

Section-A

Multiple Choice Questions (MCQ's)

Q.1 Choose the correct answer for each from the given options:

- (i) A simple covalent molecule possesses two bond pairs and two lone pairs around the central atom, its shape should be:
- (a) linear (b) Planar Trigonal (c) angular (d) None
- (ii) The correct relation between debye and coulomb meter is:
- (a) $1 \text{ D} = 3.33 \times 10^{-30} \text{ Cm}$ (b) $1 \text{ D} = 1.6 \times 10^{-19} \text{ Cm}$
(c) $1 \text{ D} = 1.88 \times 10^{-12} \text{ Cm}$ (d) $1 \text{ D} = 1.23 \times 10^{-8} \text{ Cm}$
- (iii) The bond order of N_2 molecule is:
- (a) 0 (b) 1 (c) 2 (d) 3
- (vi) For Avogadro's number, this statement is incorrect:
- (a) It is the no. of particles in one moles of any substances
(b) its numerical value is 6.02×10^{23}
(c) Its value change if temperature increases
(d) Its value change if number of moles increases

- (v) The minimum number of moles are present in:
- (a) 1 dm³ of methane gas at STP
 - (b) 5 dm³ of helium gas at STP
 - (c) 10 dm³ of hydrogen gas at STP
 - (d) 22.4 dm³ of chlorine gas at STP
- (vi) In 1935 A.D James Chadwick was awarded Nobel Prize because...
- (a) He Discovered proton
 - (b) He discovered neutron
 - (c) He determined the radius of hydrogen atom
 - (d) He gave the rule for electronic configuration
- (vii) When 4d orbital is filled, the next electron enter into
- (a) 5s (b) 5p (c) 5d (d) 6s
- (viii) According to Graham's Law of diffusion, the ratio of diffusion of H₂ and O₂ are respectively.
- (a) 1:2 (b) 2:1 (c) 1:4 (d) 4:1
- (ix) Collection of gas over water is an example of;
- (a) Graham's law (b) Dalton's
 - (c) Avogadro's law (d) Gaylusac law
- (x) Under similar condition CH₄ diffuses Times faster than SO₂ gas:
- (a) 1.5 time (b) 2 time
 - (c) 4 time (d) 16 time

(xi) The boiling point of water (H_2O) is 100°C whereas that of hydrogen sulphide (H_2S) is 420°C . This can be attributed to:

- (a) Smaller bond angle of H_2S than H_2O
- (b) Smaller radii of oxygen than sulphur
- (c) High I.P of oxygen than sulphur
- (d) Tendency of water to form hydrogen bond

(xii) Liquids can form convex meniscus in a narrow glass tube when:

- (a) Cohesive forces are stronger than adhesive forces
- (b) Adhesive forces are stronger than cohesive forces
- (c) Cohesive and adhesive forces are equal in strength
- (d) None of these

(xiii) The equilibrium of $\text{N}_{2(g)} + \text{O}_{2(g)} \rightleftharpoons 2\text{NO}_{(g)}$ ($\Delta H = +ve$) is affected by change in:

- (a) Temperature only
- (b) Pressure only
- (c) Both and pressure
- (d) Neither temperature nor pressure

(xiv) In reaction $\text{A}_{(g)} + \text{B}_{(g)} \rightleftharpoons 2\text{C}_{(g)}$, the equilibrium constants $K_p = K_c$ because:

- (a) $\Delta n > 1$
- (b) $\Delta n < 1$
- (c) $\Delta n = 1$
- (d) $\Delta n = 0$

(xv) The term Elive mass use in law of mass action means:

- (a) No. of mole
- (b) No. of molecules
- (c) mole dm_3
- (d) gram per dm_3

(xvi) In the equilibrium system of $\text{PCl}_5(\text{g}) \rightleftharpoons \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g})$, the correct relationship between K_c and K_p is:

- (a) $K_p > K_c$ (b) $K_p < K_c$
 (c) $K_p = K_c$ (d) $\frac{K_p}{K_c} = 1$

(xvii) The equilibrium of which of the following reaction would not be affected by an increase in pressure:

- (a) $\text{PCl}_5(\text{g}) \rightleftharpoons \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g})$ (b) $2\text{NO}(\text{g}) + \text{Cl}_2(\text{g}) \rightleftharpoons 2\text{NOCl}(\text{g})$
 (c) $\text{N}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{NO}(\text{g})$ (d) $2\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{SO}_3(\text{g})$

(xviii) The unit of rate constant (K) for the first order reaction is:

- (a) s^{-1} (b) conc. s^{-1} (c) $\text{conc.}^{-1} \cdot \text{s}$ (d) $\text{conc.}^{-1} \cdot \text{s}^{-1}$

(xix) Rate constant of a reaction is affected by:

