

Curriculum Plan

(Odd Semester 2024-2025) Semester-III

Teacher Name: Dr. Rajita

Name of Paper, B.Sc. (H) -DSE, Green Synthesis in Organic Chemistry (3 Periods Per Week)

Contents	Allocation of Lectures	Month wise schedule to be followed	Tutorial/Assignments/ Presentation etc
UNIT – 1: Introduction (1 Week) Introduction to Green Chemistry, some important environmental laws, pollution prevention Act of 1990, emergence of green chemistry, need for Green Chemistry. Goals of Green Chemistry. Limitations/ Obstacles in the pursuit of the goals of Green Chemistry. Green chemistry in sustainable development.	One week	First week of August to third week of August	Doubt session, class test and Previous Year Papers Discussion
UNIT – 2: Application of Green Chemistry Principles (12 Weeks) Principles of Green Chemistry and designing a chemical synthesis Concept familiarization and application of green chemistry principles using specific examples 1. Prevention of waste/ by products; waste or pollution prevention hierarchy 2. Green metrics to assess greenness of a reaction: Calculation of atom economy of the rearrangement, addition, substitution, and elimination reactions; calculation of E-factor for industrial processes 3. Prevention/ minimization of hazardous/ toxic products 4. Safer Solvent and Auxiliaries: Problems associated with conventional reaction media Some Common Green solvents: Introduction, application, advantages, and disadvantages of green solvents in organic synthesis (taking suitable examples). Special emphasis on the following: i. Super Critical Fluids (with special reference to carbon dioxide) ii. Water: Concept of In-water, and on-water reactions (with special reference to synthesis of terpinol and linalool in water, Benzoin condensation, Heck reaction) iii. Ionic Liquids: Physical properties and classification of Ionic Liquids (with special reference to Diels Alder reaction and Coumarin synthesis in ionic liquids) iv. Biomass derived	Nine weeks	Last week of August to last week of November	Doubt Session, Previous years paper discussion, assignment

<p>Solvents: Physicochemical properties, Use of glycerol and its derivatives (Mizoroki–Heck reaction) and 2-methyltetrahydrofuran (Suzuki–Miyaura reaction).</p> <p>5. Design for energy efficiency: Phenomenon of accelerating organic reactions by using the following Green Chemistry tools (taking suitable examples) and its advantages: i. Mechanochemistryii. Ultrasound assisted reactions: Taking examples like Simmons Smith reaction, Diels– Alder reaction, iii. Microwave assisted reactions: Special emphasis on solvent-free synthesis- copper phthalocyanine and aspirin, In-water reactions-Hofmann Elimination, methyl benzoate to benzoic acid and Decarboxylation reaction; iv. Electrocatalysis: Taking examples like adiponitrile synthesis, synthesis of 3-bromothiophene. 16 v. Visible light induced Reactions: with examples such as, syntheses of caprolactam and vitamin D3, cis-trans isomerization of alkenes</p> <p>6. Use of renewable starting materials: Illustrate with few examples such as biodiesel, bioethanol, polymers from renewable resources (PLA from corn), Synthesis and properties of 2-Methyltetrahydrofuran, furfural and 5-Aminolevulinic acid (DALA) from levulinic acid</p> <p>7. Avoidance of unnecessary derivatization – careful use of blocking/protecting groups (taking specific examples like selective oxidation of aldehydic group and synthesis of 6-Aminopenicillanic Acid (6-APA) from penicillin G</p>			
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