**Multiple Choice Questions**

1. The phenomenon of concentration of molecules of a gas or liquid at a solid surface is called
2. Absorption
3. Adsorption
4. Catalysis
5. None of these

**Answer:**(b)

1. Adsorbate is the substance
2. Which concentrates on the surface
3. Where adsorption takes place
4. Which evaporates from the surface of metals
5. None of these

**Answer:**(a)

1. Increase in \_\_\_\_\_ of the adsorbent increases the total amount of the gas adsorbed
2. Density
3. Volume
4. Surface area
5. Surface tension

**Answer**: (c)

1. \_\_\_\_\_ the critical temperature of the gas, the more readily will it be adsorbed
2. Lower
3. Higher
4. Intermediate
5. None of these

**Answer**: (b)

1. The process of adsorption is
2. Exothermic
3. Endothermic
4. Sometimes exothermic, Sometimes endothermic
5. None of the above

**Answer**: (a)

1. Physical adsorption is a \_\_\_\_\_ process
2. Reversible
3. Irreversible
4. Exothermic
5. None of these

**Answer**: (a)

1. Physical adsorption occurs rapidly at \_\_\_\_\_ temperature
2. Low
3. High
4. Absolute zero
5. None of these

**Answer**: (a)

1. Physical adsorption generally \_\_\_\_\_ with increasing temperature
2. Decreases
3. Increases
4. Sometimes decreases, Sometimes increases
5. None of these

**Answer**: (a)

1. Chemisorption generally \_\_\_\_\_ with temperature
2. Increases
3. Decreases
4. Remains the same
5. None of these

**Answer**: (a)

1. Multi-molecular layers are formed in
2. Absorption
3. Physical adsorption
4. Chemisorption
5. Reversible adsorption

**Answer**: (c)

1. The relationship between equilibrium pressure of a gas and its amount adsorbed on the solid adsorbent at constant temperature is called
2. Chemisorption
3. Adsorption isobars
4. Adsorption isotherms
5. None of these

**Answer**: (c)

1. Freundlich isotherms is not applicable at
2. High pressure
3. Low pressure
4. 273 k
5. Room temperature

**Answer**: (a)

1. At low pressures, the amount of the gas adsorbed is \_\_\_\_\_ proportional to the pressure
2. Directly
3. Inversely
4. Sometimes directly, Sometimes inversely
5. None of these

**Answer**: (a)

1. Which of the following is not an equation for Freundlich isotherm?

a) $\frac{w}{m}=k×C^{\frac{1}{n}}$

b) $\frac{w}{m}=k×P^{\frac{1}{n}}$

c) log $\frac{w}{m}$ = log $k$ + $\frac{1}{n}$ log P

d) log $\frac{w}{m}$ = log $k$ - $\frac{1}{n}$ log P

**Answer**: (d)

1. In gas masks the poisonous gases are removed by the adsorbent by the process of
2. Absorption
3. Adsorption
4. Catalysis
5. None of these

**Answer**: (b)

1. Froth flotation process for the concentration of sulphide ore makes use of the process of
2. Adsorption
3. Heterogeneous catalysis
4. Absorption
5. Equilibrium

**Answer**: (a)

1. The water freed from all ions (cations and anions) is referred to as
2. Heavy water
3. Concentrated water
4. Mineral water
5. Demineralized water

**Answer**: (d)

1. In physical adsorption the gas molecules are held to the solid surface by
2. Hydrogen bond
3. Sigma bond
4. Pi bond
5. Van der Waal’s forces

**Answer**: (d)

1. The adsorption of hydrogen on charcoal is
2. Physical adsorption
3. Chemical adsorption
4. Sorption
5. None of these

**Answer**: (a)

1. The process of desorption increases with \_\_\_\_\_ of pressure
2. Decrease
3. Increase
4. Sometimes increases, Sometimes decreases
5. None of these

**Answer**: (a)

1. The heat of adsorption in physical adsorption lies in the range
2. 1 – 10 kJ mol-1
3. 10 – 400 kJ mol-1
4. 40 – 100 kJ mol-1
5. 40 – 400 kJ mol-1

**Answer**: (a)

1. In chromatographic analysis, the principle used is
2. Absorption
3. Adsorption
4. Distribution
5. Evaporation

**Answer**: (b)

1. Which of the following is not a characteristic of physical adsorption?
2. Adsorption is irreversible
3. Multi molecular layer is formed
4. ΔH is of the order 400 kJ
5. Occurs rapidly at low temperature

