

ORGANIC CHEMISTRY
(Proposed Syllabus for Autonomous)
II/IV CHEMICAL ENGINEERING (I-SEM)

L - T - P - C

CHE-214

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End-Exam marks: 60

Sessional marks: 40

Course Objectives

- To impart knowledge on the basic concepts of organic chemistry.
- To know the importance of Stereo chemical approach of organic reactions.
- To create a basic idea on the mechanisms of organic reactions involving reaction intermediates.
- To understand the Industrial preparation methods of certain organic compounds and their synthetic applications.
- To create awareness on various applications of chemical reagents and biological activity of few organic compounds.

Course Outcomes	
At the end of the course, the student will be able to:	
1	Understand the basics of reaction intermediates and polar effects.
2	Design organic molecules in stereo chemical models.
3	Arrive at an idea on mechanism of addition and condensation reactions.
4	Meet the need to understand the industrial preparation of organic compounds at various conditions.
5	Develop further organic applications using synthetic reagents and understand the biological activity of few organic compounds.

SYLLABUS:

UNIT-1

12 periods

FUNDAMENTALS OF ORGANIC CHEMISTRY.

Introduction to organic functional groups- IUPAC Nomenclature and Isomerism.

Organic reactions-Types-addition, elimination, substitution, rearrangement, polymerization-examples.Types of reagents- electrophile, nucleophile. Reaction intermediates & hybridisation-carbocation, carbanion, free-radical, examples. Polar effects – Inductive effect, Mesomeric effect, Electromeric effect and Hyperconjugation with examples; Acidic nature of carboxylic acid and phenol; basic nature of Amines

UNIT-2**10 periods****STEREOCHEMISTRY OF ORGANIC COMPOUNDS:**

Stereoisomerism- definition-types. Representation of compounds – Sawhorse projection, Newmann projection, Fisher projection, Wedge formula- examples.

Conformational isomerism- examples of ethane, n-butane, cyclohexane & potential energy diagrams. Axial & Equatorial bonds in Cyclohexane Examples of 1,2 & 1,3 interactions in substituted cyclohexanes.

Geometrical isomerism- Cis-trans & E-Z isomerism-sequence rules and examples. R & S configuration- sequence rules-examples.

Optical activity- Chirality, Enantiomers, diastereomers, mesomers, racemic mixture. Racemisation, Resolution of racemic mixture.

UNIT-3**12 periods****CHEMISTRY OF ALCOHOLS, PHENOLS & CARBONYL COMPOUNDS:**

Industrial preparations of Ethyl alcohol (Molasses), Differences between alcohols- Oxidation, Lucas Test, Catalytic dehydrogenation, Victor-Meyer test. Chemical reactions of phenols- Fries rearrangement, Kolbes reaction, Reimar-Tiemann reaction.

Reactivity of carbonyl compounds. Chemical reactions-Cannizaro, Aldol, Reformatsky and Wittig reactions, Perkin, Cope, Knoevenagel and Pinacol-Pinacolone reactions, Differences between Aldehyde and Ketone.

UNIT-4**12 periods****CHEMISTRY OF CARBOXYLIC ACIDS & DERIVATIVES & AMINES:**

Industrial preparations of Acetic acid, chemical reactions (Hell-Volhard-Zelinsky reaction, Wolf rearrangement). Functional derivatives of carboxylic acids- Esters (acid & base catalyzed hydrolysis of Ester, Claisen condensation), amides (Hoffmann Bromamide reaction) and Acid halides (Rosenmunds reduction).

Aniline - preparation, differences between amines and chemical reactions - Hoffmann elimination, Hinsberg test, Mustard oil test, Carbyl amine reaction. Benzene Diazonium salts and its synthetic applications- Coupling reactions, Schiemann reaction, Gatterman reaction, Sandmayer reaction.

UNIT-5**10 periods****HETEROCYCLIC COMPOUNDS & SYNTHETIC APPLICATIONS OF SOME ORGANIC REAGENTS:**

Aromaticity, Preparation, Properties and uses of – Five membered heterocyclic compounds- Pyrrole, Furan, Thiophene, Indole. Six membered heterocyclic compounds- Pyridine, Quinoline.

Biological activity of Sulpha drugs (Sulphanilamide, Sulphapyridene)

Chemical nature and Synthetic applications of LiAlH_4 and OsO_4 .

Recommended Text Books:

1. Text Book of Organic Chemistry by Arun Bahl & B.S.Bahl, VI Edition, 2015, S.Chand
2. Text Book of Organic Chemistry by Morrison & Boyd, VII Edition, 2010, Pearson

Reference books:

1. Organic chemistry by Jerry March, Wiley.
2. Text Book of Organic Chemistry by I.L.Finar (Vols.1&2), Pearson

ORGANIC CHEMISTRY (LABORATORY)

II/IV CHEMICAL ENGINEERING (I-SEM)

(With effect from admitted batch 2015-16)

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Course Objectives

- To improve skills in synthesizing organic compounds using various chemical techniques.
- To enable the students to analyze the functional group in the organic compound through qualitative analysis

Course Outcomes

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

1	Synthesize and analyze the properties and nature of the organic compound.
2	Use different types of solvents and reagents in analyzing the functional group of the organic compound.

LIST OF EXPERIMENTS:

CYCLE-1

One step synthesis of organic compounds and determination of melting point:

1. Phthalimide
2. Nerolin
3. Benzanilide
4. m-dinitrobenzene
5. Methyl Orange
6. Micro-Wave (MW) assisted green synthesis of Benzoic acid from Benzamide.

CYCLE-2

Qualitative analysis for the identification of functional group in the organic compound:

1. Demonstration of Qualitative analysis
2. Analysis of Compound -1
3. Analysis of Compound -2
4. Analysis of Compound -3
5. Analysis of Compound -4
6. Analysis of Compound -5
7. Analysis of Compound -6

Prescribed book:-

Organic Chemistry Lab Manual prepared by Department of Chemistry.

Reference books:-

Vogel's textbook of Practical Organic Chemistry, 5th edition, Pearson education.