- (a) Conc. of reactants (b) Conc. of products

(c) Temperature

(d) reaction time

(xx) Identify the incorrect statement about colloidal solution:

- (a) It shows Tyndall effect (b) Its particles movement is Brownian type
 (c) Its particle size is less than 1 nm (d) Its physical appearance is translucent

(xxi) For a hypothetical reaction $x + y \rightarrow z$, if the conc. of x is double, the rate increases by square and if the conc. of y is doubled the rate increases by twice. The experimental rate law of this reaction is:

(a) $R = K [x]^1 [y]^1$

(b) $R = K [x]^1 [y]^2$

(c) $R = K [x]^2 [y]^1$

(d) $R = K [x]^2 [y]^2$

(xxii) The unit of rate constant (K) for the first order reaction is:

(a) s^{-1}

(b) $\text{conc. } s^{-1}$

(c) $\text{conc.}^{-1} \cdot s$

(d) $\text{conc.}^{-1} s^{-1}$

(xxiii) Rate constant of a reaction is affected by:

(a) Conc. of reactants

(b) Conc. of products

(c) Temperature

(d) reaction time

Section-B

(Short Questions)

Note: Answer any 09 questions of the following:

- Q 2: Define rounding of data give various rules of rounding fo data.
- Q:3 What is gram molecular mass?
- Q 4: Explain why the filling of electrons in as orbital takes place prior 3d?
- Q 5: Write down the electronic configuration of the following.;
- (i) Fe ($Z=26$) (ii) Br^- ($z=35$) (iii) Ca^{2+} ($z=20$)
- (ii) Br^- ($z=35$)
- Q 6: The Dipole moment of water is 1.85 D but CO_2 has zero dipole mement why?
- Q 7: Define Isotropy. Which type of solids have this property?
- Q 8: What is transition temperature? Explain with examples.
- Q 9: What is Salt? Explain acidic, Basic and neutral salts?
- Q10: Name various units of concentration and explain mole fraction?
- Q 11: What is transition temperature? Explain with examples.
- Q:12 Give three properties of each α , β and γ rays.
- Q 13: What is meant by diffusion and effusion?

(Descriptive Question)

Note: Answer any 03 question of the following:

Q 14: (a) Define theoretical yield, actual yield and percent yield. why the practical yield is often less

(b) Ammonia gas can be produced by heating together the solid NH_4Cl and $(\text{OH})_2\text{NH}_4\text{Cl}$

$$2\text{NH}_4\text{Cl} + \text{Ca}(\text{OH})_2 \rightarrow 2\text{NH}_3 + \text{CaCl}_2 + 2\text{H}_2\text{O}$$

Q.15 Silver Sulphide (Ag_2S) is an anti microbial. In experiment 24.8g Ag_2S is reacted with the excess of hydrochloric acid

Q 16: Describe hydrogen bonding in water and explain the anomalous behavior of water due to hydrogen bonding?

(b) The PH of solution 25°C is 4.82, calculate its hydrogen ion concentration.

Q 17: what is surface tension, Explain it with example. Give its unit and describe the factors that affect on surface tension of liquids?

Q 18: How can ideal gas is differentiated from real gas? What are the causes of deviation of real gas from ideal behavior? Explain this deviation at low temperature and high pressure?

Section-A

Multiple Choice Questions (MCQ's)

Q.1 Choose the correct answer for each from the given options:

- (i) The molecule which has maximum bond angle:
(a) CS_2 (b) H_2O (c) NH_3 (d) BF_3
- (ii) The shape and hybridization of BCl_3 molecule is:
(a) Tetrahedral and sp^3 (b) Linear and sp
(c) planar trigonal and sp^2 (d) angular and sp^5
- (iii) Amongst the following molecules which one has trigonal pyramidal shape?
(a) SO_2 (b) CO_2 (c) NH_3 (d) C_2H_4
- (iv) The molar volume of oxygen gas is 22.4 dm^3 at:
(a) 0°C and 1 atm (b) 25°C and 0.5 atm
(c) 0 K and 1 atm (d) 25 K and 0.5 atm
- (v) Under similar condition CH_4 diffuses ... Times faster than SO_2 gas:
(a) 1.5 time (b) 2 time
(c) 4 time (d) 16 time

