (where, g = acceleration due to gravity = 9.81 m/sec^2 and, r = radius of trammel, metre.) ?

- A. $(1/2\pi) \cdot \sqrt{g/r}$**
- B. $(1/\pi) \cdot \sqrt{g/r}$
- C. $\frac{1}{2} \sqrt{g/r}$
- D. $2\pi \cdot \sqrt{g/r}$

BOD of raw municipal sewage may be in the range of about _____ mg/litre?

- A. 1-2
- B. 5-10**

C. 150-300

D. 2000-3000

Water entrained by circulating air in cooling towers is termed as _____?

A. Drift

B. Blow down

C. Vapor load

D. None of these

A long iron rod initially at a temperature of 20°C has one end dipped in boiling water (100°C) at time, $t = 0$. The curved surface of the rod is insulated so that heat conduction is one dimensional in the axial direction. The temperature at a distance 100 mm from the dipped end becomes 40°C at time, $t = 200$ s. The same temperature is achieved at a distance of 200 mm from the dipped end at time _____?

A. $t = 283$ s

B. $t = 356$ s

C. $t = 400$ s

D. $t = 800$ s

Nominal size of the discharge pipe of a pump is usually _____ the nominal size of the inlet pipe?

A. Smaller than

B. Larger than

C. Same as

D. Twice

Titanium dioxide is a/an _____ colour pigment?

A. White

B. Black

C. Yellow

D. Blue

Pressure drop due to pipe fittings can be estimated by the equation, $\Delta P/\rho = 4f, (L_e/D) (V^2/2g_c)$ where, L_e = equivalent length of straight pipeline which will incur the same frictional loss as the fitting and D = diameter of the fitting. The value of (L_e/D) (dimensionless) for 45° elbow and 180° close return bends would be respectively around _____?

A. 5 and 10

B. 45 and 75

C. 180 and 300

D. 300 and 500

_____ is an example of distributed parameter system ?

A. Tubular reactor

B. CSTR

C. On-off controller

D. None of these

Cast iron is having very high _____?

A. Proximity between its elastic limit and ultimate breaking strength

B. Ductility

C. Tensile strength

D. All A., B. and C.

The ratio of inertial forces to elastic forces is called the _____ number?

A. Reynolds

B. Mach

C. Euler

D. Weber

Aromatics are desired constituents of _____?

A. Lubricating oil

- B. Diesel
- C. Kerosene
- D. Petrol**

Which is the heaviest fuel gas out of the following ?

- A. Blast furnace gas**
- B. Coke oven gas
- C. Water gas
- D. Carburetted water gas

H₂SO₄ (< 50% concentration) is corrosive to _____?

- A. Aluminium, mild steel, stainless steel, concrete & tin**
- B. Copper, cast iron & high silicon iron (14% Si)
- C. Rubber (butyl and hard), silicone rubber & Teflon
- D. Glass, graphite, porcelain & stoneware

Main component of sewage gas produced during anaerobic decomposition of organic waste (by suitable bacteria) during sewage disposal is

_____?

- A. H₂
- B. CH₄**
- C. CO₂
- D. N₂

In case of a hammer crusher, the final product size depends on the _____?

- A. Feed rate
- B. Rotor speed
- C. Clearance between hammer & grinding plates
- D. All A., B. and C.**

The amount of heat required to decompose a compound into its elements is

_____ the heat of formation of that compound from its elements?

- A. Less than
- B. More than
- C. Same as**
- D. Not related to

Relative volatility varies with the concentration of component for an ideal solution. The relative volatility of a binary mixture may be defined as the ratio of vapor pressure of component 'A' to that of component 'B', when _____?

- A. Only vapor phase follows Raoult's law
- B. Only liquid phase obeys Dalton's law
- C. Liquid phase obeys Dalton's law and vapor phase obeys Raoult's law
- D. Vapor phase obeys Dalton's law and liquid phase obeys Raoult's law**

The general relationship between speed N , head H , power P and discharge Q for a centrifugal pump is _____?

- A. $Q \propto N$: $H \propto N^2$: $P \propto N^3$**
- B. $Q \propto N^2$: $H \propto N^3$: $P \propto N$
- C. $Q \propto N$: $H \propto N^3$: $P \propto N^2$
- D. $Q \propto N^3$: $H \propto N$: $P \propto N^2$

Fatigue failure of a material results from _____ stress?

- A. Tensile
- B. Compressive
- C. Fluctuating**
- D. None of these

Bond crushing law _____?

- A. Calls for relatively less energy for the smaller product particles, than does the Rittinger law**
- B. Is less realistic in estimating the power requirements of commercial crushers

- C. States that the work required to form particle of any size from very large feed is proportional to the square root of the volume to surface ratio of the product
- D. States that the work required for the crushing is proportional to the new surface created

Net efficiency of ordinary light water cooled nuclear reactor is about _____ percent?

- A. 32
- B. 52
- C. 72
- D. 88

In case of pulverised coal fired steam boiler, the secondary air serves the main purpose of _____?

- A. Transportation of coal
- B. Drying of coal
- C. **Combustion of coal by supplying it around the burner**
- D. Preheating the primary air

200 mesh sieve size corresponds to _____ microns?

- A. 24
- B. **74**
- C. 154
- D. 200

Coke compared to the coal from which it has been made, contains _____?

- A. Less volatile matter
- B. More carbon
- C. Greater percentage of ash
- D. **All A., B. and C.**

A metal wire of 0.01 m dia and thermal conductivity 200 W/m.K is exposed to a

fluid stream with a convective heat transfer coefficient of $100 \text{ W/m}^2\text{K}$. The Biot number is _____?

- A. 5.6
- B. 0.025**
- C. 3.5
- D. 0.0035

Industrial workers working in leather tanning & manufacturing units are prone to suffer from _____?

- A. Respiratory ailments (e.g. bronchitis)
- B. Skin diseases (e.g. dermatitis)**
- C. Silicosis
- D. Blurred vision

Mott and Wheeler test is conducted on coke to find its _____?

- A. Reactivity with O_2**
- B. Abradability
- C. Phosphorus content
- D. Volatile matter content

In pipe flow, heat is transferred from hot wall to the liquid by _____?

- A. Conduction only
- B. Forced convection only
- C. Forced convection and conduction**
- D. Free and forced convection

Which of the following is an extensive property of a system ?

- A. Heat capacity**
- B. Molal heat capacity
- C. Pressure

D. Concentration

Noise emitted by a ventilation fan at a distance of 3 metres is about _____ decibels?

- A. 85
- B. 105**
- C. 125
- D. 145

A certain thickness of the coal, if stored unscientifically on soft (katcha) ground having no metallic/concrete flooring gets sunked into the ground, which is termed as the 'carpet loss'. The carpet loss may be of the order of _____ cms?

- A. 1 to 2
- B. 3 to 4
- C. 5 to 15**
- D. 20 to 40

In a shell and tube heat exchanger, triangular pitch arrangement as compared to square pitch arrangement ?

A. Results in higher shell side pressure drop

B. Can accomodate less number of tubes for a given shell diameter

C. Facilitates easier shell side cleaning; hence is more suitable for handling high dirt factor shell side fluid

D. Creates relatively lower turbulence on the shell side resulting in lower shell side heat transfer co-efficient

Fibre glass is a composite material of _____?

A. Glass fibre in a polymer matrix

B. Glass fibre in a metallic matrix

- C. Polymer fibre in a glassy matrix
- D. Both 'b' & 'c'

Hydrocyanic acid is not shipped in _____?

A. Cast iron vessels

- B. Steel cylinders
- C. Aluminium containers
- D. Monel drums

Silica bricks are attacked by basic slags at high temperature. Which of the following is not used solely as a binding material ?

- A. Aluminium phosphate
- B. Water**
- C. Lime
- D. Plaster of Paris

Alum [$Al_2(SO_4)_3$] is used as a coagulant in water treatment to remove _____?

- A. Colour
- B. Turbidity
- C. Bacteria
- D. All A , B. and C.**

Economy of a multiple effect evaporator is not influenced much by the _____?

A. Boiling point elevations

- B. Temperature of the feed
- C. Rate of heat transfer
- D. Ratio of the weight of the thin liquor to thick liquor

Measurement of thermodynamic property of temperature is facilitated by _____ law of thermodynamics?

- A. 1st
- B. Zeroth**
- C. 3rd
- D. None of these

Volatile matter content in coking coal may be about _____ percent?

- A. 1
- B. 7
- C. 22**
- D. 46

In case of a 'thin' pressure vessel, the ratio of its diameter to wall thickness is _____?

- A. < 10
- B. > 10**
- C. > 20
- D. 30

At a given equilibrium pressure, with increase in temperature, the concentration of adsorbed gas on solid adsorbent _____?

- A. Increases
- B. Decreases**
- C. Remains unchanged
- D. Increases exponentially

For a small scale toy factory, the fixed cost per month is Rs. 5000/-. The variable cost per toy is Rs. 20 and sales price is Rs. 30 per toy. The break even production per month will be _____ toys ?

- A. 250
- B. 500**
- C. 1000
- D. 3000

_____ taxes are based on gross earnings ?

- A. Property
- B. Excise
- C. Income**
- D. Capital gain

Entropy is a/an _____ ?

- A. State function
- B. Macroscopic property
- C. Extensive property
- D. None of these**

One of the methods of purification of leach liquor is ion exchange, which involves _____ ?

- A. Exchange between two liquid phases
- B. Exchange between a gaseous phase and a liquid phase
- C. Exchange between a liquid phase and an organic resin phase**
- D. Exchange between a solid phase and a gas phase

Rate of heat transfer by vaporisation from pools of water is affected by the _____ ?

- A. Nature of heating surface and distribution of bubbles
- B. Surface tension of water
- C. Viscosity of water
- D. All A., B. and C.**

In regenerative air preheater (as practised in heating of coke ovens), the heat is transferred _____ ?

- A. Through a metallic wall
- B. By direct contact of hot flue gas with air
- C. By heating an intermediate material (like chequor bricks) and then heating the air from this hot material**

D. None of these

The coking process normally mostly used in Indian oil refineries is the _____ coking process ?

A. Delayed

B. Flexi

C. Fluid

D. Contact

Which of the following material handling equipments is not suitable for moving materials in varying paths ?

A. Hand trolley

B. Belt conveyor

C. Crane

D. Truck

Which of the following terms of Vander Walls equation of state for a non-ideal gas accounts for intermolecular forces ?

A. RT

B. $P + (a/V^2)$

C. $(V - b)$

D. $1/RT$

In which of the following cases, it is possible for flow to occur from low pressure to high pressure ?

A. Flow of liquid upward in a vertical pipe

B. Flow through a converging section

C. Flow of air downward in a pipe

D. Impossible in a constant cross-section conduit

The maximum CO₂ is emitted into the atmosphere by _____ ?

A. Combustion

- B. Urea
- C. Biomass burning
- D. Trees

Alcohol content in freshly prepared natural and fortified wine may be respectively around _____ percent ?

- A. 7-14 and 14-30**
- B. 7-14 and 40-50
- C. 14 – 30 and 40-50
- D. 10 – 20 and 40 – 50

As the fluid flow rate increases, the float of the Rotameter _____ ?

- A. Rises in the tube**
- B. Rotates at higher speed
- C. Rotates at lower speed
- D. Drops down in the tube

Cold chisel"s hammers are made of _____ ?

- A. High speed steel
- B. High carbon steel**
- C. Forged steel
- D. Mild steel

The fractional volume change between no conversion and complete conversion, for the isothermal gas phase reaction, $2A \rightarrow R$, is _____ ?

- A. 0.5
- B. -0.5**
- C. 1
- D. 1.5

The optimum size ratio for two mixed reactors in series depends on the kinetics

of the reaction and the conversion level. For reaction orders more than one, the _____?

- A. Equal sized reactors are the best
- B. Smaller reactor should come first**
- C. Larger reactor should come first
- D. None of these

A coal containing high amount of volatile matter will have _____?

- A. Low ignition temperature**
- B. Very little ash content
- C. High fusion point of its ash
- D. Low adiabatic flame temperature

Octane number of gasoline is a measure of its _____?

- A. Resistance to knock**
- B. Ignition delay
- C. Ignition temperature
- D. Smoke point

The major use of butadiene is _____?

- A. As a plasticiser for unsaturated polyester
- B. In the manufacture of synthetic rubber**
- C. As an anti-skinning agent in paint
- D. None of these

The energy required per unit mass to grind limestone particles of very large size to $100\ \mu\text{m}$ is $12.7\ \text{kWh/ton}$. An estimate (using Bond's law) of the energy to grind the particles from a very large size to $50\ \mu\text{m}$ is _____?

- A. $6.35\ \text{kWh/ton}$
- B. $9.0\ \text{kWh/ton}$
- C. $18\ \text{kWh/ton}$**

D. 25.4 kWh/ton

Nitriding of a steel part does not increase its _____?

A. Grain size

B. Fatigue limit

C. Surface hardness

D. Wear resistance

Washing of coal _____?

A. Reduces its ash & sulphur content

B. Improves its coking properties

C. Increase the fusion point of its ash by removing chlorine compounds

D. All A., B. and C.

'Flare tower' used in industry is meant for _____?

A. Venting off (after burning) the excess inflammable/toxic gases at high pressure

B. Absorbing the pollutant gases from the furnace exhaust

C. Cooling of furnace exhaust gases

D. None of these

The diffusivity D in a binary gas mixture is related to the pressure (P) as _____?

A. $D \propto P^{0.5}$

B. $D \propto 1/P^{0.5}$

C. $D \propto 1/P$

D. $D \propto 1/P^{1.5}$

200 mesh screen means 200 openings per _____?

A. cm^2

B. cm

C. inch

D. inch^2

Shouting by a man at his full voice corresponds to a voice level of about _____ decibels?

- A. 25
- B. 50
- C. 80**
- D. 120

The expression, $\Delta G = nRT \cdot \ln(P_2/P_1)$, gives the free energy change _____?

- A. With pressure changes at constant temperature**
- B. Under reversible isothermal volume change
- C. During heating of an ideal gas
- D. During cooling of an ideal gas

A pump operating under specific conditions delivers insufficient quantity of liquid. This may be set right by _____?

- A. Decreasing the size of the inlet pipe
- B. Increasing the size of the inlet pipe
- C. Lowering the pump position
- D. Both B. and C.**

The detrimental effect on organism and water quality with temperature rise of aquatic system is the reduction of _____ of water?

- A. Dissolved oxygen content**
- B. Biological oxygen demand
- C. Vapor pressure
- D. All A., B. and C.

Bubble cap tray is the most commonly used tray in large distillation column, because _____?

- A. Of its flexibility and nearly constant efficiency under varying conditions of operation**
- B. It incurs less pressure drop as compared to any other tray designed for the same duty

- C. It eliminates the foaming and entrainment tendency during operation
- D. None of these

In the free convection regime of pool boiling, the heat flux is proportional to _____?

- A. $\Delta t^{1/2}$
- B. Δt^2
- C. $\Delta t^{5/4}$**
- D. Δt

Applying a pressure drop across a capillary results in a volumetric flow rate 'Q' under laminar flow conditions. The flow rate for the same pressure drop, in a capillary of the same length but half the radius is _____?

- A. $Q/2$
- B. $Q/4$
- C. $Q/8$
- D. $Q/16$**

Choose the condition that must be specified in order to liquify CO₂ (triple point for CO₂ is – 57°C and 5.2 atm) ?

- A. Pressure must be kept below 5.2 atm
- B. Temperature must be kept above – 57°C
- C. Pressure must be kept below 5.2 atm. and temperature must be kept above 57°C
- D. Pressure and temperature must be kept below 5.2 atm. and – 57°C respectively**

In laminar flow through a round tube, the discharge varies

_____?

- A. Linearly as the viscosity
- B. Inversely as the pressure drop
- C. Inversely as the viscosity**
- D. As the square of the radius

The head loss in turbulent flow in pipe is proportional to (where, V = velocity of fluid through the pipe) ?

- A. V^2
- B. $1/V^2$
- C. $1/V$
- D. V

Cast iron is a _____ material?

- A. Brittle
- B. Ductile
- C. Tough
- D. Malleable

Platinum catalyst used in the earlier days of sulphuric acid manufacture by contact process suffers from the drawback like _____?

- A. High cost
- B. Fragile nature
- C. Easy poisoning tendency
- D. All A, B. and C.

Gantt charts are used for streamlining the _____?

- A. Inventory control
- B. Production schedule
- C. Sales forecasting
- D. Quality control

Which of the following approaches the ideal gas behavior most closely ?

- A. Wet steam
- B. Saturated steam
- C. Superheated steam
- D. Saturated water

Calgon used in water treatment is chemically _____?

- A. Sodium phosphate
- B. Sodium hexametaphosphate**
- C. Calcium phosphate
- D. Tricresyl phosphate

A fluid (μ/ρ) = 0.01 cm²/sec is moving at critical flow condition (NRe = 2100) through a pipe of dia 3 cms. Velocity of flow is _____ cm/sec?

- A. 7**
- B. 700
- C. 7000
- D. 630

Mild steel has _____ crystal lattice structure?

- A. Face centred cubic (fcc)
- B. Body centred cubic (bcc)**
- C. Orthorhombic
- D. Cubic

Capillary tube method of viscosity measurement is based on the _____?

- A. Hagen-Poiseuille's equation**
- B. Stoke's law
- C. Navier-stokes equation
- D. None of these

During sensible cooling of air, its wet bulb temperature ?

- A. Decreases but dew point remains constant
- B. Increases but dew point remains constant**
- C. Increases & the dew point decreases
- D. Decreases & the dew point increases

Double Contact Double Absorption (DCDA) process is the most recent process for the manufacture of _____?

- A. Nitric acid
- B. Sulphuric acid**
- C. Ammonium sulphate
- D. Hydrochloric acid

On-off control which is a special case of proportional control, has a band width of about _____ percent?

- A. 100
- B. 75
- C. 25
- D. 0**

Which of the following is a secondary air pollutant ?

- A. Photochemical smog**
- B. Sulphur dioxide
- C. Nitrogen dioxide
- D. Dust particles

Combustion of pulverised coal as compared to that of lump coal _____?

- A. Develops a non-luminous flame
- B. Develops a low temperature flame
- C. Can be done with less excess air**
- D. Provides a lower rate of heat release

Vibrations in the tubes of a shell and tube heat exchanger is induced due to the _____?

- A. Flow of fluid on the tube and shell sides
- B. Oscillations in the flow of shell/tube sides fluid
- C. Vibrations transmitted through piping and/or supports due to external reasons
- D. All A., B. and C.**

In the design of a paddle agitator, the ratio (paddle dia/tank dia) is normally

taken as _____?

- A. 0.1
- B. 0.8**
- C. 0.25
- D. 0.5

In physical adsorption, as compared to chemisorption, the _____?

- A. Quantity adsorbed per unit mass is higher**
- B. Rate of adsorption is controlled by the resistance to surface reaction
- C. Activation energy is very high
- D. Heat of adsorption is very large

A sugar solution containing _____ percent sugar is equivalent to 1 Brix?

- A. 0.01
- B. 0.1
- C. 1**
- D. 10

The amount of a radioactive material (having a half life of 100 years) remaining after 400 years will be _____ of its original weight?

- A. 1/2
- B. 1/4
- C. 1/8
- D. 1/16**

The largest stable nucleus is _____?

- A. U-235**
- B. U-238
- C. Pb-206
- D. Bi-209

Which of the following is not a thermoplastic material ?

- A. Epoxy polymer
- B. PVC
- C. Polystyrene
- D. Polythene

For classification of potable (drinking) water, we use a _____ filter?

- A. Gravity sand
- B. Plate and frame
- C. Vacuum leaf
- D. Rotary vacuum

In classification, particles are said to be equal settling, if they have the same terminal velocities in the _____?

- A. Different fluids
- B. Same fluid
- C. Same field of force
- D. Both B. and C.

Pick out the wrong statement ?

- A. The equivalent stiffness of two springs (of equal stiffness 'S') in series is $S/2$ while in parallel is $2S$
- B. For a helical spring, deflection is proportional to D^3 (D = mean coil diameter) or d^4 (d = wire diameter)
- C. Crushing load or columns is less than the buckling load
- D. Modulus of resilience is proportional to (stress at elastic limit)²

Beyond what concentration of H₂S in air, acute danger to human life exists ?

- A. 50 ppm
- B. 100 ppm
- C. 300 ppm

D. 700 ppm

_____ mean diameter of particles is given by $\Sigma (x_i/D_{pi}^{-3})$?

- A. Mass
- B. Volume**
- C. Arithmetic
- D. Volume surface

Insulating refractories should have _____?

- A. High porosity
- B. Low thermal conductivity**
- C. Both A. and B.
- D. Neither A. nor B.

The reverse process of fractional crystallisation is called _____?

- A. Stripping
- B. Leaching**
- C. Differential distillation
- D. Absorption

Which one contains maximum percentage of Al_2O_3 ?

- A. Firebrick
- B. Sillimanite**
- C. Magnesite
- D. Aluminous firebrick

Buna-N is also called _____?

- A. Butyl rubber
- B. Nitrile rubber**
- C. Neoprene
- D. Thiokol

The location of centre of pressure, which defines the point of application of the

total pressure force on the surface, can be calculated by applying the principle of moments according to which “sum of the moment of the resultant force about an axis is equal to the sum of the components about the same axis”. The centre of pressure of a rectangular surface (of width ‘w’) immersed vertically in a static mass of fluid is at a depth of (where, y = depth of the liquid) ?

- A. $1/(y/3)$
- B. $2y/3$**
- C. $1/(y/4)$
- D. $3y/4$

Frother is added in the froth floatation cell used in ore beneficiation to stabilise the air bubbles (i.e., froth), which will hold the ore particles, but it does not affect the floatability of minerals. Which of the following is not used as a frother ?

- A. Cresylic acid
- B. Xanthaies**
- C. Pine oil
- D. All A, B. & C.

Benzol is used _____ ?

- A. As a motor fuel blend
- B. For producing benzene, toluene & xylene by its distillation
- C. Both A. & B.**
- D. Neither A. nor B.

The half life period ‘t’ of a zero order reaction as shown in the bellow figure, is equal to _____ ?

- A. $CA_0/2K$**
- B. CA_0/K
- C. $0.693/K$
- D. $1/K$

Hydrochloric acid is stored in a _____ vessel?

- A. Lead lined steel
- B. Rubber lined steel**
- C. Stainless steel
- D. Cast iron

The most suitable solvent for deasphalting vacuum residue is _____?

- A. Propane
- B. Methyl ethyl ketone**
- C. Doctor's solution
- D. Methanol amine

Forced circulation evaporators are normally used for concentrating liquids having _____?

- A. Scaling characteristics
- B. High viscosity
- C. Both A. & B.**
- D. Neither A. nor B.

The outlet temperature of cooling water in a heat exchanger is generally not allowed to exceed above 50°C in industrial practice mainly to avoid _____?

- A. Its evaporation loss
- B. Excessive corrosion**
- C. Uneconomic LMTD
- D. Decrease in heat exchanger efficiency

Rate of slag attack on refractories increases with rise in temperature due to the _____?

- A. Decreased viscosity of slag**
- B. Increased thermal conductivity of brick

- C. Oxidising condition in the furnace
- D. None of these

Value of Peclet number = ∞ , is the representative of _____?

- A. Laminar flow
- B. Complete back mixing
- C. Plug flow**
- D. Eddy diffusivity = 0

Metallic wire mesh is used as a filtering medium for the separation of dust from dust laden gas in case of a/an _____?

- A. Air filter**
- B. Bag filter
- C. Venturi scrubber
- D. Hydrocyclones

Which one is remelted and poured into moulds to get cast iron ?

- A. Wrought iron
- B. Pig iron**
- C. Low carbon steel
- D. Mild steel

Referring to the periodic table of elements, it is found that with increasing atomic number. The atomic size in the same _____?

- A. Period increases
- B. Period decreases
- C. Group increases
- D. Both 'B' & 'C'**

Which of the following processes cannot be made reversible even under ideal condition of operation ?

- A. Free expansion of a gas**
- B. Compression of air in a compressor

- C. Expansion of steam in a turbine
- D. All (A), B. & (C)

Pick out the wrong statement ?

- A. The concentric atmosphere layer just above troposphere is called stratosphere, which is rich in ozone
- B. Mesosphere is characterised by very low atmospheric pressure and low temperature
- C. Troposphere is a dusty zone containing water vapor and clouds
- D. The radio waves used in the long distance radio communication are reflected back to earth by stratosphere**

Surface tension of a liquid _____?

- A. Is due to intermolecular forces of cohesion
- B. Decreases with rise in temperature
- C. Is responsible for the spherical shape of an isolated liquid drop
- D. All A, B. & C**

Which of the following is the most lethal water pollutant ?

- A. Phenol and cyanide**
- B. Chlorine
- C. Alkalis
- D. Suspended solids

Reaction of anhydrous liquid ammonia with ortho-phosphoric acid produces _____?

- A. Ammonium phosphate**
- B. Superphosphate
- C. Triple superphosphate
- D. None of these

Which of the following is not a reversible process ?

- A. Expansion of an ideal gas against constant pressure
- B. Atmospheric pressure vaporisation of water at 100°C
- C. Solution of NaCl in water at 50°C**
- D. None of these

The process by which fine solids is removed from liquids is termed as _____?

- A. Decantation
- B. Flocculation
- C. Sedimentation**
- D. Classification

Rotary kilns meant for calcination of limestone are lined with chrome magnesite in _____ zone?

- A. Preheating
- B. Cooling
- C. Burning**
- D. All the above

Ionisation potential applied across the electrodes of electrostatic tar precipitator is around _____?

- A. 230 V AC
- B. 60 KV AC
- C. 230 V DC
- D. 60 KV DC**

Cast iron contains _____ percent carbon?

- A. 2.5**
- B. 3.75
- C. 4.75
- D. 5.25

In a nuclear explosion, the energy is released primarily in the form of

_____ energy?

- A. Potential
- B. Thermal
- C. Kinetic**
- D. Electrical

Sodium melts (at atmospheric pressure) at a temperature of _____ °C?

- A. 58
- B. 98**
- C. 348
- D. 588

The nominal size of a hose pipe is specified by its _____?

- A. I.D.**
- B. O.D.
- C. Thickness
- D. None of these

Solvent used for extraction of oil is _____?

- A. Hexane
- B. Methyl ethyl ketone**
- C. Furfural
- D. None of these

Extended heat transfer surface like fins are used to increase the heat transfer rate. Fin efficiency is defined as the ratio of heat transferred across the fin surface to the theoretical heat transfer across an equal area held at the _____?

- A. Surrounding temperature
- B. Average temperature of the fin
- C. Temperature of the fin end
- D. Constant temperature equal to that of the base**

In connection with corrosion of metals, passivation is the process that _____?

- A. Intensifies deterioration
- B. Changes the composition of the metal
- C. Inhibits further deterioration**
- D. None of these

A composite wall consists of two plates A and B placed in series normal to the flow of heat. The thermal conductivities are k_A and k_B and the specific heat capacities are C_{PA} and C_{PB} for plates A and B respectively. Plate B has twice the thickness of plate A. At steady state, the temperature difference across plate A is greater than that across plate B, when _____?

- A. $C_{PA} > C_{PB}$
- B. $C_{PA} < C_{PB}$
- C. $k_A < 0.5 k_B$**
- D. $k_A > 2 k_B$

Which of the following provides maximum contact surface for a liquid-vapour system ?

- A. Packed tower**
- B. Bubble-cap plate column
- C. Sieve-plate column
- D. Wetted wall column

Specific gravity of a metal, which weighs 5 kg in air and 4 kg when submerged in water, will be _____?

- A. 5**
- B. 1.25
- C. 2.5
- D. 3.75

_____ is an example of axial flow impeller?

- A. Paddle
- B. Turbine
- C. Propeller**
- D. All A., B. and C.

Pick out the correct statement ?

- A. In an isothermal system, irreversible work is more than reversible work
- B. Under reversible conditions, the adiabatic work is less than isothermal work**
- C. Heat, work, enthalpy and entropy are all 'state functions'
- D. Matter and energy cannot be exchanged with the surroundings in a closed system

Which of the following is an undesirable characteristic of a refrigerant ?

- A. It should be non-explosive
- B. It should have a sub-atmospheric vapor pressure at the temperature in refrigerator coils**
- C. Its vapor pressure at the condenser temperature should be very high
- D. None of these

Personnel working in the market research group is responsible for the job of _____?

- A. Equipment selection
- B. Product evaluation**
- C. Equipment design
- D. Cost estimation

Higher pressure in the reforming reactor _____?

- A. Increases coke formation
- B. Increases the rate of reaction
- C. Produces high octane number gasoline
- D. None of these**

Presence of sodium tripolyphosphate (an additive) in synthetic detergent _____?

- A. Facilitates its use even in hard water (by sequestering the water-hardening Ca & Mg ions)**
- B. Inhibits its corrosive effects
- C. Does not allow redeposition of dirt on the cleaned surface
- D. None of these

In a shell and tube heat exchanger, floating head is used for _____?

- A. Large temperature differentials**
- B. High heat transfer co-efficient
- C. Low pressure drop
- D. Less corrosion of tubes

Which of the following is used for making the explosive „TNT“ ?

- A. Benzol
- B. Toluene**
- C. Pyridine
- D. Cerosote

Cast iron has _____?

- A. High ductility
- B. High malleability
- C. Very high tensile strength
- D. Its elastic limit very close to ultimate breaking strength**

The maximum adiabatic flame temperature in air is _____ the maximum flame temperature in pure oxygen?

- A. Lower than**
- B. Higher than
- C. Same as
- D. Not related to

Function of secondary air in pulverised coal firing is to _____?

- A. Transport the coal to the burner
- B. Dry the coal
- C. Ensure efficient burning of coal around the burner**
- D. Reduce primary air requirement

Kopper-Totzek coal gasifier (installed in a coal based nitrogenous fertiliser plant) employs a/an _____ bed gasifier?

- A. Entrained**
- B. Moving
- C. Fixed
- D. Fluidised

The buoyant force acting on a floating body is dependent on the _____?

- A. Viscosity of the liquid
- B. Weight of the liquid displaced**
- C. Depth of immersion of the body
- D. Surface tension of the liquid

For transporting pasty material, one will use a/an _____?

- A. Apron conveyer
- B. Belt conveyer
- C. Screw conveyer**
- D. Bucket elevator

C_nH_{2n} is the general formula for _____?

- A. Olefins
- B. Naphthenes
- C. Both A. and B.**
- D. Neither A. nor B.

Baffles in the shell side of a shell and tube heat exchanger ?

- A. Increase the cross-section of the shell side liquid

- B. Force the liquid to flow parallel to the bank
- C. Increase the shell side heat transfer co-efficient**
- D. Decrease the shell side heat transfer co-efficient

Pick out the wrong statement?

- A. Atoms with same number of nucleons but different number of protons are called isobars
- B. Atoms with same number of protons but different number of nucleons are called isoters**
- C. Out of α , β , and γ -rays, the one having maximum penetration power are γ -rays
- D. The product formed by emission of α -particle has mass number less by 4 units than the parent nuclide

For turbulent flow of an incompressible fluid through a pipe, the flow rate „Q“ is proportional to $(\Delta P)^n$, where ΔP is the pressure drop. The value of exponent 'n' is _____?

- A. 1
- B. 0
- C. < 1**
- D. > 1

Which of the following has the least value of ultimate tensile strength (UTS) ?

- A. Medium carbon steel
- B. High carbon steel**
- C. Cast iron
- D. Wrought iron

Presence of volatile compounds like gasoline, oil, alcohol, ether etc. in municipal sewers may cause _____?

- A. Explosion**
- B. Non biodegradable foam
- C. Undesirable plant growth
- D. Corrosion

Ratio of primary air to secondary air increases with increase in the rank of coal, because the _____?

- A. High rank coals have higher amount of volatile matter
- B. Ratio of fixed carbon to volatile matter increases**
- C. Oxygen content progressively decreases
- D. Calorific value of the coal increases

Brinell Hardness Number (BHN) for talc is approximately in the range of _____?

- A. 1-5
- B. 20-30**
- C. 100-150
- D. 200-250

In the reaction, $\text{Ca} + 2\text{H}_2\text{O} = \text{Ca}(\text{OH})_2 + \text{H}_2$; what volume (c.c.) of hydrogen at STP would be liberated, when 8 gm of calcium reacts with excess water? (Atomic weight of calcium = 40) ?

- A. 4480**
- B. 2240
- C. 1120
- D. 0.4

Chemical potential is a/an _____?

- A. Extensive property
- B. Intensive property
- C. Force which drives the chemical system to equilibrium
- D. Both B. and C**

Isopropyl benzene produced by alkylation of benzene with propylene is known as _____?

- A. Neoprene
- B. Cumene**

- C. Gelatin
- D. Mercaptans

Which of the following nuclear reactors is the most efficient thermodynamically while operating between the same temperature and pressure limits of the reactor ?

- A. Molten sodium cooled
- B. CO₂ gas cooled
- C. Pressurised water
- D. Boiling water**

The main constituent of bones is _____?

- A. CaF₂
- B. Ca₃(PO₄)₂**
- C. CaCO₃
- D. CaCl₂

Which of the following is the most suitable for isothermal operation?

- A. Batch reactor
- B. Back-mix reactor**
- C. Plug-flow reactor
- D. Fixed bed reactor

Basic oxide is absent in _____ glass?

- A. Flint
- B. Pyrex
- C. Quartz**
- D. All A, B. & C

A thermal nuclear reactor compared to a fast breeder reactor ?

- A. Uses slower neutrons for fission**
- B. Uses faster neutrons for fission
- C. Gives higher power density

D. Requires less fuel to run at the same power level

Slurry reactors are characterised by the _____?

A. Lack of intraparticle diffusion resistance

B. Presence of two mobile phases

C. Both A. and B.

D. Neither A. nor B.

Gases having same reduced temperatures and reduced pressures _____?

A. Deviate from ideal gas behaviour to the same degree

B. Have nearly the same compressibility factor

C. Both A. and B.

D. Neither A. nor B.

Metalloids _____?

A. Are good conductor of heat & electricity

B. Act as electron donors with metals & as electron acceptor with non-metals

C. Are not necessarily solids at room temperature

D. Are compounds that exhibit both metallic & non-metallic properties to some extent and are

exemplified by elements like germanium, silicon & boron

Polymerisation reactor used for the production of styrene butadiene rubber (SBR) is made of _____?

A. Cast iron

B. Stainless steel or glass lined vessel

C. Carbate

D. Wrought iron

Name the safety device used to protect the boiler, when the water level falls below a minimum level ?

A. Blow down valve

- B. Blow off cock
- C. Fusible plug**
- D. Safety valve

Phthalic anhydride is made by the _____?

- A. Oxidation of naphthalene**
- B. Oxidation of benzene
- C. Dehydrogenation of ethyl benzene
- D. None of these

Cylindrical pressure vessels in horizontal condition is generally supported on a _____ support?

- A. Lug
- B. Skirt
- C. Saddle**
- D. Guy wire

Esterification reaction produces _____?

- A. Detergent
- B. Vanaspati
- C. Soap**
- D. Mercaptans

Pick out the wrong unit conversion of heat transfer co-efficient?

- A. $1 \text{ kcal/m}^2\cdot\text{hr}\cdot^\circ\text{C} = 0.2048 \text{ BTU/ft}^2\cdot\text{hr}\cdot^\circ\text{F} = 1.163 \text{ W/m}^2\cdot^\circ\text{K}$
- B. $1 \text{ kcal/m}^2\cdot\text{hr}\cdot^\circ\text{K} = 1.163 \text{ W/m}^2\cdot^\circ\text{C}$**
- C. $1 \text{ W/m}^2\cdot^\circ\text{C} = 0.1761 \text{ BTU/ft}^2\cdot\text{hr}\cdot^\circ\text{F}$.
- D. $1 \text{ BTU/ft}^2\cdot\text{hr}\cdot^\circ\text{F} = 4.88 \text{ kcal/m}^2\cdot\text{hr}\cdot^\circ\text{C} = 20.44 \text{ kJ/m}^2\cdot\text{hr}\cdot^\circ\text{C} = 5.678 \text{ W/m}^2\cdot^\circ\text{C}$

Materials having _____ lattice structure are usually the most ductile ?

- A. Body centred cubic (bcc)
- B. Hexagonal close packed (hcp)

C. Face centred cubic (fcc)

D. None of these

'Cox' chart which is useful in the design of a distillation column (particularly suitable for petroleum hydrocarbons) is a plot of the _____?

A. Temperature vs. log (vapor pressure)

B. Vapor pressure vs. log (temperature)

C. Log (temperature) vs. log (vapor pressure)

First experimental observation of nuclear fission was done by

_____?

A. Plane

B. Rutherford

C. Fermi

D. Hahn and Strassmann

Orlan fibre which is used as a wool substitute is _____?

A. An amorphous polymer

B. A natural polymeric fibre

C. Polyacrylonitrile

D. Poly-methyl-methacrylate (PMMA)

At constant temperature, the thermal conductivities of gases _____ with rise in pressure?

A. Decrease

B. Increase

C. Remain unchanged

D. May increase or decrease; depends on the pressure

Neoprene is the trade name of _____?

A. Polyurethane

B. Phenol formaldehyde

C. Polychlorophrene

D. Styrene-butadiene rubber

The ratio of atomic radius to its nuclear radius is about _____?

- A. 105
- B. 108
- C. 1012
- D. 1015

Optimum economic pipe diameter for fluid is determined by the _____?

- A. Viscosity of the fluid
- B. Density of the fluid
- C. Total cost considerations (pumping cost plus fixed cost of the pipe)
- D. None of these

Percentage of differential pressure lost in a Venturimeter with a tapering of 15° may be about _____?

