



ARSD College, University of Delhi

Model Course Handout/Lesson Plan

Course Name : B.Sc. (Hons) chemistry						
Semester	Course Code	Course Title	Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
I	Unique paper code: 2172011102 DSC 2: ORGANIC CHEMISTR Y - I	Basic Concepts and Aliphatic Hydrocarbons	3			3
Teacher/Instructor(s)		Dr. Neha Bhardwaj				
Session		2022-2023				

Course Objective: The core course Organic Chemistry I is designed in a manner that it forms a cardinal part of the learning of organic chemistry for the subsequent semesters. The course is infused with the recapitulation of fundamental concepts of organic chemistry and the introduction of the concept of visualizing the organic molecules in a three-dimensional space. To establish the applications of these concepts, the functional groups-alkanes, alkenes, alkynes are introduced. The constitution of the course strongly aids in the paramount learning of the concepts and their applications.

Course Learning Outcomes: By the end of this course, students will be able to:

Understand and explain the electronic displacements and reactive intermediates and their applications in basic concepts.

Formulate the mechanistic route of organic reactions by recalling and correlating the fundamental concepts.

Identify and comprehend mechanism for free radical substitution, electrophilic addition, nucleophilic substitution and elimination reactions.

Understand the fundamental concepts of stereochemistry.

Understand and suitably use the chemistry of hydrocarbons

Lesson Plan:

S. NO.	Learning Objective	Lecture No.	Topics to be covered
I	Basic Concepts of Organic Chemistry Lectures: 8	1-2	Electronic displacements and their applications: inductive, electromeric effect
		3-4	Electronic displacements and their applications: inductive, electromeric, resonance and mesomeric effects and hyperconjugation.
		5-6	Dipole moment, acidity and basicity.

			Homolytic and heterolytic fissions with suitable examples. Types, shape and relative stability of carbocations, carbanions, carbenes and free radicals.
		7-8	Electrophiles & nucleophiles, and introduction to types of organic reactions: addition, elimination and substitution reactions.
II	Stereochemistry	9-10	Stereoisomerism: Optical activity and optical isomerism, asymmetry,
		11-12	chirality, enantiomers, diastereomers. specific rotation; Configuration and projection formulae: Newman, Sawhorse, Fischer and their interconversion.
		13-14	Chirality in molecules with one and two stereocentres; meso configuration. Racemic mixture and their resolution.
		15-16	Relative and absolute configuration: D/L and R/S designations (CIP rules).
		17-18	Geometrical isomerism: cis-trans, syn-anti and E/Z notations. Conformational Isomerism: Alkanes
		19-20	(Conformations, relative stability and energy diagrams of Ethane, Propane and butane).
		21-22	Relative stability of cycloalkanes (Baeyer strain theory)
		23-24	Cyclohexane conformations with energy diagram.
		25-26	Conformations of monosubstituted cyclohexanes
		III	Aliphatic Hydrocarbons
29-30	Alkenes and Alkynes: Methods of preparation of alkenes using Mechanisms of E1, E2, E1cb reactions		
31-32	Saytzeff and Hoffmann eliminations.		

		33-34	Electrophilic additions, mechanism with suitable examples
		35-36	(Markownikoff/Anti-markownikoff addition)
		37-38	syn and anti-addition; addition of H ₂ , X ₂ oxymercuration-demercuration, hydroboration-oxidation
		39-40	ozonolysis, hydroxylation, reaction with NBS, Reactions of alkynes; acidity
		41-42	Alkylation of terminal alkynes, electrophilic addition: hydration to form carbonyl compounds,
		43-44	Relative reactivity of alkenes and alkynes, 1,2- and 1,4-addition reactions in conjugated dienes
		45	Diels Alder reaction (excluding stereochemistry)

Evaluation Scheme:

No.	Component	Duration	Marks
1.	Internal Assessment		30
	• Quiz		
	• Class Test		
	• Attendance		
	• Assignment		
2.	End Semester Examination	3 hr	90

Details of the Course		
Unit	Contents	Contact Hours
1 Basic Concepts of Organic Chemistry	Electronic displacements and their applications: inductive, electromeric, resonance and mesomeric effects and hyperconjugation. Dipole moment, acidity and basicity. Homolytic and heterolytic fissions with suitable examples. Types, shape and relative stability of carbocations, carbanions, carbenes and free radicals. Electrophiles & nucleophiles, and introduction to types of organic reactions: addition, elimination and substitution reactions.	8

2 Stereochemistry	<p>Stereoisomerism: Optical activity and optical isomerism, asymmetry, chirality, enantiomers, diastereomers. specific rotation; Configuration and projection formulae: Newman, Sawhorse, Fischer and their interconversion. Chirality in molecules with one and two stereocentres; meso configuration.</p> <p>Racemic mixture and their resolution. Relative and absolute configuration: D/L and R/S designations (CIP rules).</p> <p>Geometrical isomerism: cis-trans, syn-anti and E/Z notations.</p> <p>Conformational Isomerism: Alkanes (Conformations, relative stability and energy diagrams of Ethane, Propane and butane). Relative stability of cycloalkanes (Baeyer strain theory), Cyclohexane conformations with energy diagram. Conformations of monosubstituted cyclohexanes.</p>	18
3 Aliphatic Hydrocarbons	<p>Alkanes: Preparation, Halogenation of alkanes, Concept of relative reactivity v/s selectivity.</p> <p>Alkenes and Alkynes: Methods of preparation of alkenes using Mechanisms of E1, E2, E1cb reactions, Saytzeff and Hoffmann eliminations. Electrophilic additions, mechanism with suitable examples, (Markownikoff/Anti-markownikoff addition), syn and anti-addition; addition of H₂, X₂, oxymercuration-demercuration, hydroboration-oxidation, ozonolysis, hydroxylation, reaction with NBS, Reactions of alkynes; acidity, Alkylation of terminal alkynes, electrophilic addition: hydration to form carbonyl compounds, Relative reactivity of alkenes and alkynes, 1,2 -and 1,4-addition reactions in conjugated dienes, Diels Alder reaction (excluding stereochemistry)</p>	19
	Total	45
Suggested Books:		
Sl. No.	Name of Authors/Books/Publishers	Year of Publication/Reprint
-1	Morrison, R.N., Boyd, R.N., Bhattacharjee, S.K., Organic Chemistry, 7th Edition, Dorling Kindersley (India) Pvt. Ltd., Pearson Education.	2010
2	Finar, I.L., Organic Chemistry, Volume 1, 6th Edition, Dorling Kindersley (India) Pvt. Ltd., Pearson Education.	2002
3	Eliel, E.L., Wilen, S.H., Stereochemistry of Organic Compounds; Wiley: London.	1994
Mode of Evaluation:	Internal Assessment / End Semester Exam	

