

B.Sc. (Part-II) Semester-III Examination
CHEMISTRY

Time : Three Hours]

[Maximum Marks : 80

Note :— (1) Question No. 1 is compulsory.

(2) Solve **ONE** question from each unit.

(3) Draw diagrams and give equations wherever necessary.

(4) Use of scientific calculator is allowed.

1. (A) Fill in the blanks :—

4 × ½ = 2

(i) The property of metals to form thin sheets on hammering is known as _____.

(ii) LiAlH_4 reduces the carbonyl group into _____ group.

(iii) The surface tension of liquid _____ with increase of the temperature.

(iv) The titration between an acid and the base is also called as _____.

(B) Choose the correct alternative :—

4 × ½ = 2

(i) In conformational analysis of n-butane the highly stable conformation is :

(a) Gauche

(b) Anti or Skew

(c) Partially Eclipsed

(d) Fully Eclipsed

(ii) The hybridisation of carbon and oxygen atoms in carbonyl group is :

(a) sp^3

(b) sp

(c) sp^2

(d) dsp^2

(iii) The upper critical solution temperature of Phenol-water system is :

(a) 68.1

(b) 67.8

(c) 68.7

(d) 67.9

(iv) In gravimetric estimation the unknown compound is analysed by measuring its :

(a) Pressure

(b) Volume

(c) Density

(d) Mass

(C) Answer the following in **ONE** sentence :—

4

(i) What is meant by resolution ?

(ii) What is phase transition ?

(iii) What are optically active compounds ?

(iv) What is molality ?

UNIT—I

2. (A) Explain VSEPR theory with suitable example.

4

(B) How will you compare atomic orbitals with molecular orbitals ?

4

(C) Draw molecular orbital energy level diagram of O_2 molecule. Calculate its bond order.

4

OR

3. (P) How will you differentiate bonding and antibonding molecular orbitals ? 4
(Q) Discuss (i) metallic luster (ii) Electrical conductivity of metal on the basis of free electron theory. 4
(R) Discuss the structure of BF_3 molecule on the basis of VSEPR theory. 4

UNIT—II

4. (A) Calculate the mole fraction of ethanol and water, if solution contains 6 moles of ethanol and 3 moles of water. 4
(B) Explain the terms :—
(i) Normality
(ii) Molality. 4
(C) Discuss the choice of suitable indicator in strong acid with weak base. 4

OR

5. (P) Discuss the following steps involved in gravimetric estimation of Barium as barium Sulphate :
(i) Precipitation
(ii) Digestion. 4
(Q) Write a note on Iodimetry and Iodometry. 4
(R) Explain :—
(i) End Point
(ii) Molarity. 4

UNIT—III

6. (A) Complete the following reactions :
(i) $\text{CH}_3\text{—CH}_2\text{—OH} + [\text{O}] \xrightarrow[\text{H}^+]{\text{K}_2\text{Cr}_2\text{O}_7} ? + ?$
(ii) $\text{H—}\overset{\text{O}}{\underset{||}{\text{C}}}\text{—H} + \text{H—}\overset{\text{O}}{\underset{||}{\text{C}}}\text{—H} \xrightarrow[\Delta]{50\% \text{ NaOH}} ? + ?$ 4
(B) How will you prepare acetone from :
(i) Isopropyl alcohol
(ii) 2, 2-Dichloro propane ? 4
(C) What happens when Benzoic acid is treated with :
(i) Ethyl alcohol in presence of conc. H_2SO_4
(ii) PCl_5 in presence of conc. H_2SO_4 ? 4

OR



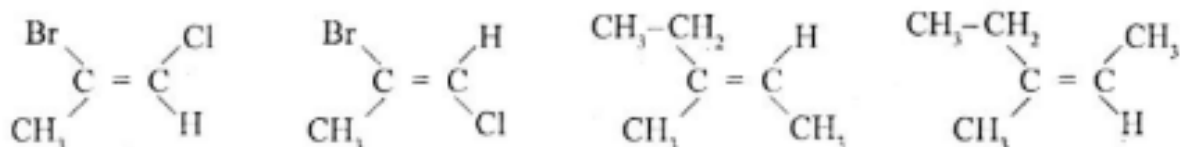
7. (P) How will you prepare Benzoin acid from
- (i) Benzyl alcohol
 - (ii) Phenyl cyanide. 4
- (Q) What happens when
- (i) Ethylene glycol on oxidation with chromic acid
 - (ii) Lactic acid reacts with ethanol in conc. H_2SO_4 ? 4
- (R) Explain Aldol condensation in Aldehydes and Ketones with example. 4

UNIT—IV

8. (A) Explain the following :
- (i) Plane of symmetry
 - (ii) Centre of symmetry. 4
- (B) Assign the following groups in proper priority order according to 'R' and 'S' nomenclature system :
- (i) $-COOH$, $-NH_2$, $-H$, $-CH_3$
 - (ii) $-C_2H_5$, $-OH$, $-H$, $-CH_3$ 4
- (C) What is geometrical isomerism ? Explain with suitable example. 4

OR

9. (P) Explain the conformational analysis of n-butane with energy level diagram. 4
- (Q) Explain the terms :
- (i) Chirality
 - (ii) Racemisation. 4
- (R) Classify the following compounds into E-2 type :



4

UNIT—V

10. (A) Explain the variation of Gibbs free energy with temperature and pressure. 4
- (B) State and explain Nerst Distribution Law. State the conditions of its validity. 4
- (C) What is extraction ? Explain its types. 4

OR

11. (P) Derive Gibb's-Duhem equation. 4
- (Q) Explain the Phenol-Water system. 4



is 1.6×10^{-5} at 25°C . Calculate the standard free energy change (ΔG°) of the reaction at 25°C .

($R = 8.314 \text{ JK}^{-1} \text{ mole}^{-1}$)

4

UNIT—VI

12. (A) How relative viscosity of liquid is determined by Ostwald's Viscometer ? 4

(B) Define :—

(i) Cell constant

(ii) Molar conductance.

4

(C) 0.5 N solution of salt occupying volume between two platinum electrodes 0.0172 m apart and 0.04499 sq m. area has resistance 25 ohm. Calculate equivalent conductance of solution. 4

OR

13. (P) What are the advantages of conductometric titrations over ordinary titrations ? 4

(Q) Explain the variation of specific and equivalent conductance with dilution. 4

(R) Describe moving boundary method for determination of transport number. 4