- A. 1
- B. 10
- C. 25
- D. 50

General crushing equation is given by $d(P/m) = -K (d\bar{D} S/\bar{D} n S)$. Bond's crushing law is obtained by solving this equation for $n =$ _____ and feed of infinite size?

- A. 1
- B. 1.5
- C. 2
- D. 2.5

Flow measurement in an open channel is done by a/an _____?

- A. Venturimeter

- B. Orificemeter
- C. Weir**
- D. Rotameter

Free flowing granular materials can be best dried in a _____ drier?

- A. Rotary**
- B. Cylinder
- C. Drum
- D. Freeze

The rate of scaling of furnace stock depends upon the _____?

- A. Temperature
- B. Time
- C. Nature of atmosphere
- D. All A., B. and C.**

If pH value of a solution is 8, then its pOH value will be _____?

- A. 6**
- B. 1
- C. 7
- D. 10

_____ of water makes it a widely used coolant in heat exchangers?

- A. Low corrosiveness
- B. Low dirt factor
- C. High specific heat**
- D. Low viscosity

_____ column is preferred to be used, when a high liquid hold up is required in a reactor for gas-liquid reaction ?

- A. Packed
- B. Bubble**

- C. Spray
- D. Tray

Which of the following has the poorest weldability ?

- A. Low carbon steel
- B. Mild steel
- C. Wrought iron
- D. High-carbon steel**

The radiation heat flux from a heating element at a temperature of 800°C , in a furnace maintained at 300°C is 8 kW/m^2 . The flux, when the element temperature is increased to 1000°C for the same furnace temperature is _____?

- A. 11.2 kW/m^2
- B. 12.0 kW/m^2
- C. 14.6 kW/m^2
- D. 16.5 kW/m^2**

Sour crude means the _____ bearing crude?

- A. Asphalt
- B. Sulphur compounds**
- C. Wax
- D. Nitrogen compounds

Noise level heard at a distance of about 100 metres from a jet engine with after burner is about _____ decibels?

- A. 120
- B. 140
- C. 170**
- D. 200

Flow rate of a river is measured by a/an _____?

- A. Pitot tube
- B. Vane meter**
- C. Kennison nozzle
- D. Open weir

The major constituent of laminate of safety glass, which holds the broken glass, pieces in their places during accident (and thus minimises the danger from flying glass fragments) is _____?

- A. Polyvinyl alcohol
- B. Polyvinyl acetate
- C. Polyvinyl butyral**
- D. PVC

In a shell and tube heat exchanger, tube side _____ of the mass velocity?

- A. Heat transfer co-efficient is proportional to 0.8th power
- B. Pressure drop is proportional to the square
- C. Both A. & B.**
- D. Neither A. nor B.

The biological decomposition of organic substances in wastes controlled conditions is called _____?

- A. Incineration
- B. Biological oxidation
- C. Composting**
- D. None of these

The maximum depth from which a centrifugal pump can draw water is _____?

- A. Dependent on the speed of the pump
- B. Dependent on the power of the pump
- C. 34 feet**

D. 150 feet

Flash point of most vegetable oils is about _____ °C ?

- A. 50
- B. 100
- C. 200**
- D. 300

Which of the following unit operations makes use of Thiele-Geddes equation ?

- A. Liquid-liquid extraction
- B. Solid-liquid extraction
- C. Multi-component absorption with chemical reaction
- D. Multi-component distillation**

Inhalation of silica dust causes a disease called _____ ?

- A. Bronchitis
- B. Silicosis**
- C. Pneumoconiosis
- D. None of these

Coal is finally pulverised to 200 mesh size for burning in boilers by a _____ ?

- A. Hammer crusher
- B. Ball mill**
- C. Roll crusher
- D. Gyratory crusher

Hard water _____ ?

- A. Does not affect the lather formation by soap
- B. Is not unfit for drinking purpose**
- C. Pollutes the water stream
- D. All A, B. and C

Out of the following temperature measuring instruments, the measurement accuracy will be minimum for the _____?

- A. Mercury in glass thermometer
- B. Optical pyrometer**
- C. Iron-constantan thermocouple
- D. Alcohol filled thermometer

Consider a centrifugal pump having a specific impeller diameter, fixed impeller speed pumping a liquid of constant density at a particular discharge capacity. With decrease in the capacity of the pump, the _____ decreases?

- A. NPSH required
- B. BHP required by the pump
- C. Head of the liquid pumped
- D. All A., B. and C.**

Most of the phosphorous present in the blast furnace burden enters into _____?

- A. Hot metal**
- B. Flue gases
- C. Slag
- D. Refractory lining

The efficiency of a Carnot heat engine operating between absolute temperatures T_1 and T_2 (when, $T_1 > T_2$) is given by $(T_1 - T_2)/T_1$. The co-efficient of performance (C.O.P.) of a Carnot heat pump operating between T_1 and T_2 is given by _____?

- A. $T_1/(T_1 - T_2)$**
- B. $T_2/(T_1 - T_2)$
- C. T_1/T_2
- D. T_2/R_1

Tube side pressure drop in a 1-2 heat exchanger (for turbulent flow of fluids

through the tubes) is about _____ times, that in a 1-1 heat exchanger having the same size & number of tubes and operated at the same liquid flow rate ?

- A. 2
- B. $\frac{1}{2}$
- C. 4
- D. 8**

A good lubricant should have high _____ ?

- A. Viscosity index**
- B. Volatility
- C. Pour point
- D. None of these

A packed tower compared to a plate tower for a particular mass transfer operation _____ ?

- A. Incurs smaller pressure drop**
- B. Allows installation of cooling coils
- C. Is less costly when built in large sizes/diameters
- D. Is more suitable, if suspended solids are present in fluid streams

Initial pressure of oxygen introduced into the 'bomb' of the bomb calorimeter for determination of calorific value of coal/fuel oil may be around _____ atm?

- A. 3-5
- B. 25-30**
- C. 60-65
- D. 95-100

Polyvinyl chloride containers are not suitable for storing _____ ?

- A. Foodstuffs**
- B. Woolen clothes

- C. Metallic powder
- D. None of these

Tin in its pure form is used for making _____?

- A. Cans for food packing
- B. Collapsible tubes for toilet preparations
- C. Foil for wrapping cheese
- D. All A., B. and C.**

Straight run petrol as compared to methyl/ethyl alcohol has _____?

- A. Lower calorific value
- B. Lower octane number**
- C. Higher specific gravity
- D. Higher ignition temperature

A system with transfer function $[(2S/4S) + 1]$ is of _____ order?

- A. Zero
- B. 1st**
- C. 2nd
- D. 3rd

Thermocol (expanded polystyrene) is not used for _____?

- A. Low temperature thermal insulation as in refrigerator and air conditioners
- B. Acoustic control and ceiling for building
- C. High temperature thermal insulation in furnaces**
- D. Packing of delicate electronic gadgets

Holding time for flow reactors is _____ the space time, for constant fluid density ?

- A. Double
- B. Triple
- C. Equal to**

D. None of these

If R_m is the minimum reflux ratio, the optimum reflux ratio may be around _____ R_m ?

- A. 1.2 to 1.5
- B. 2.5 to 3
- C. 3 to 4
- D. 5

The single parameter model proposed for describing non-ideal flow is the _____ model?

- A. Tank in series
- B. Dispersion
- C. Both A. & B.
- D. Neither A. nor B.

Clock pendulums are usually made of _____ steel?

- A. High speed
- B. Stainless
- C. Heat resisting
- D. None of these

Which of the following constituents of coal is the most important in the production of coke ?

- A. Moisture
- B. Ash
- C. Volatiles
- D. Carbon

Which of the following represents the Virial equation of state ?

- A. $T = [RT/(V - b)] - [a/VT \cdot V(V + b)]$
- B. $PV/RT = 1 + (B/V) + (C/V^2) + \dots$
- C. $n_1u_2 + \mu_2\mu_1 = 0$

D. None of these

Transition state theory gives the rate constant as _____?

- A. $K \propto e^{-E/RT}$
- B. $K \propto e^{E/RT}$
- C. $K \propto T \cdot e^{-E/RT}$**
- D. $K \propto \sqrt{T} \cdot e^{-E/RT}$

U_{mf} is the minimum fluidisation velocity for a bed of particles. An increase in the superficial gas velocity from $2 U_{mf}$ to $2.5 U_{mf}$ results in (all velocities are smaller than the entrainment velocity of the particles) no change in the _____?

- A. Drag on particles
- B. Drag on column walls
- C. Bed height**
- D. Bed voidage

Commercial production of hydrogen for the manufacture of nitrogenous fertilisers is done by _____?

- A. Steam reforming of naphtha and cracking of natural gas
- B. Electrolysis of water
- C. Cryogenic separation of hydrogen from coke oven gas
- D. All A., B. and C.**

Froth floatation is used for _____?

- A. Washing fine coal dust (< 0.5 mm size)**
- B. Washing lump coal (> 80 mm size)
- C. Removing ash from the coal based on difference in specific gravity of coal and ash
- D. All A., B. and C.

An ideal material of construction for the storage of 50% caustic soda solution would be _____?

- A. Karbate
- B. High silicon cast iron
- C. Monel**
- D. None of these

Ion exchange process is similar to _____?

- A. Absorption
- B. Adsorption**
- C. Extraction
- D. Leaching

Most widely and commonly used coagulant for the removal of suspended impurities in water is _____?

- A. Bleaching powder
- B. Slaked lime
- C. Alum**
- D. Copper sulphate

Sulphur melting pit in the sulphuric acid plant is made of _____?

- A. Lead lined stainless steel
- B. Cast iron
- C. Steel or cement-brick lined**
- D. Hard wood

A thin, flat & square plate measuring $2\text{ m} \times 2\text{ m}$ is freely hanging in ambient air at 25°C . It is exposed to the solar radiation falling on one side of the plate at the rate of 500 W/m^2 . The plate temperature will remain constant at 30°C , if the convective heat transfer co-efficient is _____ $\text{W/m}^2\text{ }^\circ\text{C}$?

- A. 50
- B. 100**
- C. 150
- D. 200

Fanning friction factor for laminar flow of fluid in a circular pipe is _____?

- A. Not a function of the roughness of pipe wall
- B. Inversely proportional to Reynolds number
- C. Both A. & B.**
- D. Neither A. nor B.

Multipass heat exchangers are used _____?

- A. Because of simplicity of fabrication
- B. For low heat load
- C. To obtain higher heat transfer co-efficient and shorter tube**
- D. To reduce the pressure drop

An equipment which converts the latent or sensible heat of one fluid into the latent heat of vaporisation of another, is called a _____?

- A. Boiler
- B. Heat exchanger**
- C. Recuperator
- D. Regenerator

The unit of bulk modulus of elasticity for a liquid in S.I. unit is _____?

- A. N
- B. N/m
- C. N/m²**
- D. N/m³

_____ process is used for the commercial production of nitric acid by the catalytic oxidation of ammonia ?

- A. Solvay
- B. Ostwald's**
- C. Haber's

D. None of these

Number of components (C), phase (P) and degrees of freedom (F) are related by Gibbs phase rule as _____?

- A. $P + F - C = 2$
- B. $C = P - F + 2$
- C. $F = C - P - 2$
- D. $P = F - C - 2$

Deaeration of high pressure boiler feed water is done to reduce _____?

- A. Foaming from boilers
- B. Its dissolved oxygen content**
- C. Its silica content
- D. Caustic embrittlement

Back-trapping in a distillation column results due to _____?

- A. Low gas velocity
- B. High gas velocity
- C. Excessive liquid gradient over the tray**
- D. Low reflux ratio

Addition of _____ to steel does not help in improving its machinability ?

- A. Sulphur
- B. Silicon**
- C. Lead
- D. Phosphorous

Choose the correct statement ?

- A. Octane number of i-octane is zero**
- B. Octane number of paraffins increases with increasing number of carbon atoms
- C. Branched chain paraffins have higher octane number than straight chain paraffins with

same number of carbon atoms

D. The aromatics have lower octane number than naphthenes with same number of carbon atoms

Inside the distillation columns, the _____?

- A. Highest temperatures is near the feed plate
- B. Driving force for the liquid flow is its weight**
- C. Vapors are not always at their dew points
- D. All A., B. and C.

What is the minimum recommended ligament for square pitch arrangement in case of heat exchangers ?

- A. 6.5 cms
- B. 6.5 mm**
- C. Equal to tube I.D
- D. Equal to tube O.D

Vapor phase reaction of ammonia & nitric acid to produce ammonium nitrate is termed as the _____ process?

- A. Haber's
- B. Stengel**
- C. Le-chatelier's
- D. Du-pont's

Pick out the correct statement?

- A. Bound moisture is removed during constant rate drying period
- B. Free moisture is removed during falling rate drying period
- C. The sum of free moisture and equilibrium moisture in a solid is called the critical moisture
- D. The driving force for mass transfer in a wet solid is its free moisture content**

An example of indirectly heated furnace is the _____?

- A. Soaking pit

B. Muffle furnace

- C. Reheating furnace
- D. None of these

When vaporisation takes place directly at the heating surface, it is called _____?

- A. Film boiling
- B. Nucleate boiling**
- C. Vapour binding
- D. None of these

Adhesives _____?

- A. Can't be used in the form of pressure sensitive tapes
- B. Can't join two dissimilar metals
- C. Cure instantaneously after application on a surface
- D. None of these**

Galvanising is generally done on _____?

- A. Non-ferrous metals
- B. Low carbon steel**
- C. Stainless steel
- D. Cast iron

Baffles are provided in heat exchangers to _____?

- A. Remove dirt
- B. Increase heat transfer rate**
- C. Reduce vibrations
- D. Reduce heat transfer rate

Use of pulverised coal in boilers provides _____?

- A. Higher calorific value
- B. Better combustion**
- C. Smokeless burning

D. Less erosion on furnace wall

Maximum hardenability of steel depends upon its _____?

A. Chemical composition

B. Carbon content

C. Grain size

D. Alloying elements content

Velocity of a chemical reaction _____?

A. Decreases with increase in temperature

B. Increases with increase of pressure of reactants for all reactions

C. Decreases with increase of reactant concentration

D. None of these

'P' is the investment made on an equipment, 'S' is its salvage value and 'n' is the life of the equipment in years. The depreciation for Rath year by the sum-of-year"s digit method will be _____?

A. $(P - S)/n$

B. $1 - (P/S)^{1/n}$

C. $(m/n) (P - S)$

D. $[2(n - m + 1)/n(n + 1)]. (P - S)$

Rock phosphate constitutes mainly of _____?

A. Fluorapatite

B. Di-calcium phosphate

C. Mono-calcium phosphate

D. Di-ammonium phosphate

For a reaction, $X \rightarrow Y$, if the concentration of 'X' is tripled; the rate becomes nine times. The order of reaction is _____?

A. 0

B. 1

C. 2

D. 3

Which of the following polymers are produced by employing all bulk polymerisation, solution polymerisation & suspension polymerisation technique of addition (chain) polymerisation ?

- A. PVC
- B. Bakelite
- C. PTFE
- D. Epoxy resin

The pressure co-efficient is the ratio of pressure forces to _____ forces?

- A. Viscous
- B. Inertial
- C. Gravity
- D. Surface tension

Lurgi coal gasifier is a pressurised _____ bed reactor?

- A. Moving
- B. Fixed
- C. Fluidised
- D. Entrained

Dry mix hydraulic compositions of refractory aggregates with suitable bonding materials are called refractory _____?

- A. Mortars
- B. Cements
- C. Castables
- D. None of these

Working principle of mercury in glass thermometer is based on volumetric expansion of mercury with increase in temperature. Which of the following

undergoes minimum volumetric expansion for a given temperature change ?

- A. Water
- B. Mercury**
- C. Methyl alcohol
- D. Carbon-tetrachloride

The inter particle forces between linear chains in nylon-66 are _____ bonds?

- A. Hydrogen**
- B. Covalent
- C. Ionic
- D. None of these

With increase in annealing temperature, the following defect density decreases?

- A. Vacancy
- B. Dislocation
- C. Grain boundary
- D. All of these**

Hot extrusion process is not used for making _____?

- A. Cast iron pipe for domestic water supply**
- B. Aluminium curtain rods
- C. Stainless steel tubes used in furnitures
- D. Any of these

Which of the following chemical reactions will be favoured by low pressure ?

- A. $2\text{HI} \rightleftharpoons \text{H}_2 + \text{I}_2$
- B. $\text{N}_2\text{O}_2 \rightleftharpoons 2\text{NO}_2$**
- C. $\text{N}_2 + \text{O}_2 \rightleftharpoons 2\text{NO}$
- D. None of these

Hydrophilic group of a soap or detergent solution is _____?

- A. Water hating
- B. Soil loving
- C. Water loving**
- D. None of these

Equilibrium constant of a reaction varies with the _____?

- A. Initial concentration of the reactant
- B. Pressure
- C. Temperature**
- D. None of these

Reactor used in the production of polyvinyl chloride (PVC) is made of _____?

- A. Nickel or glass lined steel**
- B. Aluminium
- C. Tantalum
- D. Lead

Pick out the wrong statement?

- A. Dehydration of ammonium carbamate to produce urea is endothermic
- B. Direct use of liquid ammonia as a fertiliser for a tropical country like India is suitable**
- C. Gypsum ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$) is obtained as a by-product in the wet process for manufacture of ortho-phosphoric acid
- D. Phosphate rock when reacted with dilute H_2SO_4 produces superphosphate

For shell and tube heat exchanger, with increasing heat transfer area, the purchased cost per unit heat transfer area _____?

- A. Increases
- B. Decreases
- C. Remain constant
- D. Passes through a maxima**

How much temperature is maintained during quicklime manufacture in the calcination zone of the vertical shaft kiln ?

- A. 500°C
- B. 750°C
- C. 1000°C**
- D. 1500°C

Presence of MgO in alumino-silicate refractories _____ its refractoriness?

- A. Increases
- B. Lowers**
- C. Does not affect
- D. Either A. or B.; depends on its quantity

Back-trapping in a distillation column ?

- A. Increases tray efficiency
- B. Decreases tray efficiency**
- C. Reduces pressure drop
- D. Is desirable, as it provides improved vapour-liquid contact

Batch tray dryers suffers from the disadvantage of _____ ?

- A. High maintenance cost
- B. Non-uniform & low production rate
- C. High labour cost & low heat economy**
- D. All 'a', 'b' & 'c'

Mechanical conveyors which push the material along an endless trough or tube are called scrappers. Which of the following conveying equipments comes under the category of „scrappers“ ?

- A. Bucket conveyor
- B. Flight conveyor
- C. Screw conveyor

D. Both B. and C.

Ball bearings are generally made of _____?

- A. Plain carbon steel
- B. Chrome carbon steel**
- C. Stainless steel
- D. Malleable cast iron

The range of a particular Rotameter can be increased by _____?

- A. Use of floats of different densities**
- B. No means
- C. Increasing the diameter of the float
- D. Decreasing the diameter of the float

A thermodynamic system is taken from state A to B along ACB and is brought back to A along BDA as shown below in the P-V diagram. The net work done during the complete cycle is given by the area covered by _____?

- A. P1ACBP2P1
- B. ACBB1A1A
- C. ACBDA**
- D. ADBB1A1A

Which of the following does not come under the sales expenses for a product of a chemical plant ?

- A. Advertising
- B. Warehousing
- C. Legal fees**
- D. Customer service

A semi-conductor is damaged & behaves like a conductor, on passing a strong electric current through it, because it heats up the crystals & breaks the covalent bonds resulting in _____ electrons ?

- A. Lack of free
- B. Excess of**
- C. Decrease in
- D. None of these

Pick out the correct statement?

- A. Paraffins have higher octane number than corresponding iso-paraffin
- B. Paraffins have lower smoke point than aromatics**
- C. Suitability of kerosene as a fuel & as an illuminant may be determined by char value test
- D. Aviation fuel should have very high cloud point

Which of the following expressions defines the Baume gravity scale for liquids lighter than water ?

- A. $^{\circ}\text{Be} = (140/\text{G}) - 130$**
- B. $^{\circ}\text{Be} = 200(\text{G}-1)$
- C. $^{\circ}\text{Be} = 145 - (145/\text{G})$
- D. $^{\circ}\text{Be} = (400/\text{G}) - 400$

Carboxymethyl cellulose (CMC) is added in detergents to act as a/an _____?

- A. Surfactant
- B. Builder
- C. Optical brightening agent
- D. Anti soil redeposition agent**

If the specific heats of a gas and a vapor are $0.2\text{KJ}/\text{Kg}\cdot^{\circ}\text{K}$ and $1.5\text{KJ}/\text{Kg}\cdot^{\circ}\text{K}$ respectively, and the humidity is 0.01; the humid heat in $\text{KJ}/^{\circ}\text{Kg}$.

is _____?

- A. 0.31
- B. 0.107
- C. 0.017
- D. 0.215**

Aerodynamic noise resulting from turbulent gas flow is the most prevalent source of valve noise in fluid flow control. It is caused due to _____?

- A. Reynold stresses
- B. Shear forces
- C. Both A. & B.**
- D. Neither A. nor B.

Titanium is produced by _____ of $TiCl_4$?

- A. Electrolytic reduction
- B. Calcium reduction
- C. Magnesium reduction**
- D. Thermal dissociation

With increase in initial concentration, the fractional conversion of a first order reaction in a given time _____?

- A. Increases
- B. Decreases
- C. Remain constant**
- D. Unpredictable

Ringelmann chart No. 2 corresponds to _____ percent black smoke?

- A. 10
- B. 20
- C. 40**
- D. 80

The simple Pitot tube measures the _____ pressure?

- A. static
- B. Dynamic
- C. Total**
- D. None of these

Degree to which an instrument indicates the changes in measured variable without dynamic error is called its _____?

- A. Speed of response
- B. Reproducibility
- C. Fidelity**
- D. Static characteristics

Type of glass used in optical work is the _____ glass?

- A. Soda-lime
- B. Fibre
- C. Lead**
- D. Borosilicate

Heating of ortho-phosphoric acid to about 900°C, produces _____?

- A. Meta-phosphoric acid**
- B. Pyrophosphoric acid
- C. No change in it
- D. None of these

The maximum heat transfer co-efficient from steam heating will be attained when the steam is _____?

- A. Supersaturated
- B. Saturated**
- C. Wet
- D. None of these

The humid volume may be increased by increasing the _____?

- A. Temperature at constant humidity
- B. Humidity at constant temperature
- C. Both A. and B.**
- D. Neither A. nor B.

Kinetic energy of fluid per unit weight represented by the velocity head is given by _____?

- A. $2v^2/gc$
- B. $v^2/2gc$**
- C. $\rho v^2/gc$
- D. $\rho.v^2/2gc$

Skull is not formed on the carbon blocks in the hearth of a blast furnace, when it becomes cold, because of its _____?

- A. Non-wetting characteristic**
- B. High thermal conductivity
- C. High crushing strength
- D. None of these

A dilute aqueous solution is to be concentrated in an evaporator system. High pressure steam is available. Multiple effect evaporator system is employed, because _____?

- A. Total heat transfer area of all the effects is -less than that in a single effect evaporator system
- B. Total amount of vapor produced per Kg of feed steam in a multiple effect system is much higher than in a single effect**
- C. Boiling point elevation in a single effect system is much higher than that in any effect in a multi-effect system
- D. Heat transfer co-efficient in a single effect is much lower than that in any effect in a multieffect system

When both the fluids flow concurrently in an absorber, the slope of the operating line is _____?

- A. -ve**
- B. +ve

- C. 1
- D. -1

Cp of a gas at its critical temperature and pressure _____?

- A. Becomes zero
- B. Becomes infinity**
- C. Equals 1 kcal/kmol °K
- D. Equals 0.24 kcal/kmol °K

Cementite is _____?

- A. Fe₃C chemically
- B. A compound of carbon and iron
- C. Characterised by an orthorhombic crystal structure
- D. All A., B. and C.**

In a 1-1 concurrent heat exchanger, if the tube side fluid outlet temperature is equal to the shell side fluid outlet temperature, then the LMTD is _____?

- A. ∞
- B. 0**
- C. Equal to the difference between hot and cold fluids inlet temperature
- D. Equal to the difference between hot fluid inlet temperature and cold fluid outlet temperature

For the flow of gases through a capillary, with increase in temperature, the permeability _____ as per Knudsen law?

- A. Increases**
- B. Decreases
- C. Remain same
- D. Either A. or B.; depends on the gas

Most widely used solvent for dewaxing is _____?

- A. Methyl-ethyl-ketone (MEK)**

- B. Naphtha
- C. Petroleum ether
- D. Sodium plumbite

(64-132) rank coal (ASTM) means a coal with 64%_____?

- A. Fixed carbon and having a heat value of 13, 200 BTU/1b**
- B. Ash and a heating value of 13, 200 BTU/1b
- C. Fixed carbon and a heating value of 132 BTU/1b
- D. None of these

The most efficient cooling tower out of the following is_____?

- A. Induced draft**
- B. Forced draft
- C. Natural draft
- D. Atmospheric

Lewis number (Le) is_____?

- A. $Sc \times Pr$**
- B. $Pr \times St$
- C. $Sh \times Pr$
- D. $St \times Sh$

Which of the following processes is involved in the biochemical treatment of sewage effluents ?

- A. Oxidation**
- B. Reduction
- C. Dehydration
- D. Fermentation

Fire in fuel gas pipelines is extinguished most effectively by _____?

- A. Spraying water

B. Blanketting the area with nitrogen atmosphere

- C. Fire fighting foam
- D. None of these

Power number is the ratio of _____?

A. Drag stress to inertial stress

- B. Inertial stress to drag stress
- C. Inertial stress to gravitational stress
- D. Gravitational stress to drag stress

Equilibrium of a chemical reaction as viewed by kinetics is a _____ state?

A. Dynamic steady

- B. Static steady
- C. Dynamic unsteady
- D. None of these

It is possible to integrate an automatic flow controller to a _____?

- A. Flow nozzle
- B. Venturimeter
- C. Rotameter**
- D. None of these

For estimation of heat capacity of a solid compound, one can use _____?

- A. Clapeyron's equation
- B. Gibb's equation
- C. Kopp's rule**
- D. Trouton's rule

Which of the following hydrocarbons of same carbon atoms has minimum smoking tendency ?

A. Paraffins

- B. Naphthenes
- C. Aromatics
- D. Iso-paraffins

From collision theory, the reaction rate constant is proportional to _____?

- A. $\exp(-E/RT)$
- B. $\exp(-E/2RT)$
- C. \sqrt{T}
- D. $T \exp(-E/RT)$**

Glycerine is used as a coolant in cooling of some engines instead of water, because _____?

- A. Its higher boiling point (290°C) increases its heat carrying capacity
- B. Comparatively less weight of coolant is required
- C. Smaller radiator can be used
- D. All a, b & c**

The dispersion number of perfect mixed flow is _____?

- A. 0
- B. > 150
- C. ∞**
- D. < 2100

Clapeyron Equation deals with the _____?

- A. Rate of change of vapour pressure with temperature**
- B. Effect of an inert gas on vapour pressure
- C. Calculation of ΔF for spontaneous phase change
- D. Temperature dependence of heat of phase transition

Which of the following accentuates clinkering trouble on furnace grate burning coal?

- A. Low reactivity of carbonised residue containing high proportions of iron & sulphur

- B. Low forced draught and fuel bed temperature
- C. Thick fire bed and preheated primary air
- D. All A., B. and C.**

Gross & net calorific value is the same for _____?

- A. Blast furnace gas
- B. Coke oven gas
- C. L.D. converter gas**
- D. None of these

$(\partial T/\partial P)_H$ is the mathematical expression for _____?

- A. Specific heat at constant pressure (C_p)
- B. Specific heat at constant volume (C_v)
- C. Joule-Thompson co-efficient**
- D. None of these

If 'D' is the inside diameter of the shell of a shell and tube heat exchanger, then the baffle spacing is usually in the range of _____?

- A. $D/2$ or minimum 2" to $5D$
- B. $D/5$ or minimum 2" to $5D$**
- C. $D/5$ or minimum 2" to D
- D. None of these

The entropy change in a reversible isothermal process, when an ideal gas expands to four times its initial volume is _____?

- A. $R \log_e 4$**
- B. $R \log_{10} 4$
- C. $C_v \log_{10} 4$
- D. $C_v \log_e 4$

The substance used as a smoke screen in warfare is _____?

- A. C_2H_2
- B. $SiCl_4$**

- C. P205
- D. PCI5

Pick out the wrong statement ?

- A. Cold SBR is superior as compared to hot SBR
- B. Polymerisation temperature can modify the properties of SBR
- C. Production of cold SBR employs lower pressure as compared to that of hot SBR
- D. None of these**

Which of the following non-flow reversible compression processes require maximum work ?

- A. Adiabatic process**
- B. Isothermal process
- C. Isobaric process
- D. All require same work

Which of the following thermocouples has the widest temperature measurement range ?

- A. Iron-constantan
- B. Chromel-alumel
- C. Copper-constantan
- D. Platinum-platinum/rhodium**

A solid is being dried in the linear drying rate regime from moisture content X_0 to X_F . The drying rate is zero at $X = 0$ and the critical moisture content is the same as the initial moisture X_0 . The drying time for $M = (L_s/ARc)$ is (where, $L =$ total mass of dry solid, $A =$ total surface area for drying $R_c =$ Constant maximum drying rate per unit area $X =$ moisture content (in mass of water/mass of dry solids)) _____ ?

- A. $M(X_0 - X_F)$
- B. $M(X_0/X_F)$
- C. $M \ln(X_0/X_F)$

D. MXo In(Xo/XF)

Lewis number, which is important in problems involving simultaneous heat and mass transfer, is the ratio of _____?

- A. Mass diffusivity to momentum diffusivity
- B. Thermal diffusivity to mass diffusivity**
- C. Momentum diffusivity to thermal diffusivity
- D. None of these

The pipe wall thickness is minimum for a pipe of given nominal size having schedule number _____?

- A. 160
- B. 120
- C. 80
- D. 40**

The expression, $nC_v(T_2 - T_1)$, is for the _____ of an ideal gas?

- A. Work done under adiabatic condition**
- B. Co-efficient of thermal expansion
- C. Compressibility
- D. None of these

Thermal pollution due to excessive heat & temperature in the working place causes _____?

- A. Reduction in working efficiency of manpower
- B. Fatigue
- C. High breathing rate
- D. All A., B. & C.**

Advantages of use of preheated combustion air are _____?

- A. Saving in fuel consumption
- B. Reduction in scale losses
- C. Increase in flame temperature

D. All A., B. and C.

Nuclear fuel complex, Hyderabad is engaged in the job of _____?

- A. Manufacture of nuclear fuel elements/assemblies
- B. Processing of uranium ore
- C. Treatment of spent fuel
- D. None of these

Presence of free moisture in coal is most disadvantageous during _____?

- A. Its pulverisation (as it requires more power)
- B. Combustion of fire slacks on the grates
- C. Handling (e.g. when emptying wagons)
- D. None of these

For a fluid flowing in an annulus space, the wetted perimeter for heat transfer and pressure drop are _____?

- A. Same
- B. Different
- C. Never different
- D. Linearly related

The density of a gas 'X' is twice that of another gas 'Y'. If the molecular weight of gas 'Y' is 'M'; then the molecular weight of the gas 'X' will be _____?

- A. 2M
- B. M/2
- C. M
- D. M/4

If helium is introduced in a reactor containing O₂, SO₂ and SO₃ at equilibrium,

so that total pressure increases while volume and temperature remains constant. In this case the dissociation of SO_3 (as per Le Chatelier's principle)?

- A. **Decreases**
- B. Increases
- C. Remains unaltered
- D. Changes unpredictably

Silica bricks have low spalling resistance below 600°C , due to its _____?

- A. Very high thermal conductivity
- B. **High co-efficient of expansion upto this temperature**
- C. High thermal diffusivity
- D. Low refractoriness

During constant rate drying period, vaporisation rate per unit drying surface area _____?

- A. Decreases with time
- B. Increases with time
- C. **Does not change with time**
- D. Does not affect the moisture content of the wet solid

_____ is the process of killing organism in water ?

- A. Coagulation
- B. Sterilisation
- C. **Disinfection**
- D. Sedimentation

Maximum apparent porosity of magnesite bricks is about _____ percent?

- A. 8
- B. **24**
- C. 44

D. 58

Pick out the wrong statement ?

- A. Magnetic separation method can be employed to treat both dry & wet ores
- B. Reduction ratio in crushing operation is defined as the ratio of minimum feed size to the maximum product size**
- C. Gyratory crusher is used for coarse crushing
- D. Screens are of stationary, moving and vibratory types

“If different processes are used to bring about the same chemical reaction, the enthalpy change is same for all of them”. This is _____ law?

- A. Hess's**
- B. Kirchoff's
- C. Lavoisier and Laplace
- D. None of these

Heat transfer by radiation between two bodies at T_1 & T_2 and in an ambient temperature of T_a °C depends on _____?

- A. $T_1 - T_2$
- B. $T_1 - T_a$
- C. $T_2 - T_a$
- D. None of these**

Bakelite is chemically known as _____?

- A. Polyvinyl chloride (PVC)
- B. Polybutadiene
- C. Phenol formaldehyde**
- D. Polyurethane

Filtration rate is affected by the _____?

- A. Pressure drop across the cake & filter medium
- B. Cake & filter medium resistance

C. Area of filtering surface & the viscosity of filtrate

D. All A., B. and C.

The discharge through a semi-circular weir varies as (where, H = Head of liquid.)

?

A. H

B. H²

C. H^{3/2}

D. H^{1/2}

Biological shield in a nuclear power reactor is made of _____?

A. Concrete

B. Steel

C. Cadmium

D. Zircaloy

Characteristic equation is the denominator of _____ loop transfer function?

A. Open

B. Closed

C. Both A. and B.

D. Neither A. nor B.

Which is the most undesirable component in kerosene ?

A. Aromatics

B. i-paraffins

C. n-paraffins

D. Naphthenes

For a homogeneous reaction of nth order, the dimension of the rate constant is given by _____?

A. 1/(time)ⁿ

B. (Concentration)^{1 - n}/(time)

- C. $(\text{Concentration})^n - 1/(\text{time})$
- D. None of these

Brine (15% concentration) can be stored in a vessel made of _____?

- A. Monel**
- B. Karbate
- C. Cast iron
- D. None of these

Pulverised coal used in boiler firing need not have _____?

- A. Less moisture content
- B. High fusion point of its ash**
- C. High bulk density
- D. Lower ash content

_____ base crude oil is also called asphaltic crude?

- A. Paraffinic
- B. Naphthenic**
- C. Mixed
- D. Aromatic

Washing of coal is done to reduce the _____?

- A. Inherent impurities
- B. Adhering impurities
- C. Mineral matter
- D. Both B. and C.**

A dense structure of grinding wheel is not used for the _____?

- A. Ductile material**
- B. Hard materials
- C. Brittle materials

D. Finishing cuts

_____ test determines the yield strength, Young's modulus of elasticity, percentage reduction in area & percentage elongation of a material ?

A. Tensile

B. Fatigue

C. Impact

D. None of these

Deoiling of wax is done by its _____?

A. Heating

B. Cooling

C. Solvent extraction

D. Both B. & C.

_____ can replace tungsten in high speed steel ?

A. Chromium

B. Vanadium

C. Cobalt

D. Molybdenum

A very dilute solution is prepared by dissolving 'x1' mole of solute in 'x2' mole of a solvent. The mole fraction of solute is approximately equal to _____?

A. $x1/x2$

B. $x2/x1$

C. $1 - (x1/x2)$

D. $1/x2$

Solvent used in duo-sol extraction for lube oil upgradation is a mixture of _____?

A. Propane & phenol-cresol mixture

- B. Methyl ethyl ketone & glycol
- C. Phenol & furfural
- D. Propane & liquid sulphur dioxide

For sizing of fine materials, the most suitable equipment is

a _____?

- A. Trommel
- B. Grizzly
- C. Shaking screen
- D. Vibrating screen**

Shrinkage allowance on pattern is provided to compensate for shrinkage when the _____?

- A. Metal changes from liquid state to solid state at freezing temperature
- B. Solid phase temperature drops from freezing temperature to the room temperature**
- C. Liquid metal temperature drops from pouring temperature to room temperature
- D. Liquid metal temperature drops from pouring temperature to freezing temperature

An ideal gas can be liquefied, because _____?

- A. Its molecular size is very small
- B. Its critical temperature is more than 0°C
- C. Forces operative between its molecules are negligible**
- D. It gets solidified directly without becoming liquid

Which of the following is an elastomer ?

- A. Thiokol**
- B. Phenol formaldehyde
- C. Urea formaldehyde
- D. Polystyrene

The amount of simple interest during 'n' interest period is (where, i = interest rate based on the length of one interest period, p = principal) ?

- A. p.i.n.**

- B. $p(1 + i.n)$
- C. $p(1 + i)n$
- D. $p(1 - i.n)$

(Le/D) for a Tee (used as elbow, entering run) would be around _____?

- A. 5
- B. 60**
- C. 160
- D. 200

Water hammer is caused in steam carrying pipelines, because of _____?

- A. Partial condensation of steam**
- B. Vibration of the pipeline
- C. High degree of superheat of steam
- D. Its exposure to torrential rain

Titanium is added to molten aluminium alloys before casting for the purpose of _____?

- A. Grain refinement
- B. Increasing corrosion resistance
- C. Reducing porosity
- D. Improving fluidity**

In frictional fluid flow, the quantity, $(P/\rho) + (V^2/2gc) + gz/gc$ is _____?

- A. Constant along a streamline
- B. Not constant along a streamline**
- C. Increased in the direction of flow
- D. None of these

Oxygen is produced by fractionation of air using _____ process?

- A. Linde's
- B. Claude's
- C. Either A. or B.**
- D. None of these

Catalyst used in catalytic reforming is _____?

