

MANGALORE UNIVERSITY
DEPARTMENT OF CHEMISTRY

M. SC. ORGANIC CHEMISTRY

4th SEMESTER

OC H 551: Organic Synthetic Methods

COURSE OUTCOME:

Enable the students:

- To acquire knowledge on the various reagents employed for oxidation and reduction of various kinds of organic molecules.
- To understand the various methods of halogenations of carbonyl compounds, benzylic and allylic halogenations.
- To learn the principles and technologies used in disconnection approach,
- To study the utility of protecting group strategy in organic synthesis and retrosynthetic analysis.

UNIT-I:

[15 Hours]

Reduction Reactions: Catalytic hydrogenation-Introduction, catalysts and solvent employed, reduction of functional groups, mechanisms and stereochemistry of catalytic hydrogenations, Hydrogenolysis, homogeneous catalytic hydrogenation.

Metal hydride reduction: Reduction with LiAlH_4 , NaBH_4 , BH_3 , AlH_3 and DIBAL. Stereochemistry of reduction, Functional group transformation during reduction, Reduction with diborane and related reactions. Reduction with Trimethylsilane. Reduction in Biological systems-NADH, FAD.

Dissolving Metal Reductions: Mechanisms of reduction of conjugated system and carbonyl compounds (including Birch, Benkeser, Clemmensen reductions), Bimolecular reductions of esters, Birch reduction, Reduction with hydrazine and its derivatives, Wolf-Kishner reduction, McMurry reaction, Pummer, Willgerdot, Corey-Bakshi-Shibata and Tishchenko reactions. Reduction with arene sulphonyl derivative of hydrazine, Reaction with diimide and related compounds.

UNIT-II:

[15 Hours]

Oxidation Reactions: Introduction and different oxidative processes, Mechanism of oxidation reaction with chromium (Jones, Sarett, Collins & PCC), Lead tetra acetate, Oxone, Osmium tetroxide, MnO_2 and manganese salts, peracids and peresters, periodic acid,

Ozone, Dess-Martin periodinane, TEMPO, CAN, Swern oxidation and their synthetic importance in functional group transformation.

Halogenation Reactions: Halogenation of olefins and carbonyl compounds, Benzylic and Allylic halogenation, Dehalogenation reactions. Dehydrogenation with S, Se, Pt, Pd, Ni.

UNIT-III

[15 Hours]

Basic principles and technologies used in disconnection approach. Synthons and synthetic equivalents. Interconversion of functional groups. One group C-X and two group C-X disconnections.

Protecting groups: Principle of protection of hydroxyl, amino, carboxylic and carbonyl groups and their synthetic applications.

Retrosynthetic analysis: Analysis of alcohols, carbonyl compounds, cyclic and acyclic alkanes, benzocaine, p-methoxyacetophenone, acetonecyanohydrin, 2-methyl-6-methoxy-indole-3-acetic acid, 6-methylquinoline & 1-phenyl-4-p-methoxyphenyl-1,3-butadiene, Limonene, Danishefsky's pentalenolactone, Benzydolone, nitrofurazone, Warfarin and Juvabione.

References :

1. Modern Organic Reactions- H.O. House
2. Organic Synthesis- R.E. Ireland (Prentice Hall India) 1969.
3. Art in Organic Synthesis- Anand, Bindra & Ranganath (Wiley) 1970.
4. Organic Synthesis a Disconnection Approach- Stuart
5. Advanced Organic Chemistry, IV ed., Part A & B- Carrey & Sundberg (Kluwer-Academic) 2001.
6. Modern Methods of Organic Synthesis-N. Carruthers (Cambridge University), 1996.
7. Selected Organic Synthesis-Ian Fleming (John Wiley & Sons) 1973.

