

ORGANIC: COMPOUNDS, CONTAINING ACTIVE METHYLENE, NITROGEN CONTAINING FUNCTIONAL GROUPS; POLYNUCLEAR HYDROCARBONS AND HETEROCYCLES

THEORY

Unit I: Active methylene compounds

Concept of Keto-enol tautomerism, preparation, reactions and synthetic applications of diethyl malonate and Ethyl acetoacetate: Synthesis of carboxylic acids, dicarboxylic acids, β -keto acids, diketones and heterocyclic compounds.

Unit II: Compounds with Nitrogen Containing Functional Groups

Nitro compounds: Preparation, physical properties and reactions.

Alkyl nitriles and Isonitriles: Preparation, physical properties and reactions.

Aliphatic and aromatic amines: Preparation: rearrangement reactions (Lossen, Curtius, Schmidt and Hofmann bromamide), Gabriel phthalimide synthesis, reduction (including reductive amination).

Structure, physical properties and basic character of amines: Effects of solvent, substituents and steric inhibition of resonance.

Reactions: Reactions involving nucleophilic character: Alkylation, acylation, Mustard oil reaction, Carbylamine reaction, Mannich reaction, Eschwieler Clark methylation, Hofmann exhaustive methylation, Hofmann elimination (stereochemistry and comparison with Cope reaction), oxidation reactions, coupling reactions and electrophilic substitution in aromatic Amines.

Separation of 1^o, 2^o and 3^o amines (Hofmann method and Hinsberg method).

Diazonium salts: Preparation and their applications.

Unit III: Polynuclear Hydrocarbons

Introduction to polynuclear hydrocarbons.

Structure elucidation of Naphthalene.

Preparation and reactions of Naphthalene, Anthracene and Phenanthrene.

Unit IV: Heterocyclic Compounds

Heterocyclic compounds: Classification, nomenclature and their importance in medicine and agrochemicals.

Structure, basic character and aromaticity in 5- and 6-membered rings containing one heteroatom and condensed heterocyclics. Comparative study of basicity of heterocyclic compounds.

Synthesis and reactions of one heteroatom containing five membered ring and its benzofused ring: Furan, Pyrrole (Paal-Knorr synthesis, Knorr Pyrrole synthesis, Hantzsch synthesis), Thiophene, Indole(Fischer indole synthesis and Madelung synthesis)

Synthesis and reaction of one hetero atom containing six membered ring and its benzofused ring: Pyridine (Hantzsch synthesis), Quinoline and Isoquinoline (Skraup synthesis, Friedlander's synthesis, Knorr quinoline synthesis, Doebner-Miller synthesis, Bischler-Napieralski reaction, Pictet-Spengler reaction, Pomeranz-Fritsch reaction).

Recommended Texts:

1. Morrison, Robert Thornton & Boyd, Robert Neilson *Organic Chemistry*, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education), Sixth Edition, 2003.
2. Finar, I. L. *Organic Chemistry (Volume 1)*, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education), Sixth Edition, 2003.
3. Finar, I. L. *Organic Chemistry (Volume 2: Stereochemistry and the Chemistry of Natural Products)*, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education) Fifth Edition, 1975.
4. Graham Solomons, T.W., Craig B. Fryhle *Organic Chemistry*, Ninth edition John Wiley & Sons, Inc. 2008.
5. Acheson, R.M. *Introduction to the Chemistry of Heterocyclic compounds*, John Welly & Sons, Third Edition 1976.

PRACTICAL

ORGANIC: FUNCTIONAL GROUP ANALYSIS AND QUALITATIVE ANALYSIS

1. Detection of extra elements.
2. Functional group test for nitro, amine and amide groups.
3. Qualitative analysis of unknown organic compounds containing simple functional groups (alcohols, carboxylic acids, phenols and carbonyl compounds)

Recommended Texts:

1. Mann, F.G. & Saunders, B.C. *Practical Organic Chemistry*, Pearson Education 2009.
2. Furniss, B.S.; Hannaford, A.J.; Smith, P.W.G.; Tatchell, A.R. *Practical Organic Chemistry, 5th Ed.*, Pearson 2012/
3. Ahluwalia, V.K. & Aggarwal, R. *Comprehensive Practical Organic Chemistry: Preparation and Quantitative Analysis*, University Press 2000.
4. Ahluwalia, V.K. & Dhingra, S. *Comprehensive Practical Organic Chemistry: Qualitative Analysis*, University Press 2000.