

B.Sc. (Part—I) Semester—II Examination
2S : CHEMISTRY

Time : Three Hours]

[Maximum Marks : 80

- Note :—** (1) All questions are compulsory.
(2) Question No. 1 carries 8 marks. While each of the remaining 6 questions carry 12 marks.
(3) Draw diagrams and write equations wherever necessary.
(4) Use of scientific calculator is allowed.

1. (A) Fill in the blanks :

- (i) Water is regarded as an _____ solvents.
(ii) The reaction whose rate is independent of the concentration of reactant is known as _____.
(iii) Fluorides of carbon are collectively known as _____.
(iv) Hybridization state of carbon to which chlorine attached in benzyl chloride is _____.

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(B) Choose the correct option from the given alternatives :

- (i) Ethyl bromide is a _____ alkyl halide.
(a) Primary (b) Secondary
(c) Tertiary (d) None of these
- (ii) The acid catalyzed hydrolysis of methyl acetate is _____ reaction.
(a) First order (b) Second order
(c) Third order (d) Zero order
- (iii) The unit of magnetic moment is _____.
(a) B.M. (b) cm^{-1}
(c) kg (d) m^3
- (iv) The geometry of XeO_4 is :
(a) Linear (b) Tetrahedral
(c) Square planar (d) Trigonal bipyramidal

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(C) Answer in **one** sentence each :

- (i) Define hard acid.
(ii) What is a diamagnetic compound ?
(iii) Define unsymmetrical ether.
(iv) What is curie point ?

4

UNIT—I

2. (A) Explain Fajan's Rules with respect to large and highly charged anions. 4
(B) What is hybridization ? Explain the structure of PCl_5 molecule on the basis of hybridization. 4
(C) Explain LUX-Flood concept of acid and base with suitable example. 4

OR

3. (P) Explain why melting point of NaCl is higher than CaCl₂. 4
(Q) Explain the formation of NH₄⁺ ion on the basis of hybridization. 4
(R) What is SHAB principle ? How is it useful to predict stability of the complexes ? 4

UNIT—II

4. (A) What are halogens ? Discuss the electronic configuration of halogen family. 4
(B) Discuss the structure of XeF₂. 4
(C) Give the requirements of good solvent. 4

OR

5. (P) Define :
(i) Dielectric constant
(ii) Dipole moment. 4
(Q) What are interhalogen compounds ? Discuss the structure of ClF₃ molecule. 4
(R) What are the merits and demerits of liquid ammonia as solvent ? 4

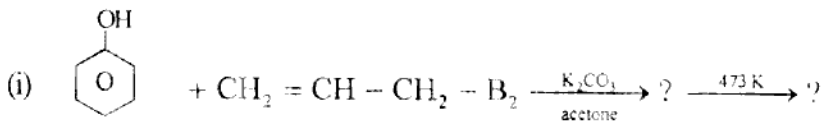
UNIT—III

6. (A) What happens when :
(i) Allyl chloride is treated with Aq.KOH.
(ii) Acetylene is treated with dil.HCl ? 4
(B) How does PCl₅ react with :
(i) Ethylene glycol
(ii) Glycerol ? 4
(C) Explain Pinacol-Pinacolone rearrangement. Discuss its mechanism. 4

OR

7. (P) Compare the reactivity of chlorobenzene and benzyl chloride. 4
(Q) Explain the Benzyne intermediate mechanism of aromatic nucleophilic substitution in chlorobenzene. 4
(R) How will you prepare
(i) Ethylene glycol from ethylene using alkaline KMnO₄
(ii) Chlorobenzene from Phenol ? 4

UNIT—IV

8. (A) Explain with example :
(i) Reimer-Tiemann Reaction
(ii) Kolbe's Reaction. 4
(B) Complete the following reaction :
(i)  + CH₂ = CH - CH₂ - B₂ $\xrightarrow[\text{acetone}]{\text{K}_2\text{CO}_3}$? $\xrightarrow{473 \text{ K}}$?
(ii) CH₃ - CH₂ - O - CH₂ - CH₃ + 2HI $\xrightarrow{373 \text{ K}}$? 4
(C) Explain the ring opening reaction of epoxide catalyzed by alkali. 4

OR

9. (P) Explain the acidic nature of phenol. 4
- (Q) How will you prepare diethyl ether from :
- (i) Ethyl bromide .
- (ii) Ethyl alcohol ? 4
- (R) How will you obtain :
- (i) Phenol from cumene
- (ii) Mixture of ortho and para hydroxyl acetophenone from phenol. 4

UNIT—V

10. (A) Describe vapour temperature method for the determination of dipole moments. 4
- (B) Calculate the number of unpaired electron when $\mu_s = 3.87$ B.M. 4
- (C) Distinguish between ferromagnetism and anti-ferromagnetism. 4

OR

11. (P) Define the terms :
- (i) Non-Polar molecule
- (ii) Induced dipole moment. 4
- (Q) Explain orientation polarization. 4
- (R) Describe Gouy's method to determine magnetic susceptibility. 4

UNIT—VI

12. (A) What is second order reaction ? Explain with suitable example. 4
- (B) Show that half life period of first order reaction is independent of initial concentration of reactants. 4
- (C) The value of rate constant for the decomposition of nitrogen peroxides is $3.46 \times 10^{-5} \text{ min}^{-1}$ and 25°C and $4.87 \times 10^{-3} \text{ min}^{-1}$ at 65°C . Calculate the energy of activation for this reaction. (Given : $R = 8.314 \text{ JK}^{-1}\text{mol}^{-1}$) 4

OR

13. (P) Describe Ostwald's isolation method for the determination of order of the reaction. 4
- (Q) Define :
- (i) Order of the reaction
- (ii) Activation energy. 4
- (R) In the hydrolysis of ethyl acetate using equal concentration of ester and NaOH the following results were obtained. Show that the reaction follow second order kinetics :

Times (Min)	0	5	15	25
Alkali used (M)	16.0	10.24	6.13	4.32

Show that the reaction follows second order kinetics. 4