- (vi) Balmer series appears in the hydrogen spectrum if electron jump from any appropriate higher energy orbit to
- (a) Second orbit (b) third orbit
(c) Fourth orbit (d) Fifth orbit
- (x) The shape of orbital for which $l = 0$ is
- (a) Spherical (b) Dumbbell
(c) Double dumbbell (d) complicated
- (xi) A simple covalent molecule possesses two bond pairs and two lone pairs around the central atom, its shape should be:
- (a) linear (b) Planar Trigonal (c) angular (d) None
- (xii) The correct relation between debye and coulomb meter is:
- (a) $1 \text{ D} = 3.33 \times 10^{-30} \text{ Cm}$ (b) $1 \text{ D} = 1.6 \times 10^{-19} \text{ Cm}$
(c) $1 \text{ D} = 1.88 \times 10^{-12} \text{ Cm}$ (d) $1 \text{ D} = 1.23 \times 10^{-18} \text{ Cm}$
- (xiii) If the kelvin temperature of ideal gas is increase to double and pressure is reduce to one half, the volume of gas will:
- (a) Remains same (b) Double
(c) Reduced to half (d) Four time
- (xiv) The molar volume of oxygen gas is 22.4 dm^3 at:
- (a) 0°C and 1 atm (b) 25°C and 0.5 atm
(c) 0 K and 1 atm (d) 25 K and 0.5 atm
- (xv) The bond order of N_2 molecule is:
- (a) 0 (b) 1 (c) 2 (d) 3

(xvi) The number of sigma and pi bonds in C_2H_4 molecule are respectively.

- (a) 3 and 1 (b) 2 and 2 (c) 5 and 1 (d) 4 and 2

(xvii) A non-polar molecule with bigger size will experience:

- (a) London forces (b) dipole-dipole interaction
(c) Hydrogen bonding (d) All of these

(xviii) Cooking time is reduced in a pressure cooker because:

- (a) Boiling point of water increases
(b) Boiling point of water decreases
(c) Vapor pressure of liquid is reduced
(d) Heat is uniformly distributed

(xix) What happens to value of K_c when catalyst is added to a chemical system at equilibrium?

- (a) It decreases (b) It increases
(c) It becomes zero (d) It remains unchanged

(xx) The correct K_{sp} expression of a sparingly soluble salt $Li_2C_2O_4$ among the following is:

- (a) $K_{sp} = [Li^+][C_2O_4^{2-}]$ (b) $K_{sp} = [Li^+][C_2O_4^{2-}]$
(c) $K_{sp} = [2Li^+][C_2O_4^{2-}]$ (d) $K_{sp} = [Li^+][C_2O_4^{2-}]^2$

(xxi) How many moles of NaOH are present in a 2dm^3 of 1 molar aqueous solution of it.

(a) 0.5 mole

(b) 1 mole

(c) 1.5 mole

(d) 2 mole

(xxii) A colloidal solution of liquid into liquid is as:

(a) Gel

(b) Foam

(c) sol

(d) Emulsion

(xxiii) An example of completely immiscible liquid pair is:

(a) Benzene to toluene

(b) Water and phenol

(c) Water and Benzene

(d) Water and methanol

(xxiv) A 15% W/W KOH solution can be prepared by mixing 15g KOH in:

(a) 15g water

(b) 85g water

(c) 100 water

(d) 115g water

(Short Questions)

Note: Answer any 09 questions of the following:

Q2: Name three major kinds of intermolecular forces in liquid. Explain intermolecular forces in HCl.

Q 3: Give reasons for the following.

- (i) Water spilled on floor evaporate faster than the same amount of water in a container.
- (ii) A falling drop of a liquid is spherical.
- (iii) Evaporation is a cooling process.

Q 4: Define Isotropy. Which type of solids have this property?

Q 5: What is transition temperature? Explain with examples.

Q 6: What is Salt? Explain acidic, Basic and neutral salts?

Q7: Name various units of concentration and explain mole fraction?

Q 8: What is transition temperature? Explain with examples.

Q 9: Differentiate between Isomorphism and polymorphism?

Q 10: Why the aqueous solution of NH_4Cl is acidic and Na_2CO_3 is alkaline?

Q 11: Water is move volatile than glycerin but petrol is move volatile than water ate the same temperature. Explain in term of intermolecular force.

Q.12 What is hydrogen bond?

Q13: Define anisotropy. Which type of solids have this property?

Section-C

(Descriptive Question)

Note: Answer any 03 question of the following:

Q 14: Molecular solids are soft and possess low melting point, how can you justify this statement?

Q.14: What is buffer solution? Explain how it resist the change of PH by adding small amount of acid and base. Give the application of buffer solution?

Q15: Differentiate AMONG TRUE SOLUTION, COLLOIDAL SOLUTION AND SUSPENSION ON THE BASES OF:

(i) Particle size

(ii) visibility

Q 16: What is meant by internal energy change (ΔE) and enthalpy change (ΔH)? Under what conditions are ΔE & ΔH equal.

Q 17: Give four properties of ionic solids. How can you determine the number of Na^+ and Cl^- ions in a unit cell of sodium chloride?

