

CHEMISTRY QUESTION PAPER

Time : 2 Hrs.

Max. Marks : 40

- Q.1** Select and write the most appropriate answer from the given alternatives for each sub-question. [8]
- (i) $\Delta E = 0$ is true for [1]
(a) adiabatic process (b) isothermal process
(c) isobaric process (d) isochoric process
- (ii) If 'S' is solubility in mol dm^{-3} and K_{sp} is solubility product of BA_2 type of salt, then relation between them is [1]
(a) $S = \sqrt{K_{sp}}$ (b) $K_{sp} = 4S^3$
(c) $K_{sp} = S^3$ (d) $S = K_{sp}$
- (iii) Fused NaCl conducts electricity due to the presence of [1]
(a) free electrons (b) free atoms of Na and Cl
(c) free molecules (d) free ions of Na and Cl
- (iv) The number of electrons present in the nucleus of carbon is [1]
(a) zero (b) six
(c) twelve (d) fourteen
- (v) For the reaction $2A \rightarrow 3C$ the reaction rate is equal to [1]
(a) $\frac{d[A]}{dt}$ (b) $-\frac{1}{2} \times \frac{d[A]}{dt}$
(c) $-\frac{1}{3} \times \frac{d[A]}{dt}$ (d) $\frac{d[A]}{dt}$
- (vi) Which of the following element does NOT belong to first transition series? [1]
(a) Fe (b) V (c) Ag (d) Cu
- (vii) The molecular weight of KOH is 56. What is the molarity of solution prepared by dissolving 84.0 gram of pure KOH in 500 ml of solution? [1]
(a) 3 (b) 5 (c) 2 (d) 2.5
- (viii) The enthalpies of formation of $\text{N}_2\text{O}_{(g)}$ and $\text{NO}_{(g)}$ are 82 kJ mole^{-1} and 90 kJ mole^{-1} respectively. Then enthalpy of a reaction $2 \text{N}_2\text{O}_{(g)} + \text{O}_{2(g)} \rightarrow 4 \text{NO}_{(g)}$ is [1]
(a) 8 kJ (b) -16 kJ (c) 88 kJ (d) 196 kJ
- Q.2 (A) Attempt any One :** [8]
- (i) Define the following terms : [2]
(a) Ebullioscopic constant. (b) Radioactivity.
- (ii) Derive the expression showing effect of temperature on heat of reaction at constant pressure. [2]
- (B) Attempt any One :**
- (i) Write the position of Zinc ($Z = 30$) in the periodic table and write its electron configuration. [2]
- (ii) Differentiate between molecularity and order of reaction. [2]
- (C) Answer the following :**
- (i) Classify the following into Lewis acid and Lewis base. [2]
(a) S^{2-} (b) BF_3
(c) Ag^+ (d) $(\text{CH}_3)_3\text{N}$
- (ii) State and explain van't Hoff-Avogadro's Law. [2]
- Q.3 (A) Attempt any One :** [8]
- (i) What is half-life period of a reaction? Show that half-life period does not depend upon the initial concentration for first order reaction. [3]
- (ii) Define single electrode potential. Explain development of negative and positive electrode potentials when metal is dipped in its aqueous salt solution. [3]
- (B) Attempt any One :**
- (i) Define degree of dissociation. Show that degree of dissociation of weak acid is inversely proportional to the square root of the concentration. [3]
- (ii) Give reasons : [3]
(a) Zinc salts are white. (b) Transition metals show catalytic properties. (c) Manganese shows variable oxidation states. ($\text{Mn}, Z = 25$)

(C) Answer the following :

Write the applications of Hess' Law. (2)

Q. 4 (A) Answer the following : [8]

Define solution. How is molecular weight of a solute is determined by Ostwald and Walker's dynamic method ? (4)

(B) Attempt any One :

(i) Describe the construction and working of $H_2 - O_2$ fuel cell. Write its advantages. (4)

(ii) Derive the expression for the work done by an ideal gas in an isothermal and irreversible process. Under what conditions work done by a gas is 'zero' ? (4)

Q. 5 (A) Attempt any One : [8]

(i) Half-life period of a radio-isotope is 5 days. Calculate, (1) decay constant (2) time required for 60% disintegration (3) fraction left behind after 2 days (4)

(ii) Calculate the hydrolysis constant, degree of hydrolysis and pH of 0.05 M ammonium chloride. (Dissociation constant of $NH_4OH = 1.8 \times 10^{-5}$ and $K_w = 1 \times 10^{-14}$) (4)

(B) Attempt any Two :

(i) Standard reduction potentials of aluminium and copper are -1.66 volt and $+0.34$ volt respectively. Using these electrodes represent the cell and calculate its e.m.f. under standard conditions. (2)

(ii) A solution of glucose containing 10 g of it dissolved in 1 dm^3 is isotonic with a solution of glycerine containing 5.2 g/dm^3 . Calculate molecular weight of glycerine, if that of glucose is 180. (2)

(iii) Heat of combustion of carbon monoxide is -124 kJ at constant volume at 297 K . Calculate heat of combustion of carbon monoxide at constant pressure at the same temperature. (Given : $R = 8.314 \text{ JK}^{-1} \text{ mol}^{-1}$) (2)