**Answer**: (c)

1. In gas masks, the poisonous gases are adsorbed by activated charcoal. The activated charcoal acts as
2. Adsorbate
3. Adsorbent
4. Catalysis
5. Adsorption agent

**Answer**: (b)

1. Which is incorrect statement?
2. Physical adsorption is irreversible in water
3. Physical adsorption involves multi-molecular layers
4. The energy evolved is small
5. Physical adsorption is caused by van der Waal’s forces

**Answer**: (a)

1. Which out of the following is incorrect?
2. Chemisorption is reversible in nature
3. Physical adsorption is reversible in nature
4. ΔH is small in Physical adsorption
5. ΔH is large in Chemical adsorption

**Answer**: (a)

1. The efficiency of adsorbent increases with increase in
2. Viscosity
3. Surface tension
4. Surface area
5. Number of ions

**Answer**: (c)

1. Which of the following is not an application of adsorption?
2. Gas masks
3. Heterogeneous catalysis
4. Froth flotation process
5. Softening of water by boiling

**Answer**: (d)

1. Which of the following is incorrect?
2. Chemisorption is caused by bond formation
3. Chemisorption is specific in nature
4. Chemisorption is reversible
5. Chemisorption increases with increase in temperature

**Answer**: (c)

1. In an adsorption process unimolecular layer is formed. It is
2. Physical adsorption
3. Chemical adsorption
4. Ion-exchange
5. Chromatographic analysis

**Answer**: (b)

1. The rate of desorption Rd is given by (Where $θ$ is the fraction of total surface covered by the adsorbed molecules)
2. Rd = kd$θ$
3. Rd = kd$θ$2
4. Rd = kd/$θ$
5. Rd = kd/$θ$2

**Answer**: (a)

1. Langmuir Isotherms holds at low pressure but fails at
2. Low temperature
3. High pressure
4. Intermediate pressure
5. None of these

**Answer**: (b)

1. The value of log 1 is
2. 1
3. 0
4. 2
5. 3

**Answer**: (b)

1. The value of log (xy) is
2. 0
3. 1
4. log x + log y
5. 2

**Answer**: (c)

1. Log ($\frac{x}{y})$ is equal to
2. log x – log y
3. 0
4. 1
5. 3

**Answer**: (a)

1. What is the value of log xy?
2. log x + log y
3. log x – log y
4. y log x
5. zero

**Answer**: (c)

1. The graph of linear equation is always in the form of
2. Circle
3. Sphere
4. Straight line
5. Curve

**Answer**: (c)

1. Slope of a line is not defined if the line is
2. Parallel to x-axis
3. Parallel to line x -y = 0
4. Parallel to the line x + y =0
5. Parallel to the y-axis

**Answer**: (d)

1. Slope of any line parallel to the x-axis is
2. 1
3. -1
4. 0
5. Not defined

**Answer**: (d)

1. The equation y-y1 = m(x -x1) for different values of m and (x1, y1) fixed, represents
2. A family of parallel lines
3. A straight line
4. A family of lines which are concurrent
5. A family of concurrent lines

**Answer**: (d)

1. The straight lines y = m1x and y = m2x are perpendicular to each other if
2. m1 = 1/m2
3. m1m2 = -1
4. m1 = m2
5. m1= -m2

**Answer**: (b)

1. Two straight lines, whose gradients are m1,m2 respectively are parallel if
2. m1 = 0
3. m2 = 0
4. m1m2 = -1
5. m1 = m2

**Answer**: (d)

1. The intercept form of line is given by
2. y = mx + b
3. $\frac{x}{a}$ + $\frac{y}{b}$ = 1
4. 2x + 3y = 1
5. x + 2y = 3

**Answer**: (b)

1. The relation between sin2x and cos2x is
2. sin2x - cos2x = 1
3. sin2x + cos2x = 1
4. $\frac{sin^{2}x}{cos^{2}x}$ = 1
5. sin2x X cos2x = 1

**Answer**: (b)

1. The relation between cosec2x and cot2x is
2. $\frac{cosec^{2}x}{cot^{2}x}$ = 1
3. cosec2x + cot2x = 1
4. cosec2x - cot2x = 1
5. cosec2x X cot2x = 1

**Answer**: (c)

1. The value of sin (x+y) is
2. sin x cos y – cos x sin y
3. sin x cos y + cos x sin y
4. sin x sin y + cos x cos y
5. sin x sin y – cos x cos y

**Answer**: (b)

1. Amorphous solids do not have
2. Sharp melting point
3. Characteristics geometrical shapes
4. Regularity of the structure
5. All of these