- A. Platinum on alumina**
- B. Nickel
- C. Iron
- D. Aluminium chloride

What happens, when SO_2 is passed through a solution of H_2S in water ?

- A. Precipitation of sulphur takes place**
- B. H_2SO_3 is formed
- C. Oleum is formed
- D. None of these

Fundamental principle of refrigeration is based on the _____ law of thermodynamics?

- A. Zeroth
- B. First
- C. Second**
- D. Third

Isotopes of an element have the same _____?

- A. Number of neutrons
- B. Mass number
- C. Electronic configuration**
- D. Atomic weight

Paraffins are desirable in lubricating oil, as it has got high _____?

- A. Viscosity
- B. Viscosity index
- C. Smoke point**
- D. Pour point

The equivalent diameter for fluid flow through square cross section channel of side 'x', for pressure drop calculation purpose is given

by _____?

- A. $4x$
- B. $2x$
- C. x**
- D. \sqrt{x}

Presence of high concentration of ozone and smog in atmospheric air causes the _____?

- A. Embrittlement & decrease of folding resistance of paper
- B. Cracking of rubber products**
- C. Fading of dye on textiles
- D. Damage of electrical insulator on high tension power line

'Super refractories' are made from pure _____?

- A. Carbides
- B. Oxides**
- C. Borides
- D. Nitrides

Oxyacetylene reducing flame is used while carrying out welding on _____?

- A. Alloy steel
- B. Grey cast iron
- C. Mild steel**
- D. High carbon steel

Pick out the correct combination about the role of various additives used in polymers ?

- A. Plasticiser: increases the polymer strength
- B. Heat stabiliser: increases the maximum service temperature
- C. Fillers: Does not affect the property of polymer but increases its weight**
- D. Lubricants: increases the flexibility of polymers

Which of the following is used as a solvent in deasphalting of petroleum products ?

- A. Furfural
- B. Propane**
- C. Methyl ethyl ketone
- D. Liquid sulphur dioxide

Which is the strongest paramagnetic gas ?

- A. CO₂
- B. O₂**
- C. NO
- D. NO₂

The most commonly used feed stock for the reforming reactor is _____ ?

- A. Heavy fuel oil
- B. Residuum
- C. Straight run gasoline**
- D. Casing head gasoline

Which of the following is directly concerned with Psychrometry ?

- A. Lewis relationship**
- B. Galileo number
- C. Weber number
- D. Dean number

Naphthenic acid is a/an _____ compound?

- A. Sulphur
- B. Nitrogen
- C. Oxygen**
- D. None of these

The phenomenon occurring during pumping of a liquid solution containing dissolved gases, which may come out of the solution giving rise to gas pockets, is termed as _____?

- A. Evaporation
- B. Cavitation**
- C. Sublimation
- D. Stripping

Pick out the wrong statement ?

- A. Fibrillation of fibre during paper manufacture is done to develop the strength in paper
- B. Alkali consumption in digestion/cooking of bamboo is measured in terms of permanganate number
- C. Bagasse fibre contains both lignin & cellulose
- D. Presence of sodium sulphate in pulp makes the pulp bleachability poor**

Thermal nuclear reactors using enriched uranium as fuel contains a maximum of _____ percent fissile material i.e. U-235?

- A. 1
- B. 2
- C. 3**
- D. 7

Functional depreciation of an equipment is the measure of decrease in its value due to its _____?

- A. Ageing

- B. Wear and tear
- C. Obsolescence**
- D. Breakdown or accident

Thermal conductivities of most of the liquids _____ with rise in temperature?

- A. Increases
- B. Decreases**
- C. Remains unchanged
- D. May increase or decrease; depends on the liquid

Critical energy should be _____ the neutron binding energy of the atom in order to initiate a nuclear fission?

- A. Equal to
- B. Less than
- C. More than**
- D. Either more or less

A form of stress corrosion failure termed as 'season cracking' is generally observed in _____?

- A. Thermosetting polymers
- B. High carbon steels
- C. Brasses**
- D. Borosilicate glasses

Gross heating value of coal is _____ the net heating value?

- A. Higher than**
- B. Lower than
- C. Same as
- D. None of these

Non-colloidal solution is an example of the _____ fluid?

- A. Non-Newtonian

B. Newtonian

- C. Dilatent
- D. Pseudo-plastic

Which of the following contains maximum sulphur ?

- A. Diesel
- B. Petrol
- C. Kerosene

D. Fuel oil

'If the catalyst pore size is small in comparison with the mean free path, collisions with the pore wall controls the process'. The diffusivity under this condition is called 'Knudsen diffusivity', which is affected by the _____?

- A. Pressure
- B. Temperature**
- C. Both A. & B.
- D. Neither A. nor B.

TLV of NO₂ & NO exposure for the human being is 5 & 25 ppm respectively. Prolonged exposure of human being to NO₂ causes _____?

- A. Skin disorder
- B. Bronchitis**
- C. Bone disease
- D. Cancer

In case of a _____ the energy of flow is considerably decreased downstream of the machine?

- A. Blower
- B. Turbine**
- C. Centrifugal pump
- D. Centrifugal fan

Sides of equilateral-triangular co-ordinates (on which ternary liquid system is plotted) represent _____?

- A. A pure component
- B. A binary mixture**
- C. A ternary mixture
- D. Partially miscible ternary system

For increased speed of response of an expansion pressure spring thermometer, the thermometer bulb should have a _____?

- A. Large area but small mass
- B. High thermal conductivity
- C. Small specific heat
- D. All A , B & C**

Glass is corroded by _____?

- A. Fluorine (dry or wet)**
- B. Sulphuric acid
- C. Phosphoric acid
- D. None of these

A fluid is pumped at the rate of 10 lb/sec to a height of 55 ft. The horse power required is _____ hp?

- A. 1**
- B. 10/55
- C. 5.5
- D. 1/55

Pick out the wrong statement ?

- A. Raoult's law holds good for the solubility of polar gases in non-polar liquids**
- B. Molecules with symmetrical arrangement (e.g., CH₄ and CCl₄) are non-polar
- C. Most of the hydrocarbons are non-polar
- D. Generally, non-polar compounds are chemically inactive, conduct electricity poorly and

do
not ionise

Incomplete combustion of a fuel is characterised by the high _____
in the flue gas?

- A. Smoke
- B. Temperature
- C. Oxygen
- D. Carbon monoxide**

Le-Blanc process is a primitive process for the manufacture
of _____?

- A. Caustic soda
- B. Soda ash**
- C. Bromine from sea water
- D. Hydrochloric acid

Reynolds number for flow of water at room temperature through 2 cm dia pipe
at an average velocity of 5 cm/sec is around _____?

- A. 2000
- B. 10
- C. 100
- D. 1000**

For a vapour phase catalytic reaction ($A + B \rightarrow P$) which follows the Ridel
mechanism and the reaction step is rate controlling, the rate of reaction is given
by (reaction rate is irreversible, product also absorbs) ?

- A. $-r_A = (k \cdot P_A \cdot P_B)/(1 + K_A P_A + K_P P_P)$**
- B. $-r_A = (k \cdot P_A$
 $2 - k_1 P_P)/(1 + K_A P_A + K_P P_P)$
- C. $-r_A = (k \cdot P_A \cdot P_B)/(1 + K_A P_B + K_B P_B \cdot K_P P_P)$
- D. $-r_A = (k \cdot P_A \cdot P_B)/(1 + K_A P_A)$

Which allotrope of sulphur is insoluble in carbon disulphide ?

- A. Rhombic sulphur
- B. Monoclinic sulphur
- C. Plastic sulphur**
- D. Milk of sulphur

Inhalation of lead compounds present in automobile exhaust (using leaded petrol) causes _____?

- A. Blood poisoning
- B. Anaemia
- C. Nervous system disorder
- D. All A., B. & C.**

$C_p \mu / K$ is termed as the _____ number?

- A. Grashoff
- B. Nusselt
- C. Prandtl**
- D. Stanton

The absolute entropy for all crystalline substances at absolute zero temperature is _____?

- A. Zero**
- B. Negative
- C. More than zero
- D. Indeterminate

Which of the following commonly used condenser tube materials has the lowest thermal conductivity ?

- A. Admiralty brass
- B. Stainless steel**
- C. Aluminium brass
- D. Titanium

Cement mainly contains _____?

- A. **CaO, SiO₂, Al₂O₃**
- B. MgO, SiO₂, K₂O
- C. Al₂O₃, MgO, Fe₂O₃
- D. CaO, MgO, K₂O

In a shell and tube heat exchanger, the outlet temperature of heating/cooling fluid is the _____ variable?

- A. Load
- B. Manipulated
- C. **Controlled**
- D. None of these

What happens in a reversible adiabatic compression ?

- A. **Heating occurs**
- B. Cooling occurs
- C. Pressure is constant
- D. Temperature is constant

Casing head gasoline is the liquid _____?

- A. **Butane**
- B. Propane
- C. Natural gas
- D. Gasoline separated from wet natural gas by compression

Heat flux is the time rate of heat transfer per unit _____?

- A. Length
- B. **Area**
- C. Volume
- D. None of these

Mach number is defined as the ratio of the local flow velocity to the sonic

velocity in the fluid. For what value of Mach number, the gases are considered incompressible ?

- A. < 0.3
- B. > 3
- C. 50
- D. 1

If pore diffusion is the controlling step in a solid catalysed reaction, the catalyst_____?

- A. Porosity is very important
- B. Porosity is of less importance**
- C. Internal surface area is utilised efficiently
- D. None of these

RDX (an explosive), which is more sensitive but less toxic than TNT, is chemically_____?

- A. Cyclo trimethylene trinitramine**
- B. Trinitro resorcinol
- C. Cyclo tetramethylene tetranitramine
- D. Trinitrobenzene

Oxidation of ammonia is_____?

- A. Exothermic**
- B. Endothermic
- C. Non-catalytic
- D. Autocatalytic

Heat is generated in a nuclear reactor (thermal) by_____?

- A. Combustion of a nuclear fuel e.g. uranium
- B. Fusion of atoms of uranium
- C. Absorption of neutrons in uranium atoms
- D. Fission of U-235 by neutrons**

A fluid element has a velocity $V = -y^2 \cdot i + 2yx^2 \cdot j$. The motion at $(x, y) = (1/\sqrt{2}, 1)$ is _____?

- A. Rotational and incompressible
- B. Rotational and compressible**
- C. Irrotational and compressible
- D. Irrotational and incompressible

_____ stability method uses open loop transfer function?

- A. Nyquist**
- B. Mikhailov
- C. Ruth
- D. None of these

Air-petrol ratio in an automotive petrol engine is around _____?

- A. 14 : 1**
- B. 22 : 1
- C. 25 : 1
- D. 4 : 1

The heat transfer co-efficient in film type condensation is _____ that for dropwise condensation?

- A. Greater than
- B. Lower than**
- C. Is same as
- D. Half

Working of a _____ pump characterises mixed flow?

- A. Turbine**
- B. Piston
- C. Diaphragm
- D. None of these

In case of isentropic flow, the speed of sound in an ideal gas is proportional to

(where, T = absolute temperature) ?

- A. $1/\sqrt{T}$
- B. $1/T$
- C. \sqrt{T}**
- D. T

Low temperature carbonisation of coal takes place at _____ °C?

- A. 300
- B. 1100
- C. 700**
- D. 150

Depreciation is _____ in profit with time?

- A. Decrease**
- B. Increase
- C. No change
- D. None of these

For a first order chemical reaction, the concentration of the reactant decreases _____ with time?

- A. Linearly**
- B. Exponentially
- C. Logarithmically
- D. Inversely

Pine oil and Cresylic acid are used as _____ in the froth floatation process?

- A. Frother**
- B. Collector
- C. Depressor
- D. Conditioner

Pick out the correct statement ?

- A. Higher is the temperature of the radiating body, higher is the wavelength of radiation
- B. Logarithmic mean area is used for calculating the heat flow rate through a thick walled cylinder**
- C. The wavelength corresponding to maximum mono-chromatic emissive power increases with rise in temperature
- D. Solid angle subtended by the finite surface at the radiating element is called the angle of incidence

The temperature at which new grains are formed in the metal is called the _____ temperature?

- A. Eutectic
- B. Recrystallisation**
- C. Upper critical
- D. Lower critical

The ratio of volume of mixed reactor to the volume of P.F.R. (for identical flow rate, feed composition and conversion) for zero order reaction is _____?

- A. ∞
- B. 0
- C. 1**
- D. > 1

In a heat exchanger, one transfer unit means _____?

- A. A section of the exchanger in which change in temperature of one stream equals the average driving force in the section**
- B. The size of the exchanger in which heat transfer rate is 1 kcal/hr
- C. Both A. and B.
- D. None of these

Which of the following is not a sulphur compound present in petroleum ?

- A. Thiophenes
- B. Mercaptans
- C. Sulphones
- D. Pyrroles**

Total energy at a point comprises of _____ energy?

- A. Potential & kinetic
- B. Pressure
- C. Internal
- D. All A., B. & C.**

Sensible heat of hot industrial flue gases cannot be recovered by a/an _____?

- A. Economiser
- B. Regenerator
- C. Ceramic recuperator
- D. None of these**

Hydrogen differs from deuterium in _____ properties?

- A. Radioactive
- B. Physical**
- C. Chemical
- D. All A., B. and C.

Polymerisation reactor used in the production of styrene butadiene rubber (SBR) is made of _____?

- A. Stainless steel or glass lined steel**
- B. Nickel clad steel
- C. High silicon cast iron
- D. Aluminium

Hydraulic intensifier is used for increasing the _____?

- A. Rate of velocity of liquid supply

- B. Rate of flow through delivery pipeline of a pump
- C. Intensity of pressure of the liquid**
- D. Momentum rate through delivery pipe

Starting friction is low in case of the _____ lubrication?

- A. Boundary
- B. Hydrodynamic
- C. Hydrostatic**
- D. Mixed/semi-fluid

Pick out the wrong statement?

- A. Biological oxygen demand (BOD) is a characteristic and not a constituent of water
- B. BOD is a measure of the amount of oxygen which will be demanded & used in 5 days by the biological decomposition of the organic matter present in water stream present as food for the living organism
- C. BOD is expressed in mg/litre (typically, BOD=2.5 mg/litre for potable water)
- D. None of these**

What is the value of Joule-Thomson co-efficient for an ideal gas ?

- A. +ve
- B. -ve
- C. 0**
- D. ∞

Helium is produced on commercial scale from _____?

- A. Air
- B. Natural gas**
- C. Coke oven gas
- D. None of these

Constantan is an alloy of _____?

- A. Cu (55%) & Sn (45%)
- B. Cu (55%) & Ni (45%)**
- C. Pt (95%) & Rh (10%)
- D. Fe (80%) & Ni (20%)

Glass lined vessels are not used for handling/storing _____?

- A. Dilute H₂SO₄
- B. Dilute HNO₃
- C. Dilute HCl
- D. Hydrofluoric acid**

The maximum service temperature for fibre glass used as thermocouple wire insulation material is _____ °C?

- A. 250
- B. 500**
- C. 750

A reaction which is catalysed by a base is catalysed by all substances which have a tendency to _____?

- A. Lose a proton
- B. Gain a proton**
- C. Gain an electron
- D. None of these

Natural draft created by the chimney depends upon _____?

- A. Temperature of the flue gas
- B. Its height
- C. Both A. & B.**
- D. Neither A. nor B.

Gibbs-Helmholtz equation is _____?

- A. $\Delta F = \Delta H + T [\partial(\Delta F)/\partial T]_P$**
- B. $\Delta F = \Delta H - T\Delta T$

- C. $d(E - TS)_{T, V} < 0$
D. $dP/dT = \Delta H_{\text{vap}}/T \cdot \Delta V_{\text{vap}}$

The maximum adiabatic flame temperature of fuels in air is _____ the maximum flame temperature in pure oxygen?

- A. Lower than**
B. Higher than
C. Same as
D. Not related to

Hydrogen bomb employs the nuclear fusion of _____ ?

- A. Hydrogen
B. Deuterium
C. Tritium
D. Helium

Fusion temperature of pure silica (SiO_2) is _____ °C?

- A. 1350
B. 1715
C. 2570
D. 2800

With increase in temperature, the thermal conductivity of a gas _____ ?

- A. Increases**
B. Decreases
C. Remain same
D. May increase or decrease depending on the type of gas

The root locus method, a pole of a transfer function $G(s)$ is the value of s for which $G(s)$ approaches _____ ?

- A. -1
B. 0

- C. 1
- D. ∞

An irreversible first order reaction is being carried out in a CSTR and PFR of same volume. The liquid flow rates are same. The relative conversion will _____?

- A. Be more in CSTR than in PFR
- B. Be more in PFR than in CSTR**
- C. Be same in both cases
- D. Depend on the temperature

Oils and fats are converted to soap in a process called _____?

- A. Hydrogenation
- B. Esterification
- C. Saponification**
- D. None of these

Function of air vessel provided in a reciprocating pump is to _____?

- A. Reduce discharge fluctuation**
- B. Reduce the danger of cavitation
- C. Avoid the necessity of priming
- D. Increase the pump efficiency

Which is not a basic refractory ?

- A. Chrome magnesite
- B. Magnesite
- C. Dolomite
- D. Silicon carbide**

Which of the following shows maximum dip effect (indicating reverse direction of temperature change) ?

- A. Mercury thermometer**
- B. Radiation pyrometer
- C. Bimetallic thermometer
- D. Thermocouple

Which of the following is unsuitable fuel for producer gas manufacture ?

- A. Coke
- B. Anthracite
- C. Coal having low fusion point of its ash**
- D. Coal having high fusion point of its ash

At 60° C, vapour pressure of methanol and water are 84.562 kPa and 19.953 kPa respectively. An aqueous solution of methanol at 60° C exerts a pressure of 39.223 kPa; the liquid phase and vapour phase mole fractions of methanol are 0.1686 and 0.5714 respectively. Activity co-efficient of methanol is _____?

- A. 1.572**
- B. 1.9398
- C. 3.389
- D. 4.238

Light oil whose major component is Benzol, is obtained by the distillation of crude tar in the temperature range of _____ °C?

- A. 80-170**
- B. 200-300
- C. 250-270
- D. 280-300

If 'S' is the amount available after 'n' interest periods for an initial principal 'P' with the discrete compound interest rate 'i', the present worth is given by _____?

- A. $(1 + i)^n/S$

- B. $S/(1 + i)^n$
- C. $S/(1 + in)$
- D. $S/(1 + n)i$

Thoria is an expensive refractory material and is radioactive in nature. Thorium oxide is used in the manufacture of _____?

- A. Segar cones
- B. Muffles for muffle furnaces
- C. Insulating bricks
- D. Crucibles used for melting of high purity metals**

_____ furnace is not an electric furnace?

- A. Arc
- B. Induction
- C. Pot**
- D. Resistance

_____ are added in lacquers to remove film brittleness and to improve adhereness?

- A. Film forming materials
- B. Plasticisers**
- C. Diluents
- D. Solvents

The speed of a sound wave in a gas is analogous to the speed of

_____?

- A. An elementary wave in an open channel**
- B. Flow in an open channel
- C. A disturbance travelling upstream in moving fluid
- D. None of these

High relative humidity decreases the evaporative process and as the

temperature is increased, the relative humidity decreases. The comfort range for human body is the ambient temperature of 22 to 27°C with relative humidity ranging from _____ percent ?

- A. 5 to 10
- B. 15 to 25
- C. 45 to 50**
- D. 75 to 80

Minimum recommended baffle spacing in a shell and tube heat exchanger is about (where, D = shell diameter) ?

- A. 0.2 D**
- B. 0.5 D
- C. 0.66 D
- D. 0.80 D

The value of Stefan-Boltzmann constant in SI unit is _____ ?

- A. $5.6697 \times 10^{-8} \text{W/m}^2 \cdot \text{K}^4$**
- B. $0.1714 \times 10^{-8} \text{W/m}^2 \cdot \text{K}^4$
- C. $5.6697 \times 10^{-8} \text{kcal/m}^2 \cdot \text{K}^4$
- D. $0.1714 \times 10^{-8} \text{kcal/m}^2 \cdot \text{K}^4$

The slope of the feed line in distillation operation is given by (where, q = fraction of the feed stream that is liquid) ?

- A. -q
- B. $-q/(1-q)$**
- C. $-q/(q-1)$
- D. None of these

Most important factor to be considered in the selection of packings for absorbers is the _____ of packing?

- A. Size
- B. Durability**

C. Porosity

D. Cost

Noise produced by cooling fans (employed in air cooled heat exchangers or cooling tower) is mainly caused due to the turbulence created by blade passage through air. It can be reduced by use of a slower fan _____?

A. With greater number of blades

B. Of increased diameter

C. Both A. & B.

D. Neither A. nor B.

Nylon-66 is manufactured from _____?

A. Adipic acid and Hexamethylene diamine

B. Caprolactam

C. Maleic anhydride and Hexamethylene diamine

D. Dimethyl terephthalate (DMT) and ethylene glycol

The rough value of diffusion co-efficient of water vapor into air at 25°C may be about _____ cm²/sec?

A. 0.25

B. 2.5

C. 1.25

D. 0.0025

A reaction which is catalysed by an acid is also catalysed by any substance, which has a tendency to _____?

A. Lose a proton

B. Gain a proton

C. Lose an electron

D. None of these

In case of pulverised coal fired steam boiler, the secondary air serves the main

purpose of _____ ?

- A. Transportation of coal
- B. Drying of coal
- C. Combustion of coal by supplying it around the burner**
- D. Preheating the primary air

Finned tube heat exchangers _____ ?

- A. Give larger area per tube**
- B. Use metal fins of low thermal conductivity
- C. Facilitate very large temperature drop through tube wall
- D. Are used for smaller heat load

Which of the following variables does not affect the furnace capacity ?

- A. Size of the furnace
- B. Gas velocity in furnace
- C. Ratio of wall surface to surface of stock
- D. None of these**

The most important function of a washer is to provide bearing area and washers are normally specified by their hole diameters. The diameter of washer as compared to the nut is _____ ?

- A. More**
- B. Less
- C. Same
- D. More but less than the diameter of bolt

_____ temperature is the steady state temperature attained by a small amount of liquid evaporating into a large quantity of unsaturated gas-vapor mixture ?

- A. Dry bulb
- B. Wet bulb**
- C. Dew point

D. None of these

The work done in isothermal compression compared to that in adiabatic compression will be _____?

A. Less

B. More

C. Same

D. More or less depending upon the extent of work done

The time taken for a radioactive element to reduce to 50% of its original weight is _____ years, if its half life period is 12 years?

A. 24

B. 18

C. 6

D. 36

The velocity profile exhibited by laminar flow of Newtonian fluids is such that the velocity distribution w.r.t. radius of the circular pipe is a/an _____ with the apex at the centre line of the pipe?

A. Hyperbola

B. Parabola

C. Semi-circle

D. Semi-ellipse

Molecular weights of polymers are in the range of _____?

A. $10^2 - 10^2$

B. $10^5 - 10^9$

C. $10^2 - 10^7$

D. $10^9 - 10^{11}$

Which of the following is not a condensation polymer ?

A. Bakelite

- B. Melamine polymer
- C. Poly-methyl-methacrylate (PMMA)**
- D. None of these

Pick out the correct statement?

- A. Compression ratio of an Otto engine is comparatively higher than a diesel engine
- B. Efficiency of an Otto engine is higher than that of a diesel engine for the same compression ratio**
- C. Otto engine efficiency decreases with the rise in compression ratio, due to decrease in work produced per quantity of heat
- D. Diesel engine normally operates at lower compression ratio than an Otto engine for an equal output of work

Chlorine gas is produced by the electrolysis of brine (NaCl solution with solid NaCl make up) in mercury electrolytic cell. Which of the following is the anodic reaction ?

- A. Oxidation of Na⁺ ions
- B. Oxidation of Cl⁻ ions**
- C. Reduction of Na⁺ ions
- D. Reduction of Cl⁻ ions

In gas-liquid contact operation, the number of ideal stages, $N = (x_a - x_b)/(x_b - x^*b)$. This is true when the stripping factor 'S' is _____?

- A. $S > 1$**
- B. $S < 1$
- C. $S = 1$
- D. $S = \infty$

Which of the following alloys does not contain nickel ?

- A. Chloro, et-2 alloy

- B. Monel
- C. Inconel
- D. Babbitt metal**

Extraction of _____ employs an electrolytic process ?

- A. Aluminium**
- B. Silver
- C. Copper
- D. All A, B. and C

Drag is defined as the force exerted by the _____ ?

- A. Fluid on the solid in a direction opposite to flow
- B. Fluid on the solid in the direction of flow**
- C. Solid on the fluid
- D. None of these

The pitot static tube does not measure the _____ pressure?

- A. Static
- B. Total
- C. Difference in static & dynamic
- D. All A., B. and C.**

The ratio of width to depth for the most economical rectangular section in open channel flow is _____ ?

- A. 0.5
- B. 1
- C. 1.5
- D. 2**

Claude process of gas liquefaction employs _____ ?

- A. Merely compression of gas beyond its critical pressure
- B. Joule-Thomson expansion cooling
- C. Heat exchange with colder stream

D. Adiabatic expansion against a piston or in a turbine

The time constant of a first order process with resistance R and capacitance C is _____?

- A. $R + C$
- B. $R - C$
- C. RC**
- D. $1/RC$

A black body does not _____ radiation?

- A. Absorb or emit
- B. Refract
- C. Reflect
- D. Both B. & C.**

An evaporator while concentrating an aqueous solution from 10 to 40% solids evaporates 30000 kg of water. The amount of solids handled by the system in kg is _____?

- A. 4000**
- B. 9000
- C. 4600
- D. 3000

Superior quality laboratory apparatus is made of the _____ glass having low thermal coefficient of expansion & high chemical resistance?

- A. Flint
- B. Soda
- C. Pyrex**
- D. Potash

Catalytic oxidation of naphthalene produces _____?

- A. Styrene

- B. Phenol
- C. Phthalic anhydride**
- D. None of these

To avoid fire by spontaneous combustion of coal due to its low temperature oxidation, it should be stored in_____?

- A. Shallow and small piles**
- B. Fine sizes without the presence of any lump
- C. Closed space without any ventilation facility
- D. Large heaps with small surface to volume ratio

In a parallel flow heat exchanger, if the outlet temperature of hot and cold fluids are the same, then the log mean temperature difference (LMTD) is_____?

- A. Minimum
- B. Maximum
- C. Zero**
- D. Infinity

Thermodynamic Celsius scale of temperature measurement is_____?

- A. Defined on the basis of melting point of ice and evaporation temperature of water vapor
- B. Defined on the basis of melting point of ice and condensation temperature of water vapor
- C. Having an interval of 100° between ice point to steam point
- D. Both B. and C.**

Which of the following is not an additive for flue gases from furnace to reduce its dewpoint ?

- A. Ammonia
- B. Fine dolomite
- C. Alkaline powders

D. None of these

For storing hazardous chemicals in large storage tanks, the minimum safe distance between the two tanks should range between _____ times the tank diameter?

- A. 1 to 1.5**
- B. 2.5 to 3.5
- C. 4 to 5
- D. 6 to 8

Tea kept in a thermos flask is vigorously shaken. If the tea is considered as a system, then its temperature will _____?

- A. Increase**
- B. Decrease
- C. Remain unchanged
- D. First fall and then rise

The condition of diffraction from a crystal is given by _____?

- A. $n\lambda = 2d \sin \theta$**
- B. $\lambda = d \sin 2\theta$
- C. $\lambda = 2d \sin 2\theta$
- D. $n\lambda = d \sin \theta$

Rotary dryers cannot handle _____ materials ?

- A. Free flowing
- B. Dry
- C. Sticky**
- D. Granular

Choking in case of pipe flow means that a _____?

- A. Specified mass flow rate cannot be achieved**
- B. Valve is closed in the line
- C. Restriction in flow cross-section area occurs

D. None of these

In case of a/an _____ chemical reaction, conversion increases with the rise in temperature?

- A. Reversible exothermic
- B. Irreversible exothermic
- C. Irreversible endothermic
- D. Reversible endothermic**

The most detrimental impurity in high pressure boiler feed water is _____?

- A. Suspended salt
- B. Dissolved salt
- C. Silica**
- D. Turbidity

Most commonly used rubber vulcanising agent is _____?

- A. Sulphur**
- B. Bromine
- C. Platinum
- D. Alumina

6 gm of carbon is burnt with an amount of air containing 18 gm oxygen. The product contains 16.5 gms CO₂ and 2.8 gms CO besides other constituents. What is the degree of conversion on the basis of disappearance of limiting reactant ?

- A. 100%
- B. 95%**
- C. 75%
- D. 20%

Total product cost of a chemical plant does not include the _____

cost?

A. Market survey

- B. Operating labour, supervision and supplies
- C. Overhead and utilities
- D. Depreciation, property tax and insurance

is desired to bring about a certain change in the state of a system by performing work on the system under adiabatic conditions ?

- A. The amount of work needed is path dependent
- B. Work alone cannot bring out such a change of state
- C. The amount of work needed is independent of path
- D. More information is needed to conclude anything about the path dependence or otherwise of the work needed

The most economical flow control valve for use with large diameter pipes is a _____?

A. Butterfly valve

- B. Globe valve
- C. Needle valve
- D. None of these

Schmidt number is given by _____?

A. $\mu/\rho D A B$

- B. $Re \times Pe$
- C. $Sh \times Pe$
- D. Re/Pe

_____ process is meant for direct hydrogenation of coal to produce liquid fuel?

- A. Fischer-Tropsch
- B. Bergius**
- C. Lurgi

D. None of these

Tower diameter may be decreased by _____?

- A. Using higher reflux ratio
- B. Use of increased tray spacing**
- C. Increasing the liquid flow rate
- D. Increasing the vapour flow rate

Pick out the wrong statement?

- A. Catalytic converter is fitted in automobiles to reduce carbon monoxide concentration in exhaust emissions
- B. Inhalation of pollutant carbon monoxide results in death by asphyxiation
- C. Sulphur dioxide is the main pollutant emitted from the exhaust of petrol driven automobiles**
- D. Decomposition of plants containing chlorophyll is a natural source of carbon monoxide in atmosphere

_____ is not a fertiliser?

- A. Calcium ammonium nitrate
- B. Ferrous sulphate**
- C. Liquid ammonia
- D. Ammonium sulphate

Which of the following assumptions enables the Euler's equation of motion to be integrated ?

- A. The fluid is incompressible**
- B. The fluid is non-viscous
- C. The continuity equation is satisfied
- D. The flow is rotational and incompressible

A forced circulation long tube vertical evaporator as compared to the natural circulation evaporator _____?

- A. Is economical in operation
- B. Employs high velocity, high heat transfer rate and less heating surface requirement
- C. Employs a centrifugal pump placed between external downtake from vapor drum and inlet to tube bundle
- D. Both B. & C.**

Interstage coolers are provided in a multistage compressor to _____?

- A. Save power in compressing a given volume to a given pressure**
- B. Cool the delivered air
- C. Achieve the exact delivery pressure
- D. None of these

The most suitable equipment for removing the fine dust particle (< 1 micron dia.) from air below its dew point will be a/an _____?

- A. Bag filter
- B. Electrostatic precipitator**
- C. Cyclone separator
- D. Wet scrubber

Tube mill compared to ball mill _____?

- A. Produces finer products
- B. Is long in comparison with its diameter
- C. Uses smaller balls
- D. All A., B. & C.**

Which of the following denotes the effect of compressibility in fluid flow ?

- A. Weber number
- B. Mach number**
- C. Euler number
- D. Reynolds number

Pick out the correct relationship. (Where, R_i = internal reflux ratio R_o = external reflux ratio.) ?

- A. $(1 + R_o) = R_o/R_i$
- B. $(1 - R_o) = R_o/R_i$
- C. $(1 + R_i) = R_o/R_i$
- D. $(1 - R_i) = R_o/R_i$

Which of the following is not a source of ozone emission in the atmosphere?

- A. Refrigerators
- B. Xerox machines
- C. Dermatological photo-therapy equipments
- D. High voltage electrical equipments

Which one of the following devices is not used for both the absorption as well as the liquidliquid extraction processes ?

- A. Packed towers
- B. Plate towers
- C. Spray towers
- D. **Wetted wall columns**

The catalyst used in the production of elemental sulphur from H_2S (by oxidation-reduction) is _____?

- A. **Alumina**
- B. Silica gel
- C. Platinum
- D. Nickel

Which of the following measurements can be made by the measurement of emf ?

- A. pH value
- B. Degree of hydrolysis
- C. Composition of complex ions

D. All A., B. & C.

For an ideal black body _____?

- A. Absorptivity = 1
- B. Reflectivity = 1
- C. Emissivity = 0
- D. Transmissivity = 1

Alinco, which is a aluminium-cobalt-nickel steel, is used for making _____?

- A. Surgical instruments
- B. Powerful magnets
- C. Chemical equipments
- D. Boiler tubes

Stefan's law describes the mass transfer by _____?

- A. Diffusion
- B. Bulk flow
- C. Both A. & B.
- D. Neither A. nor B.

In case of a centrifugal pump, the ratio h_1/h_2 is termed as the _____ efficiency (where, h_1 = actual measured head & h_2 = head imparted to the fluid by impeller)?

- A. Mechanical
- B. Overall
- C. Volumetric
- D. Impeller

Disinfection of water is done to destroy pathogenic bacteria and thus prevent water-borne diseases. Disinfection of water may be done by the use of _____?

- A. Ozone and iodine
- B. Chlorine or its compounds
- C. Ultraviolet light for irradiation of water
- D. All A., B. & C.**

The temperature at which the second Virial co-efficient of a real gas is zero is called the _____?

- A. Eutectic point**
- B. Boyle temperature
- C. Boiling point
- D. Critical temperature

Bernoulli's equation for fluid flow is derived following certain assumptions. Out of the assumptions listed below, which set of assumptions is used in derivation of Bernoulli's equation? A. Fluid flow is frictionless & irrotational. B. Fluid flow is steady. C. Fluid flow is uniform & turbulent. D. Fluid is compressible. E. Fluid is incompressible ?

- A. A, C, D
- B. B, D, E
- C. A, B, E**
- D. A, D, E

In nylon-6, the number 6 represents the total number of _____?

- A. Carbon atoms in the ring
- B. Carbon atoms in the linear polymer chain**
- C. Nitrogen atoms in the ring
- D. Hydrogen atoms in the ring

Which of the following ores contains maximum percentage of uranium ?

- A. Carnotite
- B. Thorium
- C. Rescolite

D. Pitchblende

Water is a better coolant than a gas (like CO₂, He, N₂ etc.), because it _____?

- A. Is a better neutron moderator as well
- B. Require comparatively smaller pumps and heat exchanger for a given heat transfer rate
- C. Has a better heat transfer characteristics, and it can be pressurised to attain a high temperature

D. All A., B. and C.

Bearings subjected to light load are made of _____?

- A. White metal
- B. Phosphorous bronze**
- C. Monel
- D. Silicon bronze

If 1.5 moles of oxygen combines with aluminium to form Al₂O₃, then the weight of aluminium (atomic weight = 27) used in this reaction is _____ gm?

- A. 27
- B. 54**
- C. 5.4
- D. 2.7

Which of the following thermometers is not suitable for distant reading upto 60 metres ?

- A. Vapor pressure thermometer
- B. Mercury in glass thermometer**
- C. Constant volume gas thermometer
- D. Resistance thermometer

From pollution control point of view, the maximum permissible concentration of sulphur dioxide in atmospheric air is about _____ ppm?

- A. 5
- B. 50
- C. 500
- D. 5000

The dimensionless group in mass transfer that is equivalent to Prandtl number in heat transfer is _____?

- A. Nusselt number
- B. Sherwood number
- C. **Schmidt number**
- D. Stanton number

In a shell and tube heat exchanger, the height of 25 percent cut baffles is equal to (where, D = inside diameter of shell) ?

- A. 0.25 D
- B. 0.50 D
- C. **0.75 D**
- D. None of these

CO_2 can be absorbed by _____?

- A. Hot cupric oxide
- B. **Heated charcoal**
- C. Cold $\text{Ca}(\text{OH})_2$
- D. Alumina

On decreasing the grain size of a polycrystalline material, the property most likely to deteriorate is _____?

- A. Creep
- B. **Toughness**
- C. Tensile strength
- D. Fatigue

For stripping of a gas in a counter current stripper, the operating line

_____?

- A. Lies above the equilibrium curve
- B. Lies below the equilibrium curve
- C. Can lie above or below the equilibrium curve**
- D. Is always parallel to the equilibrium curve

Which of the following has the highest value of refractive index ?

- A. Brine (sea water)
- B. Diamond**
- C. Distilled water
- D. Glass

Joule-Thomson co-efficient which is defined as, $\eta = (\partial T/\partial P)_H = 1/C_p (\partial H/\partial T)_P$, changes sign at a temperature known as inversion temperature. The value of Joule-Thomson co-efficient at inversion temperature is _____?

- A. 0**
- B. ∞
- C. +ve
- D. -ve

Steam side heat transfer co-efficient in an evaporator is in the range of _____ kcal/hr.m²°C?

- A. 10-50
- B. 100-500
- C. 1000-1500
- D. 5000-15000**

The end bleaching agent used to move last traces of colour bodies from the pulp is _____?

- A. Chlorine dioxide (ClO₂)**
- B. MgO
- C. SO₂ gas

D. Mercaptans

A diathermanous substance _____ the thermal radiation completely?

A. Absorbs

B. Reflects

C. Transmits

D. None of these

The most conducive surface for dropwise condensation to occur is the _____ surface?

A. Coated

B. Oily

C. Glazed & polished

D. Smooth

When dilute aqueous solutions of two salts are mixed, the process is associated with _____?

A. Decrease in temperature

B. Increase in temperature

C. No change in temperature

D. Change in temperature which is a function of composition

Which of the following produces maximum pressure difference for transportation of gases ?

