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Section : Chemical Engineering

Q.1 Overall order of reaction for which the rate constant has units of $(\text{mol/L})^{-1/2} \cdot \text{sec}^{-1}$ is

- A. $-1/2$
- B. $1/2$
- C. $3/2$
- D. $5/2$

Ans ☒ 1. A
☒ 2. B
☒ 3. C
☒ 4. D

Question ID : 5834935633

Q.2 The function of moderators in nuclear reactor is to

- A. Slow down secondary neutrons
- B. Absorb secondary neutrons
- C. Control the chain reaction
- D. None of these

Ans ☒ 1. A
☒ 2. B
☒ 3. C
☒ 4. D

Question ID : 5834935646

Q.3 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

Ans  1. A
 2. B
 3. C
 4. D

Question ID : 5834935639

Q.4 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 component 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 the above

Ans  1. A
 2. B
 3. C
 4. D

Question ID : 5834935595

Q.5 Cavitation in a centrifugal pump results from

- A. High discharge pressure
- B. Low barometric pressure
- C. High discharge velocity
- D. High discharge rate

Ans  1. A
 2. B
 3. C
 4. D

Question ID : 5834935602

Q.6 If f = moles of vapour present per mole of feed, then the slope of feed line is (McCabe – Thiele method)

- A. $\frac{1-f}{f}$
- B. $\frac{f-1}{f}$
- C. $\frac{-1}{f}$
- D. $\frac{-f}{1-f}$

Ans  1. A
 2. B
 3. C
 4. D

Question ID : 5834935623

Q.7 In which one of the following situations, the entropy change will be negative?

- A. Air expands isentropically from 6 bar to 3 bar
- B. Air expands isothermally from 6 bar to 3 bar
- C. Air is compressed to half the volume at constant pressure
- D. Heat is supplied to air at constant volume till the pressure becomes double

Ans  1. A
 2. B
 3. C
 4. D

Question ID : 5834935592

Q.8 Water is extensively used as the heat exchange medium since

- A. It has a low dirt factor
- B. It has a high heat capacity
- C. It has low viscosity
- D. It is relatively less corrosive

Ans  1. A
 2. B
 3. C
 4. D

Question ID : 5834935647

Q.9 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 independent 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

Ans  1. A
 2. B
 3. C
 4. D

Question ID : 5834935661

Q.10 In ball mill operation, the feed size (D_f in meters) and the ball diameter (D_b in meters) are related as (where, k = Grindability constant)

- A. $D_b^2 = k D_f$
- B. $D_b = k D_f$
- C. $D_b^3 = k D_f$
- D. $D_b^2 = k D_f^2$

Ans  1. A
 2. B
 3. C
 4. D

Question ID : 5834935616

Q.11 A straight line is obtained on plotting reciprocal of filtration rate Vs the volume of filtrate for ___ flow of filtrate.

- A. Compressible cake and laminar
- B. Incompressible cake and laminar
- C. Compressible cake and turbulent
- D. Incompressible cake and turbulent

Ans  1. A
 2. B
 3. C
 4. D

Question ID : 5834935611

Q.12 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. $1/f$

Ans  1. A
 2. B
 3. C
 4. D

Question ID : 5834935622

Q.13 Correction is applied to LMTD for

- A. Parallel flow
- B. Counter flow
- C. Cross flow
- D. None of the above

Ans  1. A
 2. B
 3. C
 4. D

Question ID : 5834935590

Q.14 Which of the following relates the absorption and evolution of heat at the junction of a thermocouple to the current flow in the circuit?

- A. Seebeck effect
- B. Peltier effect
- C. Joule heating effect
- D. Thompson effect

Ans  1. A
 2. B
 3. C
 4. D

Question ID : 5834935597

Q.15 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 $\sqrt{T}$

Ans  1. A
 2. B
 3. C
 4. D

Question ID : 5834935621

Q.16 Rise of a liquid in a capillary tube is a result of

- A. Cohesion
- B. Adhesion
- C. Both (a) and (b)
- D. Neither (a) nor (b)

Ans  1. A
 2. B
 3. C
 4. D

Question ID : 5834935607

Q.17 Which of the following is most suitable for handling fibrous and dense slurries?