**Answer**: (d)

1. A crystalline solid has
2. Definite geometrical shape
3. Flat faces
4. Sharp edges
5. All of these

**Answer**: (d)

1. Amorphous substances are isotropic because
2. They have same value of any property in all directions
3. They have different values of physical properties in different directions
4. They have definite geometrical shape
5. None of the above

**Answer**: (a)

1. The elements of symmetry are
2. Plane of symmetry
3. Axis of symmetry
4. Centre of symmetry
5. All of these

**Answer**: (d)

1. The amorphous solid among the following is
2. Table slat
3. Diamond
4. Plastic
5. Graphite

**Answer**: (c)

1. A crystalline solid does not have one of the following properties. It is
2. Anisotropy
3. Sharp melting points
4. Isotropy
5. Definite and regular geometry

**Answer**: (c)

1. For tetragonal crystal system, which of the following is not true
2. a = b ≠ c
3. α = β = γ = 90°
4. a ≠ b ≠ c
5. none of these

**Answer**: (c)

1. Na+Cl-, Cs+Cl- are the example of
2. Cubical crystal system
3. Tetragonal crystal system
4. Orthorhombic crystal system
5. Rhombohedral crystal system

**Answer**: (a)

1. The total number of atoms in a body centred cubic until cell is
2. 1
3. 2
4. 3
5. 4

**Answer**: (b)

1. The co-ordination number of Na+ in Na+Cl- crystal is
2. 2
3. 4
4. 6
5. 8

**Answer**: (c)

1. The co-ordination number of body centred cubic lattice is
2. 2
3. 4
4. 6
5. 8

**Answer**: (d)

1. The Bragg’s equation for diffraction of X-rays is
2. nλ = 2 d2 sin $θ$
3. nλ = 2 d sin $θ$
4. nλ = 2 d sin2$θ$
5. nλ = d sin $θ$

**Answer**: (b)

1. In Bragg’s equation n λ = 2 d sin$θ$, ‘n’ represents
2. The number of moles
3. The principal quantum number
4. The Avogadro’s number
5. The order of reflection

**Answer**: (d)

1. Potassium crystallises in a *bcc* structure. The co-ordination number of potassium in potassium metal is
2. 2
3. 4
4. 6
5. 8

**Answer**: (d)

1. NaCl is example of
2. Covalent solid
3. Metallic solid
4. Ionic solid
5. Molecular solid

**Answer**: (c)

1. Which of the following defects results in decrease of density of crystal
2. Schottky defect
3. Frenkel defect
4. Interstitial defect
5. Impurity defect

**Answer**: (a)

1. Which of the following is a non-crystalline solid?
2. Rubber
3. ZnS
4. HgS
5. PbI

**Answer**: (a)

1. LiF is an example of
2. Molecular crystal
3. Covalent crystal
4. Ionic crystal
5. Metallic crystal

**Answer**: (c)

1. According to Boyle’s law the volume of a fixed mass of a gas, at constant temperature, is
2. Directly proportional to its pressure
3. Inversely proportional to its pressure
4. The square root of its pressure
5. None of these

**Answer**: (b)

1. Mathematically, Boyle’s law can be represented as
2. V $∝$ 1/P
3. V = k/P
4. V P = k
5. All of these

**Answer**: (d)

1. At constant pressure, the volume of a fixed mass of a gas is
2. Directly proportional to its temperature
3. Directly proportional to its absolute temperature
4. Inversely proportional to its temperature
5. Inversely proportional to its absolute temperature

**Answer**: (b)

1. Which of the following is the correct mathematical relation for Charle’s law at constant pressure
2. V$∝$ T
3. V $∝$ t
4. V = kt
5. None of these

**Answer**: (a)

1. “Equal volume of all gases at the same temperature and pressure contain equal number of molecules is the statement of
2. Combined gas law
3. Charle’s law
4. Avogadro’s law
5. Boyle’s law

**Answer**: (c)

1. For one mole of gas, the ideal gas equation is
2. PV = RT
3. PV = 1/2 RT
4. PV = 3/2 RT
5. PV = 5/2 RT

**Answer**: (a)

1. The units of R, the gas constants are
2. Erg K-1 mol-1
3. Cal K-1 mol-1
4. Joule K-1 mol-1
5. All of these

**Answer**: (d)

1. In lit atm K-1 mol-1 the numerical value of R, the gas constant, is
2. 0.821
3. 0.0821
4. 0.00821
5. 0.000821

**Answer**: (b)

1. The average kinetic energy of the gas molecules is
2. Inversely proportional to its absolute temperature
3. Directly proportional to its absolute temperature
4. Equal to the square to its absolute temperature
5. Directly proportional to the square root of its absolute temperature

