

Core Course XII : Organic Chemistry II

UNIT 1: CHEMISTRY OF CARBOHYDRATES :

Carbohydrate - classification, properties of mono saccharide (glucose and fructose), structure and configuration of mono saccharide, interconversion, ascending and descending series, muta rotation, epimerisation- cyclic structure - determination of size of sugar rings - disaccharide - sucrose, maltose - structure elucidation - polysaccharide - starch and cellulose (elementary treatment).

UNIT 2: CHEMISTRY OF PROTEINS AND VITAMINS

Amino acids - classification, general methods of preparation and reactions of amino acids, zwitter ion - isoelectric points, action of heat on α and β amino acids. Peptides and proteins - Peptide linkage - polypeptide - classification of proteins - synthesis of peptides - Merrifield synthesis - primary structure - end group analysis - Dancyl chloride, Edman method - secondary structure - tertiary structure - denaturation - colour reactions of proteins - nucleic acids - elementary treatment of DNA and RNA . vitamins (structural elucidation not needed) - classification, biological importance of vitamins A, B₁, B₂, B₆, B₁₂ and C.

UNIT 3: CHEMISTRY OF ALKALOIDS AND TERENOIDS

Chemistry of natural products - alkaloids - isolation, classification, general methods of elucidating structure - structural elucidation and synthesis of coniine, piperine, nicotine and ephedrine. terpenes - classification - isoprene, special isoprene rule, general methods of structural elucidation - structural elucidation and synthesis of citral, limonene, menthol, camphor.

UNIT 4: MOLECULAR REARRANGEMENTS

Molecular rearrangements - types of rearrangement (nucleophilic and electrophilic) – mechanism with evidence for the following re-arrangements : pinacol - pinacolone, benzil - benzilic acid, benzidine, Claisen, Fries, Hofmann, Curtius, Lossen, Beckmann, dienone - phenol and Orton - photochemical reactions of ketones - Norrish type I and II.

UNIT 5: ORGANIC SPECTROSCOPY

UV - VIS spectroscopy - types of electronic transitions - solvent effects on λ_{max} - Woodward - Fieser rules - calculation of λ_{max} : dienes and α, β unsaturated carbonyls.

IR spectroscopy - number and types of fundamental vibrations - modes of vibrations and their energies, position of IR absorption frequencies for functional groups like aldehyde, ketone, alcohol, acid and amide- factors affecting the frequency absorption - conjugation, inductive effect and hydrogen bonding.

NMR spectroscopy - principle - equivalent and non equivalent protons - shielded and deshielded protons, anisotropy, chemical shift - TMS, tau and delta scales, integral, splitting of signals - spin -spin coupling, NMR spectrum of EtOH, n - propyl bromide and isopropyl bromide.

Books for Reference :

1. Finar I.L., Organic Chemistry, Vol 1&2, (6th edition) England, Addison Wesley Longman Ltd. (1996).
2. Morrison R.T., Boyd R.N., Organic Chemistry, (4th edition) New York, Allyn & Bacon Ltd., (1976)
3. Bahl B.S, Arun Bahl, Advanced Organic Chemistry, (12th edition) New Delhi, Sultam Chand and Co., (1986)
4. Pine S.H., Organic Chemistry, (4th edition) New Delhi, McGraw - Hill International Book Company (1986)
5. Seyhan N. Ege, Organic Chemistry, New York, Houghton Mifflin Co., (2004)
6. William Kemp, Organic Spectroscopy, 3rd edition, ELBS.