- A. Propeller agitator
- B. Cone type agitator
- C. Turbine agitator
- D. Radial propeller agitator

Ans  1. A
 2. B
 3. C
 4. D

Question ID : 5834935612

Q.18 The Lewis number of a mixture is defined as

- A. N_{Pr} / N_{Sc}
- B. $N_{Pr} N_{Sc}$
- C. N_{Sc} / N_{Pr}
- D. $C_S (N_{Sc} / N_{Pr})$

Ans  1. A
 2. B
 3. C
 4. D

Question ID : 5834935619

- Q.19** As the reflux ratio decreases, the
- A. Separation becomes more efficient
 - B. Number of plates increases
 - C. Column diameter increases
 - D. None of these

Ans  1. A
 2. B
 3. C
 4. D

Question ID : 5834935620

- Q.20** For identical feed composition, flow rate, conversion and for all positive reaction orders the ratio of the volume of mixed reactor to the volume of plug flow reactor
- A. Is independent of the order of reaction
 - B. Increases linearly with increase in the order of reaction
 - C. Increases with increase in the order of the reaction
 - D. Decreases with increase in the order of reaction

Ans  1. A
 2. B
 3. C
 4. D

Question ID : 5834935630

- Q.21** An element 'A' form cation by loss of two electrons and 'B' gain two electrons to form Anion. Then formula of Ionic compound formed is

- A. A^2B
- B. AB^2
- C. AB
- D. AB^3

Ans  1. A
 2. B
 3. C
 4. D

Question ID : 5834935660

- Q.22** According to Kirchhoff's First and Second Law's, which quantities are conserved?
- A. Charge and Potential Difference
 - B. Current and Potential Difference
 - C. Current and Energy
 - D. Charge and Energy

Ans  1. A
 2. B
 3. C
 4. D

Question ID : 5834935659

Q.23 Normal screwed fittings are used for pipes up to a diameter of -----inches.

- A. 1.5
- B. 3
- C. 5
- D. 9

Ans  1. A
 2. B
 3. C
 4. D

Question ID : 5834935648

Q.24 In the Vanderwaals equation of state, $(P + (a/V^2))(V - b) = RT$, the units of 'a' is

- A. N-m
- B. N-m²
- C. N-m⁴
- D. N-m/K

Ans  1. A
 2. B
 3. C
 4. D

Question ID : 5834935593

Q.25 Which of the following factors influence a chemical system in accordance with the Le Chatelier's principle?

- A. Concentration only
- B. Pressure and concentration
- C. Concentration, pressure and temperature
- D. Temperature and pressure

Ans  1. A
 2. B
 3. C
 4. D

Question ID : 5834935640

Q.26 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

Ans  1. A
 2. B
 3. C
 4. D

Question ID : 5834935631

Q.27 Acidity or alkalinity of a solution is expressed by its pH value, which is defined as

- A. $\text{Log } 1/[\text{H}^+]$
- B. $-\text{Log } 1/[\text{H}^+]$
- C. $1/\log [\text{H}^+]$
- D. $-1/\log [\text{H}^+]$

Ans  1. A
 2. B
 3. C
 4. D

Question ID : 5834935638

Q.28 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 $(\text{COP})_R$ and the coefficient of performance as a heat pump $(\text{COP})_{HP}$ are

- A. $(\text{COP})_R = (\text{COP})_{HP} = 0.6$
- B. $(\text{COP})_R = 1.5; (\text{COP})_{HP} = 2.5$
- C. $(\text{COP})_R = 2.5; (\text{COP})_{HP} = 1.5$
- D. $(\text{COP})_R = (\text{COP})_{HP} = 2.5$

Ans  1. A
 2. B
 3. C
 4. D

Question ID : 5834935594

Q.29

Unit of viscosity is

- A. Poise
- B. Centipoise
- C. Ns/m^2
- D. All of the above

Ans  1. A
 2. B
 3. C
 4. D

Question ID : 5834935599

Q.30 Magnetic lines of force move from _____ to _____ pole

- A. North, South
- B. South, North
- C. Centre, North
- D. Centre, South

Ans  1. A
 2. B
 3. C
 4. D

Question ID : 5834935655

Q.31 Mirages are an example for

- A. Critical angle
- B. Total internal reflection
- C. Refraction
- D. Multiple reflection

Ans  1. A
 2. B
 3. C
 4. D

Question ID : 5834935656

Q.32 Find the minimum value of function $f(x) = x^2 - x + 2$

- A. $\frac{1}{2}$
- B. $\frac{3}{4}$
- C. $\frac{7}{4}$
- D. $\frac{1}{4}$

Ans  1. A
 2. B
 3. C
 4. D

Question ID : 5834935650

Q.33 The equivalent diameter for pressure drop is ____ that for heat transfer.