A. Vacuum pumps

B. Blowers

C. Fans

D. Compressors

Addition of _____ to steel does not help in improving its machinability?

- A. Sulphur
- B. Silicon**
- C. Lead
- D. Phosphorous

Melamine formaldehyde resin which has a very high anti tacking properties, is not used for the _____?

- A. Electrical insulation purpose
- B. Tanning of leather
- C. Strengthening of plaster of Paris**
- D. Decorative laminates

Weber number is significant and is concerned with the _____?

- A. Solid-liquid mixing
- B. Liquid-liquid mixing
- C. Dispersion of liquid in liquid**
- D. Suspension of solid in liquid

Absolute vapor pressure of petrofuels is found by Reid bomb which is heated in water bath to 100°F. In Reid apparatus, the ratio of the volume of air chamber to that of the liquid fuel chamber is _____?

- A. 4**
- B. 3
- C. 2
- D. 1

Zeigler process _____?

- A. Produces high density polyethylene**
- B. Produces low density polyethylene
- C. Uses no catalyst
- D. Employs very high pressure

The material used for coating the welding electrode is termed as

the _____ ?

- A. Flux
- B. Slag**
- C. Protective layer
- D. Binder

The hydrodynamic and thermal boundary layers will merge, when _____ ?

- A. Prandtl number is one**
- B. Schmidt number tends to infinity
- C. Nusselt number tends to infinity
- D. Archimedes number is greater than 10000

The lightest non-inflammable gas is _____ ?

- A. H₂
- B. He**
- C. Ar
- D. O₂

The mass number of an element is not changed, when it emits _____ radiations?

- A. α & β
- B. β & γ**
- C. γ & α
- D. α , β , & γ

Pick out the wrong statement ?

- A. Momentum transfer in laminar flow results from velocity gradient
- B. A fluid in equilibrium is not free from shear stress
- C. The viscosity of a non-Newtonian fluid is a function of temperature only
- D. Both B. and C.**

Which of the following forced convection heat transfer equation accounts for

the liquid viscosity effect for viscous liquids ?

- A. Dittus-Boelter equation
- B. Sieder-Tate equation**
- C. Nusselt equation
- D. None of these

Stresses encountered in the metal forming processes are less than the _____ of the material?

- A. Fracture strength**
- B. Yield strength
- C. Elastic limit
- D. Limit of proportionality

Diamagnetic materials are magnetised _____ ?

- A. Strongly
- B. Only slightly
- C. With eddy currents only
- D. In a direction opposite to that of the applied field**

Size measurement of ultrafine particles can be best expressed in terms of _____ ?

- A. Centimetre
- B. Screen size
- C. Micron
- D. Surface area per unit mass**

Powdery materials can be guarded against caking tendency on storage by _____ ?

- A. Providing irregular grain size
- B. Providing minimum percentage of voids
- C. Having maximum possible points of contact
- D. None of these**

Which of the following is not suitable for measuring the temperature of a red hot object in the range of 800 – 1600°C ?

- A. Optical pyrometer
- B. Radiation pyrometer
- C. Photoelectric pyrometer
- D. Thermocouples**

_____ strain is measured using a 'strain rosetter' ?

- A. Volumetric
- B. Shear
- C. Linear**
- D. None of these

Out of the following gas-liquid contacting devices, for a given set of operating conditions, gas pressure drop is the least in _____ tower?

- A. Wetted wall**
- B. Bubble cap
- C. Perforated tray
- D. Packed

If the solubilities of different components (in a liquid-liquid extraction system) increase with rise in temperature, then the temperature above which they dissolve completely is known as the critical solution temperature (CST or consolute temperature). If solubilities increase with decrease in temperature, then CST is the temperature below which they dissolve completely. If a binary system has no critical solution temperature, it implies that _____ ?

- A. The system comprises of partially miscible liquids
- B. The system comprises of miscible liquids
- C. The system comprises of an azeotrope
- D. On heating, a vapor phase will appear; while on cooling, a solid phase will appear**

Stoichiometric combustion of 12 kg of carbon requires _____ of oxygen?

- A. 1kg mole
- B. 22.4 Nm³
- C. 32 kg
- D. All A., B. and C.**

_____ iron is the purest form of iron?

- A. Cast
- B. Wrought**
- C. Pig
- D. High silicon

Coal tar fuels (CTF) as compared to petroleum based fuel oils have higher _____?

- A. Calorific value
- B. Higher C/H ratio**
- C. Sulphur content
- D. Difference in gross & net calorific value

Perforated plate towers are unique for solvent extraction because, they provide _____?

- A. Higher contact area
- B. Better contact of the phase
- C. Repeated coalescence & redispersion of the drop phase**
- D. None of these

Chemically, mullite refractories is _____?

- A. 3Al₂O₃.2SiO₂**
- B. Al₂O₃
- C. ZrSO₄
- D. ThO₂

Sea weeds are an important source of _____?

- A. Fluorine
- B. Chlorine
- C. Bromine
- D. Iodine**

Which of the following is not used as a moderator in nuclear reactor ?

- A. Molten sodium**
- B. Light water
- C. Beryllium
- D. Boron hydride

Heat transfer co-efficient equation for forced convection, $Nu = 0.023 Re^{0.8} Pr^n$, is not valid, if the value of _____?

- A. $n = 0.4$ is used for heating
- B. $n = 0.3$ is used for cooling
- C. Reynolds number for the flow involved is > 10000
- D. Reynolds number for the flow involved is < 2100**

Exposure to small amount of _____ results in high blood pressure & heart disease in human beings?

- A. Hydrogen sulphide
- B. Mercury
- C. Cadmium**
- D. Asbestos

Solvay process as compared to dual process (i.e. modified Solvay process) ?

- A. Can use low grade brine
- B. Has less corrosion problems
- C. Involves higher investment in NH_3 recovery units than that for crystallisation units for NH_4Cl
- D. Both B. and C.**

The fluid velocity varies as the square of the cylindrical pipe diameter, in case of steady state laminar flow at constant pressure drop, for _____ fluid?

- A. **Newtonian**
- B. Dilatant
- C. Pseudo-plastic

Firing temperature of magnesite bricks is about _____ °C?

- A. 800-1000
- B. 1000-1200
- C. **1600-1800**
- D. 2400-2600

During the absorption of HCl gas in water (to produce liquid HCl), the gas is kept above dew point to _____?

- A. Increase the rate of absorption
- B. **Avoid corrosion**
- C. Reduce the cooling water circulation rate
- D. None of these

World environment day is observed every year on the 5th of _____?

- A. **June**
- B. December
- C. July
- D. September

Boiling of milk in an open vessel is an example of _____ boiling?

- A. **Film**
- B. Sub-cooled
- C. Saturated nucleate
- D. None of these

The activity co-efficient of the solute in a dilute solution ?

- A. Decreases with the increase of concentration of the solute
- B. Increases with the increase of concentration of the solute
- C. Remains constant**
- D. Is unity at infinite dilution

Acetic acid will be most economically separated from a dilute solution of acetic acid in water by _____?

- A. Solvent extraction**
- B. Continuous distillation
- C. Evaporation
- D. Absorption

Weber number is the ratio of inertial force to _____ force?

- A. Surface tension**
- B. Gravity
- C. Viscous
- D. Elastic

Trommels are revolving screens which normally operate in the range of _____ rpm?

- A. 1 – 2
- B. 15 – 20**
- C. 40 – 50
- D. 60 – 75

Which of the following same diameter columns gives lowest pressure drop per unit height ?

- A. Bubble-cap column
- B. Sieve-plate column
- C. Packed column (stacked)**
- D. Randomly packed column

Stack heat losses can be minimised by _____?

- A. Controlling the excess air**
- B. Oxygen enrichment of combustion air
- C. Using low c.v. fuels
- D. Maintaining proper draft in the furnace

If a solid is compressed adiabatically in its elastic range, its _____ remains constant ?

- A. Internal energy
- B. Enthalpy
- C. Entropy**
- D. Temperature

Lane and Garton classification of petroleum is based on its _____?

- A. Composition
- B. Specific gravity**
- C. Optical properties
- D. Viscosity

Joint efficiency (J) for a seamless pipe is _____?

- A. 1**
- B. 0.85
- C. 1.5
- D. < 0.5

The frequency response of a dynamic element shows a constant magnitude ratio at all frequencies. The element exhibits a negative phase shift at all frequencies. The absolute value of the phase shift increases linearly with frequency. The element has the transfer function ?

- A. $e^{-\eta S}$**
- B. $(T1S + 1)/(T2S + 1)$

- C. $(T1S)/(T2S + 1)$
- D. $(T1S + 1)/(T2S$

Spherical shaped pressure vessel is considered to be the most ideal, because it can _____?

- A. Withstand higher pressure for a given metallic shell thickness**
- B. Be fabricated very easily
- C. Be designed without wind load considerations
- D. Be supported very easily

An equation for calculating vapour pressure is given by, $\log_{10} P = A - B(t + c)$.

This is called the _____?

- A. Kistyakowsky equation
- B. Antoine equation**
- C. Kopp's rule
- D. Trouton's rule

_____ iron is produced by the annealing of white cast iron?

- A. Malleable**
- B. Nodular
- C. Ductile
- D. Grey

For achieving maximum capacity of the ball mill, the ball charge should be equal to about _____ percent of the ball mill volume?

- A. 10
- B. 25
- C. 50**
- D. 75

Tolerable limit of nitrogen oxides in air is _____ ppm?

- A. 0.1
- B. 1**

- C. 5
- D. 25

Agitated film evaporator is suitable for concentrating _____ liquids?

- A. Foaming
- B. Viscous**
- C. Very thin
- D. Corrosive

Flash point of an oil gives an idea of the _____?

- A. Nature of boiling point diagram of the system**
- B. Amount of low boiling fraction present
- C. Explosion hazards
- D. All A., B. and C.

The diffusion co-efficient in m^2/s . of acetic acid in benzene (liquid in liquid) is _____?

- A. 2.09×10^{-4}**
- B. 2.09×10^{-5}
- C. 2.09×10^{-9}
- D. 2.09×10^{-12}

Which will have the least volatile matter and hence will be the most difficult to ignite ?

- A. Bituminous coal
- B. Coke**
- C. Semi-bituminous coal
- D. Anthracite

Velocity distribution for flow between two fixed parallel plates _____?

- A. Varies parabolically across the section**
- B. Is constant over the entire cross-section

- C. Is zero at the plates and increases linearly to the mid-plane
- D. None of these

The critical pressure at which the latent heat of vaporization of steam becomes zero is _____ Kg/cm² ?

- A. 273.15
- B. 225.65**
- C. 100.03
- D. 373.15

Which of the following remains constant during sensible cooling process ?

- A. Specific humidity
- B. Partial pressure of vapour
- C. Both A. and B.**
- D. Neither A. nor B.

Flow rate through an orifice is _____ the pressure differential?

- A. Proportional to
- B. Inversely proportional to the square root of
- C. Proportional to the square root of**
- D. Inversely proportional to the square of

Sucrose is a disaccharide consisting of _____ ?

- A. Glucose and glucose
- B. Glucose and fructose**
- C. Glucose and galactose
- D. Fructose and galactose

A differential pressure cell is used for _____ ?

- A. Measuring small pressure difference in gases
- B. Measuring small pressure difference in liquids
- C. Remote recording of pressure difference**
- D. Measuring the difference of the impact & the static pressure

Steam undergoes isentropic expansion in a turbine from 5000 kPa and 400°C (entropy = 6.65 kJ/kg K) to 150 kPa) (entropy of saturated liquid = 1.4336 kJ/kg. K, entropy of saturated vapour = 7.2234 kJ/kg. K) The exit condition of steam is _____?

- A. **Superheated vapour**
- B. Partially condensed vapour with quality of 0.9
- C. Saturated vapour
- D. Partially condensed vapour with quality of 0.1

McLeod gauge is used to measure the _____?

- A. Point velocity
- B. Flow rate
- C. **Vacuum**
- D. Pressure

Difference at any instant between the value of the controlled variable and the set point is called the _____?

- A. **Deviation**
- B. Derivative time
- C. Error ratio
- D. Differential gap

Specific _____ does not change during phase change at constant temperature and pressure?

- A. Entropy
- B. **Gibbs energy**
- C. Internal energy
- D. Enthalpy

Advantages of fluidised bed combustion are _____?

- A. Reduced NO_x formation in flue gas

- B. Lower furnace operating temperature
- C. High heat transfer rate
- D. All A., B. & C.**

The average translational kinetic energy with which a gas molecule is endowed is dependent on its _____?

- A. Nature
- B. Size
- C. Absolute temperature**
- D. All A., B. & C.

Rotary kilns are used in the _____?

- A. Calcination of limestone & dolomite
- B. Cement manufacture
- C. Both A. and B.**
- D. Neither A. nor B.

Pick out the correct statement ?

- A. When highly corrosive fluids are to be handled, the plate towers prove to be cheaper and easier to construct than packed tower
- B. Packed towers are generally preferred over plate towers, if the liquids have a foaming tendency**
- C. The pressure drop through the packed towers is generally more than the pressure drop through plate towers designed for same duty
- D. None of these

Major loss in sudden contraction in pipe flow is due to _____?

- A. Boundary friction
- B. Flow contraction**
- C. Expansion of flow after sudden contraction
- D. None of these

Pyrometric cone equivalent (PCE) of a refractory is the measure of

its _____?

- A. Spalling resistance
- B. Fusion point**
- C. Resistance to slag penetration
- D. Resistance to carbon monoxide attack

Wax is a _____?

- A. Mixture of glycerides
- B. Mixture of esters of polyhydric alcohols excepting glycerine**
- C. Liquid at room temperature
- D. Mixture of glycerides of fatty acids

The enzyme which can catalyse the conversion of glucose to ethyl alcohol is _____?

- A. Invertase
- B. Maltase
- C. Diastase
- D. Zymase**

Polyvinyl alcohol is used as a _____?

- A. Cation/anion exchanger
- B. Water soluble adhesive**
- C. Textile fibre
- D. Non-sticky coating on frying pans

Which of the following is not the commercial name of poly-methyl-methacrylate (PMMA)?

- A. Perspex
- B. Lucite
- C. Plexiglass
- D. Teflon**

Regenerators are installed in _____?

- A. Coke ovens
- B. Open hearth furnace
- C. Both A. & B.**
- D. Neither A. nor B.

The unit of C_p in S.I. units is _____ ?

- A. $W/m^2 \cdot ^\circ K$
- B. $J/kg \cdot ^\circ K$**
- C. $W/m \cdot ^\circ K$
- D. $J/m^3 \cdot ^\circ K$

Boundary layer separation is characterised by one of the conditions given below, where 'Re' is the Reynolds number for the flow. Select the appropriate conditions ?

- A. $Re \ll 1$, accelerating flow
- C. $Re \ll 1$, decelerating flow
- D. $Re \gg 1$, decelerating flow**

Pick out the correct statement?

- A. A real gas on expansion in vacuum gets heated up
- B. An ideal gas on expansion in vacuum gets cooled
- C. An ideal gas on expansion in vacuum gets heated up
- D. A real gas on expansion in vacuum cools down whereas ideal gas remains unaffected**

Which of the following has the highest octane number ?

- A. Aromatics**
- B. i-paraffins
- C. Naphthenes
- D. Olefins

The equation $DU = Tds - PdV$ is applicable to infinitesimal changes occurring in _____ ?

- A. An open system of constant composition

- B. A closed system of constant composition
- C. An open system with changes in composition
- D. A closed system with changes in composition**

Soap kettle used in the production of laundry soap is made of _____?

- A. Steel with top section nickel clad or stainless steel**
- B. Cast iron
- C. Nickel
- D. Concrete

Specific speed of a centrifugal pump depends upon the _____ head?

- A. Suction
- B. Delivery
- C. Manometric
- D. None of these**

The number of degrees of freedom at the triple point of water is _____?

- A. 0**
- B. 1
- C. 2
- D. 3

Chrome magnesite is not used in the _____?

- A. Inner lining of L.D. converter
- B. Aluminium melting furnaces
- C. Wear out lining of steel melting furnaces**
- D. All A., and B. and C.

The high expansion metal normally used in the bimetallic thermometer is _____ temperature measurement?

- A. Brass for low

- B. Nickel alloys for high
- C. Both A. & B.**
- D. Aluminium for all

The specific cake resistance for compressible sludges is a function of the pressure drop _____?

- A. Over cake**
- B. Over medium
- C. Overall
- D. None of these

Catalyst used in alkylation process is _____?

- A. Sulphuric acid**
- B. Nickel
- C. Silica gel
- D. Alumina

Filtration capacity of a rotary drum vacuum filter depends upon the _____?

- A. Cake thickness
- B. Characteristics of the feed slurry
- C. Both A. & B.**
- D. Neither A. nor B.

Exposure of a photographic plate to produce a latent image is an example of _____ reaction?

- A. Very slow
- B. Very fast
- C. Photochemical
- D. Both B. and C.**

In Bode plot, ϕ vs. ω is plotted on a/an _____ graph paper?

- A. log-log**

- B. Ordinary
- C. Semi-log
- D. Triangular

Main use of hard coke produced by high temperature carbonisation is in the _____ ?

- A. Iron blast furnace**
- B. Cupola in foundries
- C. Sinter making
- D. Domestic ovens

Shear stress in a fluid flowing in a round pipe _____ ?

- A. Varies parabolically across the cross-section
- B. Remains constant over the cross-section
- C. Is zero at the centre and varies linearly with the radius**
- D. Is zero at the wall and increases linearly to the centre

Heat of _____ of a fuel is called its calorific value?

- A. Formation
- B. Combustion**
- C. Reaction
- D. Vaporisation

The relation, $Sc = Pr = 1$, is valid, when the mechanism of _____ transfer is same?

- A. Heat and mass**
- B. Mass and momentum
- C. Heat and momentum
- D. Heat, momentum and mass

Momentum transfer in laminar flow of fluids results due to the _____ ?

- A. Viscosity

- B. Density
- C. Velocity gradient**
- D. None of these

Enthalpy 'H' is defined as _____?

- A. $H = E - PV$
- B. $H = F - TS$
- C. $H - E = PV$**
- D. None of these

Relationship between absorption/evolution of heat at the thermocouple junctions and the current flow in the circuit is given by _____ effect?

- A. Peltier**
- B. Thomson
- C. Seebeck
- D. None of these

Safety rods provided in nuclear reactors to guard against accidents, in case of earthquake are made of _____?

- A. High carbon steel
- B. Molybdenum
- C. Zircaloy
- D. Boron or cadmium**

If CO₂ is not fully absorbed by the KOH solution meant for its absorption in the orsat apparatus, it will appear as _____?

- A. O₂
- B. CO
- C. N₂
- D. SO₂**

Gypsum is chemically _____?

- A. Calcium chloride

- B. Potassium sulphate
- C. Sodium sulphate
- D. Calcium sulphate**

Pick out the wrong statement ?

- A. More commonly used jaw crusher between Dodge jaw crusher and Blake jaw crusher is the later one
- B. There are only four methods namely compression, impact, attrition and cutting, which the size reduction equipments employ
- C. Cutting machines mainly employ 'attrition' for size reduction of solids**
- D. Operating principles of Dodge and Blake jaw crushers are combined in the working of universal jaw crushers

Polarograph is meant for the analysis of _____?

- A. Gaseous mixture
- B. Miscible liquids
- C. Solids**
- D. Isotopes

The unit of gc is _____?

- A. lbf/lbm. ft/sec²**
- B. lbf/lbm. ft/sec²
- C. ft/sec²
- D. lbf/lbm. sec²/ft

The role of a catalyst in a chemical reaction is to change the _____?

- A. Equilibrium constant
- B. Activation energy**
- C. Final products
- D. Heat of reaction

Formation of ammonium carbamate by reaction of NH_3 with CO_2 is a/an _____ reaction?

- A. Catalytic
- B. Exothermic**
- C. Endothermic
- D. Reversible

Half the angle of nip, (α), for a roll crusher is given by (where, d_r , d_p and d_f are diameters of crushing rolls, feed particles and rolls gap respectively) ?

- A. $\cos \alpha = (d_r + d_p)/(d_r + d_f)$**
- B. $\cos \alpha = (d_r + d_f)/(d_r + d_p)$
- C. $\tan \alpha = (d_r + d_p)/(d_r + d_f)$
- D. $\sin \alpha = (d_r + d_p)/(d_r + d_f)$

During agitation of liquids, the _____ ?

- A. Froude number is independent for the curves between power number and Reynolds number in baffled system
- B. Power number becomes independent of impellers Reynolds number at high Reynolds number, but is dependent on the geometry of the impeller
- C. Froude number is used to account for the effect of surface (e.g., the centre vortex) on the power number
- D. All A., B. and C.**

Continuous measurement of moisture in paper is done by _____ ?

- A. Sling psychrometer
- B. Hair-hygrometer
- C. Weighing
- D. High resistance Wheatstone bridge circuit**

Toothed roll crushers achieve size reduction by _____?

- A. Tearing (shear) and compression
- B. Impact and attrition
- C. Both A. & B.**
- D. Neither A. nor B.

Pick out the wrong statement?

- A. Multigrade lubricating oils have high viscosity index
- B. Paraffinic oil has very high viscosity index
- C. Naphthenic oil has very low viscosity index
- D. High viscosity index means a large change in viscosity with change in temperature**

Temperature maintained in the emulsion polymerisation reactor for PVC manufacture is about _____ ° C?

- A. -20
- B. 50**
- C. 250
- D. 500

The refrigerant freon-12 is chemically _____?

- A. CCl₂F₂**
- B. CCl₃F
- C. CClF₃
- D. CCl₄F

A solution is made by dissolving 1 kilo mole of solute in 2000 kg of solvent. The molality of the solution is _____?

- A. 2
- B. 1
- C. 0.5**
- D. 0.05

Load cells used for the measurement of weight has _____?

- A. Compact & rugged construction with an accuracy of 0.1 to 1%
- B. No moving parts and incurs negligible deflection under load
- C. Provision of thermal compensation and is hermetically sealed
- D. All A, B & C**

Sizing of very fine particles of the order of 5 to 10 microns is done by elutriation, which is a _____ operation?

- A. Clarification
- B. Sedimentation
- C. Flocculation
- D. Classification**

In a multiple effect evaporator, the effect of boiling point elevation is to _____?

- A. Reduce the capacity**
- B. Reduce the economy
- C. Increase the economy
- D. None of these

A propeller agitator _____?

- A. Produces mainly axial flow**
- B. Is used for mixing high viscosity pastes
- C. Runs at very slow speed (2 rpm)
- D. All A., B. and C.

Crude oil produced by Indian oil fields are predominantly _____ in nature?

- A. Paraffinic
- B. Naphthenic
- C. Asphaltic**
- D. Mixed base

Particulates (< 1 μ m size) remaining suspended in air indefinitely and

transported by wind currents are called _____?

- A. Fumes
- B. Mists
- C. Smoke
- D. Aerosols**

For an ideal gas mixture undergoing a reversible gaseous phase chemical reaction, the equilibrium constant ?

- A. Is independent of pressure
- B. Increases with pressure**
- C. Decreases with pressure
- D. Increases /decreases with pressure depending on the stoichiometric co-efficients of the reaction

At a constant volume, for a fixed number of moles of a gas, the pressure of the gas increases with rise of temperature due to _____?

- A. Decrease in mean free path
- B. Increased collision rate among molecules
- C. Increase in molecular attraction**
- D. Increase in average molecular speed

The frequency at which maximum amplitude ratio is attained is called the _____ frequency?

- A. Corner
- B. Resonant**
- C. Cross-over
- D. Natural

Metallic surveying tapes are made of _____ which has a low coefficient of expansion & enough strength ?

- A. Invar**
- B. Hastelloy

- C. Duralumin
- D. Monel metal

White cast iron is not _____?

- A. Malleable**
- B. Whitish in color
- C. Brittle
- D. Strong and hard

Caking index of a coal is a measure of its _____?

- A. Abradability
- B. Reactivity
- C. Agglutinating (binding) properties**
- D. Porosity

When the mixture to be distilled has a very high boiling point and the product material is heat sensitive, the separation technique to be used is _____ distillation?

- A. Continuous
- B. Steam**
- C. Azeotropic
- D. None of these

During the phase transition, _____ changes?

- A. Pressure
- B. Volume**
- C. Temperature
- D. All A , B. and C

Large tonnage of refractory bricks are dried in a _____?

- A. Shaft furnace
- B. Rotary hearth furnace
- C. Tunnel kiln**

D. Muffle furnace

Which of the following stainless steels is non-magnetic ?

A. Ferritic

B. Martenistic

C. Austenitic

D. None of these

With increase in temperature, the surface tension of water _____ ?

A. Increases

B. Decreases

C. Remain constant

D. Increases linearly

Which of the following fertilisers is required for the development of fibrous materials of the plants and of the sugar of vegetable & fruits ?

A. Nitrogenous fertilisers

B. Phosphatic fertilisers

C. Potassic fertiliser

D. None of these

Nickel and _____ are the alloying element added in steel to increase its toughness?

A. Molybdenum

B. Chromium

C. Vanadium

D. Silicon

The curve of metacentre for a floating body _____ the curve of buoyancy?

A. Is always below

B. Is the evolute of

- C. Intersects at right angle
- D. Is tangential to

Specific speed of a centrifugal pump relates it with another pump having the _____?

A. Dynamic similarity

- B. Same efficiency
- C. Same speed
- D. Geometrical similarity

White phosphorous is stored under water, because _____?

- A. It does not react with water
- B. It is poisonous
- C. Its kindling temperature in dry air is very low**
- D. It is unstable

Pick out the wrong unit conversion of calorific value?

- A. $1 \text{ kcal/kg} = 1.8 \text{ BTU/lb} = 4.186 \text{ kJ/kg}$
- B. $1 \text{ BTU/ft}^3 = 8.9 \text{ kcal/m}^3 = 0.038 \text{ MJ/m}^3$
- C. $1 \text{ BTU/lb} = 2.3 \text{ kcal/kg}$**
- D. $1 \text{ kcal/m}^3 = 0.1124 \text{ BTU/ft}^3$

At standard conditions, $\text{N}_2 + 2\text{O}_2 \rightleftharpoons 2\text{NO}_2$; $\Delta G^\circ = 100 \text{ kJ/mole NO} + \frac{1}{2}\text{O}_2 \rightleftharpoons 2\text{NO}_2$; $\Delta G^\circ = -35 \text{ kJ/mole}$ The standard free energy of formation of NO in kJ/mole is _____?

- A. 15
- B. 30
- C. 85**
- D. 170

Celluloid is chemically _____?

- A. Cellulose acetate

- B. Regenerated cellulose
- C. Cellulose nitrate**
- D. Cellulose acetate butyrate

Brittleness induced due to the presence of sulphur in steel can be reduced by adding_____?

- A. Manganese**
- B. Magnesium
- C. Vanadium
- D. Copper

_____ is used for tying the steel columns to concrete foundation?

- A. Grouting
- B. Eyebolt
- C. Anchor bolts**
- D. Refractory castables

The energy of activation of exothermic reaction is_____?

- A. Zero
- B. Negative
- C. Very large compared to that for endothermic reaction
- D. Not possible to predict**

A first order reaction $A \rightarrow B$ occurs in an isothermal porous catalyst pellet of spherical shape. If the concentration of A at the centre of the pellet is much less than at the external surface, the process is limited by_____?

- A. Diffusion within the pellet**
- B. Reaction
- C. External mass transfer
- D. None of the above

Brass parts with high residual tensile stress at the surface are susceptible to season cracking (i.e. spontaneous cracking occurring on exposure to atmospheric corrosion), if its zinc percentage is more than ?

- A. 5
- B. 10
- C. 20**
- D. 35

Regenerators are used for waste heat recovery in _____?

- A. By-product coke ovens**
- B. Beehive coke oven
- C. Blast furnace stoves
- D. Soaking pits

Which of the following has the least thermal efficiency ?

- A. Steam engine**
- B. Carnot engine
- C. Diesel engine
- D. Otto engine

Pick out the true statement pertaining to water treatment ?

- A. Slow sand filters can remove colour completely
- B. Activated carbon can be used for taste & odour control without subsequent filtration
- C. Application of activated carbon reduces the temporary hardness of water
- D. Normally, the turbidity is removed by adding a coagulant prior to sedimentation**

A piezometer opening measures the _____ fluid pressure?

- A. Static
- B. Undisturbed**
- C. Total
- D. Dynamic

Nylon-6 is a _____?

A. Polyamide

- B. Thermosetting resin
- C. Polyester
- D. None of these

A reduction in thermal resistance during heat transfer does not occur in the _____?

- A. Convection heat transfer by stirring the fluid and cleaning the heating surface
- B. Conduction heat transfer by reduction in the material thickness and increase in the thermal conductivity
- C. Radiation heat transfer by increasing the temperature and reducing the emissivity**
- D. None of these

The atomic number of a radioactive element is not changed, when it emits _____ rays?

- A. α
- B. β
- C. γ**
- D. α & β

Multiple effect evaporators are commonly used in the manufacture of P. Paper Q. Superphosphate R. Sugar S. Fats ?

- A. P and Q
- B. P and R
- C. P and S**
- D. R and S

Varnish does not contain _____?

- A. Thinner
- B. Pigment**
- C. Both A. & B.
- D. Neither A. nor B.

Below is given an equilibrium moisture curve of a substance. State which regions represent free moisture and unbound moisture respectively ?

- A. II, III
- B. II, IV
- C. IV, III
- D. IV, II

Jigging is a technique by which different particles can be _____?

- A. Separated by particle size
- B. Separated by particle density
- C. Separated by particle shape
- D. Mixed

The most common standard size of bubble caps used in industrial operation is _____?

- A. 1" dia cap with 0.5" dia riser
- B. 6" dia cap with 4" dia riser
- C. 8" dia cap with 1" dia riser
- D. 4" dia cap with 8" dia riser

The thermal radiative flux from a surface of emissivity = 0.4 is 22.68 kW/m². The approximate surface temperature (K) is (Stefan-Boltzmann constant = 5.67×10^{-8} W/m².K⁴) ?

- A. 1000
- B. 727
- C. 800
- D. 1200

The concentration of A in a first order reaction, $A \rightarrow B$, decreases _____?

- A. Linearly with time
- B. Exponentially with time**
- C. Very abruptly towards the end of the reaction
- D. Logarithmically with time

_____ glass has the lowest co-efficient of thermal expansion and hence is more heat resistant ?

- A. Pyrex**
- B. Soda lime
- C. Lead
- D. High silica

Photographic plates are coated with _____ ?

- A. Silver nitrate
- B. Silver halide**
- C. Calcium silicate
- D. Metallic silver

Which of the following is an ore dressing operation ?

- A. Classification**
- B. Smelting
- C. Roasting
- D. None of these

The main reducing agent in iron blast furnace is _____ ?

- A. Carbon dioxide
- B. Carbon monoxide**
- C. Oxygen
- D. Air

The ratio of down take area to cross-sectional area of the tube, for calandria type evaporator ranges from _____ ?

- A. 0.5 to 1**

- B. 1 to 1.5
- C. 1.5 to 2
- D. 2 to 2.5

Regenerators as compared to recuperators for the same duty_____?

- A. Store smaller quantity of waste heat
- B. Are lighter & compact
- C. Involve higher initial cost**
- D. All A., B. & C.

Sodium salt of higher molecular weight fatty acid is termed as the _____ soap?

- A. Hard
- B. Soft**
- C. Metallic
- D. Lubricating

The manufacture of Kraft pulp is done by a/an _____ process?

- A. Alkaline**
- B. Acidic
- C. Neutral
- D. None of these

pertaining to the analogy between equations of heat and mass transfer operations ? Pick out the wrong statement With increase in compression ratio, the efficiency of the otto engine_____?

- A. Increases**
- B. Decreases
- C. Remain constant
- D. Increases linearly

Soaking pits are meant for heating steel _____?

- A. Ingots**
- B. Coils
- C. Sheets
- D. Slabs

Liquor poisoning generally occurs due to the presence of _____ in it ?

- A. Ethyl alcohol
- B. Impurities
- C. Methyl alcohol**
- D. Carbonic acid

Heavy duty bearings are usually made of _____?

- A. White metal**
- B. Phosphorous bronze
- C. Monel
- D. Zinc

Gutta percha rubber is _____?

- A. Soft & tacky at room temperature
- B. An isomer of natural rubber**
- C. A thermosetting resin
- D. Recovered by coagulation of rubber latex

Addition of _____ in steel can help in increasing the depth of hardness?

- A. Nickel
- B. Chromium
- C. Vanadium
- D. Tungsten**

Pick out the wrong statement?

- A. In the McCabe-Thiele diagram for binary distillation, vertical feed line represents saturated liquid feed and horizontal feed line represents saturated vapour feed
- B. In small columns, local efficiency is larger than Murphree efficiency; in large columns local efficiency is smaller than Murphree efficiency
- C. For Laminar flow over a plate of length L , the local mass transfer co-efficient at a distance L from the leading edge is $1.5 \times 10^{-2}m/s$. Then the average mass transfer co-efficient for the plate is $2 \times 10^{-2}m/s$**
- D. The concentration and hydrodynamic boundary layers over a flat plate are of equal thickness, if Schmidt number is equal to unity

Which of the following has the minimum °API gravity of all ?

- A. Diesel
- B. Kerosene
- C. Petrol
- D. Furnace oil**

For multi-component multiple phases to be in equilibrium at the same pressure and temperature, the _____ of each component must be same in all phases?

- A. Chemical potential
- B. Fugacity
- C. Both A. and B**
- D. Neither A. nor B

Pick out the wrong statement ?

- A. Co-current absorbers are usually used, when the gas to be dissolved in the liquid is a pure substance

- B. In case of gas absorption, HETP is equal to HTU, when both the operating line & the equilibrium lines are parallel
- C. Hatta number is important in case of gas absorption with chemical reaction
- D. In actual practice, absorption is an endothermic process, while stripping is an exothermic process**

Degrees of freedom at triple point will be _____?

- A. 0**
- B. 1
- C. 2
- D. 3

The specific surface of spherical particles is given by (where D and ρ are diameter and density of particle) ?

- A. $6/D.\rho$**
- B. $2/D.\rho$
- C. $4/D.\rho$
- D. $12/D.\rho$

Applicability of Clausius-Clapeyron Equation is subject to the condition that the _____?

- A. Vapor follows ideal gas law
- B. Volume in the liquid state is negligible
- C. Both A. & B.**
- D. Neither A. nor B.

Reboiler is considered as one theoretical plate, because _____?

- A. Of the assumption that vapour and liquid leaving the reboiler are in equilibrium**
- B. Vapour is recycled to the column
- C. Reboiler itself contains one plate
- D. None of these

Pressure of 0.01 psi (absolute) can be measured by _____ gauge?

- A. Ionisation
- B. Pirani
- C. Mcleod**
- D. None of these

In troposphere (the weather domain), the temperature 't' at height 'h' above the sea level in metres is given by (where, temperature at sea level is 15°C and t is in °C ?

- A. $t = 15 - 0.0065h$**
- B. $t = 15 + 0.0065h$
- C. $t = 0.0035h - 15$
- D. $t = 15 - 0.0035h$

Dimension of absolute viscosity is _____?

- A. ML-1T-1**
- B. MLT-1
- C. ML-1T
- D. MLT

Catalyst used in steam reforming of naphtha is _____?

- A. Bauxite
- B. Cobalt
- C. Nickel oxide on alumina support**
- D. Chromium

If the time required to complete a definite fraction of reaction varies inversely as the concentration of the reactants, then the order of reaction is _____?

- A. 1
- B. 2**

- C. 3
- D. 4

Gases are cooled in Joule-Thomson expansion, when it is _____ inversion temperature?

- A. Below**
- B. At
- C. Above
- D. Either B. or C.

_____ nuclear reactor does not require a heat exchanger to supply steam to power turbine?

- A. Molten sodium cooled
- B. Helium cooled
- C. Boiling water**
- D. Pressurised water

Which of the following is not categorised as a “mechanical operation”?

- A. Agitation
- B. Filtration
- C. Size enlargement
- D. Humidification**

Kopp’s rule is concerned with the calculation of _____?

- A. Thermal conductivity
- B. Heat capacity**
- C. Viscosity
- D. Surface tension

The rate of change of moment of momentum represents the _____ by the fluid?

- A. Torque applied**
- B. Force exerted

- C. Work done
- D. Power developed

Preheating of coal charge for the coke ovens reduces the _____?

- A. Time of carbonisation
- B. Yield of gas and tar
- C. Fuel consumption in coking
- D. All A., B. and C.**

Atmospheric pollution caused by the exhaust gas of supersonic transport aircrafts is mostly in the atmospheric region called _____?

- A. Thermosphere
- B. Stratosphere**
- C. Troposphere
- D. Mesosphere

Pick out the wrong statement ?

- A. Reboiler is not used in open steam distillation
- B. The separation of solutes of different molecular sizes in a liquid solution by use of a suitable membrane is called dialysis
- C. Freeze drying is used for the drying of fish
- D. Fenske-Underwood equation is used for calculating theoretical number of plates in a distillation column at normal operating reflux condition**

Pick out the correct statement?

- A. It is preferred to use a vertical condenser for condensation of vapor from a distillation column without sub-cooling
- B. Draining of residual liquid on tray during shut down of distillation column is facilitated by weep holes
- C. Random packing a packed tower offers the advantage of lower pressure drop and higher throughput of fluids as compared to regular/stacked packing

D. Risers are generally not connected to the plate in a distillation column by bolts, rivets or welding

Screen capacity is not a function of _____?

- A. Its openings size
- B. Screening mechanism
- C. Screening surface

D. Atmospheric humidity

For gas absorption, low viscosity solvents are preferred, because of their _____?

