

# 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) The addition of the non-volatile solute into the pure solvent ..... (1)  
(a) Increases the vapour pressure of solvent. (b) Decreases the boiling point of solvent.  
(c) Decreases the freezing point of solvent. (d) Increases the freezing point of solvent.
- (ii) What is true for an adiabatic process ? (1)  
(a)  $\Delta T = 0$  (b)  $\Delta E = 0$  (c)  $\Delta H = \Delta E$  (d)  $q = 0$
- (iii) An aqueous solution of which one of the following salts is basic ? (1)  
(a)  $\text{CH}_3\text{COONa}$  (b)  $\text{NH}_4\text{Cl}$  (c)  $\text{KNO}_3$  (d)  $\text{CuSO}_4$
- (iv) Which one of the following is the best projectile ? (1)  
(a) Proton (b) Neutron (c)  $\alpha$ -particle (d) Deuteron
- (v) In a bimolecular reaction if one of the reactant is in large excess, then order of reaction is said to be ..... (1)  
(a) Zero (b) Pseudo First (c) Second (d) Third
- (vi) Which one of the following transition elements show highest oxidation state ? (1)  
(a) Sc (b) Ti (c) Mn (d) Zn
- (vii) The electromotive force of the following cell : (1)  
 $\text{Cu} \mid \text{Cu}^{++}(1\text{M}) \parallel \text{Ag}^+(1\text{M}) \mid \text{Ag}$  is ..... if  $E_{\text{Cu}^{++}/\text{Cu}}^0 = 0.33 \text{ V}$  and  $E_{\text{Ag}^{++}/\text{Ag}}^0 = 0.79 \text{ V}$   
(a) 0.46 V (b) -0.46 V (c) 1.12 V (d) -1.12 V
- (viii) A gas expands from a volume of  $5 \times 10^{-3} \text{ m}^3$  to  $20 \times 10^{-3} \text{ m}^3$  at a pressure of  $2.5 \times 10^5 \text{ Nm}^{-2}$ . The work done is ..... (1)  
(a)  $37.5 \times 10^2 \text{ J}$  (b)  $3.75 \times 10^2 \text{ J}$  (c)  $-3.75 \times 10^2 \text{ J}$  (d)  $-37.5 \times 10^2 \text{ J}$

**Q. 2 (A)** Attempt any One : [8]

- (i) Distinguish between molecularity and order of reaction. (2)  
(ii) Derive the relationship between heat of a reaction at constant pressure and at constant volume. (2)

**(B)** Attempt any One :

- (i) Explain Lewis theory of acids and bases. (2)  
(ii) Define : (a) Colligative Properties, (b) Solubility Product. (2)

**(C)** Answer the following :

- (i) Explain the position of d-block elements in the periodic table. (2)  
(ii) Mention different ways of expressing concentration of a solution. (2)

**Q. 3 (A)** Attempt any One : [8]

- (i) What is the action of the following on zinc ? (3)  
(a) dil.  $\text{H}_2\text{SO}_4$ , (b) Hot and Conc.  $\text{NaOH}$ , (c)  $\text{CuSO}_4$  solution.
- (ii) What is mass defect and binding energy ? Give the mathematical expression for binding energy per nucleon. (3)

**(B)** Attempt any One :

- (i) Write a note on de-electronation and electronation. (3)  
(ii) Define rate of reaction. Derive integrated rate equation for first order reaction. (3)

**(C)** Answer the following :

Show that the degree of dissociation of weak acid is inversely proportional to square root of concentration. (2)

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

State and explain Hess's law of constant heat summation. Give its any four applications. (4)

**(B)** Attempt any One :

- (i) Describe the construction and working of Standard Hydrogen Electrode. Give any two disadvantages of it. (4)  
(ii) Describe Ostwald-Walker method for determination of molecular weight by lowering of vapour pressure. (4)

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

- (i) Heat of following of  $\text{NH}_3(\text{g})$  at 300 K is  $-46.2 \text{ KJ mol}^{-1}$ . Calculate its value at (a) 400 K and (b) 250 K. The mean molar heat capacities of  $\text{N}_2(\text{g})$ ,  $\text{H}_2(\text{g})$  and  $\text{NH}_3(\text{g})$  at constant pressure and in the given range of temperature are 28.4, 28.3 and  $34.5 \text{ JK}^{-1}$  respectively. (4)

- (ii) Calculate the hydrolysis constant, degree of hydrolysis and pH of 0.001 M ammonium chloride solution at 298 K.

Give  $K_b$  of  $\text{NH}_4\text{OH} = 1.8 \times 10^{-5}$  and  $K_w = 1 \times 10^{-14}$  (4)

(B) Attempt any Two :

- (i) The activity of radio-isotope reduces to 80% in 10 days. Calculate its decay constant and half-life period. (2)

- (ii) What current strength in ampere will be required to liberate 0.2 kg of iodine from potassium iodide solution in one hour ?

Give : E.C.E. of iodine =  $1.31 \times 10^{-6}$  kg/C. (2)

- (iii) Calculate molarity of a solution when 3.65 gm of HCl is dissolved in 4 dm<sup>3</sup> of solution. (At. Wt. of H = 1, Cl = 35.5). (2)