- A. Smaller than
- B. Greater than
- C. Equal to
- D. Non related with

Ans  1. A
 2. B
 3. C
 4. D

Question ID : 5834935589

Q.34 Closed system has ----- type of boundary wall

- A. Impermeable
- B. Permeable
- C. Rigid
- D. None of the above

Ans  1. A
 2. B
 3. C
 4. D

Question ID : 5834935642

Q.35 Principle of fluid mechanics works on the utilization of -----.

- A. Velocity
- B. Accelerating mass
- C. Volume
- D. Work

Ans  1. A
 2. B
 3. C
 4. D

Question ID : 5834935606

Q.36 Filtrate flow-rate in case of a rotary dryer vacuum filter (in which $R_m < R_c$) is proportional to _____ of the cycle time

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

Where μ = Filtrate viscosity, R_m = Filtrate medium resistance, R_c = Cake resistance

Ans  1. A
 2. B
 3. C
 4. D

Question ID : 5834935617

Q.37 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

Ans  1. A
 2. B
 3. C
 4. D

Question ID : 5834935643

Q.38 Mesh indicates the number of holes per

- A. Square inch
- B. Linear inch
- C. Square foot
- D. Linear foot

Ans  1. A

 2. B

 3. C

 4. D

Question ID : 5834935610

Q.39 In a triangle XYZ , $\tan x=2$, $\tan y=4$; then what is the value of $\tan z$?

- A. $\frac{6}{5}$
- B. $\frac{5}{6}$
- C. $\frac{6}{7}$
- D. $\frac{7}{6}$

Ans  1. A

 2. B

 3. C

 4. D

Question ID : 5834935651

Q.40 Penicillin is separated from fermented broth by

- A. Ternary azeotropic distillation
- B. Evaporation in calandria
- C. Simple distillation
- D. Extraction with amyl or butyl acetate

Ans  1. A

 2. B

 3. C

 4. D

Question ID : 5834935636

Q.41 Controlling film coefficient means

- A. The coefficient which offers the largest resistance
- B. The coefficient which offers the least resistance
- C. The coefficient which doesn't offer any resistance
- D. The average of the film thickness

Ans  1. A

 2. B

 3. C

 4. D

Question ID : 5834935583

Q.42 Bollman extractor

- A. Is a static bed leaching equipment
- B. Is used for extraction of oil from oil seed
- C. Is a centrifugal extractor
- D. Employs only counter current extraction

Ans  1. A

 2. B

 3. C

 4. D

Question ID : 5834935618

Q.43 Circulation pump is located below the evaporator to

- A. Avoid cavitation
- B. Avoid frequent priming
- C. Create more suction head
- D. None of the above

Ans  1. A

 2. B

 3. C

 4. D

Question ID : 5834935587

Q.44 For absorption of solute gas A in solvent B with chemical reaction of first order in A and B, the Hatta number is defined as

- A. $\frac{K_1}{(K_{AB} C_B D_A)^{1/2}}$
- B. $\left[\frac{K_{AB} C_B D_A}{K_1^2} \right]^2$
- C. $\frac{(K_{AB} C_B D_A)^{1/2}}{K_1^2}$
- D. $\frac{(K_{AB} C_B D_A)^{1/2}}{K_1}$

Where K_{AB} = Reaction rate constant, K_1 = Liquid phase mass transfer coefficient of physical adsorption, D_A = diffusion coefficient of A in liquid, C_B = Concentration of B

Ans ☒ 1. A
☒ 2. B
☒ 3. C
☒ 4. D

Question ID : 5834935627

Q.45 In gray body, emissivity is

- A. Less than 1
- B. Equal to 1
- C. More than 1
- D. None of the above

Ans ☒ 1. A
☒ 2. B
☒ 3. C
☒ 4. D

Question ID : 5834935582

Q.46 Solvent B is used to extract solute C from a given feed containing A and C. If solute C is more soluble in A than in B, the distribution coefficient for C will be

- A. $\gg 1$
- B. 1
- C. < 1
- D. > 1

Ans ☒ 1. A
☒ 2. B
☒ 3. C
☒ 4. D

Question ID : 5834935624

Q.47 Compounds having same molecular formula but different structural formulae are called

- A. Allotropes
- B. Isomers
- C. Isotopes
- D. Isobars

Ans  1. A

 2. B

 3. C

 4. D

Question ID : 5834935654

Q.48 Newton's law of viscosity relates the

- A. Shear stress and strain
- B. Velocity gradient and pressure intensity
- C. Shear stress and rate of angular deformation in fluid
- D. Pressure gradient and rate of angular deformation

Ans  1. A

 2. B

 3. C

 4. D

Question ID : 5834935604

Q.49 Converging -diverging nozzles are also known as -----.

