CHE 123(T+P): Inorganic and Physical Chemistry

Credit – (2T+2P), Theory Hours – 30, Practical Hours – 60 UNIT – I – Bonding and Structure

[25 Marks] [15 Hours]

Chemical bond, Types of Bond (Ionic, Covalent, Coordinate and Metallic Bond), Ionic Bond, Conditions and factors governing the formation of Ionic Bond, Properties of Ionic Compounds, Covalent Bond, Covalency, Conditions for the formation of Covalent Bond, Properties of Covalent Compounds, Failure of octet rule (Lewis Concept) in Covalent Compounds, Covalent Bond having partial Ionic character, Co-ordinate Bond, Condition for the formation of Co-ordinate Bond, , Properties of Co-ordinate Compounds, Metallic Bond, Conditions for the formation of Metallic Bond, Hydrogen Bond, Properties of Hydrogen Bond, Types of Hydrogen Bond, Sidgwick Powel theory, VSEPR theory and its application for CH₄, NH₃, H₂O, CIF₃, SF₄, SF₆, I₃⁻, IF₇, Hybridization of atomic orbitals, Rules for Hybridization, Types of hybridization and shape of molecules with sp, sp², sp³, sp³d, sp³d² hybridization.

UNIT II - Ionic Equilibrium

[25 Marks] [15 Hours]

Definition of basic terms: Electrical conductance, Specific conductance, Equivalent conductance, Molar conductance, Cell constant and its determination, Incomplete dissociation, Degree of dissociation, Oswald's dilution law and its limitations, Kohlraush law and its application, Debye – Huckel theory, Self ionization of water and Ionic product of water K_w , pH Scale, Hydrolysis of different salts (strong acid and weak base, strong base and weak acid, weak acid and weak base) including relation between K_a , K_b , K_h , h, K_w and their pH equation, Buffer Solutions, Henderson – Hasselbalch equation, Indicator theory, useful pH range of indicator for acid and base titration.

CHE 123(P): Chemistry Practical Chemistry Lab- III (2 credit)

Credit – 2, Hours – 60, Marks - 50

Basic awareness to lab instruments, reagents, indicators & lab. technics.

(I) Volumetric Titrations

Preparation of solutions of different Normality, Molarity, %V/V, %W/V, %W/V.

(II) Acid base titrations

1. Na₂CO₃ \rightarrow 0.1N HCl

2. Estimation of carbonate and bicarbonate together $\rightarrow 0.1$ N HCl

(III) Redox titration

Preparation of standard solutions of 0.05N KMnO₄

1. Std. KMnO₄ (0.05N) \rightarrow Oxalic acid

(IV) Complexometry Titration

Preparation of standard solutions of (0.01M) EDTA.

1. $Zn^{++} \rightarrow Std. EDTA 0.01M$)

(V) Iodimetry Titration

Preparation of standard solutions of $0.05N Na_2S_2O_3.5H_2O$.

1. Iodine \rightarrow Std. Sodium thiosulphate

(VI) Iodometry Titration

Preparation of standard solutions of 0.05N Na₂S₂O₃.5H₂O

1. CuSO₄.5H₂O \rightarrow Std. Na₂S₂O₃.5H₂O (0.05N)

2. $K_2Cr_2O_7 \rightarrow Std. Na_2S_2O_3.5H_2O (0.05N)$

Demonstration

Concept of pH, buffer solution, electrodes

- 1. Demonstration of pH meter and measurement of pH of 0.1N HCl solution.
- 2. Preparation of an acidic buffer (CH₃COONa CH₃COOH, pH = 5) and its pH measurement.

3. Preparation of a basic buffer (NH₄Cl - NH₄OH, pH = 10) and its pH measurement.

Viva-Voce questions

REFERENCE BOOKS

1. **'Vogel's Textbook of Quantitative Chemical analysis'** Revised by G. H. Jeffery, J. Bassett, J. Mendham & R. C. Denney, ELBS (English Language Book Society) Longman. 5th Ed., New York.

2. **'Analytical Chemistry'** by Dhruba Charan Dash, 2011, 2th Ed., PHI Learning Private Ltd, New Delhi.

3. **'Analytical Chemistry' by Gary D. Christian,** 1986, 4th Ed., John Wiley & Sons.

4. 'Advanced Practical Inorganic Chemistry' by Gurdeep Raj, 9th Ed., Goel Publishing House, Meerut.

 'Advanced University Practical Chemistry' by P. C. Kamboj, Vishal Publishing Co., Jallandhar – Delhi.