

SRI VENKATESWARA UNIVERSITY - TIRUPATI
B.S.c., (Honours) in CHEMISTRY (MINOR)
III SEMESTER
(W.E.F. Academic Year 2024-25)

Course Code 5: FUNDAMENTALS IN ORGANIC CHEMISTRY

Credits: 03

Course outcomes:

At the end of SEMESTER the student will be able to

1. Understand and explain the differential behaviour of organic compounds based on fundamental concepts learnt.
2. Formulate the mechanism of organic reactions by recalling and correlating the fundamental properties of the reactants involved.
3. Learn and identify many organic reaction mechanisms .
4. Correlate and describe the stereo-chemical properties of organic compounds and reactions.

Syllabus:

Unit1. Structural theory in Organic Chemistry (9 h)

Types of bond fission and organic reagents (Electrophilic, Nucleophilic, and free radical reagents). Reaction intermediates – Carbocations, carbanions & free radicals. Bond polarization: Factors influencing the polarization of covalent bonds, inductive effect - Application of inductive effect (a) Basicity of amines (b) Acidity of carboxylic acids (c) Stability of carbonium ions. Resonance or Mesomeric effect, application to (a) acidity of phenol, and (b) acidity of carboxylic acids. Hyper conjugation and its application to stability of carbonium ions, Free radicals and alkenes.

Unit II Saturated Hydrocarbons (Alkanes and Cycloalkanes) 9h

General methods of preparation of alkanes- Wurtz and Wurtz Fittig reaction, Corey House synthesis, physical and chemical properties of alkanes, Conformational analysis of alkanes (Conformations, relative stability and energy diagrams of Ethane, Propane and butane). General molecular formulae of cycloalkanes and relative stability, Baeyer strain theory, Cyclohexane conformations with energy diagram, Conformations of monosubstituted cyclohexane.

UNIT-III Unsaturated Hydrocarbons (Alkenes and Alkynes) 9h

General methods of preparation, physical and chemical properties, Saytzeff and Hoffmann eliminations (with mechanism), Electrophilic Additions, (H₂, HX) mechanism (Markownikoff/ Anti markownikoff addition) with suitable examples-syn and anti-addition; addition of X₂, HX. Oxymercuration de mercuration, ozonolysis, hydroxylation, Diels Alder reaction, 1,2- and 1,4-addition reactions in conjugated dienes. Reactions of alkynes, acidity, electrophilic and nucleophilic additions, hydration to form carbonyl compounds, Alkylation of terminal alkynes, Oxidation with KMnO₄, OsO₄, Reduction and Polymerization reaction of acetylene.

UNIT-IV Benzene and its reactivity (9h)

Concept of aromaticity, Huckel's rule - application to Benzenoid (Benzene, Naphthalene) and

Non - Benzenoid compounds (cyclopropenylcation, cyclopentadienyl anion and tropylium cation) Structure of Benzene – Preparation
- polymerisation of acetylene and decarboxylation- Properties -mechanism of electrophilic aromatic substitution of Friedel-Craft's alkylation and acylation. halogenation and nitration,

UNIT-V Orientation of aromatic substitution(9h)

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 Phenolic). Orientation of (i) Amino, methoxy and methyl groups (ii) Carboxy, nitro, nitrile, carbonyl and sulphonic acid groups (iii) Halogens.

II. List of Reference Books

1. Morrison, R. N. & Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
2. Finar, I. L. Organic Chemistry (Volume 1), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
3. Guide book to Mechanism in Organic Chemistry by Peter Sykes 6th edition, 1985.

III –SEMESTER
Course Code 5: Organic Qualitative analysis
Credits: 01
Organic Qualitative analysis

PRACTICAL

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. Determine melting and boiling points of organic compounds
3. Understand the application of concepts of different organic reactions studied in theory part of organic chemistry

Syllabus:

Analysis of an organic compound through systematic qualitative procedure for functional group identification including the determination of melting point and boiling point with suitable derivatives. Alcohols, Phenols, Aldehydes, Ketones, Carboxylic acids, Aromatic primary amines, amides and simple sugars.

Co-curricular activities and Assessment Methods

1. Continuous Evaluation: Monitoring the progress of student's learning
2. Class Tests, Worksheets and Quizzes
3. Presentations, Projects and Assignments and Group Discussions:
Enhances critical thinking skills and personality
4. SEMESTER -End Examination: critical indicator of student's learning and teaching methods adopted by teachers throughout the SEMESTER .

Reference books:

- 1) Vogel A.I .Practical Organic Chemistry, Longman Group Ltd.
- 2) \ Bansal R.K. Laboratory Manual of Organic Chemistry, Wiley-Eastern.
- 3) Ahluwalia V. K. and Agarwal R. Comprehensive Practical Organic Chemistry, University press.