

**SYLLABUS**  
**SAVITRIBAI PHULE PUNE UNIVERSITY, PUNE**  
**S.Y.B.Sc. Chemistry IV, CH-402**  
**From June 2023--2024**  
**Semester – 1-Inorganic Chemistry**

**Chapter 1: Isomerism in coordination complexes**

Introduction, polymerization isomerism, ionization isomerism, hydrates isomerism, linkage isomerism, coordination coordination position isomerism, geometriisomerism, optical isomerism. (Ref-1:232-236)

**Chapter 2: Valance Bond Theory of Coordination Compounds.**

Aspects and assumptions of VBT, of the hybridization to bonding in  $[\text{Ag}(\text{NH}_3)_2]^+$ ,  $[\text{Ni}(\text{Cl})_4]^{2-}$ ,  $[\text{Ni}(\text{CN})_4]^{2-}$ ,  $[\text{Ni}(\text{CN})_4]^{2-}$ ,  $[\text{Cn}(\text{H}_2\text{O})_3]$ ,  $[\text{Fc}(\text{CN})_3]^{3-}$  (Inner orbital complex) and  $[\text{FeF}_6]^{3-}$  outer orbital complex). Use magnetic moment deciding the geometry in complexes with C. N. 4, limitations of VBT (Ref -2:592-597 Ref-350-351).

**Chapter 3: Crystal Field Theory**

Shapes of d-orbitals, Crystal field Theory (CFT): Assumptions, Application of CFT to 1) Octahedral complexes (splitting of 'd' orbitals in Oh ligand field, effect of weak and strong ligand fields, colour absorbed and spectrochemical series, crystal splitting energy. Crystal field stabilization energy and factors affecting it, tetragonal distortion in Cu(H) complexes) ii) Square planar complexes and Tetrahedral complexes; spin only magnetic moment of Oh and Td complexes. (Ref-1:194-225)

**Reference Books (Inorganic Chemistry)**

1. Concise Inorganic Chemistry, J. D. Lee, 5th Ed (1996) Blackwell Science
2. Inorganic Chemistry, James E. House, Academic Press (Elsevier), 2008
3. Inorganic Chemistry by Miessler and Tarr, Third Ed. (2010), Pearson.

## SEMISTER II Organic Chemistry

### Chapter 4: Aldehydes and Ketones (aliphatic and aromatic)

(Formaldehyde, acetaldehyde, acetone and benzaldehyde)

Introduction and IUPAC nomenclature, Preparation from acid chlorides and from nitriles. Reactions Reaction with HCN, ROH, NaHSO<sub>3</sub>, NH<sub>2</sub>-G derivatives, Iodoform test, Aldol Condensation, Cannizzaro's reaction, Wittig reaction. Benzoin condensation, Clemenson reduction and Wolff Kishner reduction. Meerwein-Pondorff Verley reduction.

(Ref-1:657-700 and 797-816)

### Chapter 5: Carboxylic acids and their derivatives

Carboxylic acids (aliphatic and aromatic): (up to 5 carbons) Preparation: Acid chlorides, Anhydrides, Esters and Amides from acids and their inter conversion. Reaction: Comparative study of nucleophilicity of acyl derivatives. Reformatsky Reaction, Perkin condensation.

(Ref-1:713-745 and 753-785)

### Chapter 6: Amines and Diazonium Salts

Amines (Aliphatic and Aromatic): Introduction and IUPAC nomenclature, Preparation from alkyl halides, Gabriel's Phthalimide synthesis, Hofmann Bromamidereaction. Reactions Hofmann vs. Saytzeff elimination, Electrophilic substitution (Case Aniline): nitration, bromination, sulphonation.

### Chapter 7: Stereochemistry of Cyclohexane:

Bayer's strain theory, heat of combustion of cycloalkanes, structure of cyclohexane, axial and equatorial H atoms, conformations of cycloalkane, stability of conformations of cyclohexane, methyl and t-butyl monosubstituted cyclohexane, 1, 1 and 1, 2 dimethyl cyclohexane and their stability. (Ref-1: 283-308)

### References: Organic Chemistry

1. Morrison, R.T. and Boyd, R. N Organic Chemistry, Prentice Hall of India, Sixth Edition, 2002, 283-308.

Other Reference Books for All Chapters:

2. Jonathan Clayden, Nick Greeves, Stuart Warren, Peter Wothers Organic Chemistry -Oxford University Press, USA, 2nd Ed.

3. Bahl, A and Bahl, B. S. Advanced Organic Chemistry, S. Chand, 2010.

4. Graham Solomon, T. W., Fryhle, C. B. and Snyder, S. A. Organic Chemistry, John Wiley and Sons (2014)

5. Mc Murry, J. E. Fundamentals of Organic Chemistry, 7th Ed. Cengage Learning India Edition, 2013.

6. Sykes, P. A. Guidebook to Mechanism in Organic Chemistry, Orient Longman, New Delhi (1988).