Q 18: Define PH and POH of a solution?. Also show that $\text{PH} + \text{POH} = 14$

Section-A

Multiple Choice Questions (MCQ's)

Q.1: Choose the correct for each from the given options:

- (i) One mole of any gas at S.T.P occupies:
(a) 22.4 cm^3 (b) 2240 cm^3 (c) 22400 cm^3 (d) 100 cm^3
- (ii) Volume of gas would theoretically be zero at:
(a) -273.16K (b) 0°C (c) 273.16°C (d) -273.16°C
- (iii) Surface tension of liquid decreases with the increases in:
(a) Pressure (b) Volume (c) Temperature (d) Number of moles
- (iv) Which orbital has lowest energy?
(a) 3d (b) 4s (c) 3p (d) 4f
- (v) Which orbital has quantum number values $n = 4, l = 3, m = -3$ to $+3$:
(a) 3d (b) 4d (c) 4f (d) 4p
- (vi) Which one represent ISO Electronic pair:
(a) $\text{O}^{2-}, \text{S}^{2-}$ (b) Na^+, K^+ (c) Na^+, F^- (d) $\text{Mg}^{2+}, \text{S}^{2-}$
- (vii) Number of active set of Electron Pairs around each "C" in Ethene (C_2H_4) are:
(a) 3 (b) 4 (c) 5 (d) 6
- (viii) Which one is not Intensive property:
(a) Viscosity (b) Boiling point (c) Volume (d) Density
- (ix) What is pH value of 0.1 M aqueous solution of NaOH at 25°C .
(a) 1 (b) 13 (c) 2 (d) 12
- (x) Oxidation number of oxygen in Na_2O_2 is:
(a) -1 (b) -2 (c) $-\frac{1}{2}$ (d) $+\frac{1}{2}$

- (xi) Photochemical reactions are considered as _____ reactions:
(a) Zero order (b) 1st order (c) 2nd order (d) 3rd order
- (xii) The oxidation electrode potential value of Li^+/Li is:
- (xiii) Which one is not Physical Method to determine the rate of reaction:
(a) pH (b) Spectroscopic (c) Polarimetric (d) Titration
- (xiv) If $\frac{dx}{dt} = K$ then concentration of each reactant in a reaction must be:
(a) 2M (b) 3M (c) 10M (d) 1M
- (xv) Electron pair repulsion model was presented by :
(a) Kossel and Lewis (b) Heisenberg (c) Wolfgang Pauli
(d) Sigwick and Powell
- (xvi) NaHSO_4 is _____
(a) Normal salt (b) Acidic salt (c) Basic salt (d) Table salt
- (xvii) What will be the ratio of rate of diffusion between O_2 and H_2 gases:
(a) 4 : 1 (b) 1 : 4 (c) 1 : 2 (d) 2 : 1

Section-B (Short Answer)

Note: Answer any EIGHT of the following questions. Each question carries 05 marks.

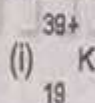
Q.2 Define with examples:

- (i) Significant Figure (ii) Chemical Equation

Q.3 50 cm³ of moist O₂ gas is collected over water at 25°C and 724 torr pressure. What volume of dry O₂ gas at S.T.P was produced? (Pressure of H₂O at 25°C = 24 torr).

Q.4 Differentiate between cathode rays and canal rays.

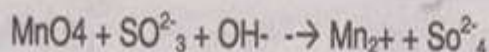
Q.5 What is Aufbau principle? Write number of Electron, Proton, Neutrons and Electronic configuration of the following ions.



Q.6 Discuss the chemical bonding in NaCl showing energy changes.

Q.7 In a certain process 848 J of heat is absorbed by a system, while 394 J of work is done on the system. What is the change in the internal Energy for the Process?

Q.8 Define Oxidation number. Balance the following equation by Ion Electron method:



Q.9 What is solubility product? Should AgCl Precipitate from a solution prepared by mixing 400ml of 0.1 M NaCl and 600ml of 0.03M Ag NO₃? (K_{sp} of AgCl is $1.6 \times 10^{-10} \text{ mole}^2/\text{dm}^6$)

Q.10 State and explain First Law of thermodynamics and prove that $q_p = \Delta H$

Q.11 Define catalyst? Explain different types of catalyst with examples.

Section-C

(Descriptive Answer)

Note: Answer any TWO of the following questions. Each question carries 14(7+7) marks.

Q.12(a) State law of mass action. Derive an expression of K_c for the following reaction. $2 O_3 \rightleftharpoons 3 O_2$

(b) What do you understand by " K_c " ? Describe their the rate of reaction?

Q.13 (a) Define rate of reaction. Explain how different factors affect the rate of reaction?

(b) Define and explain Common Ion Effect with examples.

Q.14 Write short notes on any THREE of the following:

(i) Rutherford's atomic model

(ii) Types of reactions based on reaction velocity

(iii) Surface tension

(iv) Bond Energy