- A. Better flow characteristics
- B. Low pumping pressure drop
- C. Rapid absorption rates

D. All A., B. and C.

Water is normally used as a coolant in the heat exchange equipments mainly because of its _____?

A. Abundance & high heat capacity

- B. Low density
- C. Low viscosity
- D. High fluidity

Which of the following is Clausius-Clapeyron Equation for vaporisation of an ideal gas under the condition that the molar volume of liquid is negligible compared to that of the vapor ?

A. $d \ln p/dt = H_{vap}/RT^2$

- B. $d \ln p/dt = RT^2/H_{vap}$
- C. $dp/dt = RT^2/H_{vap}$
- D. $dp/dt = H_{vap}/RT^2$

When the gas to be dissolved in liquid is a/an _____ then

normally co-current adsorber are used?

- A. Mixture of two gases
- B. Pure gas**
- C. Ideal gas
- D. Sparingly soluble gas

Out of the following, copper vessels are the most suitable for the storage of _____?

- A. Bromine
- B. Dry chlorine & dry fluorine**
- C. Nitric acid (95% and fuming)
- D. Phosphoric acid (95%) & sulphuric acid (95% and fuming)

Which of the following is the hardest material ?

- A. Calcite
- B. Quartz
- C. Corundum**
- D. Gypsum

In a furnace, the heat taken by the charge/stock and the heat lost to the furnace structure & flue gases depends on the _____?

- A. Rate of firing and emissivity of flame
- B. Thermal conductivity of the charge & structural materials of furnace
- C. Nature of process; whether batch, continuous or intermittent
- D. All A., B. and C.**

_____ fuels require the maximum percentage of 'excess air' for complete combustion ?

- A. Solid**
- B. Liquid
- C. Gaseous
- D. Nuclear

In the atmospheric pressure crude distillation, the content of _____ from lighter fraction to heavier ones?

- A. Sulphur increases**
- B. Sulphur decreases
- C. Nitrogen decreases
- D. None of these

Crude oils containing more than _____ kg of total salts (expressed in terms of NaCl) per thousand barrel is called a 'salty crude' ?

- A. 1
- B. 5**
- C. 15
- D. 25

Flexible foam (for mattresses) are usually made of _____ ?

- A. PVC
- B. Silicone rubber
- C. Polyurethanes**
- D. Polyamides

Small pressure differences in liquids is measured using a/an _____ ?

- A. U-tube manometer
- B. Inclined tube manometer**
- C. Pitot tube
- D. None of these

Pick out the wrong statement?

- A. The mass diffusivity, the thermal diffusivity and the eddy momentum diffusivity are the same
for $N_{Sc} = N_{Pr} = 1$
- B. 1 Nm³ of dry air is lighter than 1Nm³ of humid air**
- C. The Lewis number of a mixture is unity, when the thermal diffusivity is equal to the mass

diffusivity

D. An Azeotropic mixture of two liquids has boiling point higher than either of them, when it shows negative deviation from Raoult's Law

Pipelines carrying various utilities in chemical industries are identified by their colour codes. The color of pipeline carrying steam is _____?

- A. Black
- B. Silver grey**
- C. Green
- D. Yellow

Which of the following is not a weightless pollutant ?

- A. SPM**
- B. Thermal pollution
- C. Radioactive rays
- D. Noise pollution

A steel sphere of radius 0.1 m at 400°K is immersed in an oil at 300°K. If the centre of the sphere reaches 350°K in 20 minutes, how long will it take for a 0.05 m radius steel sphere to reach the same temperature (at the centre) under identical conditions? Assume that the conductive heat transfer co-efficient is infinitely large ?

- A. 5 minutes**
- B. 10 minutes
- C. 20 minutes
- D. 40 minutes

Baffles may be eliminated for _____?

- A. Low viscosity liquids (< 200 poise)
- B. High viscosity liquids (> 600 poise)**
- C. Large diameter tanks

D. None of these

A good metallurgical coke should have very low _____?

A. Sulphur & phosphorous content

B. Porosity

C. Fusion point of its ash

D. Hardness & strength

For identical flow rate and feed composition, X plug flow reactors (PFR) in series with a total volume V gives the same conversion as single _____?

A. CSTR of volume V

B. PFR of volume V

C. CSTR of volume V/X

D. PFR of volume V/X

Baffles are provided in heat exchangers to increase the _____?

A. Fouling factor

B. Heat transfer area

C. Heat transfer co-efficient

D. Heat transfer rate

Pick out the one which is a first order instrument ?

A. Mercury in glass thermometer (without any covering or air gap)

B. Bare metallic thermometer

C. Bare vapor pressure thermometer

D. All A., B. and C.

A reactor is generally termed as an autoclave, when it is a _____?

A. High pressure batch reactor

B. Atmospheric pressure tank reactor

C. High pressure tubular reactor

D. Atmospheric pressure CSTR

Bad odour in sanitary latrines is reduced by periodically sprinkling _____?

- A. Bleaching powder
- B. Lime powder**
- C. Aluminium sulphate
- D. None of these

In case of a multipass shell and tube heat exchanger, the temperature drop in the fluid _____?

- A. Is inversely proportional to the resistance across which the drop occurs
- B. And the wall are proportional to individual resistances**
- C. And the wall is not related
- D. None of these

Ball mill is used for _____?

- A. Crushing
- B. Coarse grinding
- C. Fine grinding**
- D. Attrition

A chemical reaction occurs, when the energy of the reacting molecules is _____ the activation energy of reaction?

- A. Less than
- B. Equal to
- C. More than
- D. Equal to or more than**

Soaps remove dirt by _____?

- A. Increasing the surface tension
- B. Decreasing wettability
- C. Supplying hydrophilic group
- D. None of these**

A chemical process is said to occur under unsteady state, if the _____?

- A. Inventory changes do not take place
- B. Ratio of streams entering/leaving are independent of time
- C. Flow rates & composition both are time dependent**
- D. None of these

Ammonia content in raw coke oven gas is about _____ gm/Nm³?

- A. 1
- B. 5**
- C. 50
- D. 100

Chrome magnesite bricks are used in the _____?

- A. Side walls of soaking pits and arc furnaces
- B. Copper melting furnaces & converters
- C. Burner block of glass tanks
- D. All A., B. and C.**

Pick out the wrong statement ?

- A. Mechanical agitation is required, if the system has low interfacial tension**
- B. Sieve tray towers are generally used for systems having low interfacial tension
- C. When Henry's law constant is very small, then the mass transfer rate is controlled by the gas film resistance
- D. Taylor-Prandtl analogy for heat and mass transfer considers the transfer through both laminar and turbulent layers

Saturated steam at a pressure of 25 kg/cm² is throttled to attain 5 kg/cm². Then the outcoming steam will be _____?

- A. Wet

- B. Saturated
- C. Superheated**
- D. None of these

_____ column is the most suitable for achieving the best performance for mass transfer operations involving liquid with dispersed solids ?

- A. Wetted wall
- B. Packed
- C. Plate**
- D. Spray

Digestion of wood-base materials (for manufacture of pulp) is done to _____ ?

- A. Remove lignin**
- B. Produce long fibres
- C. Prevent deterioration on storage
- D. None of these

Both tritium and deuterium have the same number of _____ ?

- A. Neutrons**
- B. Electrons
- C. Protons
- D. Nucleons

Baffles are provided in a shell and tube heat exchanger to increase the turbulence and velocity of the shell side fluid. Which of the following shaped baffles does not fall in the category of transverse baffle ?

- A. Segmental baffle
- B. Flat plate extending across the wall**
- C. Disk type baffle
- D. Helical type baffle

A large iceberg melts at the base, but not at the top, because of the reason that _____?

- A. Ice at the base contains impurities which lowers its melting point
- B. Due to the high pressure at the base, its melting point reduces**
- C. The iceberg remains in a warmer condition at the base
- D. All A, B. and C

In multistage equilibrium conversion of SO_2 to SO_3 ($2\text{SO}_2 + \text{O}_2 \rightleftharpoons 2\text{SO}_3$), the reverse reaction becomes appreciable at a temperature of 550°C . The percentage equilibrium conversion of SO_2 to SO_3 can be increased by ?

- A. Increasing the oxygen concentration
- B. Putting more quantity of V_2O_5 catalyst in the converter
- C. Removing some quantity of SO_3 during intermediate stage**
- D. Maintaining low temperature & pressure in the converter

In a laboratory test run, the rate of drying was found to be $0.5 \times 10^{-3} \text{ kg/m}^2 \cdot \text{s}$, when the moisture content reduced from 0.4 to 0.1 on dry basis. The critical moisture content of the material is 0.08 on a dry basis. A tray dryer is used to dry 100 kg (dry basis) of the same material under identical conditions. The surface area of the material is $0.04 \text{ m}^2/\text{kg}$ of dry solid. The time required (in seconds) to reduce the moisture content of the solids from 0.3 to 0.2 (dry basis) is _____?

- A. 2000
- B. 4000
- C. 5000**
- D. 6000

A multigrade lubricating oil means an oil having high _____?

- A. Viscosity index**
- B. Viscosity
- C. Aniline point

D. Flash point

Thermal pyrolysis of ethylene dichloride produces _____?

A. Trichloroethylene

B. Vinyl chloride

C. Ethanol amine

D. Ethylene oxide

The rate constant of a reaction depends on the _____?

A. Initial concentration of reactants

B. Time of reaction

C. Temperature of the system

D. Extent of reaction

In a shell and tube heat exchanger, the 'tube pitch' is defined as the _____?

A. O.D. of the tube for square pitch

B. Shortest distance between two adjacent tube holes

C. Shortest centre to centre distance between adjacent tubes

D. None of these

Phenol formaldehyde _____?

A. Employs addition polymerisation

B. Employs condensation polymerisation

C. Is a monomer

D. Is an abrasive material

Purpose of hydraulic accumulator is to _____?

A. Ensure intermittent supply of hydraulic pressure

B. Increase the pressure and store/ accumulate it

C. Accumulate pressure to increase force

D. Generate high pressure to operate hydraulic machines like cranes, lifts, presses etc

Fusion point of coal ash generally varies from 1000 to 1700° C. Ash having fusion point less than _____ °C is liable to form clinker?

- A. 1100
- B. 1250
- C. 1350
- D. 1400

Pick out the wrong statement?

- A. The toughness of a material decreases, when it is heated
- B. Crane hooks are normally made of wrought iron
- C. Cold working of a metal decreases its fatigue strength**
- D. The temperature at which new grains are formed in a metal is known as the recrystallisation temperature

Pick out the wrong statement?

- A. Close circuit grinding is more economical than open circuit grinding
- B. Cod oil, beef tallow or aluminium stearates are used as grinding aids in cement 'industries'
- C. The equipment used for the removal of traces of solids from a liquid is called a classifier**
- D. Size enlargement is a mechanical operation exemplified by medicinal tablet making

A tube is specified by its _____ ?

- A. Thickness only
- B. Outer diameter only
- C. Thickness & outer diameter both**
- D. Inner diameter

During the washing of cake _____ ?

- A. All the resistances are constant**
- B. Filter medium resistance increases
- C. Filter medium resistance decreases

D. Cake resistance decreases

Unsaturated air (with dry bulb temperature and dew point being 35°C and 18°C respectively) is passed through a water spray chamber maintained at 15°C . The air will be cooled _____?

- A. And humidified
- B. And dehumidified with increase in wet bulb temperature
- C. At the same relative humidity
- D. And dehumidified with decrease in wet bulb temperature**

The number of degree of freedom for an Azeotropic mixture of ethanol and water in vapourliquid equilibrium, is _____?

- A. 3
- B. 1**
- C. 2
- D. 0

An increase in the NH_3/CO_2 ratio in urea manufacture results in _____?

- A. Increased degree of conversion of CO_2 to urea**
- B. Decreased degree of conversion of NH_3 to urea
- C. Decreased yield of urea
- D. Decreased specific volume of molten mass

Creep is not exhibited at low temperature by _____?

- A. Rubber
- B. Acrylics
- C. Lead**
- D. Plastics

Velocity of a gas in sound is not proportional to (where, T = Absolute temperature of the gas. P = Absolute pressure of the gas. γ = Ratio of specific

heats (C_p/C_v) ρ = specific weight of the gas) ?

- A. \sqrt{T}
- B. $1/\sqrt{P}$**
- C. \sqrt{y}
- D. $1/\sqrt{\rho}$

Orsat apparatus is meant for _____ ?

- A. Gravimetric analysis of flue gas
- B. Finding out combustion efficiency
- C. Direct determination of nitrogen in flue gas by absorbing it in ammoniacal cuprous chloride
- D. None of these**

If 'x' is the depth of flow in an open channel of large width, then the hydraulic radius is equal to _____ ?

- A. x**
- B. $x/2$
- C. $x/3$
- D. $2x/3$

Faster rate of drying of moulded refractories results in high _____ of refractories?

- A. Green strength
- B. Voids
- C. Shrinkage
- D. Both B. and C.**

Which of the following thermocouples will give the highest output for the same value of hot and cold junction temperature ?

- A. Platinum-platinum + rhodium
- B. Iron-constantan
- C. Chromel-constantan**
- D. All will give the same output

Rate of an autocatalytic chemical reaction is a function of _____?

- A. Temperature only
- B. Pressure only
- C. Composition only
- D. All A., B. and C.**

Henry's law is closely obeyed by a gas, when its _____ is extremely high?

- A. Pressure
- B. Solubility
- C. Temperature
- D. None of these**

For the same feed, feed quality and separation (in a distillation column), with the increase of total pressure, the number of ideal plates will _____?

- A. Increase**
- B. Decrease
- C. Remain same
- D. Data insufficient, can't be predicted

Which one expands on heating ?

- A. Silica bricks**
- B. Fireclay bricks
- C. Both A. & B.
- D. Neither A. nor B.

The ratio of wall drag to total drag in the Stoke's law range is _____?

- A. 0.5

- B. 1
- C. 1/3
- D. 2/3**

Reforming_____?

- A. Uses naphtha as feedstock
- B. Does not much affect the molecular weight of the feed
- C. Improves the quality & yield of gasoline
- D. All A., B. and C.**

Conversion of yellow phosphorous to red phosphorous is done by heating it in covered retorts at _____ °C in absence of air?

- A. 50-80
- B. 250-400**
- C. 1000-1200
- D. 800-900

Which of the following polymers does not belong to the class of Polyacrylate polymer ?

- A. PMMA
- B. Polyacrylonitrile
- C. Poly Ethyl acrylate
- D. None of these**

_____ nozzles are used in continuous casting of steel?

- A. Zircon**
- B. Thoria
- C. Carborundum
- D. Beryllia

The solvent used in liquid extraction should not have high latent heat of vaporisation, because _____?

- A. The pressure drop and hence the pumping cost will be very high

- B. It cannot be recovered by distillation
- C. Its recovery cost by distillation may be prohibitively high**
- D. It will decompose while recovering by distillation

For laminar flow ($NRe < 2100$) in steel pipe, the optimum inside pipe diameter is given by _____?

- A. $D_i, opt = 3.9 Q^{0.36} \rho^{0.18}$**
- B. $D_i, opt = 3.9 Q^{0.45} \rho^{0.23}$
- C. $D_i, opt = 7.6 Q^{0.36} \rho^{0.9}$
- D. $D_i, opt = 3 Q^{0.36} \rho^{1.86} \mu^{0.08}$

Which of the following is correct ?

- A. Rate = Driving force \times Resistance
- B. Driving force = Rate \times Resistance**
- C. Resistance = Driving force \times Rate
- D. Rate = Resistance/Driving force

With increase in temperature, the electrical conductivity of a _____ decreases ?

- A. Semi-conductor**
- B. Metal or alloy
- C. Dielectric
- D. None of these

A constant volume gas thermometer employing _____ is used to measure sub-zero (i.e., $< 0^\circ\text{C}$) temperature?

- A. Helium**
- B. Hydrogen
- C. Nitrogen
- D. None of these

Which of the following material of construction may be recommended by a

chemical engineer for handling a gaseous chlorine (dry or wet) stream in a fluid flow system ?

- A. High silicon iron, silicon rubber, Kel-F and Teflon
- B. Mild steel and stainless steel
- C. Cast iron, tin and aluminium
- D. Copper, nickel and Monel

Naphtha yield in straight run distillation of crude oil may be about _____ percent?

- A. 2
- B. 6
- C. 12
- D. 18

Liquid metal (e.g., molten sodium) is preferred as a coolant in case of a/an _____ reactor?

- A. Homogeneous
- B. Graphite moderated
- C. Fast breeder
- D. Enriched uranium (3% U-235) fuelled

The individual mass transfer co-efficients (moles/m²s) for absorption of a solute from a gas mixture into a liquid solvent are, $K_L = 4.5$ and $K_G = 1.5$. The slope of the equilibrium line is 3. Which of the following resistance (s) is (are) controlling ?

- A. Liquid side
- B. Gas side
- C. Interfacial
- D. Both liquid and gas side

Saturated solution of benzene in water is in equilibrium with a mixture of air and vapours of benzene and water at room temperature and pressure. Mole

fraction of benzene in liquid is x_B and the vapour pressures of benzene and water at these conditions are p_{vB} and p_{vw} respectively. The partial pressure of benzene in air-vapour mixture is _____?

- A. p_{vB}
- B. $x_B \cdot p_{vB}$**
- C. $(P_{atm} - p_{vw})x_B$
- D. $x_B \cdot P_{atm}$

Range of hydrogen gas constant volume thermometer is _____ °C?

- A. -10 to 20
- B. 0 to 100**
- C. 100 – 500
- D. 400 – 1000

I.D. of 1/4" schedule 40 pipe is 0.364". I.D. of a 1/2" schedule 40 pipe would be _____ inch?

- A. 4.728
- B. 0.5
- C. 0.622**
- D. 0.474

The necessary and sufficient condition for equilibrium between two phases is _____?

- A. The concentration of each component should be same in the two phases
- B. The temperature of each phase should be same
- C. The pressure should be same in the two phases
- D. The chemical potential of each component should be same in the two phases**

Most of the centrifugal pumps used in chemical plants are usually _____ driven?

- A. Steam
- B. Diesel engine

C. Electric motor

D. Gas turbine

Steady state equimolar counter diffusion occurs in case of

_____?

A. Leaching

B. Absorption

C. Binary phase distillation

D. Liquid-liquid extraction

Which of the following judges the accuracy of an instrument ?

A. Dead zone

B. Drift

C. Static error

D. None of these

Calcium ammonium nitrate (a fertiliser) is dried in a _____ dryer?

A. Rotary

B. Vacuum

C. Tunnel

D. Tray

Hot dipping process is used for coating a low melting point metal (e.g. Pb, Sn, Zn) on iron, steel & copper having relatively higher melting points. Which of the following is not a hot dipping process ?

A. Galvanising

B. Tinning

C. Sherardizing

D. None of these

At minimum reflux ratio for a given separation _____?

A. Number of plates is zero

B. Number of plates is infinity

- C. Minimum number of the theoretical plates is required
- D. Separation is most efficient

Tea percolation employs _____?

- A. Liquid-liquid extraction
- B. Leaching**
- C. Absorption
- D. None of these

With increase in the ratio of orifice diameter to pipe diameter, the fraction of the orifice pressure differential that is permanently lost _____?

- A. Increases
- B. Decreases**
- C. Remains unchanged
- D. Increases exponentially

Which of the following has the least value of ultimate tensile strength (UTS) ?

- A. Medium carbon steel
- B. High carbon steel
- C. Cast iron**
- D. Wrought iron

Coking time in narrow by-product coke ovens is around _____ hours?

- A. 18**
- B. 48
- C. 8
- D. 80

For spinning viscose rayon, the extrusion spinnerettes are made of

_____?

- A. Platinum or gold alloys**
- B. High carbon steel
- C. Aluminium

D. Nickel

Fast breeder reactors do not _____?

- A. Use Th-232 as fissile fuel
- B. Convert fertile material to fissile material
- C. Use fast neutrons for fission
- D. Use molten sodium as coolant

40 gms each of the methane and oxygen are mixed in an empty container maintained at 40°C. The fraction of the total pressure exerted by oxygen is _____?

- A. 1/2
- B. 1/3
- C. 1/4
- D. 2/3

The equation $f^{-0.5} = 4.07 \log_e (NRe \sqrt{f})^{-0.6}$ is called the _____?

- A. Colebrook formula
- B. Von-Karman equation
- C. Fanning equation
- D. None of these

Pick out the wrong statement ?

- A. In case of heat transfer by purely forced convection, $GR/Re^2 \leq 1$
- B. The equivalent diameter of heat transfer for a duct of square cross-section (having each side as 'x') is equal to 4x
- C. Distillation process is not the same as evaporation
- D. The effectiveness of nucleate boiling depends basically on the ease with which the bubbles are formed and detached from the heating surface

Dearomatization of kerosene (by liquid sulphur dioxide extraction) is done

to _____?

- A. Increase its smoke point
- B. Improve its oxidation stability**
- C. Decrease the breathing loss
- D. None of these

In which of the following unit operations, the selectivity is an important parameter ?

- A. Distillation
- B. Solvent extraction**
- C. Absorption
- D. None of these

Multistage compression of air as compared to single stage compression offers the advantage of _____?

- A. Power saving per unit weight of air delivered
- B. Moisture elimination in the inter-stage cooler
- C. Increased volumetric efficiency
- D. All A , B. & C.**

Ratio of tube length to shell diameter for a shell and tube heat exchanger is _____?

- A. 8 : 1 to 12 : 1 for both liquid-liquid and gas-gas heat exchangers
- B. 4 : 1 to 8 : 1 for liquid-liquid exchanger
- C. < 4 : 1 for gas-gas exchangers
- D. Both B. & C.**

Small dia distillation column can be a _____?

- A. Packed column**
- B. Sieve tray
- C. Bubble cap
- D. Any of these

In panel test for spalling resistance, the average face temperature of panel assembly is maintained at _____ °C for 24 hours?

- A. 700
- B. 1000
- C. 1600**
- D. 2000

McCabe Thiele method used for finding theoretical stages in a distillation column assumes that the _____?

- A. Sensible heat differences are small, because the temperature changes from tray to tray is small
- B. Trouton's rule is applicable
- C. Liquid/vapor loading across the column remains constant
- D. All A., B. and C.**

Shrinkage volume in cement setting does not depend upon the _____?

- A. Sand to cement ratio**
- B. Water to cement ratio
- C. Ambient temperature fluctuation
- D. Drying period

_____ forces act on a particle moving through a stationary fluid?

- A. Gravity
- B. Drag
- C. Buoyant
- D. All A., B., & C.**

The most important application of distribution law is in _____?

- A. Evaporation
- B. Liquid extraction**

- C. Drying
- D. Distillation

Kinetics of a catalytic reaction can be best studied on a/an _____ reactor?

- A. Mixed
- B. Integral (plug flow)
- C. Differential (flow)
- D. Either A., B. and C.**

Efficiency of a Carnot engine working between temperatures T_1 and T_2 ($T_1 < T_2$) is _____?

- A. $(T_2 - T_1)/T_2$**
- B. $(T_2 - T_1)/T_1$
- C. $(T_1 - T_2)/T_2$
- D. $(T_1 - T_2)/T_1$

1 torr is equal to _____ mm Hg column?

- A. 1**
- B. 0.1
- C. 10
- D. 1000

Main constituent of cotton fiber is _____?

- A. Lignin
- B. Cellulose**
- C. Starch
- D. Gelatine

Pick out the correct equation ?

- A. $jH = (St)(Pr)^{2/3} = f/2$**
- B. $jH = (St)(Pr)^{1/3} = f/2$
- C. $jH = (St)^{2/3}(Pr) = f/2$

D. $jH = (St)^{1/3}(Pr) = f/2$

Carbon percentage (by weight) in crude petroleum may be about _____?

- A. 65
- B. 75
- C. 85**
- D. 95

“Overfire burning” in a furnace is a phenomenon characterised by the _____?

- A. Supply of excess fuel
- B. Supply of excess air
- C. Burning of carbon monoxide and other incombustibles in upper zone of furnace by supplying more air**
- D. None of these

The purpose of adding Na_2CO_3 to water of low alkalinity is to _____?

- A. Permit the use of alum as a coagulant**
- B. Increase the softening capacity of zeolite
- C. Facilitate easy regeneration of zeolite
- D. All A , B. and C.

Gasoline yield in catalytic reforming of naphtha may be about _____ percent by weight?

- A. 85**
- B. 65
- C. 50
- D. 98

'Cryogenics' is concerned with the generation & use of low temperature in the range of _____?

- A. 0°K to 123°K
- B. 0°C to – 123°C
- C. 0°C to – 273°C
- D. 0°K to 273°K

Thermal efficiency of blast furnace stoves used for heating blast (air) may be about _____ percent?

- A. 20
- B. 40
- C. 60
- D. 80

In a distillation column, the minimum residence time for liquid in the downspout is about _____ seconds?

- A. 1
- B. 8
- C. 80
- D. 180

Water hammer is caused, when water flowing in a pipe is suddenly brought to rest by closing the valve. The extent of pressure thus produced due to water hammer depends on the _____?

- A. Pipe length
- B. Fluid velocity in the pipe
- C. Time taken to close the valve
- D. All A., B. and C.

Molar heat capacity of water in equilibrium with ice at constant pressure is _____?

- A. 0

- B. ∞
- C. 1
- D. None of these

Main constituent of phosphate rock is _____?

- A. Ammonium phosphate
- B. Flour apatite**
- C. Calcium fluoride
- D. Calcium phosphate

The liquid used for the washing of coal in an industrial coal washery is a mixture of water and _____?

- A. Carbon tetrachloride
- B. Sand (40%)**
- C. Mineral oil of high viscosity & specific gravity (1.6)
- D. None of these

Lead _____?

- A. Is the hardest metal in common use
- B. Is the lightest metal in common use
- C. Cannot be scratched by finger nails
- D. Cannot be work hardened**

Cold crushing strength of refractories depends upon its _____?

- A. Composition
- B. Texture
- C. Firing temperature
- D. All A., B. and C.**

For a perfectly transparent surface (like gases), the _____?

- A. Absorptivity = 0
- B. Transmissivity = 1**
- C. Reflectivity = 0

D. All A., B. & C.

Screen capacity is proportional to (where, S = screen aperture) _____?

- A. S
- B. 1/S
- C. S²
- D. √S

Throttling (Joule-Thomson effect) process is a constant _____ process?

- A. Enthalpy
- B. Entropy
- C. Pressure
- D. None of these

(CH₃ C₆ H₄)₃ PO₄ is the chemical formula of _____?

- A. Triple superphosphate
- B. Tricresyl phosphate
- C. Fluorapatite
- D. Superphosphate

What type of motion the fluid element undergoes, when it changes from one position to another position, such that the angle between the two sides changes ?

- A. Rotation
- B. Translation
- C. Linear deformation
- D. Angular deformation

In forced circulation, the heating element is injected _____?

- A. Internally

- B. Externally
- C. Both A. and A.
- D. Neither A. nor B.

The falling rate period in the drying of a solid is characterised by _____?

- A. Increase in rate of drying
- B. Increasing temperatures both on the surface and within the solid**
- C. Decreasing temperatures
- D. None of these

Bulk density of pulverised coal may be about _____ kg/m³?

- A. 100
- B. 500**
- C. 1000
- D. 1500

On opening the door of an operating refrigerator kept in a closed room, the temperature of the room will _____?

- A. Increase**
- B. Decrease
- C. Remain same
- D. Increase in summer and will decrease in winter

18/8 steel is a/an _____ stainless steel ?

- A. Austenitic**
- B. Ferritic
- C. Martensitic
- D. None of these

Laboratory glass wares which reacts with hydrofluoric acid, are made of the _____ glass?

- A. Lead

B. Borosilicate

- C. Soda lime
- D. Alkali silicate

For flow through a venturi at a particular discharge, the correct relationships among heads at points X, Y, and Z are _____?

- A. $h_1 > h_2 < h_3$**
- B. $h_1 > h_2 > h_3$
- C. $h_2 < h_1 < h_3$
- D. $h_1 < h_2 < h_3$

In case of absorption & stripping, the interface of the liquid & gas phases are present in equilibrium, when the diffusional resistance of _____ is zero?

- A. Interface**
- B. Gas phase
- C. Liquid phase
- D. All A , B. & C.

Oxidation of SO_2 to SO_3 is favoured by _____?

- A. Low temperature and low pressure
- B. Low temperature and high pressure**
- C. High temperature and low pressure
- D. High temperature and high pressure

In a size reduction crushing operation, feed size is 100 to 300 mm. while the product size is 10 to 50 mm. This is a case of the _____ crushing?

- A. Primary
- B. Secondary**
- C. Fine
- D. Ultrafine

Pick out the correct statement?

- A. A lower temperature favours the reaction of lower activation energy
- B. The dispersion number for a reactor/vessel is uL/D
- C. The rate controlling step in a reaction involving many steps is the fastest step
- D. Pore volume and porosity of a catalyst is measured by Brunauer-Emmett-Teller (BET) technique

Waste/polluted water discharged from electroplating, blast furnace and coal mining industries contain mainly _____ substances?

- A. Radioactive
- B. Organic
- C. Inorganic
- D. None of these

Which of the following is an inorganic polymer ?

- A. Teflon
- B. Perspex
- C. Silicones
- D. Bakelite

Exposure to SO_2 containing chimney gases results in the _____?

- A. Reduction in strength of leather & cloth
- B. Acceleration of corrosion rates of metals
- C. Increased drying & hardening time of paints
- D. All A., B. and C.

In case of the irreversible unimolecular type, first order reaction, the fractional conversion at any time for constant volume system as compared to variable volume system is _____?

- A. More
- B. Less
- C. Same
- D. Either A. or B., depends on other factors

Use of molten metal as a coolant in fast breeder reactor helps in _____?

- A. Rapid heat transfer from the core
- B. Accelerating the reaction rate in the core
- C. Breeding neutrons
- D. Accelerating the neutrons

_____ is the process used for setting up compressive stresses in the surface of a metal to improve its fatigue strength ?

- A. Lancing
- B. Shot peening
- C. Slugging
- D. Spinning

Lead is added to 60:40 brass primarily to improve _____?

- A. Machinability
- B. Corrosion resistance
- C. Fluidity
- D. Strength

In the design of a shell and tube heat exchanger, the corrosion allowance _____?

- A. Need not be provided for non-pressure parts like tie rods, spacers, baffles, supports etc.
- B. For carbon steel and cast iron pressure parts is 1.5 mm (except for tubes) and for severe conditions it is 3 mm
- C. For internal cover and tube sheet is provided on both the sides
- D. All A., B. & C.

The frequency response of a first order system, has a phase shift with lower and upper bounds given by _____?

- A. $-\infty, \pi/2$

- B. $-\pi/2, \pi/2$
- C. $-\pi/2, 0$
- D. $0, \pi/2$**

The vapor pressure of liquids of similar chemical nature at any particular temperature _____ with increase in the molecular weight?

- A. Increases
- B. Decreases**
- C. Remains unchanged
- D. Either A. or B.; depends on the liquid

For the same residence time, which one will give the maximum conversion ?

- A. Single stirred tank ($v = 5$ litres)
- B. Two stirred tank (each of 2.5 litres) in series
- C. Stirred tank followed by tubular flow reactor (each of 2.5 litres)
- D. Single tubular flow reactor ($v = 5$ litres)**

The excess energy of the reactants required to dissociate into products is known as the _____ energy?

- A. Thermal
- B. Activation**
- C. Threshold
- D. Binding

Thermal neutrons which are used to cause the fission of U-235 have energy _____ eV?

- A. < 0.025**
- B. > 1
- C. 1-25
- D. > 200

A stirred tank reactor compared to tubular-flow reactor

provides _____?

- A. More uniform operating conditions
- B. Permits operation at the optimum temperature for a long reaction time
- C. Higher overall selectivity for a first order consecutive reaction
- D. All A., B. and C.**

Gaseous diffusion co-efficient increases with increase in the _____?

- A. Pressure
- B. Temperature**
- C. Both A. & B.
- D. Neither A. nor B.

The activity of pure hydrogen gas at 1000°C and 5 atm pressure _____?

- A. Is always less than 1
- B. Is always greater than 1
- C. Can be 5
- D. Depends on the choice of the standard state**

Ebonite is a/an _____?

- A. Highly vulcanised rubber**
- B. Natural rubber
- C. Unvulcanised raw rubber
- D. Adhesive

With increase in the temperature of pure (distilled) water, its _____?

- A. pOH decreases and pH increases
- B. pOH and pH both decreases**
- C. pH and pOH both increases
- D. pH decreases and pOH increases

Which of the following is a polymer of Hexamethylene diamine and adipic acid ?

- A. Nylon-6
- B. Nylon-66**
- C. Nylon-6, 10
- D. Epoxy resin

In a shell and tube heat exchanger for a given heat transfer surface area, smaller diameter tubes are favoured as compared to larger diameter ones; because the smaller diameter tubes _____?

- A. Are easier to clean
- B. Are less prone to fouling
- C. Can be fitted into a smaller shell diameter hence the cost of the heat exchanger would be less**
- D. None of these

Aromatics have the highest _____ of all the hydrocarbons of same carbon atoms?

- A. Smoke point
- B. Octane number**
- C. Cetane number
- D. Viscosity

Pick out the undesirable property for a solvent meant for dewaxing of lube oil ?

- A. Complete miscibility with oil
- B. High solubility of wax in the solvent
- C. Both A. and B.**
- D. Neither A. nor B.

As particle size is reduced _____?

- A. Screening becomes progressively more difficult**
- B. Screening becomes progressively easier
- C. Capacity and effectiveness of the screen is increased
- D. None of these

In the formation of cermets, the ratio of ceramic material to metallic material is usually 80:20. Which of the following is a cermet ?

- A. Zirconia
- B. Alumina
- C. Bakelite
- D. Tungsten carbide**

Catalyst used in the catalytic converter employed in automobiles to convert CO into CO₂ and for complete oxidation of un-burnt hydrocarbons is _____ ?

- A. Nickel
- B. Cobalt
- C. Vanadium
- D. Platinum**

The effect of changing the evaporator temperature on COP as compared to that of changing the condenser temperature (in vapour compression refrigeration system) is _____ ?

- A. Less pronounced
- B. More pronounced**
- C. Equal
- D. Data insufficient, can't be predicted

In sewage treatment, its sedimentation is speeded up by commonly adding _____ ?

- A. Hydrochloric acid
- B. Lime**
- C. Copper sulphate
- D. Sodium sulphate

Which of the following has no effect on the carbide forming tendency in steels ?

- A. Molybdenum
- B. Phosphorus**
- C. Chromium
- D. Vanadium

Atomic _____ is a whole number for an element?

- A. Number**
- B. Weight
- C. Radius
- D. None of these

Maximum safe working temperature for fireclay bricks is about _____ °C?

- A. 1150
- B. 1300
- C. 1450
- D. 1550**

Which of the following is used for pumping crude oil from oil well ?

- A. Single stage centrifugal pump
- B. Gear pump
- C. Screw pump
- D. Duplex/triplex reciprocating pump**

Ore concentration by froth floatation utilises the _____ of ore particles ?

- A. Density difference
- B. Wetting characteristics**
- C. Terminal velocities
- D. None of these

Potential flow is characterised by the _____?

- A. Irrotational and frictionless flow**
- B. Irrotational and frictional flow

- C. One in which dissipation of mechanical energy into heat occurs
- D. Formation of eddies within the stream

Mixing mechanism employed in a pan mixer is by _____?

A. Mulling

- B. Kneading
- C. Dispersion
- D. None of these

Equilibrium constant decreases as the temperature _____?

A. Increases, for an exothermic reaction

- B. Decreases, for an exothermic reaction
- C. Increases, for an endothermic reaction
- D. None of these

According to Reynolds analogy, Stanton number is equal to (where, f = Fanning friction factor) ?

- A. $2f$
- B. f
- C. $f/2$**
- D. $f/4$

A manometer measures the _____ pressure?

- A. Atmospheric
- B. Absolute
- C. Gauge**
- D. None of these

Zircaloy used as a fuel cladding material in a nuclear reactor (thermal) is an alloy of zirconium _____?

A. Tin, nickel, iron and chromium

- B. And graphite
- C. And copper

D. None of these

Two gas based fertiliser plants are located in India are _____?

- A. Maharashtra and Gujarat**
- B. Maharashtra and Orissa
- C. Gujarat and Madhya Pradesh
- D. Jharkhand and Chhattisgarh

Extremely large or small volumes of fluids are generally best routed through the shell side of a shell and tube heat exchanger, because of the _____?

- A. Less corrosion problems
- B. Flexibility possible in the baffle arrangement**
- C. Low pressure drop
- D. High heat transfer co-efficient

The most suitable material for die casting is _____?

- A. Iron
- B. Copper**
- C. Steel
- D. Nickel

Pressure of CO₂ gas (which is a coolant) in the Calder-Hall nuclear reactor is _____ kgf/cm²?

- A. 0.2
- B. 7**
- C. 35
- D. 50

Pick out the wrong statement ?

- A. Proportional controller is normally used for level control in industrial applications
- B. CSTR can be considered as a distributed parameter system**
- C. Distributed parameter approach gives partial differential equation

D. Non-linear behaviour is exemplified by an on-off controller

Carbon/hydrogen ratio (by weight) is maximum (out of following) for _____?

- A. Gasoline
- B. Kerosene
- C. Light gas oil
- D. Heavy fuel oil

Pick out the wrong conversion formula for the conversion of weight units ?

- A. 1 tonne = 1000 kg = 22.046 lbs
- B. 1 U.S. ton = 907 kg = 0.907 tonne = 0.893 ton
- C. 1 ton = 2240 lbs = 1016 kg = 1.016 tonnes = 1.12 U.S. tons
- D. None of these

Rate determining step in a reaction consisting of a number of steps in series is the _____ step?

