



# बिरसा मुंडा ट्रायबल युनिवर्सिटी Birsa Munda Tribal University

राजपिपला, जि० नर्मदा Rajpipla, Dist. Narmda

Established by Tribal Development Department, Govt. of Gujarat

## School of Science

### B.Sc. (Chemistry) Programme

Subject Code & Name: - BS03MJCHE1 Organic Chemistry-I

#### Teaching and Evaluation Scheme:

Teaching Scheme				Examination Scheme			
Credits				Component Weightage (%)			
				CCE		SEE	
L	T	P	Total	TH	PWE	TH	PWE
3	-	1	4	35	15	35	15

Programme Name	B.Sc.
Semester	III
Course Code	BS03MJCHE1
Course Title	Organic Chemistry-I
Course Content Type (Th./Pr.)	Theory & Practical
Course Credit	3 + 1
Sessions+ Lab. Per Week	3 +2
Total Teaching/Lab. Hours	45 Theory Hours + 30 Practical Hours
* 2 Laboratory = 1 Session	

#### Learning Objectives

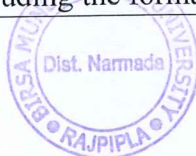
1. Understand the Nature of Aromatic Compounds
2. Define Electrophilic Aromatic Substitution (EAS)
3. Recognize why aromatic rings undergo substitution rather than addition reactions.
4. Understand what cycloalkanes are and how they differ from linear or branched alkanes.
5. Recognize common monosaccharides like glucose, fructose, and galactose.
6. Define and explain key terms such as chirality, enantiomers, diastereomers, and meso compounds.
7. Distinguish between constitutional isomers and stereoisomers.

#### Prerequisites (if any)

#### Learning Outcomes

On the Completion of this course, students will able to:

1. Define Electrophilic Aromatic Substitution and explain why it occurs in aromatic compounds.
2. Identify common electrophilic aromatic substitution reactions (e.g., nitration, halogenation, sulfonation, Friedel-Crafts alkylation and acylation).
3. Describe the mechanism of EAS, including the formation of the arenium ion intermediate







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4. Recognize the chemical structure of cycloalkanes, including common examples such as cyclopropane, cyclobutane, cyclopentane, and cyclohexane.
5. Understand the concept of ring strain and how it affects the stability and reactivity of different cycloalkanes.
6. Define and explain key stereochemical terms such as chirality, enantiomers, diastereomers, meso compounds, and optical activity.
7. Recognize the importance of stereochemistry in molecular structure and function.

### Detailed Contents

UNIT	TOPIC/SUB-TOPIC	TEACHING HOURS
I	<b>Aromatic Substitution Reactions</b> <ul style="list-style-type: none"><li>➤ Introduction And Types Of Substitution Reactions,</li><li>➤ Electrophilic Aromatic Substitution Reactions</li><li>➤ Effect of Substituent Groups,</li><li>➤ Determination of Orientation And Relative Reactivity,</li><li>➤ Classification of Substituent Groups,</li><li>➤ Electrophilic Substitution (ES) Reactions. (Nitration, Sulfonation, Halogenation, Friedel Craft Alkylation and Acylation),</li><li>➤ Orientation In Mono And Disubstituted Benzene.</li><li>➤ Nucleophilic Aromatic Substitution Reaction,</li><li>➤ Substitution via Epsō and Benzyne Mechanism.</li></ul>	15
II	<b>Cycloalkanes</b> <ul style="list-style-type: none"><li>➤ Introduction And Classification of Ring System (Monocyclic and Polycyclic, Size,</li><li>➤ Number of Carbon Atoms Common Between the Two Rings).</li><li>➤ IUPAC Nomenclature of Cycloalkanes (Including Simple Spiro Compounds, Fused Ring and Bridged Ring Systems- Bicyclic Only).</li><li>➤ Method of Preparation of Small Ring Cycloalkanes: Intra-Molecular Wurtz's Reaction,</li><li>➤ Simmons-Smith, Diels-Alder Reaction</li><li>➤ Chemical Properties of Cycloalkanes: Substitution Reactions, Addition Reactions,</li><li>➤ Baeyer's Strain Theory and Its Limitations</li></ul>	15







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III	<b>Stereochemistry-I</b> <ul style="list-style-type: none"><li>➤ Introduction,</li><li>➤ Types of isomerism,</li><li>➤ Newman projection and Sawhorse formula, Fischer and flying wedge formula.</li><li>➤ D- L and R-S, system of nomenclature,</li><li>➤ Stereochemical aspects of organic molecules, Chirality, Optical isomerism, Enantiomers and Diastereomers, threo and erythro diastereomers, meso compounds,</li><li>➤ Resolution of enantiomers, inversion, retention and, racemization.</li><li>➤ Relative and absolute configuration,</li><li>➤ Geometric isomerism — determination of configuration of geometric isomers, E &amp; Z system of nomenclature,</li><li>➤ Calculation of no. of stereoisomers</li></ul>	15
<b>Text Book(s)</b>		
<b>Reference Books</b>		
<ol style="list-style-type: none"><li>1. Robert Thornot Morrison and Robert Neilson Boyd, "Organic Chemistry", Prentice Hall of India Pvt Ltd, New Delhi, Sixth Edition, 1992.</li><li>2. Bhupinder Mehta, Manju Mehta, "Organic Chemistry", Prentice Hall of India Pvt Ltd, New Delhi, 2005.</li><li>3. James B Hedrickson Donald J. Cram and George S. Hammond, "Organic Chemistry", Mc-Graw-Hill Kogakusha, Ltd., Third Edition.</li><li>4. Arun Bahl, B. S. Bahl, "Advance Organic Chemistry", S. Chand &amp; Company Ltd., New Delhi, First Edition, 2003.</li><li>5. I. L. Finar, "Organic Chemistry", Pearson Education Pet Ltd, New Delhi, First Edition, 2002.</li><li>6. G. Marc Loudon, "Organic Chemistry", Oxford University Press, Forth Indian edition, 2010.</li><li>7. P.S.Kalsi, "Text book of Stereochemistry Chemistry", MacMillan of India Pvt. Ltd., 1999.</li><li>8. P.L. Soni and H.M. Chawala, "Text book of Organic Chemistry", Sultan Chand &amp; Sons</li></ol>		
<b>Web Resources</b>		
<b>Required Software(s) (if any)</b>		
<b>Practical(s) (if any)</b>		







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<b>BINARY ORGANIC MIXTURE [Solid + Solid]</b> <ul style="list-style-type: none"><li>• Only water insoluble (At least Ten)</li><li>• Separation and identification of binary organic mixture : Solid + Solid [A/B/P/N]</li><li>• Solid Acid : Benzoic Acid, Salicylic Acid And Cinnamic Acid</li><li>• Solid Phenol : (<math>\alpha</math>-naphthol, <math>\beta</math>-naphthol)</li><li>• Solid Base : (o, m, and p-nitroaniline)</li><li>• Solid Neutral : p-dichlorobenzene, naphthalene, anthracene, benzamide, acetanilide, m-dinitrobenzene.</li></ul>	30
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**L::** Lecture, **T::** Tutorial , **P::**Practical

**CCE::** Continuous and Comprehensive Evaluation

(CCE Theory includes Mid Semester Examination, Assignment, MCQ quizzes, Seminar, Reflective notes, class participation, case analysis and presentation, slip tests (announced/ surprised), attendance etc. or any combination of these)

**PWE::** Practical Work Examination

(PWE includes Laboratory practical work, project work, viva simulation exercise work etc.)

**SEE::** Semester End Evaluation