- A. Pascal nozzle
- B. Bernoulli's nozzle
- C. Torricelli's nozzle
- D. De laval' nozzle

Ans  1. A

 2. B

 3. C

 4. D

Question ID : 5834935608

Q.50 With increase in the capacity of screens, the screen effectiveness

- A. Remains unchanged
- B. Increases
- C. Decreases
- D. Decreases exponentially

Ans  1. A
 2. B
 3. C
 4. D

Question ID : 5834935609

Q.51 Critical thickness of insulation for a sphere is steady state heat conduction given by (h_o =heat transfer coefficient at outer surface)

- A. $r_c = k/h_o$
- B. $r_c = 2k/h_o$
- C. $r_c = h_o/2k$
- D. $r_c = h_o/k$

Ans  1. A
 2. B
 3. C
 4. D

Question ID : 5834935585

Q.52 The most suitable equipment for removing the fine dust particle ($< 1\mu$ dia.) from air below its dew point will be

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

Ans  1. A
 2. B
 3. C
 4. D

Question ID : 5834935613

Q.53 The most abundant metal in the earth's crust is

- A. Copper
- B. Aluminum
- C. Silver
- D. Silicon

Ans  1. A
 2. B
 3. C
 4. D

Question ID : 5834935657

Q.54 “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 is known as

- A. Raoult’s law
- B. Henry’s law
- C. Amgat’s law
- D. Dalton’s law

Ans  1. A
 2. B
 3. C
 4. D

Question ID : 5834935641

Q.55 Laminar flow in a pipe, heat is transferred from hot wall to the liquid by

- A. Conduction only
- B. Convection only
- C. Forced convection and conduction
- D. Free convection and conduction

Ans  1. A
 2. B
 3. C
 4. D

Question ID : 5834935586

Q.56 The equation of the tangent to the curve $y = x^3$ at (1,1)

- A. $x - 10y + 50 = 0$
- B. $3x - y - 2 = 0$
- C. $x + 3y - 4 = 0$
- D. $x + 2y - 7 = 0$

Ans  1. A
 2. B
 3. C
 4. D

Question ID : 5834935653

Q.57 Molar flow rate of NH_3 , when it is flowing at 112 lit/min through a non-reacting continuous reactor ismoles/min.

- A. 5
- B. 10
- C. 0.5
- D. 1

Ans  1. A

 2. B

 3. C

 4. D

Question ID : 5834935632

Q.58 The weber number may be defined as the ratio of

- A. Inertial forces to surface tension forces
- B. Surface tension forces to pressure forces
- C. Pressure forces to viscous forces
- D. Viscous forces to gravity forces

Ans  1. A

 2. B

 3. C

 4. D

Question ID : 5834935605

Q.59 Industrially, the process of sedimentation is conducted on a large scale in equipment called

- A. Sorting classifiers
- B. Cyclones
- C. Thickeners
- D. Filters

Ans  1. A

 2. B

 3. C

 4. D

Question ID : 5834935614

Q.60 A space time of 20 min. means

- A. 20% conversion is achieved in one min.
- B. 80% conversion is achieved in one min.
- C. 100% conversion of the reactant in 20 min.
- D. One reactor volume of feed at specified conditions is processed in 20 min.

Ans  1. A
 2. B
 3. C
 4. D

Question ID : 5834935629

Q.61 Anemometer is used to measure

- A. Velocity
- B. Pressure
- C. Viscosity
- D. Density

Ans  1. A
 2. B
 3. C
 4. D

Question ID : 5834935600

Q.62 A passenger in an Airplane can see the rainbow in a shape of

- A. Arc
- B. Cone
- C. Circle
- D. Sphere

Ans  1. A
 2. B
 3. C
 4. D

Question ID : 5834935658

Q.63 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. Inverse temperature

Ans  1. A

 2. B

 3. C

 4. D

Question ID : 5834935637

Q.64 Styrene is produced from Ethyl benzene by the process of

- A. De-hydrogenation
- B. Oxidation
- C. Alkylation
- D. Dehydration

Ans  1. A

 2. B

 3. C

 4. D

Question ID : 5834935634

Q.65 In the reaction $A+B \rightarrow R+S$, the consumption of A followed the first order and the consumption of B followed zeroth order. What is the overall order?