- A. Fastest
- B. Slowest
- C. Intermediate
- D. Data insufficient; can't be predicted

Major component of flint glass is _____?

- A. Lead oxide
- B. Silica
- C. Alumina
- D. Soda

_____ heat exchanger is also known as 'hair pin type' exchanger?

- A. Double pipe
- B. Finned
- C. Plate type
- D. Regenerative

Most commonly used rubber vulcanisation agent is _____?

- A. Sulphur
- B. Bromine
- C. Platinum
- D. Alumina

When the density of the reaction mixture is constant in a chemical reaction, the ratio of the mean residence time to space time is _____?

- A. > 1
- B. < 1
- C. 1
- D. 0

One ton of refrigeration capacity is equivalent to the heat removal rate of _____?

- A. 50 kcal/hr
- B. 200 BTU/hr
- C. 200 BTU/minute
- D. 200 BTU/day

Glauber's salt is chemically ?

- A. Calcium sulphate
- B. Potassium sulphate
- C. Potassium chlorate
- D. None of these

How much O₂ can be obtained from 90 kg of water ?

- A. 32 kg
- B. 80 kg
- C. 64 kg
- D. 90 kg

One poise (unit of absolute/dynamic viscosity) is equivalent to one _____?

- A. gm/cm². sec
- B. gm/cm. sec**
- C. cm²/sec
- D. m²/sec

Pick out the wrong statement ?

- A. The expansion of a gas in vacuum is an irreversible process
- B. An isometric process is a constant pressure process**
- C. Entropy change for a reversible adiabatic process is zero
- D. Free energy change for a spontaneous process is negative

In a gas-liquid absorption column, for obtaining the maximum absorption efficiency _____?

- A. Liquid stream should be distributed uniformly
- B. Gas stream should be distributed uniformly
- C. Both gas as well as liquid streams should be distributed uniformly**
- D. By passing should be completely avoided

Answer: Option C

Which of the following variables affects the furnace capacity ?

- A. Temperature of flue gas
- B. Thermal conductivity of stock
- C. Thickness of heating stock
- D. All A., B. and C.**

Nickel as a material of construction _____?

- A. Is used as an alloying element for both ferrous & non-ferrous alloys**
- B. Is paramagnetic below 415° C (its Curie temperature)
- C. Diamagnetic
- D. Has a body centred cubic (bcc) crystal lattice structure

Positive deviation from Raoult's law means a mixture whose total pressure is _____?

- A. Greater than that computed for ideality
- B. Less than that computed for ideality
- C. Less than the sum of the vapour pressure of the components
- D. None of these

Dew point of a gas-vapour mixture _____?

- A. Increases with temperature rise
- B. Decreases with temperature rise
- C. Decreases with decrease in pressure
- D. Increases with increase in pressure

Number of macrocomponents present in coal according to Stopes are _____?

- A. Four
- B. Five
- C. Six
- D. Two

Semibatch reactor is preferred, when a/an _____?

- A. A highly exothermic reaction is to be controlled
- B. Undesirable side reaction (at high concentration of one of the reactants) is to be avoided
- C. A gas is to be reacted with liquid (e.g. hydrogenation of fat)
- D. All A., B., and C.

The reason why a catalyst increases the rate of reaction is that, it _____?

- A. Decreases the energy barrier for reaction
- B. Increases the activation energy
- C. Decreases the molecular collision diameter
- D. None of these

Pick out the wrong statement?

- A. The nucleus of a hydrogen atom is identical with a proton
- B. A, β -ray particle is identical with an electron
- C. Mass of an electron is about 1/1800th of the lightest nucleus
- D. Positron is heavier than a proton**

Mass velocity is independent of temperature & pressure, when the flow is _____?

- A. Unsteady through unchanged cross-section
- B. Steady through changing cross-section
- C. Steady and the cross-section is unchanged**
- D. Unsteady and the cross-section is changed

Which of the fluid forces are not considered in the Reynold's equation of flow ?

- A. Viscous forces
- B. Turbulent forces
- C. Pressure forces
- D. Compressibility forces**

An electric furnace producing heat by means of an electric arc struck between each of three electrodes and the charge is called _____ furnace?

- A. Resistance
- B. Arc**
- C. Low frequency induction
- D. None of these

All thermoplastic, thermosetting & elastic materials can be processed in a extrusion machine, however it cannot be used for the production of plastic _____?

- A. Filaments
- B. Pipes
- C. Buckets**

D. Tubings

Which of the following would not be a suitable material of construction for handling aqueous hydrofluoric acid (HF) at 100°C ?

- A. Monel
- B. Stainless steel**
- C. Graphite
- D. Kel-F and Teflon

The calorific value of a gas of composition CO₂ = 20%, H₂ = 50%, CH₄ = 30%, is y. If the composition of gas is changed to H₂ = 50%, CH₄ = 30%, CO₂ = 10%, N₂ = 10%, then the calorific value will be _____?

- A. y**
- B. 0.95 y
- C. 1.05 y
- D. 1.8 y

Which of the following is not used as a surface active agent in a flocculation operation ?

- A. Sodium silicate
- B. Quartz**
- C. Lime
- D. Alumina

The unit of conductance in SI unit is _____?

- A. W/m
- B. W/m²
- C. W/°K**
- D. W/m°K

Pick out the wrong statement pertaining to the use of valve tray, seive tray and bubble cap trays in continuous distillation column ?

- A. Bubble cap trays though most expensive are the best in situations, where low vapour rates is to be handled and a positive liquid seal is essential at all flow rates
- B. Murphree efficiency of all the three trays are nearly equal, however the peak efficiency is generally higher for sieve and valve trays than the bubble cap
- C. Maintenance cost for valve and sieve trays are comparatively more than bubble cap tray due to their relatively complicated construction features**
- D. Valve trays have the highest turn down ratio (i.e. the ratio of the highest to the lowest vapour flow rates) and thus provide the maximum flexible operating range

Most easily and cheaply available fibrous raw material for paper manufacture available in India is bamboo. The yield of pulp produced from fibrous raw material by mechanical process is about _____ percent?

- A. 75
- B. < 10**
- C. > 30
- D. 50

Refractories used in/for _____ should have low thermal conductivity?

- A. Coke ovens
- B. Insulation**
- C. Regenerators
- D. Muffle furnaces

10 to 30% magnesite is added to Chromite to produce chrome-magnesite refractories. Magnesite addition is mainly done to improve the _____ of Chromite?

- A. Spalling resistance**
- B. Refractoriness
- C. Crushing strength
- D. Resistance to slag

Concentration of sulphide ores is done usually by _____?

- A. Roasting
- B. Smelting
- C. Froth floatation**
- D. Electromagnetic separation

Glycerine is recovered from lye by _____?

- A. Evaporation followed by vacuum distillation**
- B. Liquid extraction technique
- C. Extractive distillation technique
- D. None of these

_____ catalytic reaction is involved in the thermal cracking of gas oil ?

- A. Homogeneous**
- B. Non-Homogeneous
- C. Heterogeneous
- D. Non-Heterogeneous

The rate of a gas phase reaction is given by $K \cdot C_A \cdot C_B$. If the volume of the reaction vessel is reduced to 1/4th of its initial volume, then the reaction rate compared to the original rate will be _____ times?

- A. 4
- B. 16**
- C. 8
- D. 2

White flue gas (resembling steam) coming out of the chimney of a thermal power plant indicates that the fuel used in the boiler furnace is _____?

- A. Tar
- B. Coke oven gas**

- C. Pitch
- D. Pulverised coke

Scaling of furnace stock is reduced by _____ in flue gas?

- A. CO
- B. H₂
- C. High CO/CO₂
- D. All A., B. & C.**

Penetration model (theory) for mass transfer was enunciated by _____?

- A. Danckwerts
- B. Toor and Marcello
- C. Higbie**
- D. Kissinevskii

The heating capacity of muffle furnace depends on the _____?

- A. Surface area & emissivity of the stock
- B. Properties of the muffle wall (temperature, area, and emissivity)
- C. Both A. & B.**
- D. Neither A. nor B.

The dimension of diffusivity is same as that of the _____?

- A. Density
- B. Molal concentration
- C. Kinematic viscosity**
- D. Velocity head

Moisture loss is determined by the _____?

- A. Humidity of combustion air
- B. Moisture content of fuel
- C. Both A. and B.**
- D. The water formed by combustion reaction

In which mode of heat transfer, the Biot number is important ?

- A. Transient heat conduction**
- B. Natural convection
- C. Forced convection
- D. Radiation

A highly elastic material is deformed least on loading and retains its original form on removal of the load. Which of the following is the most elastic material ?

- A. Steel**
- B. Glass
- C. Rubber
- D. Brass

With increase in _____ Knocking tendency in a spark ignition petrol engine decreases?

- A. Supercharging
- B. Wall temperature
- C. Compression ratio
- D. Engine speed**

Extensive properties of a thermodynamic system depend upon the _____ of the system?

- A. Specific volume
- B. Temperature
- C. Mass**
- D. Pressure

Aluminium alloy is one of the most suitable materials of construction for aircrafts mainly due to its _____?

- A. High strength to weight ratio**

- B. Low temperature strength properties
- C. Its ability to be cast, rolled, forged & stamped
- D. High strength and corrosion & oxidation-resistance at elevated temperature

The ratio of inertial forces to viscous forces is called the _____ number?

- A. Weber
- B. Mach
- C. Froude
- D. Reynold**

Pick out the wrong statement ?

- A. In drying a solid containing moisture above the critical moisture content the number of degrees of freedom is 2
- B. Sherwood number in mass transfer corresponds to Nusselt number in heat transfer and Schmidt number to Prandtl number
- C. Forced convection is relatively more effective in increasing the rate of mass transfer, if Schmidt number is larger**
- D. Hot gases at moderate pressure are usually in the shell side of shell and tube heat exchangers. At higher pressure, however, it is customary to put gas in the tube side

Alcohol is dehydrated using _____ distillation?

- A. Extractive
- B. Azeotropic**
- C. Steam
- D. Molecular

The main drawback of supplying more excess air in the combustion of fuel is the _____?

- A. Excessive power requirement of air blower
- B. Enhanced sensible heat loss in the flue gas**
- C. Intermittent and uncontrolled combustion of the fuel
- D. High exit flue gas temperature from the furnace

Neutrons are present in all atoms except that of _____?

- A. He
- B. C
- C. H**
- D. Ar

Upto what value of 'Mach number', a fluid may be considered as incompressible ?

- A. 0.03
- B. 0.3**
- C. 3
- D. 10

Pick out the wrong statement ?

- A. The controlling resistance in case of heating of air by condensing steam is in the air film
- B. The log mean temperature difference (LMTD) for counter flow and parallel flow can be theoretically same when any one of the fluids (hot or cold fluid) passes through the heat exchanger at constant temperature
- C. In case of a 1 – 2 shell and tube heat exchanger, the LMTD correction factor value increases sharply, when a temperature cross occurs**
- D. Phase change in case of a pure fluid at a given pressure from liquid to vapor or vice-versa occurs at saturation temperature

Energy consumed for crushing one ton of material ranges from _____ kWh?

- A. 0.01 to 0.1
- B. 0.5 to 1.5**
- C. 2 to 3.5
- D. 4 to 5

When larger particles e.g., grains are subjected to fluidisation, the

corresponding bed produced is termed as the _____ bed?

- A. Spouted
- B. Sluggish
- C. Boiling
- D. Teeter

Alcohol is produced by the _____ ?

- A. Oxidation of an aldehyde
- B. Hydrolysis of an ether**
- C. Esterification of a fat
- D. None of these

With increase in compression ratio, the volumetric efficiency of air compressor _____ ?

- A. Increases**
- B. Decreases
- C. Remain same
- D. May increase or decrease (depends on the suction pressure)

Diffusion in concentrated solutions differs from that in dilute solutions, because of the change in the _____ with the concentration of the solution?

- A. Degree of ideality
- B. Viscosity
- C. Both A & B**
- D. Neither A nor B

Naphthenic acid is represented by _____ ?

- A. $C_nH_{2n+2}O_2$
- B. $C_nH_{2n-2}O_2$**
- C. $C_nH_{2n+2}O_2$ ($n \geq 6$)
- D. $C_nH_{2n+6}O_2$ ($n \leq 6$)

Waste heat from the outgoing flue gases in a thermal power plant is recovered

by a/an _____?

- A. Economiser
- B. Steam superheater
- C. Air preheater
- D. All A., B. and C.**

Circular cross section machine parts which are symmetrical about the axis of rotation are made by hot _____?

- A. Piercing
- B. Spinning**
- C. Drawing
- D. Extrusion

A reactor having a salvage value of Rs. 10000 is estimated to have a service life of 10 years. The annual interest rate is 10%. The original cost of the reactor was Rs. 80000. The book value of the reactor after 5 years using sinking fund depreciation method will be Rs _____?

- A. 40,096
- B. 43,196
- C. 53,196
- D. 60,196**

Artificially produced radioactive isotopes are used for _____?

- A. Power generation
- B. Treatment of certain diseases**
- C. Initiating nuclear fission and fusion
- D. All A., B. and C.

In case of an _____ process, the temperature of the system increases?

- A. Isothermal compression
- B. Isothermal expansion

C. Adiabatic expansion

D. Adiabatic compression

Pressure co-efficient is the ratio of pressure forces to _____ forces?

A. Gravity

B. Inertial

C. Viscous

D. None of these

In a shell and tube heat exchanger, putting a longitudinal baffle across the shell, forces the shell side fluid to pass _____ through the heat exchanger?

A. Once

B. Twice

C. Thrice

D. Four times

Nuclear fuel usually used in a Boiling Water Reactor (BWR) is _____?

A. Plutonium

B. Enriched uranium

C. Natural uranium

D. Thorium

Nuclides having the same atomic numbers are termed as _____?

A. Isotopes

B. Isomers

C. Isotones

D. Isobars

Dilute sulphuric acid is transported in _____ pipes?

- A. Mild steel
- B. Lead**
- C. Copper
- D. Special alloys

Which one of the following is not an elastomer ?

- A. Polyisoprene
- B. Neoprene
- C. Nitrile-butadiene
- D. None of these**

A steel member used in the furnace construction to take the thrust of the brickwork is called _____ ?

- A. Buckstay**
- B. Breast wall
- C. Armouring
- D. Baffle

The difference in one unit of Rockwell hardness number corresponds to a difference in the depth of indentation of _____ mm ?

- A. 0.001
- B. 0.01
- C. 0.002**
- D. 0.02

Threshold limit value (TLV) i.e., the maximum permissible safe limit of phosgene gas which Hitler used to use to kill his enemies in 'gas chamber' is about _____ ppm?

- A. < 1**
- B. 10-100
- C. 100-200
- D. 100-1000

Galvanic corrosion cannot be prevented by _____?

- A. Cathodic protection
- B. Anodic protection**
- C. Usage of largest possible anodic area
- D. Any one of these

Which of the following types of nuclear reactors is most prone to radioactive hazards ?

- A. Pressurised water reactor
- B. Gas cooled reactor
- C. Molten sodium cooled reactor
- D. Boiling water reactor**

Cassiterite is an ore of _____?

- A. Tin**
- B. Lead
- C. Molybdenum
- D. Chromium

_____ mills fall in the category of tumbling mills ?

- A. Ball and pebble
- B. Rod and tube
- C. Compartment
- D. All A., B. & C.**

Consider the equilibrium $A(g) + B(g) = AB(g)$. When the partial pressure of A is 10^{-2} atm, the partial pressure of B is 10^{-3} atm and the partial pressure of AB is 1 atm, the equilibrium constant 'K' is _____?

- A. 10 atm^{-1}
- B. 105 atm^{-1}**
- C. 10 (dimensionless)
- D. 105 (dimensionless)

Noise level inside a jet airliner in normal flight is about _____ decibels?

- A. 80
- B. 100**
- C. 125
- D. 150

Oil is hydrogenated using nickel catalyst in a _____ reactor?

- A. Batch
- B. Slurry**
- C. Fluidised bed
- D. Fixed bed

Cellulose is the main constituent of most _____ fibres?

- A. Acrylic
- B. Spandex
- C. Synthetic
- D. Natural**

Which of the following fuel gases contains maximum amount of carbon monoxide ?

- A. Coke oven gas
- B. Water gas
- C. Blast furnace gas
- D. L.D. converter gas**

C_v is given by _____ ?

- A. $(\partial E / \partial T)_V$**
- B. $(\partial E / \partial V)_T$
- C. $(\partial E / \partial P)_V$
- D. $(\partial V / \partial T)_P$

The Stoke's stream function applies to the _____ ?

- A. Irrotational flow only
- B. Ideal/non i viscous fluids only
- C. Cases of axial symmetry**
- D. None of these

Sugar content in sugarcane on cane basis is about _____ percent by weight ?

- A. 1 to 5
- B. 5 to 10**
- C. 15 to 20
- D. 20 to 30

Which is the most suitable fertiliser for paddy ?

- A. CAN
- B. Ammonium sulphate**
- C. Ammonium nitrate
- D. Superphosphate

Liquefied Petroleum Gas (LPG) is mainly a mixture of _____?

- A. Propane & butane**
- B. Methane & ethane
- C. High boiling olefins
- D. High boiling naphthenes

Depreciation _____?

- A. Costs (on annual basis) are constant when the straight line method is used for its determination
- B. Is the unavoidable loss in the value of the plant, equipment and materials with lapse in time
- C. Does figure in the calculation of income tax liability on cash flows from an investment
- D. All A, B. and C.**

A psychrometer does not measure the _____ temperature of

moist air?

- A. Dew point
- B. Dry bulb
- C. Wet bulb
- D. None of these

Pick out the wrong statement ?

- A. The chemical potential of a pure substance depends upon the temperature and pressure
- B. The chemical potential of a component in a system is directly proportional to the escaping tendency of that component

C. The chemical potential of ith species (μ_i) in an ideal gas mixture approaches zero as the pressure or mole fraction (x_i) tends to be zero at constant temperature

D. The chemical potential of species 'i' in the mixture (μ_i) is mathematically represented as, $\mu_i =$

$\partial(nG)/\partial n_i]_{T,P,n_j}$ where, n, n_i and n_j respectively denote the total number of moles, moles of ith

species and all mole numbers except ith species. 'G' is Gibbs molar free energy

If three pipes of different diameters, lengths & friction factors are connected in parallel, then (where, Q = flow rate, V = fluid velocity f = friction factor). ?

- A. $Q = Q_1 + Q_2 + Q_3$
- B. $V_1 = V_2 = V_3$
- C. $Q_1 = Q_2 = Q_3$
- D. $f = f_1 + f_2 + f_3$

Faraday's law of electrolysis is related to the _____?

- A. Cation speed
- B. Atomic number of the cation
- C. Equivalent mass of the electrolyte**
- D. None of these

Which is a continuous furnace ?

- A. Coke ovens
- B. Annealing furnace
- C. Glass tank furnace**
- D. None of these

Which of the following flow-metering instruments is an areameter ?

- A. Venturimeter
- B. Rotameter**
- C. Pitot tube
- D. Hot wire anemometer

Absolute zero, pressure will occur, when the molecular momentum of the system becomes zero. A liquid will cease to exist as liquid at _____?

- A. High vacuum
- B. Zero pressure**
- C. 0°K
- D. Earth's centre

An ejector is used to _____?

- A. Increase pressure
- B. Increase temperature
- C. Remove condensate
- D. None of these**

Which of the following is never used as an element of industrial resistance thermometer ?

- A. Lead**
- B. Nickel
- C. Copper
- D. 30% iron + 70% nickel

High excess air in combustion of fuels results in _____?

- A. Increased fuel consumption**

- B. Incomplete combustion
- C. Smoky flame
- D. None of these

Catalytic ammonia synthesis reaction as in Haber's process

is _____?

- A. Endothermic
- B. Exothermic**
- C. Irreversible
- D. None of these

Which oil is preferred for paint manufacture ?

- A. Drying oil**
- B. Non-drying oil
- C. Semi-drying oil

'Lang factor' is defined as the ratio of the capital investment to the delivered cost of major equipments. The value of 'Lang factor' for fixed capital investment, for a solid-fluid processing chemical plant ranges from ?

- A. 1.2 to 1.4
- B. 2.5 to 2.7
- C. 4.2 to 4.4**
- D. 6.2 to 6.4

Pick out the wrong statement ?

- A. Different solids have different equilibrium moisture curves
- B. Total condenser or reboiler is considered equivalent to one theoretical plate in McCabe-Thiele method of theoretical plate calculation for distillation column
- C. Heat removal load on cooler remains constant, even with increase of the reflux ratio in a distillation column**
- D. Even a forced draft cooling tower cannot cool water below the wet bulb temperature

_____ mills are termed as disintegrators?

- A. Cage
- B. Compartment
- C. Pebble
- D. All tumbling

For an unstable equilibrium of a floating body (where, M = metacentre.) ?

- A. M is above G
- B. M is below G**
- C. M & G coincide
- D. None of these

The value of $N_A/(N_A + N_B)$ for steady state molecular diffusion of gas 'A' through nondiffusing gas 'B' is _____?

- A. 1**
- B. ∞
- C. 0.5
- D. 2

The flow of a liquid through tapering pipe at a constant rate is an example of _____ flow?

- A. Steady uniform
- B. Steady non uniform**
- C. Unsteady uniform
- D. Unsteady non uniform

Pick out the wrong statement ?

- A. Both annealing and normalising release the internal stresses of the material besides improving the mechanical properties
- B. Low carbon steel does not respond to the heat treatment for hardening of the material, hence it

is subjected to case hardening or surface hardening processes like cyaniding, carburising, nitriding etc., which produces high carbon outer layers resulting in increase of surface hardness

C. Induction hardening and flame hardening techniques are also used for surface hardening

D. Martempering of a material is a hardening process

Pick out the wrong statement?

A. Eosin requirement in tallow soap is about 40-50% which fastens the lather formation, softens

the hard soaps and increases its cleansing action

B. Soap powder is prepared by mixing soap with hydrated sodium carbonate

C. Detergents differ from soaps in their action in hard water

D. Tarnish inhibitor (e.g., Benzotriazole) is added in soap to facilitate the removal of stains due

to tea, blood etc

Which of the following is a characteristic of an ideal plug flow reactor ?

A. Axial dispersion

B. Flat velocity profile

C. Uniform mixing

D. None of these

One mole of methane undergoes complete combustion in a stoichiometric amount of air. The reaction proceeds as $\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$. Both the reactants and products are in gas phase. $\Delta H^\circ_{298} = -730$ kJ/mole of methane.

Mole fraction of water vapour in the product gases is

about _____?

A. 0.19

B. 0.33

C. 0.40

D. 0.67

Refractive index of a petrofuel which is the ratio of velocity of light in air to its velocity in the petrofuel gives an indication if its _____?

- A. Molecular weight
- B. Aromatics content
- C. Both A. & B.**
- D. Neither 'a' nor 'b'

Co-efficient of thermal expansion of glass is decreased by the addition of _____ during its manufacture?

- A. CaO
- B. MnO₂
- C. ZnO**
- D. FeS

In closed circuit grinding as compared to open circuit grinding, the _____?

- A. Specific surface of product is more
- B. Product has lesser size uniformity
- C. Production rate at a given limiting size is lower
- D. Operation is economical**

'Safe limit' called Threshold Limit Value (TLV) of carbon monoxide in atmospheric air is < 50 ppm. The main source of carbon monoxide pollutant in air is the _____?

- A. Industrial chimney exhaust
- B. Automobiles exhaust**
- C. Photochemical reaction in polluted atmosphere
- D. Burning of domestic fuel

Pick out the wrong statement about a streamline ?

- A. It is always parallel to the main direction of the fluid flow**
- B. It is a line across which there is no flow and it is equivalent to a rigid boundary

- C. Streamlines intersect at isolated point of zero velocity and infinite velocity
- D. The fluid lying between any two streamlines can be considered to be in isolation and the streamline spacing varies inversely as the velocity

The atmospheric temperature during melting of ice/snow (in the atmosphere) _____?

- A. Decreases**
- B. Increases
- C. Remain same
- D. May increase or decrease; depends on the altitude where snow melts

A _____ evaporator employs an annular downtake?

- A. Basket type**
- B. Horizontal
- C. Long tube vertical
- D. None of these

Bubble cap diameter used for the distillation column having diameter ranging from 1.5 to 4.5 metres is about _____ mm?

- A. 10
- B. 50
- C. 100**
- D. 200

Which of the following is not classified as a thermo electric pyrometer ?

- A. Resistance thermometer
- B. Thermocouple
- C. Optical pyrometer (disappearing filament type)**
- D. Radiation pyrometer

Test piece for determination of RUL of a refractory is heated in a/an _____?

- A. Oxidising atmosphere

- B. Reducing atmosphere
- C. Electric furnace**
- D. Neutral atmosphere

The hardest material just prior to diamond in Mohs scale is _____?

- A. Topaz
- B. Carborundum
- C. Corundum**
- D. Calcite

Silicon percentage in silicon steel used for electrical equipments is about _____?

- A. 1
- B. 4.0**
- C. 8
- D. 14

Use of catalyst is a must in the ammonia manufacture, because the reaction is reversible as well as the heat of dissociation of N_2 & H_2 is high. The presence of promoter along with the catalyst helps in _____ of the catalyst?

- A. Stabilisation
- B. Increasing the effectiveness
- C. Improving the strength & heat resistance
- D. All A, B & C**

Typical static submergence for bubble cap plate column operating at atmospheric pressure may be around _____?

- A. 2.5"
- B. 0.5"**
- C. 5"
- D. 50% of the plate spacing

Molten phthalic anhydride is stored in a/an _____ vessel?

- A. Aluminium
- B. Nickel clad steel
- C. Lead lined steel
- D. Glass lined steel

Which of the following is not a recuperative furnace ?

- A. Soaking pit
- B. Reheating furnace
- C. Steam boiler
- D. **Coke oven**

In the reaction, $H_2 + I_2 \rightleftharpoons 2HI$, addition of an inert gas will _____?

- A. Increase the partial pressure of H_2
- B. Increase the partial pressure of I_2
- C. Increase the total pressure and hence shift the equilibrium towards the right
- D. **Not affect the equilibrium conditions**

_____ does not change during phase transformation processes like sublimation, melting & vaporisation?

- A. Entropy
- B. **Gibbs free energy**
- C. Internal energy
- D. All (A), B. & (C)

The Fourier number (defined as $a.t/L^2$) is used in the analysis of problem involving heat transfer by _____?

- A. Forced convection
- B. Natural convection
- C. **Transient conduction**
- D. Steady state conduction

Caprolactam, a raw material for the manufacture of nylon-6, is produced from _____?

- A. Phenol
- B. Naphthalene
- C. Benzene**
- D. Pyridine

Good quality of edible salt is obtained from brine by the process of _____?

- A. Solar evaporation
- B. Vacuum evaporation**
- C. Freeze drying
- D. Electrolysis

Octane number (unleaded) of gasoline produced by isomerisation of butane may be about _____?

- A. 45
- B. 55
- C. 70**
- D. 90

In high temperature carbonisation of coal compared to low temperature carbonisation ?

- A. Yield of ammonia is less
- B. Aromatic content of tar is low
- C. H₂ content in the coke oven gas is more**
- D. Calorific value of the coke oven gas is lower

Fuel used in B.F. stove is _____?

- A. Pulverised coal
- B. Furnace oil

C. Blast furnace gas/mixed gas

D. Coke oven gas

Highest melting (m.p = 3070°C) oxide refractory is _____?

A. Alumina

B. Thoria

C. Zirconia

D. Magnesia

Addition of filter aid to the slurry before filtration is done to _____ of the cake?

A. Increase the porosity

B. Increase the compressibility co-efficient

C. Decrease the porosity

D. Decrease the compressibility co-efficient

Carbon tetrachloride (CCl₄) is the starting raw material for the manufacture of _____?

A. Trichloroethylene

B. Perchloroethylene

C. Parathion

D. Methanol

A gas mixture of three components is brought in contact with a dispersion of an organic phase in water. The degree of freedom of the system is _____?

A. 3

B. 4

C. 5

D. 6

Percentage elongation of a material is a measure of its

_____?

- A. Ductility
- B. Brittleness
- C. Toughness
- D. Malleability

The purpose of providing bleed points in the evaporator is to _____?

- A. Admit the feed
- B. Remove the product
- C. Facilitate removal of non-condensable gases
- D. Create vacuum

Slurries can be most conveniently pumped by a _____ pump?

- A. Screw
- B. Reciprocating
- C. Gear
- D. Centrifugal

With increase in the mass velocity of the gas, the rate of drying during the constant rate period _____, if the conduction and radiation through the solid are negligible ?

- A. Increases
- B. Decreases
- C. Remain same
- D. Increases linearly

Yield of elemental phosphorous from rock phosphate is about _____ percent?

- A. 1-2
- B. 15-25
- C. 40-45

D. 60-65

The energy equation, $E + (p/\rho) + (V^2/2g) + gZ = \text{constant}$ ($E = \text{internal energy/mass}$), is applicable to _____?

- A. Perfect gases only
- B. Isothermal flow of gases
- C. Adiabatic unsteady flow of gases
- D. All compressible fluids**

Fusion point of an acidic refractory material is _____?

- A. Increased by the addition of basic oxides
- B. Reduced by the addition of basic oxides**
- C. Not affected by the addition of basic oxides
- D. Always more than 2500°C

Styrene which is a monomer for the production of polystyrene, is commercially produced by the _____?

- A. Catalytic dehydrogenation of ethyl benzene**
- B. Dehydration of ethyl alcohol followed by hydrogenation
- C. Reacting ethylene oxide with acetaldehyde
- D. Fermentation of starch

Work hardening of a material _____?

- A. Decreases its tensile strength
- B. Decreases its ductility**
- C. Increases its ductility
- D. Does not affect its ductility

Thermal diffusivity is the most important in heat transfer by _____?

- A. Conduction**
- B. Radiation
- C. Condensation

D. Natural convection

In _____ process, ions of salts react with water to produce acidity or alkalinity ?

A. Hydration

B. Hydrolysis

C. Electrolysis

D. Dialysis

Pick out the one which is not a chemical coagulant ?

A. Aluminium sulphate

B. Ferrous sulphate

C. Hydrated lime

D. Chloramine

In an ordinary chemical plant, electrical installation cost may be about _____ ?

A. 10-15% of purchased equipment cost

B. 3-10% of fixed capital investment

C. Either A. or B.

D. Neither A. nor B.

Cellulose content in bamboo fibre is about _____ percent?

A. 10

B. 20

C. 50

D. 85

Which of the following is the most common type of baffle used in industrial shell and tube heat exchanger ?

A. 75% cut segmental baffle

B. 25% cut segmental baffle

C. Orifice baffle

D. Disk and doughnut baffle

Spontaneous combustion of coal on storage results due to _____?

- A. Inadequate ventilation
- B. Low temperature oxidation
- C. Storage in large heaps with small surface to volume ratio
- D. All A., B. and C.**

During sewage treatment, the sewage is subjected to _____ treatment in Imhoff tank?

- A. Filtration
- B. Digestion
- C. Sedimentation
- D. Both B. and C.**

Brass valves are usually made for pipe sizes _____ inches?

- A. ≤ 1
- B. ≤ 2**
- C. > 2.5
- D. > 3.5

A coal having high amount of volatile matter _____?

- A. Would require smaller combustion chamber
- B. Produces very little of tar and gas on carbonisation
- C. Ignites easily and burns with long smoky flame
- D. All A., B. and C.**

During a reversible isothermal expansion of an ideal gas, the entropy change is _____?

- A. +ve**
- B. 0
- C. -ve

D. ∞

Joule-Thomson co-efficient is the ratio of _____?

- A. Pressure change to temperature change occurring during adiabatic compression of a gas
- B. Pressure change to temperature change occurring during adiabatic throttling of a gas
- C. Temperature change to pressure change occurring during adiabatic compression of a gas
- D. Temperature change to pressure change occurring during adiabatic throttling of a gas**

Branched chain polymers compared to linear polymers have higher _____?

- A. Density
- B. Tensile strength
- C. Melting point
- D. Degree of irregularity in atomic packing**

Pick out the wrong statement ?

- A. Electrical conductivity of refractory is not important, when these are to be used in electrical furnaces**
- B. Graphite and metals are the good electrical conductor among the refractories and others are all electrical insulators
- C. Refractories used for lining electrical furnaces should ordinarily have very low electrical conductivity
- D. Electrical conductivity of porous refractory material is low

Hydrogen can be _____?

- A. Used in I.C. engines as fuel
- B. Liquefied & stored under cryogenic conditions
- C. Produced by electrolysis of water
- D. All (A), B. & C.**

Radioactive substances present in the polluted water stream can be removed

by _____?

- A. Biological oxygen treatment
- B. Coagulation and filtration
- C. Adsorption in ion exchange materials**
- D. None of these

Which of the following processes is absent in glass manufacturing process ?

- A. Sintering**
- B. Annealing
- C. Shaping or forming
- D. Melting

Thermal pyrolysis of ethylene dichloride produces _____?

- A. Trichloroethylene
- B. Vinyl chloride**
- C. Ethanol amine
- D. Ethylene oxide

Cumulative analysis for determining surface is more precise than differential analysis, because of the _____?

- A. Assumption that all particles in a single fraction are equal in size
- B. Fact that screening is more effective
- C. Assumption that all particles in a single fraction are equal in size, is not needed**
- D. None of these

Compressibility co-efficient for an absolutely compressible cake is _____?

- A. 0
- B. 1**
- C. 0 to 1
- D. ∞

Major sources of noise in furnace operation arises from air inspirators,

combustion, side wall vibrations and fluctuation in the process heat load. A 50% increase in fuel firing rate may increase the furnace noise level by about _____ decibels?

- A. 3
- B. 30
- C. 7
- D. 70

For series reaction, the relative yield _____?

- A. Is always greater for plug-flow reactor than for the single CSTR of the same volume
- B. Statement in A. is wrong
- C. Decreases with increasing conversion
- D. Both A. and C. hold good**

Pick out the wrong statement ?

- A. In a static mass of liquid, the pressure at a point is the same for all liquids**
- B. Pressure decreases exponentially with elevation in an isothermal atmosphere
- C. Atmospheric pressure = absolute pressure – gage pressure
- D. As per Pascal's law, the pressure at a point in a static or uniformly moving fluid is equal in all directions

What is the ratio of adiabatic compressibility to isothermal compressibility ?

- A. 1
- B. < 1**
- C. > 1
- D. >> 1

Unit operation involved in the prilling of urea is _____?

- A. Evaporation
- B. Drying
- C. Crystallisation
- D. Both B. and C.**

Which of the following fastening devices has a head at one end and a nut fitted to the other ?

- A. Bolt
- B. Stud**
- C. Top bolt
- D. None of these

Filling of gas from a high pressure cylinder into small bottles is an example of a/an _____ process?

- A. Equilibrium
- B. Adiabatic
- C. Steady
- D. Unsteady**

To remove dirt from the flowing fluid, we use a _____?

- A. Coagulant
- B. Gravity settler
- C. Strains**
- D. Clarifier

Which of the following is not concerned with the fluid-particle interaction ?

- A. Drag co-efficient
- B. Froude number
- C. Galileo number
- D. Weber number**

A batch reactor is characterised by _____?

- A. Constant residence time
- B. Variation in extent of reaction and properties of the reaction mixture with time**
- C. Variation in reactor volume
- D. Very low conversion

Addition of _____ in steel is helpful in increasing the depth of hardness?

- A. Chromium**
- B. Sulphur
- C. Vanadium
- D. Tungsten

Enzymes (a protein) are catalysts found in organisms. Its efficiency of catalysing a reaction is due to its capacity to lower the activation energy of the reaction.

The enzyme ptyalin used for food digestion is present in _____?

- A. Blood
- B. Saliva**
- C. Intestine
- D. Gland

When a catalyst increases the rate of forward reaction, the value of rate constant _____?

- A. Increases**
- B. Decreases
- C. Remain same
- D. Becomes infinite

Gas yield in the Kopper-Totzek coal gasifier is about _____ Nm³/ton coal (ash = 35%)?

- A. 150
- B. 1500**
- C. 3500
- D. 5000

Function of fusible plug in a boiler is to _____?

- A. Drain out water and sludge from the boiler during repair

- B. Put off fire in the furnace when water level in the boiler falls to unsafe limit**
C. Guard the boiler in case of abnormal rise in steam pressure
D. All A, B. & C

Scouring is a finishing operation during the manufacture of fibre, which aims at _____ of fibres?

- A. Improving the stretchability
B. Dyeing/colouring
C. Detergent solution washing
D. Glycol soaking

Ammonia present in the coke oven gas is removed by washing with _____?

- A. Caustic solution
B. Dilute ammoniacal liquor
C. Dilute HCl
D. Ethanolamine

During coal carbonisation process, the conversion of semi-coke to coke is accompanied by an increase in the _____ of the mass?

- A. Density**
B. Porosity
C. Electrical resistivity
D. None of these

High density refractory bricks have lower _____?

- A. Spalling resistance**
B. Thermal conductivity
C. Fusion point
D. Slag penetration resistance

At a fixed total pressure, humidity depends only on the

_____?

- A. Partial pressure of vapour in the mixture**
- B. Heat capacity of the vapour
- C. Density of the vapour
- D. None of these

Comparing sulphate process with sulphite process, we find that _____ in the later ?

- A. Both temperature & pressure in the former is less than that
- B. Both temperature & pressure in the former is more than that**
- C. Temperature is more in the former whereas pressure is more
- D. Pressure is more in the former whereas temperature is less

LMTD correction factor is used in heat exchanger design for _____?

- A. Double pipe heat exchanger
- B. Multipass shell and tube heat exchanger
- C. Fouling fluids
- D. Counter flow of hot and cold fluids**

Boiling point of a non-homogeneous mixture of immiscible liquids is _____ that of any one of its separate components?

