

Course Code	Course Name	Credits
26CH011	ORGANIC CHEMISTRY-II	04

Course Objectives

- This course on organic chemistry intends to make the students understand different topics like Alcohols, Ethers, Epoxides and Sulphur Compounds, Pericyclic Reactions, oxidation of organic compounds, name reactions and some reagents of synthetic importance.
- This helps the students to develop a constructive approach to solving problems in organic chemistry. This is a course with a focus on employability.

Learning Outcomes

Upon successful completion of this course it is intended that a student will be able to:

- Ability to understand the chemistry of alcohols, ethers, epoxides and sulphur compounds.
- Ability to recall, explain and predict the mechanisms of name reactions in organic chemistry.
- Identify a pericyclic reaction and categorise it as a cycloaddition, a group transfer reaction, a sigmatropic.
- Explain oxidation as loss of electrons and identify various oxidizing agents used in organic reactions.
- A comprehensive understanding about name reactions and its reaction mechanisms.
- Ability to choose the appropriate reagents in organic synthesis.

Unit 1 - Alcohols, Ethers, Epoxides and Sulphur Compounds (12 Hrs.)

Alcohols as acids and bases; reactions of alcohols; substitution reactions of alcohols; conversion into sulphonate esters; tests for alcohols; Williamson synthesis; reactions of ethers; cleavage by acids; substitution reactions in ethers; analysis of ethers; reactions of epoxides; arene oxides; crown ethers; reactions of thiols, sulphides, and sulphonium salts; Pinacol–Pinacolone rearrangement; Dienone–Phenol rearrangement.

Unit 2 – Pericyclic Reactions (12 Hrs.)

Characteristics and types of pericyclic reactions; cycloaddition reactions; Diels–Alder reaction; substituent effects on reactivity, regioselectivity, and stereochemistry; catalysis by Lewis acids; synthetic applications; enantioselectivity; diastereoselective synthesis using chiral auxiliaries; 1,3-dipolar additions; relative reactivity; regioselectivity; stereoselectivity; transition structures; applications; [2+2] cycloaddition reactions of ketenes and alkenes; electrocyclic reactions; thermal and photochemical reactions; Woodward–Hoffmann rules.

Unit 3 - Oxidation (12 Hrs.)

Oxidation of alcohols to aldehydes, ketones, and carboxylic acids; transition metal oxidants; addition of oxygen to C=C bonds; formation of epoxides from alkenes using peroxide reagents; subsequent transformations of epoxides; allylic oxidations; reactions of alkenes with singlet oxygen; oxidative cleavage of C=C bonds; stereoselectivity of hydride reduction; enantioselective reduction of carbonyl compounds; reduction of other functional groups.

Unit 4 – Organic Name reactions (12 Hrs.)

Aldol condensation; Cannizzaro reaction; Wittig reaction; Benzoin condensation; Clemmensen reduction; Wolff–Kishner reduction; Meerwein–Ponndorf–Verley reduction; Pinacol–Pinacolone rearrangement; Beckmann rearrangement; Hofmann rearrangement; Curtius rearrangement; Benzidine rearrangement; Cope rearrangement; Claisen rearrangement; Fries rearrangement; Benzil–Benzilic acid rearrangement.

Unit 5 - Reagents of synthetic importance (12 Hrs.)

Aluminium isopropoxide; Baker's yeast; crown ethers; diazoacetic ester; diazomethane; lead tetraacetate; lithium aluminium hydride; lithium diisopropylamide; N-bromosuccinimide; osmium tetroxide; ozone; periodic acid; Raney nickel; selenium dioxide; selenic acid; sodamide; sodium borohydride; Wilkinson's catalyst; Ziegler–Natta catalyst.

Reference Books:

- A. Bahl, B.S. Bhal, A Textbook of Organic chemistry, 22nd Ed., 2016. S. Chand and Company Ltd., New Delhi.
- P. L. Soni, Text book of Organic Chemistry, 28th Ed., 2004 S. Chand and Company Ltd., New Delhi.
- R.T. Morrison and R.N. Boyd., Organic Chemistry, 7th Ed., 2011. Prentice Hall of India Pvt. Ltd., New Delhi.
- Francis Carey A, Richard J. Sundberg, Advanced Organic Chemistry, Part B: Structure and Mechanisms, 5th Edition, 2007 Springer (India) Pvt Ltd., New Delhi, India.
- Carey, Francis A., Sundberg, Richard J., Springer, Advanced Organic Chemistry Part A: Structure and Mechanisms, 5th Ed., 2007, New York.

Websites and eLearning Sources:

- <https://nptel.ac.in/courses/104105071>
- <https://synarchive.com/named-reactions>
- <https://www.youtube.com/watch?v=kZ1km9xLfaU&t=14s>

COs and Bloom's Taxonomy Mapping – 26CH011		
Course Outcomes	On completing U.G. program the students will be able to	BTL
CO1	Recall the basic structures and functional groups and explain the mechanisms of alcohol substitution and ether cleavage reactions with suitable examples.	K1, K2
CO2	Apply appropriate reaction mechanisms to predict the products of alcohol, ether, epoxide, and sulphur compound transformations.	K3
CO3	Analyze the influence of substituents, catalysts, and stereochemistry on the outcomes of pericyclic and name reactions.	K4
CO4	Evaluate the efficiency and selectivity of pericyclic and name reactions in complex organic syntheses, considering stereochemical and regiochemical outcomes.	K5
CO5	Design multistep synthetic pathways involving alcohols, ethers, epoxides, and sulphur compounds using appropriate reagents and name reactions.	K6

BTL K1 and K2 – remembering and understanding, K3- Applying, K4 – Analyse, K5- Evaluate and K6- Create

Relationship Matrix – 26CH011													
Course Outcomes	Programme Outcomes (POs)						Programme Specific Outcomes (PSOs)						Mean Score of Cos
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	
CO1	1	3	2	1	2	1	2	3	1	2.5	1	2	1.9
CO2	2	2	2	3	2	1.5	2	3	1	3	1	3	2.1
CO3	2	2	2	2	1	2	3	1	2	1.5	1	3	1.9
CO4	3	2	3	2	1.5	2	3	2	3	2	2	1.5	2.3
CO5	1	2	2	1	2	1.5	3	1	2	1.5	2	3	1.8
Total													2

Mean Score: 3- High, 2- Medium/Moderate, 1-Low

