UNIT – I

Nucleophilic Substitution Reactions


UNIT - II

Electrophilic Substitution Reactions

Aromatic electrophilic substitution reaction - Orientation, reactivity and mechanisms based on transition state theory with suitable reactions, substitutions in Thiophene, Pyridine and Pyridine-N-Oxide. Quantitative treatment of the structural effects on reactivity. Substituents effects – Origins of Hamnett equation – Principles of Hamnett correlation – Effect of structure on reaction mechanisms Hamnett parameters; \( \sigma \) and \( \rho \), modified forms of Hamnett equation. Taft Equation.

Aliphatic Electrophilic Substitution: \( SE^2 \),\( SE^i \) and \( SE^1 \)mechanisms , Diazonium coupling reactions. Metals as electrophile in substitution reactions and decomposition of diazonium salts.

UNIT – III

Addition and Elimination Reactions

Addition to carbon – carbon multiple bonds: Electrophilic, nucleophilic and free radical additions – Orientation of the addition – Stereochemical factors influencing the addition of bromine and hydrogen bromide, hydroxylation, hydroboration leading to formation of alcohols. Addition to carbonyl and conjugated carbonyl systems - Mechanism – Grignard reagents – 1,2 and 1,4-additions (dimethyllithiumcuprate),Benzoin , Knoevenagel, Stobbe and Darzen’s glycidic ester condensation and Reformatsky reactions.

Elimination Reactions: Mechanisms; E1,E2, E1cB – Stereochemistry of elimination, Hofmann and Saytzeff rules – Competition between elimination and substitution - Pyrolytic cis elimination, Chugaev reaction – Examples such as dehydration, dehydrohalogenatio, Hofmann degradation, Cope elimination – Bredt’s rule with examples.
UNIT – IV

Pericyclic Reactions and Rearrangements


UNIT V

Reagents in Organic Synthesis


Oxidation: Osmium tetroxide, Sharpless asymmetric epoxidation, Chromyl chloride, Ozone, DDQ, Dioxiranes, Lead tetraacetate, Selenium dioxide, DMSO with either Ac₂O or Oxalyl chloride, Dess-Martin reagent. Synthesis involving phase transfer catalysis (PTC), use of crown ethers, Merrifield resin, Baker's yeast

References