- A. Lower than**
- B. Higher than
- C. Equal to
- D. Either A. or B.; depends on the liquids

Super conduction in metals is observed at a temperature of _____ °K?

- A. <100
- B. >100**
- C. About 273

D. About 373

Height of coke oven is limited (say maximum upto 7 metres) mainly by the _____?

- A. Problem of uniform heating along its height
- B. Structural strength of silica bricks
- C. Problem in door cleaning
- D. Buckling of ram of pusher car at the time of coke pushing

As per the world health organisation (WHO) specification, the maximum permissible concentration (i.e., TLV) of particulate matter in air is _____ $\mu\text{g}/\text{m}^3$. (μg -microgram)?

- A. 10
- B. 90
- C. 800
- D. 750

Unit of mass velocity is _____?

- A. $\text{kg}/\text{m}\cdot\text{hr}$
- B. $\text{kg}/\text{m}^2\cdot\text{hr}$
- C. kg/hr
- D. kg/m^2

Pick out the wrong statement?

- A. When the concentration difference for the mass transfer becomes zero at the bottom of the gas absorption tower, then the upper end of the operating line touches the equilibrium curve
- B. The average distance between the operating line and equilibrium line is large, when the liquid/gas ratio is also large in case of a counter current gas absorption tower
- C. The operating line lies above the equilibrium curve in case of a gas desorber
- D. With decrease in the liquid flow rate for a fixed gas flow rate, the slope of the operating line

decreases, in case of gas absorption process

Minimum possible diameter of a packed column is decided mainly by the _____?

- A. Flooding**
- B. Gas viscosity
- C. Liquid density
- D. Liquid hold up

The retention time of material in a rotary dryer depends upon its _____?

- A. rpm
- B. Slope & length
- C. Flights arrangement
- D. All A., B. and C.**

The minimum temperature to which the water can be cooled in a cooling tower is the _____ temperature of air?

- A. Ambient
- B. Dry bulb
- C. Dew point**
- D. Wet bulb

Cocks are used to control _____?

- A. Water
- B. Any liquid**
- C. Solids
- D. None of these

The density of a liquid is 1500 kg/m^3 . Its value in gin/litre will be equal to _____?

- A. 1.5

- B. 15
- C. 150
- D. 1500**

Which of the following solutions will follow Raoult's law most closely ?

- A. A solution of benzene, toluene and o-xylene**
- B. 35% solution of camphor in water
- C. 35% solution of NH₃ in water
- D. A solution of polar organic compounds (not of homologue of a series)

Inhalation of silica dust by human being during hand drilling in mica mining, lead & zinc mining, silica refractory manufacture and in foundries causes _____ ?

- A. Asphyxiation (suffocation)
- B. Shortness of breath
- C. Tuberculosis
- D. All A., B. and C.**

Open pan evaporators are preferred to be used, when the solution to be concentrated is _____ ?

- A. Scaling
- B. Highly viscous**
- C. Corrosive
- D. Salty

Normalising of an object does not _____ ?

- A. Refine coarse grain structure obtained during hot working
- B. Improve ductility**
- C. Improve yield strength
- D. Improve mechanical properties

Detergent solution is dried to a powder in a _____ ?

- A. Spray dryer**

- B. Spouted bed dryer
- C. Tunnel dryer
- D. Pan open to atmosphere

Pick out the wrong statement ?

- A. The vessel dispersion number (D/UL) for plug flow and mixed flow approaches zero and infinity respectively
- B. Space time in a flow reactor is a measure of its capacity and is equal to the residence time when the density of reaction mixture is constant
- C. Mixed reactor is always smaller than the plug flow reactor for all positive reaction orders for a particular duty**
- D. In an ideal tubular flow reactor, mixing takes place in radial direction and there is no mixing in longitudinal direction

10% oleum comprises of 10% free _____ ?

- A. SO_2
- B. H_2SO_3
- C. SO_3**
- D. H_2SO_4

Which of the following rock favors petroleum formation?

- A. Sedimentary rock**
- B. Igneous rock
- C. Metamorphic rock
- D. None of these

Properties of a polymer is affected by the _____ ?

- A. Chain length
- B. Intermolecular forces
- C. Both A. and B.**
- D. None of these

Permanent hardness of water can be removed by _____?

- A. Boiling
- B. Adding $\text{Ca}(\text{OH})_2$
- C. Boiling it with Na_2CO_3**
- D. None of these

Normally, the length to diameter ratio of rotary dryers varies from 4 to 10 and for its economic operation; the number of transfer units (NTU) for such dryers varies from ?

- A. 1.5-2.5**
- B. 3.5-5.5
- C. 7.5-10.0
- D. 10-15

The Knudsen diffusivity is proportional to (where, T = absolute temperature) _____?

- A. \sqrt{T}**
- B. T^2
- C. T
- D. T^4

Pick out the wrong statement?

- A. Higher temperature is employed in visbreaking than in thermal cracking**
- B. Pyrolysis is a mild thermal cracking process
- C. Lead susceptibility of petrol produced by catalytic process is more than that produced by thermal cracking
- D. Operating pressure and temperature in thermal cracking process is more than that in catalytic cracking process

Fourdrinier machine is used in the manufacture of _____?

- A. Sugar
- B. Paper**

- C. Alcohol from molasses
- D. Phenol formaldehyde

Handling of ashes and similar materials can be done best by a _____ conveyor?

- A. Flight
- B. Drag or slat**
- C. Belt
- D. Ribbon

Selectivity of the solvent used in solvent extraction should be) _____?

- A. 1
- B. > 1**
- C. < 1
- D. 0

Which of the following curves shows the effect of temperature on the extent of gas-solid adsorption at a given pressure ?

- A. Langmuir adsorption isotherm
- B. Adsorption isobar**
- C. Freundlich adsorption isotherm
- D. None of these

Concentration of sugar solution can be determined by the _____?

- A. Polarimetry**
- B. Flame photometry
- C. Emission spectroscopy
- D. Oscillometry

Pick out the correct statement ?

- A. 1 kcal/hr.m.°C is equal to 1 BTU/hr. ft.°F
- B. In steady state heat conduction, the only property of the substance which determines the temperature distribution, is the thermal conductivity**
- C. In unsteady state heat conduction, heat flows in the direction of temperature rise
- D. In heat transfer by forced convection, Grashoff number is very important

Mass flow of granular solid (M) through a circular opening of dia, D follows _____?

- A. $M \propto \sqrt{D}$
- B. $M \propto D^2$
- C. $M \propto D^3$**
- D. $M \propto D$

Generation of heat by friction is an example of a/an _____ change?

- A. Isothermal
- B. Irreversible**
- C. Adiabatic
- D. Reversible

Condensation polymerisation of _____ produces Bakelite?

- A. Propylene
- B. Phenol & formaldehyde**
- C. Phenol & acetaldehyde
- D. Urea & formaldehyde

A nuclear reactor can't be used for _____?

- A. The production of radioisotopes
- B. Supplying intense fields or beams of neutron for scientific experiments
- C. Marine ship propulsion
- D. None of these**

Joule-Thomson co-efficient is defined as _____?

- A. $\mu = (\partial P / \partial T)H$
- B. $\mu = (\partial T / \partial P)H$**
- C. $\mu = (\partial E / \partial T)H$
- D. $\mu = (\partial E / \partial P)H$

Which of the following fuels is generally not used in thermal power plant boiler firing ?

- A. Furnace oil, light diesel oil and tar/PCM
- B. Pulverised coking coal**
- C. Coal middling from washeries
- D. B.F. gas, coke oven gas and L.D. converter gas

Smoke point of kerosene is the _____ ?

- A. Time after which smoking starts on burning
- B. Temperature at which smoking starts**
- C. Maximum height of flame (in mm) without causing smoking, when burnt in a standard lamp
- D. None of these

One Newton is equal to _____ dynes?

- A. 102
- B. 103
- C. 104
- D. 105**

Which of the following set of conditions is favourable for the maximum yield of ammonia by Haber's process ?

- A. High pressure, low reactants concentration, high temperature
- B. High pressure, low reactants concentration, low temperature
- C. High pressure, high reactants concentration, low temperature**
- D. Low pressure, high reactants concentration, low temperature

Which of the following phenomenon/ phenomena is/are diffusion controlled ?

- A. Dislocation climb
- B. Cross-slip
- C. Twinning
- D. Recrystallisation**

A catalyst in a chemical reaction _____?

- A. Decreases the activation energy
- B. Alters the reaction mechanism
- C. Increases the frequency of collisions of reacting species
- D. All A., B. and C.**

Thickness of the frame of a plate and frame filter as compared to that of plates is _____?

- A. Less
- B. Same
- C. More**
- D. Either A. or B.

A Carnot cycle consists of the following steps ?

- A. Two isothermal and two isentropic**
- B. Two isobaric and two isothermal
- C. Two isochoric and two isobaric
- D. Two isothermals and two isochoric

The vapour pressure of water is given by, in $P_{\text{sat}} = A - (5000/T)$, where A is a constant, P_{sat} is the vapour pressure in atm. and T is the temperature in K. The vapor pressure of water in atm. at 50°C is approximately _____?

- A. 0.07
- B. 0.09
- C. 0.11
- D. 0.13**

The heat of neutralisation remains constant, when there is a reaction between

dilute solutions of strong _____?

- A. Base and strong acid
- B. Base and weak acid
- C. Acid and weak base
- D. None of these

Rate of low temperature oxidation of coal due to bad storage conditions _____?

- A. Decreases with increase in surface area
- B. Does not vary with increase in surface area
- C. Is more for low volatile coal compared to high volatile coal
- D. Is accelerated by storage in large heaps with small surface to volume ratio**

Vacuum maintained in the vacuum distillation tower of the crude distillation plant is about _____ mm Hg (absolute)?

- A. 5-10
- B. 30-80**
- C. 150-250
- D. 350-400

Density of low density polythene is about _____ gm/c.c?

- A. 0.38
- B. 0.56
- C. 0.81
- D. 0.91**

Reaction of _____ acid with phosphate rock produces superphosphates?

- A. Hydrochloric
- B. Sulphuric**
- C. Nitric
- D. Phosphoric

Vinyl flooring is done using _____ sheets?

- A. Polypropylene
- B. PVC**
- C. Polythene
- D. Polyvinyl acetate

Flue gas outlet temperature from the chimney of any furnace should be ideally about _____ °C?

- A. 50
- B. 100
- C. 150**
- D. 250

_____ pumps are axial flow pumps?

- A. Turbine
- B. Propeller**
- C. Diffuser
- D. None of these

The minimum carbon content in steel should be _____ percent for it to respond to a hardening treatment ?

- A. 0.2**
- B. 0.4
- C. 0.6
- D. 0.8

Adipic acid is an intermediate in the manufacture of _____ ?

- A. Perspex
- B. Nylon-66**
- C. Polystyrene
- D. Bakelite

The thermodynamic law, $PV^\gamma = \text{constant}$, is not applicable in case

of _____?

- A. Ideal compression of air
- B. Free expansion of an ideal gas**
- C. Adiabatic expansion of steam in a turbine
- D. Adiabatic compression of a perfect gas

Dimension of kinematic viscosity is _____?

- A. MLT⁻¹
- B. L²T⁻¹**
- C. L²T
- D. L²T⁻²

Fanning friction factor is equal to (where, f_B = Blasius friction factor) ?

- A. $f_B/4$**
- B. $f_B/2$
- C. $4f_B$
- D. $2f_B$

Drinking (potable) water treatment does not involve _____?

- A. Coagulation
- B. Sedimentation
- C. Softening**
- D. Disinfection

Suppose that the gain, time constant and dead time of a process with the following transfer function: $G_c(s) = 10 \exp(-0.1s)/(0.5s + 1)$ are known with a possible error of $\pm 20\%$ of their values. The largest permissible gain K_c of a proportional controller needs to be calculated below taking the values of process gain, time constant and dead time as _____?

- A. 8, 0.6, 0.08
- B. 12, 0.6, 0.12**
- C. 8, 0.6, 0.12

D. 12, 0.4, 0.08

Of the pressure vessels, with same thickness but different diameters, which one withstands higher pressure ?

- A. Larger dia vessel
- B. Smaller dia vessel**
- C. Larger dia long vessel
- D. Strength of the vessel is same irrespective of the diameter

Solvay process is not used for the manufacture of potassium carbonate, because of the reason that potassium bicarbonate ?

- A. Is prone to thermal decomposition
- B. Has high water solubility and is unstable
- C. Is soluble in ammonium chloride and potassium chloride solution**
- D. All A , B. and C.

For the non-catalytic reaction of particles with surrounding fluid, the time needed to achieve the same fractional conversion for particles of different but unchanging sizes is proportional to the square of particle diameter, when the _____ is the controlling resistance?

- A. Film diffusion
- B. Diffusion through ash layer**
- C. Chemical reaction
- D. Either A., B. or C.

Working principle of manometer comprises of balancing a column of liquid against the pressure to be measured. Inclined tube manometer is especially used for the measurement of _____ pressure?

- A. Small differential**
- B. Atmospheric
- C. Absolute
- D. Gage

Foot valves are provided in the suction line of a centrifugal pump to _____?

- A. Avoid priming, every time we start the pump**
- B. Remove the contaminant present in the liquid
- C. Minimise the fluctuation in discharge
- D. Control the liquid discharge

Fusion of limestone and _____ produces high alumina cement?

- A. Sand
- B. Bauxite**
- C. Quicklime
- D. Calcite

The ratio of % total carbon obtained in the ultimate analysis of coke and % fixed carbon obtained in the proximate analysis is always _____?

- A. 1
- B. < 1
- C. > 1**
- D. Unpredictable

Typical solvent polymerisation reaction conditions for the production of high density polythene by Zeigler process is _____?

- A. 7 kgf/cm² and 70 °C**
- B. 1000 kgf/cm² and 100°C
- C. 7 kgf/cm² and 700°C
- D. 1 kgf/cm² (gage) and 70°C

Which is a regenerative furnace ?

- A. Coke oven heating chamber
- B. Open hearth furnace
- C. Both A. and B.**
- D. Neither A. nor B.

Blasting of tri-nitro-toluene (TNT) is done by mixing it with ammonium _____?

- A. Nitrate
- B. Sulphate
- C. Carbonate
- D. Chloride

Which of the following undergoes granular fracture ?

- A. Wrought iron
- B. Steel
- C. Cast iron
- D. None of these

Three materials A, B and C of equal thickness and of thermal conductivity of 20, 40 & 60 kcal/hr. m. °C respectively are joined together. The temperature outside of A and C are 30°C and 100°C respectively. The interface between B and C will be at a temperature of _____ °C?

- A. 40
- B. 95
- C. 70
- D. 50

Pasteurisation of milk means _____?

- A. Removal of fatty and albuminous substance from it
- B. Killing of organisms present in it by heating it at controlled temperature without changing its natural characteristics
- C. Inhibiting the growth of micro-organisms without killing them
- D. None of these

The dust collection efficiency of electrostatic precipitator increases with

increase in the _____?

- A. Gas flow rate
- B. Electrode area**
- C. Both A. & B.
- D. Neither A. nor B.

Rotary driers are generally made of _____?

- A. Cast iron
- B. Mild steel**
- C. High silicon iron (14% Si)
- D. Tin lined with refractory bricks

Which of the following equipments is not used in liquid-liquid extraction ?

- A. Pachuka tank**
- B. Agitated vessels
- C. Centrifugal extractors
- D. Packed towers

Mass spectrometer is used for the composition analysis of _____?

- A. Alloys
- B. Solids
- C. Isotopes**
- D. None of these

The linear thermal expansion of _____ bricks upto 1000 °C is very low of the order of ≤ 0.5 percent?

- A. Fireclay**
- B. Silica
- C. Magnesite
- D. Corundum

The conversion XA and residence time data are collected for zero order liquid

phase reaction in a stirred tank reactor. Which of the following will be a straight line ?

- A. X_A Vs η
- B. X_A Vs $\ln \eta$
- C. $X_A/(1 - X_A)$ Vs η
- D. $X_A(1 - X_A)$ Vs η

20% oleum means that in 100 kg oleum, there are 20 kg of _____?

- A. **SO₃ and 80kg of H₂SO₄**
- B. H₂SO₄ and 80kg of SO₃
- C. SO₃ for each 100 kg of H₂SO₄
- D. None of these

Drag co-efficient for flow past immersed body is the ratio of _____ to the product of velocity head and density?

- A. Shear stress
- B. Shear force
- C. **Average drag per unit projected area**
- D. None of these

Corona discharge is related to the operation of a/an _____?

- A. Induction motor
- B. **Electrostatic precipitator**
- C. Fast breeder reactor
- D. Magneto hydrodynamic generator (MHD)

A gas can be liquefied by pressure alone only, when its temperature is _____ its critical temperature?

- A. Less than
- B. More than

- C. Equal to or higher than
- D. Less than or equal to**

The partial pressure distribution of an ideal gas diffusing through another stagnant ideal gas at steady state follows a/an _____ law?

- A. Exponential**
- B. Parabolic
- C. Linear
- D. Cubic

Indirect contact heat exchangers are preferred over direct contact heat exchangers, because _____?

- A. Heat transfer co-efficient are high
- B. There is no risk of contamination**
- C. There is no mist formation
- D. Cost of equipment is lower

For high conversion in a highly exothermic solid catalysed reaction, use a _____ bed reactor?

- A. Fixed
- B. Fluidised bed reactor followed by a fixed**
- C. Fixed bed reactor followed by a fluidised
- D. Fluidised

Coal is pulverised before burning in large capacity boiler furnaces mainly to _____

- A. Ensure its complete combustion**
- B. Facilitate easy ash removal
- C. Enhance its calorific value
- D. Provide trouble free operation

Correction is applied to LMTD for _____ flow?

- A. Parallel
- B. Counter
- C. Cross**
- D. None of these

Maraging steels derive their strength from the following mechanism ?

- A. A fine, highly dislocated and strong martensite**
- B. Fine dispersions of inter-metallic of Fe, Ni, Ti etc
- C. Fine dispersions of alloy carbides in a ferrite matrix
- D. Fine dispersions of Fe₃C nucleated on dislocations in austenite

Which of the following units is not present in both the vapor compression refrigeration system and absorption refrigeration system ?

- A. Expansion valve
- B. Condenser
- C. Refrigerator
- D. Compressor**

1 gm mole of methane (CH₄) contains _____?

- A. 6.02×10^{23} atoms of hydrogen
- B. 4 gm atoms of hydrogen**
- C. 3.01×10^{23} molecules of methane
- D. 3 gms of carbon

When one of the fluids is highly corrosive and has fouling tendency, it should _____?

- A. Preferably flow inside the tube for its easier internal cleaning**
- B. Preferably flow outside the tube
- C. Flow at a very slow velocity
- D. Flow outside the tube, when the flow is counter-current and inside the tube when the flow is co-current

Activity co-efficient is a measure of the _____?

- A. **Departure from ideal solution behaviour**
- B. Departure of gas phase from ideal gas law
- C. Vapour pressure of liquid
- D. None of these

Water hammer in a pipeline results from the _____?

- A. Bursting of pipelines due to closure by a valve
- B. **Rapid pressure change due to a rapid change in the rate of flow**
- C. Pressure increase due to closure of a valve resulting in decrease in rate of flow
- D. None of these

The change in Gibbs free energy for vaporisation of a pure substance is _____?

- A. Positive
- B. Negative
- C. **Zero**
- D. May be positive or negative

How many phases are present at eutectic point ?

- A. 2
- B. 1
- C. **3**
- D. unpredictable

Conversion increases with increase in temperature in case of a/an _____ reaction?

- A. Autocatalytic
- B. Irreversible
- C. **Reversible endothermic**
- D. Reversible exothermic

Viscosity of water is about _____ times that of air at room

temperature?

- A. 15
- B. 55**
- C. 155
- D. 1050

For a _____ order reaction, the units of rate constant and rate of reaction are the same ?

- A. Zero**
- B. First
- C. Second
- D. Fractional

Osmotic pressure of a dilute solution of a non volatile solute in a solvent obeying Raoult's law is proportional to the _____?

- A. Temperature**
- B. Volume of solution
- C. Moles of non-volatile solute
- D. None of these

Maximum allowable noise exposure limits for a man working for 8 hours a day in a noisy chemical plant is about _____ decibels?

- A. 20
- B. 60
- C. 90**
- D. 120

The activity co-efficient of a solution, which accounts for the departure of liquid phase from ideal solution behaviour _____?

- A. Measures the elevation in boiling point
- B. Is not dependent on the temperature
- C. Is a function of the liquid phase composition**

D. Measures the depression in freezing point

Pick out the wrong statement?

A. Heat capacity of a diatomic gas is higher than that of a monatomic gas

B. Equal volumes of Argon and Krypton contain equal number of atoms

C. Total number of molecules contained in 22.4 litres of hydrogen at NTP is 6.023×10^{23}

D. The binary mixture of a particular composition in both vapor and liquid state is known as an azeotropic mixture

Water is flowing through a series of four tanks and getting heated as shown in figure. It is desired to design a cascade control scheme for controlling the temperature of water leaving the tank 4 as there is a disturbance in the temperature of a second stream entering the tank 2. Select the best place to take the secondary measurement for the second loop?

A. Tank 1

B. Tank 2

C. Tank 3

D. Tank 4

Purpose of air lift pump is to _____?

A. Compress air

B. Lift compressed air

C. Lift water from a well by using compressed air

D. Lift air under negative pressure

In case of turbulent flow of a Newtonian fluid in a straight pipe, the maximum velocity is equal to (where, V_{avg} = average fluid velocity)?

A. V_{avg}

B. $1.2 V_{avg}$

C. $1.5 V_{avg}$

D. $1.8 V_{avg}$

In flue gas analysis by Orsat's apparatus, carbon monoxide is absorbed by _____?

- A. Cuprous chloride
- B. Potassium hydroxide
- C. Alkaline pyrogallol solution
- D. None of these

In a gas-liquid shell and tube heat exchanger, the _____?

- A. Presence of a non-condensable gas decreases the condensing film co-efficient
- B. Gases under high pressure are routed through the tube side, because high pressure gases are corrosive in nature
- C. Gases to be heated/cooled is normally routed through the shell side, because the corrosion caused by the cooling water or steam condensate remain localised to the tubes
- D. All A, B. & C.

Heat load in a cooling tower _____?

- A. Means the amount of heat thrown away (KCal/hr.) by the cooling tower
- B. Is equal to the number of kg, of water circulated times the cooling range
- C. Both A. & B.
- D. Neither A. nor B.

Fluid motion in the natural convection heat transfer between a solid surface and a fluid in contact with it, results from the _____?

- A. Existence of thermal boundary layer
- B. Temperature gradient produced due to density difference
- C. Buoyancy of the bubbles produced at active nucleation site
- D. None of these

For a reaction of the type of bellow given figure, the rate of reaction (- rx) is given by _____?

- A. $(K_1 + K_1) CX$

- B. $(K_1 + K_2 + K_3) CX$
- C. $K_1CV - K_2CX$**
- D. $(K_1 - K_2) CX$

_____ equation gives the effect of temperature on heat of reaction ?

- A. Kirchoff's**
- B. Maxwell's
- C. Antoine
- D. Kistiyakowsky

Water gas generator is made of _____ ?

- A. Carbon steel-brick lined**
- B. Stainless steel-lead lined
- C. Cast iron
- D. High carbon steel-porcelain lined

Septic tanks are used for the _____ of the deposited solids?

- A. Separation
- B. Anaerobic decomposition**
- C. Aerobic decomposition
- D. None of these

Thermoplastic resins usually _____ ?

- A. Remain hard as long as they are hot
- B. Cannot be reclaimed from waste
- C. Permanent setting resins
- D. Less brittle than thermosetting resins**

With an increase in pressure in gaseous phase chemical reactions, the fractional conversion _____ when the number of moles decreases?

- A. Increases**
- B. Decreases
- C. Remain unaffected

D. Unpredictable from the data

Gases diffuse faster compared to liquids because of the reason that the liquid molecules _____?

- A. Are held together by stronger inter-molecular forces
- B. Move faster
- C. Have no definite shape
- D. Are heavier

Pick out the wrong statement about the machinability of metals. Machinability of a metal ?

- A. Decreases with increase in strain hardening tendencies
- B. Decreases with increase in hardness, in general
- C. Depend on the composition, microstructure and physical & mechanical properties
- D. **Decreases with increases in tensile strength & decrease in grain size**

Which of the following is not used as a nuclear fuel cladding material ?

- A. Zircaloy
- B. **Cadmium**
- C. Ceramics
- D. Stainless steel

Testing of the knocking characteristics of petrolfuels is done in a _____ engine ?

- A. Carnot
- B. **CFR (Co-operative fuel research)**
- C. Stirling
- D. Diesel

Dielectric strength of a material is _____?

- A. Its energy storage capacity
- B. A magnetic property
- C. Its capacity to resist the flow of current

D. Its capacity to withstand high voltage

Phase margin is equal to _____ ?

- A. $180^\circ - \text{phase lag}$**
- B. Phase lag – 180°
- C. Phase lag + 180°
- D. Phase lag + 90°

A floating/submerged body is always stable, if its centre of gravity _____ ?

- A. Lies above its centre of buoyancy
- B. And centre of buoyancy coincide
- C. Lies below its centre of buoyancy**
- D. Lies above its metacentre

The ratio of mass of a neutron to that of an electron is about 1839. What is the ratio of the mass of a proton to that of an electron ?

- A. 159
- B. 1837
- C. 2537**
- D. 10000

Density of carbon dioxide is _____ kg/Nm³ ?

- A. 44/22400
- B. 44/22.4**
- C. 22.4/44
- D. None of these

An example of autothermal reactor operation is _____ ?

- A. Sulphur dioxide oxidation
- B. Ethylene oxidation**
- C. Benzene oxidation
- D. Ammonia synthesis

Fatigue resistance of a material is measured by the _____?

- A. Elastic limit
- B. Ultimate tensile strength
- C. Young's modulus
- D. Endurance limit**

Laminar flow region is said to exist during agitation of a liquid in an agitator, when the value of Reynolds number is _____?

- A. > 10
- B. < 10**
- C. > 100
- D. < 100

The difference between saponification value and acid value is _____?

- A. Called ester value**
- B. Always negative
- C. Constant for all fatty oils
- D. None of these

Rose oil is extracted from rose leaves using _____ distillation?

- A. High pressure
- B. Low pressure
- C. Extractive
- D. Steam**

Temperature and gage pressure maintained during the manufacture of hot SBR (styrene butadiene rubber) are _____?

- A. 50°C and $3 - 4 \text{ kg/cm}^2$**
- B. 50°C and 1 kgf/cm^2
- C. 250°C and 10 kgf/cm^2
- D. 250°C and 1 kgf/cm^2

Erosion and pits formation on the impeller of a centrifugal pump may be due to _____?

A. Cavitation

- B. Low speed of impeller
- C. Its operation with delivery valve closed for considerable time after starting the pump
- D. Off centering of pump with motor

Le/D) for 90° elbow (medium radius) and 90°square elbow would be respectively around _____?

A. 25 and 60

- B. 3 and 5
- C. 100 and 250
- D. 250 and 600

Aqueous nitric acid is stored in _____?

A. Steel drum

B. Stainless steel vessel

- C. Cast iron vessel lined with acid-proof masonry brick
- D. Cast iron vessel

The depression in freezing point of a solution is _____?

- A. Inversely proportional to the mass of solvent
- B. Directly proportional to the mole of solute
- C. Both A. and B.**
- D. Neither A. nor B.

Pressure in a Pressurised Water Reactor (PWR) is used for _____?

A. Maintaining constant pressure in the primary cooling circuit under varying loads

- B. Superheating the steam
- C. Pressurising the water in the primary coolant circuit
- D. None of these

The main use of butadiene is _____ ?

- A. As a plasticiser for unsaturated polyester
- B. In the manufacture of synthetic rubber**
- C. As an anti-skimming agent in paint
- D. None of these

18-4-1 high speed steel contains 18%, 4% and 1% respectively of _____ ?

- A. Tungsten, vanadium and chromium
- B. Tungsten, chromium and vanadium**
- C. Vanadium, chromium and tungsten
- D. Chromium, tungsten and vanadium

Which of the following equations is Rittinger's crushing law? (Where P = power required by the machine, m = feed rate, k = a constant, \bar{D}_{sa} & \bar{D}_{sb} = volume surface mean diameter of feed & product respectively) ?

- A. $P/m = K/\sqrt{D_p}$
- B. $P/m = K \cdot \ln \bar{D}_{sa}/\bar{D}_{sb}$
- C. $P/m = K \cdot (1/\bar{D}_{sb} - 1/\bar{D}_{sa})$**
- D. None of these

More than 100 percent of _____ is present in oleum?

- A. SO₃
- B. H₂SO₄**
- C. H₂SO₃
- D. SO₂

Which of the following has the same dimension as mass diffusivity ?

- A. Momentum flux
- B. Kinematic viscosity
- C. Thermal diffusivity
- D. Both B. and C.**

Optimum reflux ratio in a continuous distillation column is determined by the _____?

- A. Maximum permissible vapour velocity
- B. Flooding limit of the column
- C. Total cost consideration (fixed cost of the column plus the cooling water & steam cost)**
- D. None of these

In a roll crusher, both the rolls _____?

- A. Have the same diameter
- B. Are rotated towards each other
- C. Run either at the same or different speeds
- D. All A., B. and C.**

Which is a secondary crusher for a hard & tough stone ?

- A. Jaw crusher
- B. Cone crusher**
- C. Impact crusher
- D. Toothed roll crusher

In liquid extraction, if the selectivity is unity, then _____?

- A. Separation of the constituents is the most effective
- B. No separation will occur**
- C. Amount of solvent required will be minimum
- D. Solvent flow rate should be very low

Euler's equation of motion is a statement expressing _____?

- A. Conservation of mass**
- B. Conservation of energy
- C. Newton's first law of motion
- D. Newton's second law of motion

In a shell and tube heat exchanger, the shortest centre to centre distance

between the adjacent tubes is _____?

- A. Called tube pitch**
- B. Called tube clearance
- C. Always less than the diameter of the tube
- D. None of these

Tempering of steel is done to make it _____?

- A. Brittle
- B. Hard
- C. Rollable
- D. Soft**

The heat capacity of most substances is greater for the _____ state?

- A. Solid
- B. Liquid**
- C. Gaseous
- D. None of these

A change in state involving a decrease in entropy can be spontaneous, only if _____?

- A. It is exothermic**
- B. It is isenthalpic
- C. It takes place isothermally
- D. It takes place at constant volume

Deficiency of combustion air during combustion of a gaseous fuel _____?

- A. Lengthens the flame
- B. Causes heat loss of fuel by its partial combustion
- C. Both A. & B.**
- D. Shortens the flame

Heat sensitive materials can be concentrated in an evaporator

employing _____?

- A. Vacuum
- B. High pressure
- C. High residence time
- D. None of these

Which of the following is not a batch drier ?

- A. Truck drier
- B. Agitated pan drier
- C. Fluidised bed drier
- D. Vacuum shelf drier

Addition of _____ to the steel helps in increasing the residual magnetism in steel used for making magnets?

- A. Chromium
- B. Nickel
- C. Tungsten
- D. Cobalt

Pick out the wrong statement pertaining to the design of a horizontal tube evaporator ?

- A. It is unsuitable for concentrating those liquids, which form a scale or deposit salt
- B. It is suitable for process, in which the final product is a liquor instead of solid
- C. Its usual dimensions are: tube dia = 2-3 cms; evaporator body dia = 1-4 metres and evaporator height = 2.5-4 metres
- D. Liquor flows inside the tube, while the steam is outside submerging the tube

The free energy change for a chemical reaction is given by (where, K = equilibrium constant) _____?

- A. $RT \ln K$
- B. $-RT \ln K$
- C. $-R \ln K$

D. T In K

Outer combustion chamber of blast furnace stove is lined with _____ bricks?

- A. Fireclay
- B. Silica
- C. Chrome magnesite
- D. Zirconia

In a shell and tube heat exchanger, the tube side heat transfer co-efficient just at the entrance of the tube is _____?

- A. Infinity
- B. Zero
- C. Same as average heat transfer co-efficient for tube side
- D. None of these

The temperature of tempering oil baths maintained at 400°C during heat treatment of steel is measured by a/an _____ thermocouple?

- A. Chromel-alumel
- B. Iron-constantan
- C. Platinum-platinum/rhodium
- D. None of these

In most of the shell and tube heat exchangers, the tube pitch is generally _____ the tube diameter?

- A. Less than
- B. 1.25-1.50 times
- C. 2.5 times
- D. one-fourth of

The half life period of a radioactive element depends on its _____?

- A. Temperature
- B. Pressure
- C. Amount
- D. None of these**

The heat capacity of a substance is _____?

- A. Greater for liquid state than for solid state**
- B. Lower for liquid state than for gaseous state
- C. Higher for solid state than for liquid state
- D. Equal for solid and liquid states below melting point

P2O5 percentage in the phosphoric acid produced by wet process is about _____?

- A. 10
- B. 30**
- C. 50
- D. 70

Critical velocity in a pipe flow _____?

- A. Increases as fluid viscosity increases
- B. Increases as pipe diameter increases**
- C. Independent of fluid density
- D. None of these

Which of the following is the hardest _____?

- A. Cementite
- B. Pearlite
- C. Austenite**
- D. Ferrite

Maximum alumina content in high alumina refractory can be as high as _____ percent?

- A. 30

- B. 50
- C. 70
- D. 90**

The most abundant metal present in the earth's crust is _____?

- A. Iron
- B. Copper
- C. Titanium
- D. Aluminium**

One of the steps during refining of cane sugar consists of addition of hydrated lime to the sugar syrup followed by carbonation of the resulting solution. The purpose of this step is to _____?

- A. Adjust the pH of the syrup**
- B. Remove the coloring matter from the syrup
- C. Reduce the viscosity of the syrup
- D. Improve the rate of crystallisation of sugar

Peroxyacetyl nitrate (PAN), a pollutant is found in the _____?

- A. Automobile exhaust**
- B. Flue gas of coal based power plant
- C. Exhaust of nitric acid plant
- D. Exhaust of sulphuric acid plant

All moisture in a non-hygroscopic material is the _____ moisture?

- A. Free
- B. Equilibrium
- C. Unbound**
- D. Bound

Consider two pipes of same length and diameter through which water is passed at the same velocity. The friction factor for rough pipe is f_1 and that for smooth

pipe is f_2 . Pick out the correct statement ?

- A. $f_1 = f_2$
- B. $f_1 < f_2$
- C. $f_1 > f_2$**
- D. Data not sufficient to relate f_1 & f_2

A pressurised water reactor (PWR) uses pressurised water as a _____?

- A. Coolant**
- B. Working fluid in power turbine
- C. Moderator
- D. None of these

Damage to metal surface by mechanical action is called _____?

- A. Pitting
- B. Corrosion
- C. Erosion**
- D. None of these

Which refractory must have controlled atmosphere (temperature and humidity) for its safe storage ?

- A. Tar bonded dolomite bricks**
- B. Fireclay bricks
- C. Mullite bricks
- D. Magnesite bricks

Experimental determination of _____ is done by wetted wall column method?

- A. Diffusion co-efficient
- B. Mass transfer co-efficient**
- C. NTU

D. None of these

Capacity (in tons/hr) of jaw/gyratory crusher is equal to (where, L = length of the receiving opening, cm S = greater width of the discharge opening, cm) ?

- A. 0.01 L.S
- B. 0.087 L.S**
- C. L.S
- D. L.S/0.087

From among the following, choose one which is not an exothermic process ?

- A. Methanol synthesis
- B. Catalytic cracking**
- C. Ammonia synthesis
- D. Oxidation of sulphur

Equipment installation cost in a chemical process plant ranges from _____ percent of the purchased equipment cost ?

- A. 10 to 20
- B. 35 to 45**
- C. 55 to 65
- D. 70 to 80

In the diving apparatus, helium is used along with oxygen, because it is _____ ?

- A. Easily available
- B. Not soluble in blood at high pressure**
- C. Lighter than nitrogen
- D. Completely miscible with oxygen

A saturated vapor on being compressed would _____ ?

- A. Condense
- B. Form wet steam
- C. Both A. & B.**

D. Neither A. nor B.

A mercury thermometer cannot be used to measure the temperature below the freezing point of mercury, which is _____ °C?

- A. -38.9
- B. -11.9
- C. -60.9
- D. -80.9

Pick out the wrong statement?

- A. The binary diffusivity in liquids is of the order of 10^{-5} cm²/sec
- B. Molecular diffusion in solid is much faster than that in liquids**
- C. Particles movement from higher concentration to lower concentration takes place in diffusion process
- D. According to Poiseuille's law, the permeability decreases with increase in temperature for flow of a gas through a given capillary

The size of an atom is of the order of one _____?

- A. °Angstrom**
- B. Fermi
- C. Micron
- D. mm

Heating of water under atmospheric pressure is an _____ process?

- A. Isochoric
- B. Isobaric**
- C. Adiabatic
- D. Isothermal

$C_p - C_v$ for an ideal gas is equal to _____?

- A. R**

- B. R/2
- C. 2R
- D. 3R

Permanent hardness of water can be removed by _____?

- A. Simply boiling
- B. Adding alum
- C. Passing it through cation & anion exchangers**
- D. All (A), B. and (C)

Melt spinning of polymers involves the forcing of polymer melt through spinnerates (fine holes) into an atmosphere kept at a temperature lower than the melting point of the polymer, which causes the fine diameter polymer melt to harden into filaments. Melt spinning is not used in case of the _____ fibres?

- A. Acrylic**
- B. Polyester
- C. Nylon 6:6
- D. Polypropylene

Dried finished product sampled from various parts of a _____ dryer exhibits nonuniformity in the moisture content?

