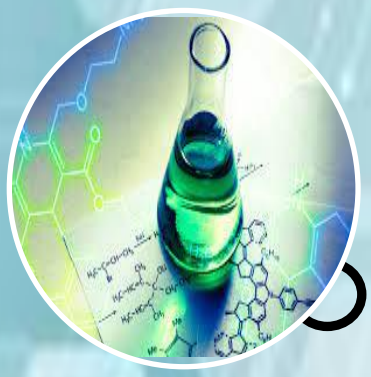
VALUE ADDED COURSE

CHEVA02 - GREEN CHEMICAL TECHNOLOGIES

Objective: To learn about the environmental status, public awareness in evolution, principles involved in green chemistry. To acquire knowledge about bio-catalytic reactions, global warming and its control measures, availability of green analytical methods and to expertise the basic principles of green and sustainable chemistry.



Session:

September to October 2022

Credits : 02

Duration: 30hours

Course Code: CHEVA02

Outcome: To learn the basic principles of green and sustainable chemistry.

➢ To know about the various Renewable chemicals and green energy sources.

➢ To get familiarise about the E-waste and its recycling technology

Course Coordinator:

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Course code: CHEVA02	GREEN CHEMICAL TECHNOLOGIES	Hours: 30
Objectives	➢ To learn about the environmental status, public awareness in evolution,principles involved in green chemistry. ➢ To acquire knowledge about bio-catalytic reactions, global warming and itscontrol measures, availability of green analytical methods. ➢ To expertisethe basic principles of green and sustainable chemistry.	
Unit -I	**BASIC CONCEPTS OF GREEN CHEMISTRY:** Definition, importance and Twelve Basic principles of Green Chemistry and their illustrations with examples - Difference between environmental and green chemistry – Green products.	
Unit -II	**DESIGNING GREEN SYNTHESIS:**Choice of starting materials, reagents, catalysts, biocatalysts, polymer supported catalysts, solvents (water, ionic liquids, fluorous solvents, supercritical CO2). Synthesis involving principles of green chemistry; examples (caprolactam, adipic acid, vanillin, methyl methacrylate, paracetamol phenol, polycarbonate).	
Unit -III	**UTILIZATION OF GREEN ENERGY SOURCES:**Renewable chemicals from biomass and sustainable polymers (polylactide). Ultrasound assisted reactions: esterification, reduction, coupling reactions.	
Unit -IV	**UTILIZATION OF MICROWAVE SOURCE**: Environmentally benign technologies: Solvent free microwave assisted organic synthesis Organic synthesis under microwaves: benefits, limitations, equipments. Reactions without support or catalyst microwave assisted reactions in water, Microwave assisted reactions in organic solvent	
Unit -V	**SUSTAINABLE AND ENVIRONMENTAL BENIGN TECHNOLOGIES:** Reactions on solid supports, phase transfer catalysis, solvent free esters saponification. Reactions without support or catalyst; examples (oxidation of toluene to benzoic acid), Diels Alder reaction. Reduction in materials, energy, waste, non-renewable, cost and risk hazards as greener alternatives for sustainable development. Carbon capture, carbon sequestration, carbon footprint and carbon trading.	
Outcomes	➢ To learn the basic principles of green and sustainable chemistry. ➢ To know about the various Renewable chemicals and green energy sources. ➢ To get familiarise about the E-waste and its recycling technology	

Recommended Books:

1. R.Shangi, M.M.Srivatsava, “Green Chemistry”, Narosa Publishers, New Delhi, 2003.

2. P.T.Anasta, Green Chemistry: Theory & Practice, Oxford University Press, 2000.

3. A.E.Marteel-Parrish, M.A.Abraham, Green Chemistry and Engineering: A Pathway to Sustainability, Wiley, 2014.

4. V. K. Ahluwalia, Green Chemistry: A Textbook, Alpha Science International, 2012.

5. Mike Lancaster. Green Chemistry: An Introductory Text, Royal Society of Chemistry, 2010.