

Organic Reaction Mechanism - Web course

COURSE OUTLINE

The course will focus on both fundamental and advanced concepts in reaction mechanisms in organic chemistry.

COURSE DETAIL

Topics	Lectures
Primer	
Fundamentals of structure and reactivity	1
Molecular orbitals of common functional groups such as carbonyl, polyenes, aromatic molecules	2
Terms and terminologies: acids, bases, electrophiles, nucleophiles, hard and soft acid concept as applied to organic molecules	2
Basic thermodynamic and kinetic considerations: Enthalpy and free energy of reactions, order and molecularity, rate of reactions and the rate-determining step.	2
Basic stereochemical considerations: Asymmetric carbons, compounds with one, two or more stereogenic centers. Enantiomers and diastereomers. Racemic mixtures.	2
Reaction Mechanisms	
Classification and determination of reaction mechanisms. Kinetic isotope effects	2
Aliphatic Nucleophilic substitution reactions: SN1, SN2, SNi mechanisms. Classification of nucleophiles, effect of solvents and other factors affecting the substitution reactions	3
Elimination Reactions: beta-eliminations. E1, E2 and E1cB mechanisms with commonly employed substrates. Stereochemical considerations. Examples involving both aliphatic and alicyclic compounds. Alpha-eliminations and generation of carbene	4



NP-TEL

NPTEL

<http://nptel.iitm.ac.in>

Chemistry and Biochemistry

Pre-requisites:

Basic Organic Chemistry

Coordinators:

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Addition Reactions: Electrophilic and nucleophilic additions to olefins, dienes and acetylenes. Examples such as epoxidation will be discussed in detail. Markonikoff and anti-Markonikoff additions.	4
Substitution reactions in aromatic compounds: Electrophilic substitutions such as nitration, sulphonation, halogenation etc., Nucleophilic substitution reactions of activated aromatic nuclei. Generation of benzyne and its reactions. Ortho-lithiation reaction and its application.	4
Reactions involving carbonyl compounds: (a) Nucleophilic addition reactions (b) reactions arising due to alpha-acidic protons (c) carboxylic acid and acid derivatives (d) mechanistic classification of ester hydrolysis	4
Molecular rearrangements: Rearrangements involving electron deficient carbon, nitrogen and oxygen. Classical and non-classical carbocations. Importance of cross over experiments in determining migratory preferences and rearrangement reactions.	4
Classifications and reactions involving carbon radicals: stabilities of radicals, importance radicals in polymerization reactions.	2
Mechanism of oxidations and reductions using commonly employed reagents.	4