- A. Rotary
- B. Tray**
- C. Freeze
- D. None of these

The fluid velocity varies as the square root of the cylindrical pipe diameter in case of steady state laminar flow at constant pressure drop of _____ fluid?

- A. Dilatent**
- B. Pseudo-plastic

- C. Bingham plastic
- D. Newtonian

Pick out the wrong statement?

- A. A fluid mass is free from shearing forces, when it is made to rotate with a uniform velocity
- B. Newton's law of viscosity is not applicable to the turbulent flow of fluid with linear velocity distribution**
- C. Laminar flow of viscous liquids is involved in the lubrication of various types of bearings
- D. Rise of water in capillary tubes reduces with the increasing diameter of capillary tubes

Stack (chimney) height in a big thermal power plant is dictated by the _____?

- A. Pollution control aspect
- B. Draught to be created**
- C. Limitation of constructional facilities
- D. None of these

Pick out the wrong statement?

- A. Catalytic activity of enzyme catalysed reactions which is affected by temperature, pH value & chemical agents, is maximum at a temperature of about 45°C
- B. Most of the enzyme catalysed reactions involve at least two substrates
- C. Enzymes help in increasing the activation energy of the reaction**
- D. Equilibrium concentrations in enzyme catalysed reactions can be calculated by using the thermodynamic properties of substrates & products

_____ remains constant during the adiabatic cooling of moist air?

- A. Wet bulb temperature**
- B. Dry bulb temperature
- C. Relative humidity

D. Specific humidity

Pick out the wrong statement?

A. Cumulative analysis for determining surface area is preferred over differential analysis, because of the assumption that “all particles in a simple fraction equal in size” is not needed

for cumulative analysis unlike differential analysis

B. A gate diagram is a plot of cumulative percent by weight undersize vs. the reciprocal of diameter, in which the area beneath the curve represents the surface

C. Capacity of crusher in choke feeding is increased

D. Rolling of pebbles/balls from top to bottom of the heap in tumbling mills is called ‘cascading

and throwing of the balls through the air to the toe of the heap is called ‘cataracting’

Radiation heat losses from satisfactorily insulated high pressure boiler may be about _____ percent?

A. 1

B. 7

C. 18

D. 26

Percentage of uranium in Carnotite ore found in Jadugoda (Jharkhand) is about _____?

A. 0.1 to 0.5

B. 1 to 5

C. 5 to 10

D. 15 to 25

$C_p - C_v = R$ is valid for _____ gases?

A. Ideal

B. Very high pressure

C. Very low temperature

D. All of the above

In a counter-current extractor, as the axial mixing increases, the extraction efficiency _____?

- A. Increases
- B. Decreases**
- C. Remains unchanged
- D. Depends on the pressure of the system

Low temperature oxidation of coal resulting from bad storage conditions does not decrease its _____?

- A. Caking power
- B. Calorific value
- C. Hydrogen content
- D. Oxygen content**

Fractional conversion _____ with increase in pressure for ammonia synthesis reaction i.e., $N_2 + 3H_2 \rightleftharpoons 2NH_3$?

- A. Increases**
- B. Decreases
- C. Remains unchanged
- D. Unpredictable from the data

Excessive liquid gradient on a tray may result in the _____?

- A. Maldistribution of gas
- B. Back trapping
- C. Gas blowing beneath cap skirt
- D. All A., B. and C.**

A centrifugal pump used to pump water is used to pump an oil with specific gravity of 0.8 at the same rate. The power consumption will now _____?

- A. Increase

B. Decrease

C. Remain same

D. Data insufficient to predict

Polycaprolactam (Nylon – 6) is produced by the condensation polymerisation of caprolactam at 240-280°C in which the conversion of caprolactam is about _____ percent?

A. 50

B. 75

C. 90

D. 99

Fenske equation determines the _____?

A. Maximum number of ideal plates

B. Height of the distillation column

C. Minimum number of theoretical plates

D. Optimum reflux ratio

The amount of steam required per unit quantity of distillate in case of steam distillation will be reduced by _____?

A. Raising the temperature

B. Lowering the total pressure

C. Both A. and B.

D. Neither A. nor B.

In sulphate pulp manufacture, the pressure and temperature in the digester is _____?

A. 10 atm., 800 °C

B. 10 atm., 170-180°C

C. 1 atm., 170 – 180°C

D. 1 atm., 800°C

Gear pump _____ ?

- A. Is a positive displacement pump
- B. Is a centrifugal pump
- C. Is a non-positive displacement pump
- D. Can be started with delivery valve closed

An insulating refractory brick should have high porosity and low thermal conductivity. Which of the following is not used for inducing porosity in the insulating refractory bricks during its manufacture ?

- A. Cork
- B. Saw dust
- C. Sand
- D. Chemically prepared foam

Highest cutting speed is achieved by the _____ tool material ?

- A. High speed steel
- B. Carbide
- C. Cast alloy
- D. Plain carbon steel

Out of the following refrigeration cycles, which one has the minimum COP (Coefficient of performance) ?

- A. Air cycle
- B. Carnot cycle
- C. Ordinary vapour compression cycle
- D. Vapour compression with a reversible expansion engine

The effect of pressure on the heat capacity of the gases _____ is negligible?

- A. At pressure below one atmosphere
- B. Below the critical temperature
- C. Both A. & B.

D. Neither A. nor B.

High speed steel tools retain their hardness upto a temperature of _____ °C?

- A. 500
- B. 750
- C. 900**
- D. 1100

For a given fluid, as the pipe diameter increases, the pumping cost _____ ?

- A. Decreases**
- B. Increases
- C. Remain unaffected
- D. May increase or decrease depending upon whether the fluid is Newtonian or non-Newtonian

Polystyrene is a _____ plastic at room temperature?

- A. Ductile
- B. Brittle**
- C. Malleable
- D. None of these

Dryer widely used in a textile industry is _____ dryer?

- A. Festoon
- B. Cylinder
- C. Conveyor**
- D. Tunnel

Which of the following equations as suggested by Colebrook and White gives the increase in roughness of a new surface (ϵ_0) with age/time (t) (where, ϵ = roughness of the surface after time 't'. α = a co-efficient to be experimentally

determined) ?

- A. $\epsilon = \epsilon_0 + \alpha.t$
- B. $\epsilon = \epsilon_0 + \alpha.t^2$
- C. $\epsilon = \epsilon_0 + \alpha.t^3$
- D. $\epsilon = \epsilon_0 + \alpha.t^4$

Hydrazine is used in water treatment for the removal of _____?

- A. Colloidal impurities
- B. Dissolved oxygen**
- C. Turbidity
- D. Chlorinous taste

Pick out the wrong statement?

- A. Azoic dyes are mostly applied on cotton fabrics
- B. Basic dyes (e.g. amino derivatives) are applied mostly to paper
- C. Mordant dyes are applied mainly to wools
- D. None of these**

Fugacity is a measure of the _____?

- A. Escaping tendencies of the same substance in different phases of a system**
- B. Relative volatility of a mixture of two miscible liquids
- C. Behaviour of ideal gases
- D. None of these

With increase in C/H ratio of a fuel, the dew point of flue gases _____?

- A. Increases
- B. Decreases**
- C. Remain same
- D. May increase or decrease; depends on the type of fuel

Stroboscope is used for the measurement of _____?

- A. Rpm of a flywheel**

- B. Frequency of light
- C. Depression of freezing point
- D. Liquid level under pressure

Power consumption during turbulent flow in agitation tank is proportional to the _____ of the liquid?

- A. Viscosity
- B. Thermal conductivity
- C. Surface tension
- D. Density**

Critical value of the _____ number governs the transition from laminar to turbulent flow in free convection heat transfer?

- A. Grashoff
- B. Reynolds
- C. Both 'a' & 'b'
- D. Prandtl & Grashoff**

Acid dew point temperature (ADT) of a flue gas produced by the combustion of a fuel containing 1% sulphur may be about _____ °C?

- A. 80
- B. 130**
- C. 180
- D. 250

A gas is termed as non-toxic, if its maximum permissible concentration (TLV) ranges from _____ ppm?

- A. 1000 to 2000
- B. 3000 to 6000
- C. 6000 to 9000
- D. 10000 to 100000**

Calorific value of pitch creosote mixture (PCM) i.e., C.T.F.-200 is about _____?

- A. 8800 kcal/m³
- B. 8800 kcal/kg**
- C. Same as that of coal middling
- D. 25000 kcal/kg

By-products are _____ recovered in 'Beehive ovens' ?

- A. Fully
- B. Partially
- C. Not at all**
- D. Negligibly

Leaching of sugar from sugar beets is done by _____?

- A. Hot water**
- B. Hexane
- C. Dilute H₂SO₄
- D. Lime water

Vulcanisation of raw rubber makes it _____?

- A. Soft
- B. Less elastic**
- C. Plastic
- D. Tacky

Batch process is preferred over continuous process, when the _____?

- A. Product yields and quality cannot be achieved in continuous process, because of long residence time
- B. Sales demand of product is not steady
- C. Same equipment cannot be used for several processes of the same nature
- D. All A., B. & C.**

Out of the following, the best material capable of withstanding shock & vibration without the danger of cracking is _____?

- A. Malleable iron
- B. Grey cast iron
- C. Chilled cast iron
- D. White cast iron

Lap joints are preferred over butt joints in soldering/brazing, because these joints are _____?

- A. Weaker in tension but stronger in shear
- B. Weaker in shear but stronger in tension
- C. Stronger in both shear and tension
- D. The lap joints are easily made

Commercial production of Vanaspati is done by _____ of edible vegetable oils ?

- A. Hydrogenation
- B. Oxidation
- C. Hydrolysis
- D. Hydrocracking

The weathering index of a coal _____?

- A. Gives an idea of the fusion temperature of ash
- B. Is related to its calorific value
- C. Is a measure of its size stability, when stored & exposed to weather
- D. Is a measure of its caking tendency

The absorption factor is defined as (where, S_1 = slope of the equilibrium curve, S_2 = slope of the operating line) ?

- A. S_1/S_2
- B. $S_1.S_2$
- C. S_2/S_1

D. 1/S1.S2

Pick out the wrong statement ?

- A. With change in temperature, the radiant energy emitted by a black body remains unchanged**
- B. Absorptivity of a body approaches unity in case of diffuse reflection
- C. Absorptivity of a perfectly black body is unity
- D. Value of Stefan-Boltzmann constant is 4.876×10^{-8} KCal/m².hr.°K⁴

What is the value of included angle of a triangular notch for maximum discharge ?

- A. 30°
- B. 60°
- C. 90°**
- D. 120°

Which of the following gasifiers can be attached to coal based fertiliser plants ?

- A. Lurgi (high pressure) gasifier
- B. Kopper-Totzek gasifier**
- C. Gasifier working at 20 atm
- D. Gasifier working at 40 atm

Which of the following is an independent variable for a batch tank reactor with uniform concentration and temperature ?

- A. Time**
- B. Useful volume of the tank
- C. Diameter of the reactor
- D. None of these

Which is a state function ?

- A. Specific volume
- B. Work**
- C. Pressure

D. Temperature

The heat of reaction _____?

- A. Depends on the pressure only
- B. Depends on the mechanism of reaction only
- C. Depends on both pressure and mechanism of reaction
- D. Is independent of the mechanism of reaction**

Thermal conductivity of refractory bricks _____?

- A. Increases with decrease in porosity**
- B. Decreases with decreases in porosity
- C. Is independent of its porosity and is maximum for insulating bricks
- D. Increases with the amount of air entrapped in pores

Fuel gases containing hydrocarbons (e.g. coke oven gas) are not preheated before burning, mainly because _____?

- A. The hydrocarbons crack thereby choking and fouling the heat transfer surface by carbon soot**
- B. It reduces its calorific value tremendously
- C. It reduces its flame temperature tremendously
- D. There are chances of explosion during preheating

Chlorine acts as a bleaching agent only in the presence of

_____?

- A. Dry air
- B. Pure oxygen
- C. Moisture**
- D. Sunlight

Pick out the wrong statement ?

- A. For a first order consecutive reaction, a tubular flow reactor as compared to a stirred tank reactor provides higher overall selectivity**

- B. For an ideal mixed reactor at steady state, the exit stream has the same composition as fluid within the reactor and the space time is equivalent to holding time for constant density system
- C. Plug flow reactor (PFR) is always smaller than mixed reactor for all positive reaction orders for a particular duty
- D. Reaction rate does not decrease appreciably as the reaction proceeds in case of an autocatalytic reaction

The accumulation in a steady state combustion process, burning 1 kg mole of carbon with 1 kg mole of oxygen thereby producing 1 kg mole of carbon dioxide, is _____ kg mole?

- A. 1
B. 0
C. 16
D. 44

Pick out the wrong statement _____?

- A. Phase rule variables are intensive properties
B. Heat and work are both state function
C. The work done by expansion of a gas in vacuum is zero
D. CP and CV are state function

Terminal point temperature differences between fluids in case of a heat exchanger is termed as _____?

- A. Approach
B. Log mean temperature difference
C. Arithmetic mean temperature difference
D. Geometric mean temperature difference

Nickel (56%) and molybdenum (17%) alloys are called _____?

- A. Monel

B. Hastelloy C

- C. Inconel
- D. Bronzes

The process used for the manufacture of ethyl alcohol from molasses is _____?

- A. Distillation
- B. Dehydration
- C. Dehydrogenation
- D. None of these**

One kilogram of water at 0°C is changed to superheated steam of one atm pressure and 300° C. The major heat consumption in the process will be to _____?

- A. Heat the water from 0°C to 100°C
- B. Evaporate the water**
- C. To superheat the steam
- D. Data insufficient, can't be predicted

Boyle's law for gases states that _____?

- A. $P \propto 1/V$, when temperature is constant
- B. $P \propto 1/V$, when temperature & mass of the gas remain constant**
- C. $P \propto V$, at constant temperature & mass of the gas
- D. $P/V = \text{constant}$, for any gas

The stress developed in a material without any permanent set is called the _____?

- A. Ultimate stress
- B. Yield stress
- C. Elastic limit**
- D. Breaking stress

Heat transfer by natural convection is enhanced in system with _____?

- A. High viscosity
- B. High co-efficient of thermal expansion**
- C. Low temperature gradients
- D. Low density change with temperature

The value of gas constant 'R' is _____?

- A. 1.987 cal/gm mole °K
- B. 1.987 BTU/lb. mole °R
- C. Both A. and B**
- D. Neither A. nor B

Epoxy resin is _____?

- A. Not used for surface coating
- B. A good abrasive**
- C. An elastomer
- D. A polyester

Pick out the wrong statement?

- A. Processing of thermosetting plastics is ideally done by injection moulding
- B. Processing of thermoplastics is ideally done by compression moulding
- C. Mass production of seamless pipes are done by electrical resistance welding (ERW)**
- D. Stretch forming is a process of cold drawing

_____ is not a case hardening process ?

- A. Carburising**
- B. Nitriding
- C. Cyaniding
- D. Annealing

In Newton's law range, the drag co-efficient for the motion of spherical particle in a stationary fluid is _____?

- A. **0.44**
- B. 0.044
- C. 4.4
- D. 44

H₂S present in gaseous stream can be removed by adsorption on _____?

- A. Silica gel
- B. Active carbon
- C. **Bog iron**
- D. Limestone powder

The partial pressure of each constituent present in an alloy is _____ the total vapor pressure exerted by the alloy?

- A. **Less than**
- B. Equal to
- C. More than
- D. Either B. or C; depends on the type of alloy

In case of a plate and frame filter press, filtrate flow through the cake follows _____ flow?

- A. Plug
- B. Turbulent
- C. **Laminar**
- D. None of these

_____ extractor is used for the concentration of radioactive nuclear waste?

- A. **Pulsed column**
- B. Sieve plate
- C. Mixer-settler
- D. Bollman

Carbon content in plain carbon steel is _____ percent?

- A. 0.1 to 0.15
- B. 0.35 to 0.45**
- C. 0.65 to 0.80
- D. 0.85 to 1.2

Extractor temperature is maintained at -20°C in Edeleanu process to reduce the _____ of kerosene?

- A. Smoke point
- B. Paraffins**
- C. Aromatics
- D. Naphthenes

Dust collection efficiency of a cyclone separator depends upon its _____?

- A. Diameter
- B. Inlet gas velocity
- C. Overall height
- D. All A., B. & C.**

Use of natural draft cooling tower is practised, when the air has low ?

- A. Humidity
- B. Temperature
- C. Both A. & B.**
- D. Neither A. nor B.

A solar cell converts the sunlight directly into _____ energy?

- A. Thermal
- B. Electrical**
- C. Mechanical
- D. Chemical

The rate of heat transfer through a pipe wall is given by, $q = 2\pi k (T_i - T_o)/\ln$

(r_i/r_0). For cylinder of very thin wall, q can be approximated by _____?

- A. $q = [2\pi k (T_i + T_0)/2]/\ln (r_i/r_0)$
- B. $q = 2\pi r_i k (T_i - T_0)/(r_0/r_i)$
- C. $q = 2\pi k (T_i - T_0)/(r_0/r_i)$
- D. $q = 2\pi k (T_i - T_0)/[(r_0 + r_i)/2]$**

To keep the power input constant for a stirred vessel operating under fully developed turbulent flow conditions (constant power number), if the impeller diameter is increased by 20%, the impeller speed should be decreased by a factor of _____?

- A. $(1.2)^{3/2}$
- B. $(1.2)^{3/5}$
- C. $(1.2)^{2/3}$
- D. $(1.2)^{5/3}$**

The response curve for a step input signal from a reactor is called C-curve. The variance of C-curve in a 'tanks in series model' comprising of 'm' tanks is equal to _____?

- A. m
- B. $1/m$**
- C. \sqrt{m}
- D. m^2

Pick out the wrong statement ?

- A. At constant pressure, solubility of a gas in a liquid diminishes with rise in temperature**
- B. Normally, the gases which are easily liquefied are more soluble in common solvents
- C. The gases which are capable of forming ions in aqueous solution are much more soluble in water than in other solvents
- D. At constant pressure, solubility of a gas in a liquid increases with rise in temperature

Quartz is _____?

- A. Stable form of silica upto 870°C
- B. Converted to Tridymite on firing between 870 to 1470°C
- C. Transformed to Cristobalite on heating above 1470°C
- D. All A., B. and C.**

Which of the following assumes constant molal vaporisation and overflow?

- A. McCabe-Thiele method**
- B. Ponchan-Savarit method
- C. Enthalpy concentration method
- D. Plate absorption column

Sometimes, in chemical processes, a part of the outlet stream is rejected as waste in order to keep the impurity level in the system within limits. This phenomenon is termed as the _____?

- A. Recycling
- B. Purging**
- C. Bypassing
- D. Recirculation

Pick out the wrong statement?

- A. Main constituents of LPG are propane and butane
- B. C.V. of natural gas is about 10000 KCal/Nm³
- C. C.V. of LPG is about 26000 kcal/Nm³ (11500 kcal/kg)
- D. L.P.G. is lighter than air**

Temperature measuring instruments are standardised mostly with _____ points of pure substances?

- A. Melting
- B. Boiling
- C. Both A. & B.**
- D. Neither A. nor B.

Commercial scale production of hydrogen from iron-steam reaction represented by $3\text{Fe} + 3\text{H}_2\text{O} = \text{Fe}_3\text{O}_4 + 4\text{H}_2$, is not practised, as it is _____?

- A. A slow reaction
- B. A discontinuous reaction (requiring regeneration of iron by water gas intermittently)
- C. Still in development stage (by employing fluidised bed technique)
- D. All A , B. and C**

Desulphurisation of petrol is done in a _____?

- A. Bollman extractor
- B. Rotating disc extractor**
- C. Packed extraction column
- D. Plate type extraction column

Wrought iron is never shaped by _____?

- A. Casting**
- B. Cold working
- C. Forging
- D. Welding

Steam traps are provided in steam carrying pipelines to _____?

- A. Condense steam
- B. Release excess steam pressure by bleeding steam
- C. Remove condensate and inert gases**
- D. None of these

Dropwise condensation is promoted on a/an _____ surface?

- A. Glazed
- B. Oily**
- C. Coated
- D. Smooth

The value of 'n' for a chemical reaction $\text{A} \rightarrow \text{B}$, whose reaction rate is $\rightarrow \text{C}_\text{A}^n$, will be _____ if the rate of the reaction increases by a factor of 8,

when the concentration of is doubled?

- A. 0
- B. 1
- C. 2
- D. 3**

For a zero order chemical reaction, the _____?

- A. Half life period is directly proportion to the initial concentration of the reactants
- B. Plot of products concentration with time is a straight line through the origin
- C. Products concentration increases linearly with time
- D. All A., B. and C.**

The normal stress is the same in all directions at a point in a fluid, when the fluid is _____?

- A. Non-viscous
- B. Incompressible
- C. Both A. and B.
- D. Having no motion of one fluid layer relative to the other**

The temperature dependence of reaction rate constant (K) by Arrhenius law is given by _____?

- A. $K \propto e^{-E/RT}$**
- B. $K \propto e^{E/RT}$
- C. $K \propto T \cdot e^{-E/RT}$
- D. $K \propto \sqrt{T} \cdot e^{-E/RT}$

Nucleate boiling is promoted _____?

- A. On polished surfaces
- B. On rough surfaces**
- C. In the absence of agitation
- D. None of these

Which of the following is an endothermic reaction ?

- A. Absorption of SO₃ in 98% H₂SO₄
- B. $C + H_2O = CO + H_2$
- C. Thermal dissociation of iron pyrites
- D. Both B. and C.**

A fuel containing carbon and carbon monoxide (but containing no hydrogen or its compounds) is burnt in pure oxygen at constant pressure. Its gross calorific value as compared to net calorific value will be _____?

- A. More
- B. Less
- C. Same**
- D. Data insufficient; can't be predicted

The standard Gibbs free energy change of a reaction depends on the equilibrium _____?

- A. Pressure
- B. Temperature**
- C. Composition
- D. All A, B. and C

Petroleum liquid fuels having flash point greater than 66°C is considered as safe during storage and handling. Which of the following has flash point > 66°C?

- A. Naphtha
- B. Petrol
- C. Kerosene
- D. Heavy fuel oil**

Presence of nitrates in water in excess of 50 ppm causes _____?

- A. Methemoglobinemia**
- B. Gastroenteritis
- C. Asphyxiation
- D. Tooth decay

Pick out the correct statement?

- A. Angle of repose is always greater than the angle of slide
- B. A hopper is a small bin with a sloping bottom**
- C. A silo is a short height vessel of very large diameter used for the storage of high volatile matter coal
- D. Pine oil is used as a 'modifying agent' (for activating or depressing the adsorption of filming agents) in froth floatation process

In the equation, $PV^n = \text{Constant}$, if the value of $n = 0$, then it represents a reversible _____ process?

- A. Isobaric**
- B. Isothermal
- C. Isentropic
- D. Isometric

Pick out the wrong unit conversion ?

- A. 1 Joule = 4.186 calorie**
- B. 1 kcal = 3.968 BTU = 0.00116 kWh = 0.00156 hp
- C. 1 ton of TNT (tri-nitro-toluene) = 4.2 GJ (1G = 10⁹)
- D. 1 ft.lbf = 0.3238 calorie = 0.1383 kg.m = 1.356 J = 1.356 N.m

Mach number is the ratio of the speed of the _____ ?

- A. Fluid to that of the light
- B. Light to that of the fluid
- C. Fluid to that of the sound**
- D. Sound to that of the fluid

The product (s) of roasting of a sulphide ore is (are) ?

- A. Oxide only**
- B. Sulphate only
- C. Oxide and sulphate
- D. Dependent on temperature and partial pressure of oxygen & sulphur dioxide

Solubility of a substance which dissolves with an increase in volume and liberation of heat will be favoured by the _____?

- A. Low pressure and high temperature
- B. Low pressure and low temperature**
- C. High pressure and low temperature
- D. High pressure and high temperature

A catalyst inhibitor _____?

- A. Lessens its selectivity
- B. May be useful for suppressing undesirable side reactions
- C. Is added in small quantity during the catalyst manufacture itself
- D. All A., B. and C.**

Commercial packed scrubbers are normally designed for a pressure drop range of _____ mm water column per metre of packed height?

- A. 4-8
- B. 17-34**
- C. 52-68
- D. 88-105

Very fine suspended and colloidal impurities are removed from water by a process called _____?

- A. Sedimentation
- B. Coagulation**
- C. Disinfection
- D. Softening

Which of the following is not correct for a reversible adiabatic process ?

- A. $TV^{\gamma-1} = \text{constant}$
- B. $p^{1-\gamma}.TY = \text{constant}$
- C. $PV^{\gamma} = \text{constant}$
- D. None of these**

Terylene is _____?

- A. Same as Dacron
- B. A polyester
- C. Both A. & B.**
- D. Neither A. nor B.

A Pitot tube indicates 5 cm of water (manometer) when it is being used for measuring velocity of air. The velocity of air in m/sec is _____?

- A. 5
- B. 14.1
- C. 56.22
- D. 28.2**

Fluidised bed reactor is characterized by _____?

- A. Uniformity of temperature**
- B. Comparatively smaller equipment
- C. Very small pressure drop
- D. Absence of continuous catalyst regeneration facility

Which of the following has the highest modulus of elasticity (about 7×10^6 kg/cm²) ?

- A. High speed steel
- B. Stainless steel
- C. Tungsten carbide**
- D. Superalloys

In case of hydraulically smooth pipe, the resistance to flow depends only on the Reynolds number, whereas for a hydraulically rough pipe, the resistance to flow is governed by the relative roughness. Two pipes are said to have the same hydraulic roughness, when they have equal values of _____?

- A. Relative roughness

- B. Absolute roughness
- C. Friction co-efficient for flows at equal Reynold number**
- D. All A., B. & C.

Internal energy change of a system over one complete cycle in a cyclic process is _____?

- A. Zero**
- B. +ve
- C. -ve
- D. Dependent on the path

Research octane number refers to the _____?

- A. Low octane number motor fuels
- B. High octane number motor fuels
- C. High octane number aviation fuels
- D. Unleaded motor fuels**

For an exothermic reaction _____?

- A. Only enthalpy change (ΔH) is negative
- B. Only internal energy change (ΔE) is negative
- C. Both ΔH and ΔE are negative**
- D. Enthalpy change is zero

Plastic tubes & pipes are generally made by _____ moulding?

- A. Injection
- B. Transfer
- C. Extrusion**
- D. Compression

Styrene butadiene rubber (SBR) as compared to natural rubber has _____?

- A. Poor tensile strength
- B. Poorer resistance

C. Greater amount of heat build up heavy loading

D. All A., B. and C.

A furnace is made of a refractory brick wall of thickness 0.5 metre and thermal conductivity $0.7 \text{ W/m}^\circ\text{K}$. For the same temperature drop and heat loss, this refractory wall can be replaced by a layer of diatomaceous earth of thermal conductivity 0.14 W/m.K and thickness _____ metre?

A. 0.01

B. 0.1

C. 0.25

D. 0.5

With the lowering of equilibrium pressure, at a given temperature, the amount of adsorbate on the adsorbent _____?

A. Increases

B. Decreases

C. Remain same

D. Either A. or B., depends on the system

CaO is called _____?

A. Quick lime

B. Slaked lime

C. Limestone

D. Calcite

Diffusion co-efficient generally depends upon the temperature, pressure & the nature of the components of the system. Its dimension is not the same as that of the _____?

A. Mass transfer co-efficient

B. Thermal diffusivity

C. Kinematic viscosity

D. Volumetric diffusivity

Forces acting on a particle settling in fluid are _____ forces?

- A. Gravitational & buoyant
- B. Centrifugal & drag
- C. Gravitational or centrifugal buoyant drag**
- D. External, drag & viscous

If 4 gm of a radioisotope has a half life period of 10 days, the half life of 2 gm of the same isotope will be _____ days?

- A. 5
- B. 10**
- C. 20
- D. 30

'Six-tenth factor' rule is used for estimating the _____ ?

- A. Equipment installation cost
- B. Equipment cost by scaling**
- C. Cost of piping
- D. Utilities cost

For the chemical reaction $P \rightarrow Q$, it is found that the rate of reaction doubles as the concentration of 'P' is doubled. If the reaction rate is proportional to C_p^n , then what is the value of 'n' for this chemical reaction ?

- A. 0
- B. 1**
- C. 2
- D. 3

Graphite is a/an _____ ?

- A. Electrical insulator
- B. Allotrope of carbon
- C. Moderator used in nuclear reactor
- D. Both B. and C.**

The length of straight rectangular weir used on cross-flow trays is generally _____ the column diameter ?

- A. 0.6-0.8 times**
- B. Equal to
- C. Twice
- D. 2 ft irrespective of (for column > 3 ft diameter)

Elimination of brittleness resulting from welding of saw blades is done by _____ of the welded portion ?

- A. Annealing**
- B. Toughening
- C. Work hardening
- D. Tempering

_____ mixer is used for devulcanisation of rubber scrap & making water dispersion & rubber solution?

- A. Tumbler
- B. Banbury**
- C. Muller
- D. Ribbon blender

Blast furnace gas constitutes mainly of _____?

- A. N₂ & CH₄
- B. N₂ & H₂
- C. N₂ & CO**
- D. CH₄ & CO₂

Plasticisers are added to synthetic plastics to _____?

- A. Impart flexibility
- B. Improve workability during fabrication
- C. Develop new improved properties not present in the original resins
- D. All A, B. and C.**

A _____ surface has the maximum thermal emissivity out of the following ?

- A. Black & smooth
- B. Black & rough**
- C. White & smooth
- D. White & rough

Water content in ground refractory material to be shaped into bricks by hand moulding is about _____ percent?

- A. 5
- B. 20**
- C. 40
- D. 55

Strain hardening effect in metals subjected to cold working is due to the _____ mechanism?

- A. Slip
- B. Fracture
- C. Winning
- D. Dislocation**

A streamline is a line in flow field _____?

- A. That is traced by all the fluid particles passing through a given point
- B. Along which a fluid particle travels
- C. Such that at every point on it, the velocity is tangential to it**
- D. None of these

Pick out the wrong statement?

- A. Bubble size increases with the dynamic viscosity of the liquid in case of nucleate pool boiling
- B. Thermal conductivity of a dry material is more than that of the damp material**
- C. Ratio of its capacity to economy equals the steam consumption in kg/hr in an evaporator

D. Vaporisation of organic substances in evaporator mostly causes foam formation

A plug-flow reactor is characterized by _____?

- A. High capacity
- B. Presence of axial mixing
- C. Presence of lateral mixing**
- D. Constant composition and temperature of reaction mixture

In a vertical short tube evaporator (Calandria type), the _____?

- A. Tube dia of 2.5-7.5 cms, tube length of 75-200 cms and cylindrical drum dia of 1-6 metres are normally used
- B. Area of central downtake is equal to 40 to 100% of total cross-sectional area of the surrounding tube
- C. Liquor is inside the tube while the steam is outside the tube
- D. All A., B. & C.**

_____ cannot increase the fatigue strength of a material?

- A. Grain refining
- B. Grain coarsening**
- C. Surface hardening
- D. Shot peening

Steady non-uniform flow is exemplified by flow through a/an _____?

- A. Long pipe at constant rate
- B. Long pipe at decreasing rate
- C. Expanding tube at increasing rate
- D. Expanding tube at constant rate**

While starting a centrifugal pump, its delivery valve should be kept _____?

- A. Opened
- B. Closed**
- C. Either opened or closed; it does not make any difference
- D. Either opened or closed; depending on the fluid viscosity

Chloral is used in the manufacture of _____?

- A. DDT**
- B. BHC
- C. Parathion
- D. None of these

Chromite refractories are _____?

- A. Acidic refractory
- B. Neutral refractory**
- C. Basic refractory
- D. Fired at a temperature of 600°C only

Ammonia synthesis reaction is _____?

- A. Exothermic**
- B. Endothermic
- C. Autocatalytic
- D. None of these

Which of the following is considered equivalent to one theoretical stage in McCabe Thiele's method ?

- A. Partial condenser
- B. Total condenser
- C. Reboiler
- D. Both B. and C**

Bernoulli's equation accounts for the _____?

- A. Various momentums
- B. Various masses

C. Different forms of mechanical energy

D. None of these

_____ is not a condensation polymer ?

A. Teflon

B. Nylon-66

C. Dacron

D. Polystyrene

For grinding of softer materials, the grinding wheel should have

_____ grain size ?

A. Finer

B. Coarser

C. Medium

D. Any type of

The latent heat of vaporisation _____ ?

A. Decreases with increased temperature

B. Decreases as pressure increases

C. Becomes zero at the critical point

D. All A., B. & C.

Which of the following is Virial equation of state ?

A. $(p + a/V^2)(V - b) = nRT$

B. $PV = nRT$

C. $PV = A + B/V + C/V^2 + D/V^3 + \dots$

D. None of these

Nuclear fission of one atom of uranium-235 produces the energy equivalent to about _____ MeV?

A. 20

B. 200

C. 500

D. 2000

25 per cent cut segmental baffle means that the baffle _____?

- A. Height is 75% of the I.D. of the shell
- B. Height is 25% of the I.D. of the shell
- C. Spacing is 75% of its height
- D. Width is 25% of its height

Higher boiling fractions like atmospheric residue is distilled under vacuum at low temperature because at high temperature, there is a tendency of the predominance of _____?

- A. Thermal cracking
- B. Gum formation
- C. Coking
- D. Discoloration

Minimum number of members required to form a Public Limited Joint Stock Com-pany is _____?

- A. 7
- B. 10
- C. 12
- D. 17

Coke oven gas after passing through return electrostatic tar precipitator (RETP) is used for the _____?

- A. Hot scarfing of steel slabs
- B. Mixing with blast furnace gas
- C. Coke oven battery heating
- D. Steel ladle drying

Solvent deoiling process is used for separating oil and soft wax from hard wax. Methyl isobutyl ketone and methyl ethyl ketone (MEK) are two commonly used

deoiling solvents. Use of former as the deoiling solvent has the advantages of the _____?

- A. Elimination of solvent drying facility
- B. Higher nitration temperature
- C. Lower solvent dilution ratio
- D. All A., B. & C.**

The head loss in turbulent flow in a pipe varies _____?

- A. As velocity
- B. As (velocity)²**
- C. Inversely as the square of diameter
- D. Inversely as the velocity

In the Contact process of sulphuric acid manufacture, 98% acid cooler is made of _____?

- A. Stainless steel
- B. Cast iron**
- C. Lead lined steel
- D. Rubber lined steel

Resistance to heat flow by conduction is proportional to (where, t & ρ are thickness & density of the material respectively and A = area normal to the direction of heat flow.) ?

- A. t
- B. $1/\rho$
- C. $1/A$
- D. All A., B. & C.**

HPO_3 is the chemical formula of _____ phosphoric acid?

- A. Pyro
- B. Ortho
- C. Meta**

D. None of these

Plate efficiency in a distillation column is reduced due to the _____ of liquid?

- A. Entrainment
- B. Foaming
- C. Weeping & dumping
- D. All A., B. & C.**

What is the percentage of chromium in 18-4-1 high speed steel ?

- A. 1
- B. 4
- C. 18**
- D. 23

In common bubble cap distillation column design practice, riser area is approximately equal to (where, A_a = Annular passage area, and S_a = Slot area) ?

- A. $A_a = S_a$**
- B. $1.2 A_a = 1.2 S_a$
- C. $S_a = 1.5 A_a$
- D. $A_a = 1.5 S_a$

The most important factor, which determines the maximum height to which water can be lifted by a pump at standard temperature is the _____?

- A. Barometric pressure**
- B. Speed of the impeller
- C. Diameter of the impeller
- D. Both B. and C.

A fertiliser contains 82% N_2 . It could be _____?

- A. Urea

B. Liquid NH₃

- C. Ammonium nitrate
- D. None of these

Magnetic permeability of iron is increased by its _____?

- A. Decarburising

B. Alloying with cobalt

- C. Purification
- D. Alternate heating & cooling

Dowtherm is a _____?

A. High temperature heating medium (a petroleum product)

- B. Product of coal tar distillation
- C. Very heat sensitive material
- D. None of these

A second order reaction of the form $A + B \rightarrow C$ is called a pseudo-first order reaction, when _____?

- A. $C_{A0} = C_{B0}$
- B. $C_{A0} > C_{B0}$
- C. $C_{B0} > C_{A0}$
- D. $C_{B0} \geq C_{A0}$**

Which of the following holds good for a solution obeying Raoult's law (i.e., an ideal solution) (where, ΔH = heat of mixing, and ΔV = volume change on mixing)?

- A. $\Delta H = 1$ (+ve) and $\Delta V = -ve$
- B. $\Delta H = 0$
- C. $\Delta V = 0$
- D. Both B. and C.**

Gelatinous solid (which plug the septum) can be filtered by a _____

filter?

- A. Sparkler
- B. Plate and frame
- C. Vacuum leaf
- D. Pre-coat**

The rate of heat transfer from a vertical plate by natural convection depends upon the temperature differences (ΔT) between wall and outside bulk. The proportionality is given as _____?

- A. $(\Delta T)^{1/4}$
- B. $(\Delta T)^{1/2}$
- C. $(\Delta T)^{5/4}$
- D. $(\Delta T)^{3/4}$**

The rate constant of a first order reaction depends on the _____?

- A. Concentration of the reactant
- B. Temperature**
- C. Concentration of the product
- D. Time

The expression, $\ln(F/W) = \int x_F x_W [dx/y^* - x]$ is _____?

- A. Differential distillation equation**
- B. For NtoG in absorption for dilute mixture
- C. Slope of q-line in McCabe-Thiele method
- D. For relative volatility

Which of the following is not a secondary air pollutant ?

- A. Ozone
- B. Photochemical smog
- C. Sulphur dioxide**
- D. All A., B. & C

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Punjab Boards | **Sindh Boards** | **KPK Boards** | **Balochistan Boards**

AJK Boards | **Federal Boards**

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