**Answer**: (b)

1. The kinetic gas equation is given by the relation
2. PV = 1/3 m N $μ$2
3. PV = 1/2 m N $μ$2
4. PV = 3/2 m N $μ$2
5. PV = 2/3 m N $μ$2

**Answer**: (a)

1. The average velocity of a gas is given by
2. $\overbar{v}=\sqrt{\frac{8RT}{n M}}$
3. $\overbar{v}=\sqrt{\frac{3RT}{n M}}$
4. $\overbar{v}=\sqrt{\frac{2RT}{n M}}$
5. $\overbar{v}=\sqrt{\frac{RT}{n M}}$

**Answer**: (a)

1. The root mean square velocity of gas molecules is given by the relation
2. $μ$ = $\sqrt{\frac{RT}{M}}$
3. $μ$ = $\sqrt{\frac{2RT}{M}}$
4. $μ$ = $\sqrt{\frac{3RT}{M}}$
5. $μ$ = $\sqrt{\frac{8RT}{M}}$

**Answer**: (c)

1. The root mean square velocity gas molecules is given by the relation
2. $μ$ = $\sqrt{\frac{3PV}{M}}$
3. $μ$ = $\sqrt{\frac{3RT}{M}}$
4. $μ$ = $\sqrt{\frac{3P}{D}}$
5. Al of these

**Answer**: (d)

1. The free path is the distance travelled by the molecule
2. Before collision
3. In one second
4. After collision
5. In one minute

**Answer**: (a)

1. The mean free path is
2. Directly proportional to the pressure of the gas
3. Directly proportional to the root mean square velocity of gas
4. Directly proportional to the temperature of the gas
5. Directly proportional to the absolute temperature of the gas

**Answer**: (d)

1. The compressibility factor, *z* i.e. the extent to which a real gas deviates from ideal behaviour is given by
2. *z =* $\frac{PV}{RT^{2}}$
3. *z =* $\frac{PV}{2RT}$
4. *z =* $\frac{PV}{2RT}$
5. *z =* $\frac{2PV}{RT}$

**Answer**: (c)

1. The real gases show nearly ideal behaviour at
2. Low pressures and low temperatures
3. High pressures and low temperatures
4. High pressures and high temperatures
5. Low pressure and high temperatures

**Answer**: (d)

1. The pressure P in the ideal gas equation is replaced by
2. $\left(P+\frac{an^{2}}{V^{2}}\right)$
3. $\left(P-\frac{an^{2}}{V^{2}}\right)$
4. $\left(P+\frac{2 n^{2}}{V^{2}}\right)$
5. $\left(P+\frac{n^{2}}{2 V^{2}}\right)$

**Answer**: (a)

1. The units of ‘a’ the van der Waal’s constant are
2. atm lit mol-1
3. atm lit-1 mol-1
4. atm lit-2 mol-2
5. atm lit-1 mol-2

**Answer**: (c)

1. Which one of the following is incorrect?
2. The critical temperature, Tc, of gas is that temperature above which it can be liquefied no matter how high pressure is applied
3. The critical pressure, Pc, is the minimum pressure required to liquefy the gas at its critical temperature
4. The critical volume, Pc, is the volume occupied by one mole of the gas at critical temperature and critical volume
5. None of these

**Answer**: (d)

1. Which one of the following relation is incorrect?
2. Vc = 3b
3. Pc = $\frac{a}{27 R b^{2}}$
4. Tc = $\frac{8a}{27 R b}$
5. None of these

**Answer**: (d)

1. A gas is heated at constant temperature. Then
2. The no. of molecules of the gas increases
3. The kinetic energy of the gas molecules decreases
4. The kinetic energy of the gas molecules remains unaltered
5. The kinetic energy of the gas molecules increases

**Answer**: (c)

1. In van der Waal’s equation of state for a non-ideal gas the net force of attraction among the molecules is given by
2. $\frac{an^{2}}{V^{2}}$
3. P + $\frac{an^{2}}{V^{2}}$
4. P - $\frac{an^{2}}{V^{2}}$
5. - $\frac{an^{2}}{V^{2}}$

**Answer**: (a)

1. The compressibility factor, *z*, for an ideal gas is
2. Zero
3. Less than one
4. Greater than one
5. Equal to one

**Answer**: (d)