

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) Which of the following is an intensive property ? (1)
(a) Internal energy (b) Heat capacity
(c) Enthalpy (d) Surface tension.
- (ii) The species which acts as an conjugate acid as well as base is (1)
(a) HSO_4^- (b) H_2SO_4
(c) NH_4OH (d) CO_3^{2-}
- (iii) The electrolyte used in Hydrogen - Oxygen fuel cell is (1)
(a) ZnSO_4 (b) NaOH
(c) 20% H_2SO_4 (d) KCl
- (iv) During α - decay, mass number decreases by how many units ? (1)
(a) 2 (b) 3
(c) 4 (d) 5
- (v) For the first order reaction, the half-life period is dependent on (1)
(a) catalyst (b) temperature
(c) square root of initial concentration of reactants
(d) rate constant
- (vi) Which of the following element does NOT exhibit variable oxidation states ? (1)
(a) Iron (b) Copper
(c) Zinc (d) Manganese
- (vii) The difference between heat of combustion of liquid benzene at constant pressure and at constant volume at 300 K is (1)
($R = 8.314 \text{ J/K/mol}$)
(a) -3741 J (b) 3741 J
(c) 37.41 kJ (d) -37.41 kJ
- (viii) The normality of solution containing $4 \times 10^{-3} \text{ kg}$ of NaOH dissolved in 0.5 m^3 of solution is (1)
(At. wt. of $\text{Na} = 23, \text{O} = 16, \text{H} = 1$)
(a) 0.2 N (b) 0.02 N
(c) 0.002 N (d) 0.0002 N

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

- (i) State and explain van't Hoff - Charles' law. (2)
(ii) Distinguish between isotopes and isobars. (2)

(B) Attempt any One :

- (i) State Rate law. Write 'one' example of it. (2)
(ii) Why do the d-block elements form coloured compounds ? (2)

(C) Answer the following :

- (i) Define : (a) Isotonic solutions, (b) Nuclear fission. (2)
(ii) Give the limitations of Arrhenius theory of acids and bases. (2)

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

- (i) What is Pseudo-first order reaction ? (3)
Distinguish between molecularity of reaction and order of reaction. (3)
(ii) What is common ion effect ? Explain its application in precipitation of Group II radicals. (3)

(B) Attempt any One :

- (i) Explain the reduction of zinc oxide to zinc by modern vertical retort process. (3)
(ii) Explain the measurement of e.m.f. of a cell using potentiometer. (3)

(C) Answer the following :

Prove that $\Delta H = \Delta E + \Delta nRT$ (2)

Q. 4 (A) Answer the following :

[8]

Describe the construction and working of Daniell cell.

(4)

(B) Attempt any One :

- (i) State van't Hoff - Avogadro law and describe determination of molecular weight from boiling point elevation by Landsberger - Walker method. **(4)**
- (ii) Write any two statements of first law of thermodynamics. Explain, internal energy as a state function.

Q. 5 (A) Attempt any One :

[8]

- (i) 0.11 kg of CO_2 is compressed to 2.5×10^5 Pa pressure isothermally and reversibly at 280 K. The work done in the process is found to be 2973.44 J. Calculate the initial pressure. ($R = 8.314 \text{ K}^{-1} \text{ mol}^{-1}$ and At. wt. of C = 12 and O = 16) **(4)**
- (ii) Calculate the hydrolysis constant, degree of hydrolysis and pH of 0.01 M solution of potassium acetate at 300 K, if dissociation constant of acetic acid is 1.8×10^{-5} and ionic product of water is 1×10^{-14} . **(4)**

(B) Attempt any Two :

- (i) A radio element has decay constant 1.809×10^{-1} per day. What fraction of it will remain at the end of five days ? **(2)**
- (ii) Calculate the amount of copper deposited at cathode from CuSO_4 solution by passing a current of 5 amperes for 5 minutes. (Equivalent weight of Cu = 31.77) **(2)**
- (iii) 2.4×10^{-3} kg of a substance dissolved in 0.120 dm^3 of water gave an osmotic pressure of 1.331 atmospheres at 293 K. Calculate the molecular weight of the substance. (Given : $K = 0.082 \text{ dm}^3 \text{ atm K}^{-1} \text{ mol}^{-1}$) **(2)**