

# H.S.C. CHEMISTRY PAPER - I

(Physical and Inorganic Chemistry)

Time : 2 Hours)

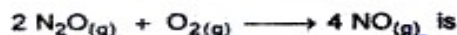
Question Paper : September 2009

(Max. Marks : 40

\* Note : Refer to Question Paper March 2008. \*

**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<sup>-3</sup> and  $K_{sp}$  is solubility product of BA<sub>2</sub> 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 N<sub>2</sub>O<sub>(g)</sub> and NO<sub>(g)</sub> are 82 kJ mole<sup>-1</sup> and 90 kJ mole<sup>-1</sup> respectively. Then enthalpy of a reaction. (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. (2)
- (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<sub>2</sub> (b) BF<sub>3</sub> (c) Ag<sup>+</sup> (d) (CH<sub>3</sub>)<sub>3</sub>N (2)
- (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 :
- (a) Zinc salts are white.
- (b) Transition metals show catalytic properties.
- (c) Manganese shows variable oxidation states. (Mn, Z = 25) (3)

**(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 10g of it dissolved in 1 dm<sup>3</sup> is isotonic with a solution of glycerine containing 5.2 g/dm<sup>3</sup>. 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 JK<sup>-1</sup> mol<sup>-1</sup>)

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