

<b>ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS), VISAKHAPATNAM</b>		
<b>V SEMESTER</b>	<b>CHEMISTRY</b>	<b>3 Hrs/Week</b>
<b>CH 5206 (3)</b>	<b>ORGANIC CHEMISTRY</b>	<b>Max. Marks: 60</b>
<b>w.e.f (2017-2018 -AC)</b>	<b>SYLLABUS</b>	

- OBJECTIVES:** To enable the students to –
- Apply the synthetic applications for the synthesis of various organic compounds.
  - To enable the students to know fundamentals of molecular spectroscopy.
  - Acquire the proper knowledge of Spectroscopy.

#### **UNIT I:**

**1. Nitrogen Compounds: A. Nitro hydro carbons:** Nomenclature and classification of nitro hydrocarbons – structure. Tautomerism of nitro alkanes leading to aci and ketoform. Preparation of nitroalkanes. Reactivity – halogenation, reaction with HONO (Nitrous acid), Nef reaction and Mannich reaction leading to Michael addition and reduction. **B. Amines** (Aliphatic and Aromatic): Nomenclature, classification into 1<sup>o</sup>, 2<sup>o</sup>, 3<sup>o</sup> Amines and quaternary ammonium compounds. A. Preparative methods – i. Ammonolysis of alkyl halides ii Hoffman's bromamide reaction (mechanism) iii. Reduction of Amides and Schmidt reaction. B. Physical properties and basic character – comparative basic strength of Ammonia, methyl amine, dimethyl amine, trimethyl amine and aniline – comparative basic strength of aniline – N-methyl aniline and N,N-dimethyl aniline (in aqueous and non-aqueous medium), steric effects and substituent effects. Use of amine salts as phase transfer catalysts. C. Chemical properties: Alkylation, Acylation, Carbylamine reaction, Hinsberg separation, Reaction with Nitrous acid of 1<sup>o</sup>, 2<sup>o</sup>, 3<sup>o</sup> (Aliphatic and aromatic amines), Electrophilic substitutions of Aromatic amines – Bromination and Nitration. Oxidation of aryl and 3<sup>o</sup> Amines. Diazotization.

**2. Diazonium Compounds:** a. Preparation of Benzene diazonium chloride from Aniline (mechanism). b. Synthetic Applications of Benzene diazonium chloride i. chloro benzene ii. bromo benzene iii. fluoro benzene iv. benzoic acid v. benzene vi. Phenol

#### **UNIT: II**

**3. Heterocyclic compounds:** Introduction and definition, classification – five membered Heterocyclic compounds-pyrrole, Furan, Thiophene- Aromatic character – Preparation from 1,4-dicarbonyl compounds, Paul-Knorr synthesis. Pyrrole: Acidic character, electrophilic substitution at 2 or 5 position, Halogenation, Nitration and Sulphonation under mild conditions, Friedel Crafts acylation. Diels Alder reaction in furan. Pyridine: - Preparation by Dehydrogenation of piperidine, - Structure, Basicity - Aromaticity – Comparison with benzene and pyrrole - and electrophilic substitution reactions Nitration, Sulphonation, Halogenation. Reactivity towards Nucleophilic substitution reactions.

**4. Carbohydrates:** Introduction, 1. Definition, 2. Classification 3. Monosaccharides: Glucose (aldo hexose) –preparation-Chemical properties – Acetylation, cyanohydrin formation, oxidation, Reduction, NH<sub>2</sub>OH, osazone formation. Structure of glucose - Objections to open chain Structure. Evidence for cyclic structure of glucose (negative aldehydes tests and mutarotation) - Proof for the ring size (methylation, hydrolysis and oxidation reactions) - Pyranose structure (Haworth formula and chair conformational formula). 4. Fructose (keto hexose) - preparation, - Chemical properties – Acetylation, cyanohydrin formation, oxidation, Reduction, NH<sub>2</sub>OH, osazone formation. - Structure of fructose Definition of anomers with examples. 5. Interconversion of Monosaccharides: (a) Killiani's synthesis- Aldopentose to Aldohexose (Arabinose to D- Glucose, D-Mannose) Epimers, Epimerisation - Lobry de Bruyn van Ekenstein rearrangement. (b) Ruff degradation- Aldohexose to Aldopentose (D-Glucose to D- Arabinose). (c) Aldohexose to Ketohexose (Glucose to Fructose) d) Ketohexose to Aldohexose (Fructose to Glucose)

### UNIT: III

**5. Molecular Spectroscopy:** Introduction **Electronic spectroscopy:** Interaction of electromagnetic radiation with molecules and types of molecular spectra. Energy levels of molecular orbitals ( $\sigma$ ,  $\pi$ ,  $n$ ). Selection rules for electronic spectra. Types of electronic transitions in molecules effect of conjugation. Concept of chromophore and auxochrome. **Infra red spectroscopy:** Different Regions in Infrared radiations. Modes of vibrations in diatomic and polyatomic molecules. Characteristic absorption bands of various functional groups. Interpretation of spectra-Alkanes, Aromatic, Alcohols carbonyls, and amines with one example to each.

**6. Proton magnetic resonance spectroscopy (H-NMR)** – Principles of nuclear magnetic resonance; equivalent and non-equivalent protons; position of signals ; Chemical shift; NMR splitting of signals-spin-spin coupling, coupling constants. Applications of NMR with suitable examples-ethyl bromide, ethanol, acetaldehyde, 1, 1, 2 -tri-bromo ethane, ethyl acetate, toluene and Acetophenone.

### REFERENCES:

1. Advanced Organic Chemistry – B.S.Bahl & Arun Bahl – XVIII Edn.-S.Chand & Company, New Delhi – 110055.2006
2. Organic Chemistry – Robert T.Morrison & Robert N.Boyd – V Edn. – Prentice-Hall of India Pvt. Ltd., New Delhi – 110001. 1989
1. Organic Chemistry (Vol.1 &2) – Stereochemistry and the Chemistry of Natural Products – I.L.Finar – V & VI Edn – (ELBS) English Language Book Society / Longman, Longman Scientific & Technical , Longman Group UK Ltd., England . 2003
2. Organic Spectroscopy – William Kemp – II Edn – The Macmillan Education Ltd., Hamshire. 1978
3. Unified Chemistry (Vol. II) – IV Edn. – Kalyani Publishers, Ludhiana – 141008. 2005
4. Unified Chemistry (Vol. III) – III Edn. – Kalyani Publishers, Ludhiana – 141008. 2003.
5. Spectroscopy by William Kemp
6. Spectroscopy by Pavia
7. Organic Spectroscopy by J. R. Dyer

## Practical paper - V

**ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS), VISAKHAPATNAM**  
**V SEMESTER CHEMISTRY TIME: 3 Hrs/Week**  
**CH 5254 (1) ORGANIC QUALITATIVE ANALYSIS Max. Marks: 50**  
**w. e .f 2017-2018'AC' batch PRACTICALSYLLABUS**

**OBJECTIVE:** To enable the students to identify organic compounds through application of systematic qualitative procedure for functional group identification

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, alkyl aryl halides.

### REFERENCES :

1. Practical Organic Chemistry – G Mann & B.C.Saunders ELBS & Long man Group Ltd – IV Edition.
2. Vogels's T.B. of Practical Organic Chemistry B S Furnis A J Hannaford, PWG Smith & AR Tatchell – ELBS V Edition.