

MJD Govt. College Taranagar (Churu)
Department of Chemistry
B.Sc.-II (Syllabus)
ORGANIC CHEMISTRY
PAPER-II

Unit-I

Electromagnetic Spectrum : Absorption Spectra

Ultraviolet (UV) absorption spectroscopy-absorption laws (Beer-Lambert law), molar absorptivity, presentation and analysis of UV spectra, types of electronic transitions, effect of

conjugation. Concept of chromophore and auxochrome. Bathchromic, hypsochromic, hyperchromic and hypochromic shifts. UV spectra of conjugated dienes and enones.

Infrared

(IR) absorptions spectroscopy, molecular vibrations, Hooke's law, selection rules, intensity and

position of IR bands, measurements of IR spectrum, fingerprint region, characteristic absorption of various functional groups and interpretation of IR spectra of simple organic compounds.

Unit-II

(a) Alcohols

Classification and nomenclature.

Monohydric alcohols-nomenclature, methods of formation by reduction of aldehydes, ketones,

carboxylic acids and esters. Hydrogen bonding. Acidic nature. Reactions of alcohols.

Dihydric alcohols-nomenclature, methods of formation, chemical reactions of vicinal glycols,

oxidative cleavage [$\text{Pb}(\text{OAc})_4$ and HIO_4] and pinacol-pinacolone rearrangement.

Trihydric alcohols-nomenclature and methods of formation, chemical reactions of glycerol.

(b) Phenols:

Nomenclature, structure and bonding. Preparation of phenols, physical properties and acidic

character. Comparative acidic strengths of alcohols and phenols, resonance stabilization of

phenoxide ion. Reactions of phenols-electrophilic aromatic substitution, acylation and carboxylation. Mechanisms of Fries rearrangement, Claisen rearrangement, Gatterman

synthesis; Hauben-Hoesch reaction, Lederer-Manasse reaction and Reimer-Tiemann reaction.

Unit-III

(a) Ethers and Epoxides

Nomenclature of ethers and methods of their formation, physical properties.

Chemical reactions-cleavage and autoxidation, Ziesels method.

Synthesis of epoxides. Acid and base-catalyzed ring opening of epoxides, orientation of epoxide ring opening, reactions of Grignard and organolithium reagents with epoxides.

(b) Aldehydes and Ketones

Nomenclature and structure of carbonyl group. Synthesis of aldehydes and ketones with particular reference to the synthesis of aldehydes from acid chlorides, synthesis of aldehydes

and ketones using 1, 3-dithianes, synthesis of ketones from nitriles and from carboxylic acid.

Physical properties.

Mechanism of nucleophilic addition to carbonyl group with particular emphasis on benzoin,

Aldol, Perkin and Knoevenagel condensations. Condensation with ammonia and its derivatives. Wittig reaction. Mannich reaction.

Use of acetate as protecting group. oxidation of aldehydes, Baeyer-villiger oxidation of ketones, Cannizzaro reaction. MPV, Clemmensen, Wolff-kishner, LiAlH_4 and NaBH_4 reductions, Halogenation of enolizable ketones.

An introduction to α, β unsaturated aldehydes and ketones.

Unit- IV

(a) Carboxylic Acid :

Nomenclature, structure and bonding, physical properties, acidity Carboxylic acids, effect of

substituents on acid strength. Preparation of carboxylic acids. Reactions of carboxylic acids.

Hell-Volhard-Zelinsky reaction. Synthesis of acid chlorides, esters and amides.

Reduction of carboxylic acids. Mechanism of decarboxylation

Methods of formation and chemical reactions of halo acids, hydroxy acids: malic, tartaric and

citric acids.

Methods of formation and chemical reactions of unsaturated monocarboxylic acids.

Dicarboxylic acids : Methods of formation and effect of heat and dehydrating agents.

(b) Carboxylic Acid derivatives

Structure and nomenclature of acid chlorides, esters, amides (urea) and acid anhydrides.

Relative stability of acyl derivatives. Physical properties, interconversion of acid derivatives by nucleophilic acyl substitution.

Preparation of carboxylic acid derivatives, chemical reactions. Mechanisms of esterification and Hydrolysis,(acidic and basic).

Unit-V

Organic Compounds of Nitrogen

Preparation of nitroalkanes and nitroarenes. Chemical reactions of nitroalkanes. Mechanisms

of nucleophilic substitution in nitroarenes and their reductions in acidic, neutral and alkaline

media. Picric acid.

Halonitroarenes : Reactivity; Structure and nomenclature of amines, physical properties. Stereochemistry of amines. Separation of a mixture of primary, secondary and tertiary amines.

Structural features affecting basicity, of amines. Amines salts as phase-transfer catalysts.

Preparation of alkyl and aryl amines (reduction of nitro compounds, nitriles), reductive amination of aldehydic and ketonic compounds. Gabriel-phthalimide reaction, Hofmann bromamide reaction.

Reaction of amines, electrophilic aromatic substitution in aryl amines, reaction of amines with

nitrous acid. Synthesis, transformation of aryl diazonium salts, azo coupling.