

Course objectives: To enable the students to

- ☐ Compare and contrast the structure, type of reaction, mechanism and chemical behaviour of organic compound during the conversion of reactants to products.
- ☐ identify the reason for aromaticity of various organic compounds used as raw materials for the synthesis of many products
- ☐ recognise geometry of compounds based on their structural arrangements and bonding
- ☐ Identify various theories involved in the bonding of inorganic molecules which are used for their higher studies
- ☐ Predict the basic mechanism involved in the reaction of organic compounds
- ☐ Differentiate the types of colloids and their applications.

Course outcomes:

At end of the course, the student will be able to;

- ☐ Understand and explain the differential behaviour of organic compounds based on fundamental concept learnt.
- ☐ Formulate the mechanism of organic reactions by recalling and correlating the fundamental properties of the reactants involved.
- ☐ Learn and identify many organic reaction mechanism including Free Radical Substitution, Electrophilic Addition and Electrophilic Aromatic Substitution.
- ☐ Correlate and describe the stereochemical properties of organic compounds and reactions.

ORGANIC CHEMISTRY:

36 Hrs

UNIT- I: RECAPITULATION OF BASICS OF ORGANIC CHEMISTRY

CARBON-CARBON SIGMA BONDS (ALKANES AND CYCLOALKANES)

General methods of preparation of alkanes- Wurtz and WurtzFittig reaction, Corey House synthesis, physical and chemical properties of alkanes, Isomerism and its effect on properties, Free radical substitutions ; Halogenation, Conformational analysis of alkanes (Conformations, relative stability and energy diagrams of Ethane, Propane and butane). General molecular formulae of cycloalkanes and relative stability, Bayer strain theory.

Carbon-Carbon pi Bonds (Alkenes and Alkynes)

General methods of preparation, physical and chemical properties. Mechanism of E1, E2, E1cb reactions, Saytzeff and Hoffmann eliminations, Electrophilic Additions, mechanism (Markovnikov/Antimarkovnikov addition) with suitable examples, *syn* and the *anti*-addition; addition of H₂, X₂, HX. Diels Alder reaction 1,2- and 1,4- addition reactions in conjugated dienes.

Reactions of alkynes;

acidity. electrophilic and nucleophilic additions.

UNIT- II: BENZENE AND ITS REACTIVITY

Concept of aromaticity ,Huckle's rule-application to Benzenoid (Benzene, Naphthalene) and Non-Benzenoid compounds (cyclopropenyl cation, cyclopentadienyl anion and tropylium cation)

Reactions – General mechanism of electrophilic aromatic substitution, mechanism of nitration, Friedel – Craft's alkylation and acylation. Orientation of aromatic substitution – ortho, para and meta directing groups. Ring activating and deactivating groups with examples (Electronic interpretation of various groups like NO₂ and phenoic). Orientation of (i) Amino, methoxy and methyl groups (ii) Carboxyl, nitro, nitrile, carbonyl and sulphonic acid groups (iii) Halogens

(Explained by taking minimum of one example from each type)

UNIT- III: CHEMISTRY OF HALOGENATED HYDROCARBONS

Alkylhalides: Methods of preparation and properties, nucleophilic substitution reactions-SN₁, SN₂ and S_Ni mechanisms with stereochemical aspects and effect of solvent etc.; nucleophilic substitution vs elimination, Williamson's synthesis.

Arylhalides: Preparation (including preparation from diazonium salts) and properties, nucleophilic aromatic substitutions; S_NAr, Benzyne mechanism.

Relative reactivity of alkyl, allyl, benzyl, vinyl and aryl halides towards nucleophilic substitution reactions.

GENERAL CHEMISTRY

UNIT- IV: SURFACE CHEMISTRY

Colloids- Coagulation of colloids- Hardy-Schulze rule. Stability of colloids, Protection of colloids, Gold number.

Adsorption-physical and chemical adsorption, Langmuir adsorption isotherm, applications of adsorption.

UNIT- V: CHEMICAL BONDING

1. Valence bond theory, hybridization, VB theory as applied to ClF₃, Ni(CO)₄, Molecular orbital theory- LCAO method, construction of M.O diagrams for homo-nuclear and hetero-nuclear diatomic molecules (N₂, O₂, CO and NO)
2. **HSAB**: Pearson's concept, HSAB principle & its importance, bonding in Hard-Hard and Soft-Soft combinations.

List of Reference Books:

1. Text book of Organic chemistry

Morrison, R.N. & Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd.

2. Text book of Organic chemistry (Pearson Education).

Finar, I. L. Organic Chemistry (Volume 1), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education)

3. Text book of Organic chemistry Finar, I. L. Organic Chemistry (Volume 2: Stereochemistry and the Chemistry of Natural Products), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).

4. Stereochemistry by Eliel, E. L. & Wilen, S. H. Stereochemistry of Organic Compounds; Wiley: London, 1994. Kalsi, P. S. Stereochemistry Conformation and Mechanism; New Age International, 2005.

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ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS), VISAKHAPATNAM

II SEMESTER

CHEMISTRY

Time:3Hrs/Week

CH 2252 (2)

ORGANIC & GENERAL CHEMISTRY

Max.Marks:50

20-21 admitted batch-"20AH" PRACTICAL SYLLABUS – I B

Course objectives: To enable the students to –

- ☐ Conduct experiments designed for volumetric analysis
- ☐ Interpret experimental/investigative data
- ☐ Apply theory-based tools to solve simple chemical problems related to subject areas

Course outcomes:

At the end of the course, the student will be able to;

1. Use glassware, equipment and chemicals and follow experimental procedures in the laboratory
2. Understand and explain the volumetric analysis based on fundamental concepts learnt in ionic equilibria
3. Learn and identify the concepts of a standard solutions, primary and secondary standards
4. Facilitate the learner to make solutions of various molar concentrations. This may include:
The concept of the mole; Converting moles to grams; Converting grams to moles;
Defining concentration; Dilution of Solutions; Making different molar concentrations.

Volumetric analysis 50 M

1. Estimation of sodium carbonate and sodium hydrogen carbonate present in a mixture.
2. Determination of Fe (II) using KMnO_4 with oxalic acid as primary standard.
3. Determination of Cu (II) using $\text{Na}_2\text{S}_2\text{O}_3$ with $\text{K}_2\text{Cr}_2\text{O}_7$ as primary standard.
4. Estimation of water of crystallization in Mohr's salt by titrating with KmnO_4

REFERENCE BOOKS:

1. Vogel's Text Book of Quantitative Inorganic Analysis, IV Edition J.Bassett, R.C.Denny, G.H.Jeffery, J.Mendhan ELBS/Longman, England.

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