- A. 0
- B. 1
- C. 1.5
- D. 2

Ans  1. A

 2. B

 3. C

 4. D

Question ID : 5834935628

Q.66 1 litre gas at 760 torr is compressed to 0.8 litre at constant temperature. What is the final pressure of the gas?

- A. 800 torr
- B. 860 torr
- C. 950 torr
- D. 540 torr

Ans  1. A
 2. B
 3. C
 4. D

Question ID : 5834935644

Q.67 Trinitro Toluene (TNT) is

- A. Used in glycerin manufacture
- B. An explosive
- C. Used in dye manufacture
- D. In printing industry

Ans  1. A
 2. B
 3. C
 4. D

Question ID : 5834935635

Q.68 Viscosity has the dimensions

- A. $ML^{-1}T^{-1}$
- B. $M^{-1}LT$
- C. $ML^{-1}T^{-3}$
- D. MLT^{-3}

Ans  1. A
 2. B
 3. C
 4. D

Question ID : 5834935603

Q.69 A Carnot cycle consists of the following steps:

- A. Two isobarics and two isothermals
- B. Two isothermals and two isentropics
- C. Two isochorics and two isobarics
- D. Two isentropics and two isochorics

Ans  1. A

 2. B

 3. C

 4. D

Question ID : 5834935591

Q.70 The storage tank for volatile liquid will have a roof which is of

- A. Flat type
- B. Conical type
- C. Hemispherical
- D. Floating head

Ans  1. A

 2. B

 3. C

 4. D

Question ID : 5834935645

Q.71 On moving the feed line (q-line) from saturated liquid feed (vertical position) to saturated vapour feed (horizontal position), if the slope of both operating lines is to be increased, then it will result in

- A. Greater degree of separation with fixed number of trays
- B. Increased reboiler load
- C. Increased reflux ratio
- D. None of these

Ans  1. A

 2. B

 3. C

 4. D

Question ID : 5834935626

Q.72 Sphericity of a cubical particle, when the equivalent diameter is taken as the height of the cube is

- A. 0.5
- B. 1
- C. $\sqrt{2}$
- D. $\sqrt{3}$

Ans  1. A

 2. B

 3. C

 4. D

Question ID : 5834935615

Q.73 A designer chooses the value of fluid flow rates and specific heats in such a manner that the heat capacities of the two fluids are equal. A hot fluid enters the counter flow heat exchanger at 100 °C and leaves at 60 °C. The cold fluid enters the heat exchangers at 40 °C. The mean temperature difference between the two fluids is (in °C)

- A. 60
- B. 40
- C. 20
- D. 10

Ans  1. A

 2. B

 3. C

 4. D

Question ID : 5834935588

Q.74 What is the value of, ($i^2+i^4+i^6+\dots+i^{2n}$), when n is the even number?

- A. 1
- B. 0
- C. -1
- D. None of the above

Ans  1. A

 2. B

 3. C

 4. D

Question ID : 5834935649

- Q.75** As the entropy of the universe is increasing, day by day, the work producing capacity of a heat engine is
- A. Not changed
 - B. Increasing
 - C. Decreasing
 - D. Data insufficient, can't be predicted

Ans  1. A
 2. B
 3. C
 4. D

Question ID : 5834935596

- Q.76** For condensation of pure vapors, if the heat transfer coefficients in film wise 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

Ans  1. A
 2. B
 3. C
 4. D

Question ID : 5834935584

- Q.77** 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. $(1-R_i) = R_o / R_i$

Ans  1. A
 2. B
 3. C
 4. D

Question ID : 5834935625

Q.78 What is the solution of the differential equation $x dy - y dx = 0$?

- A. $xy = c$
- B. $y = cx$
- C. $x + y = c$
- D. $x - y = c$

Ans  1. A

 2. B

 3. C

 4. D

Question ID : 5834935652

Q.79 Differential manometer measures the

- A. Absolute pressure
- B. Gauge pressure
- C. Pressure difference
- D. Pressure gradient

Ans  1. A

 2. B

 3. C

 4. D

Question ID : 5834935601

Q.80 In feed-back control system G & H denote open-loop and close-loop transfer function respectively. The output – input relationship is

- A. $G/(1+H)$
- B. $H/(1+G)$
- C. G/H
- D. H/G

Ans  1. A

 2. B

 3. C

 4. D

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