

OCY151

GREEN CHEMICAL TECHNOLOGIES

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(offered to B.E./B.Tech. Programmes)

OBJECTIVES:

To enable the students to understand

- the importance & advantages of Green Chemistry in the present scenario of industrial life.
- the efficient use of renewable energy and the principles involved in waste water treatment technologies and waste recycling.

UNIT I INTRODUCTION TO GREEN CHEMISTRY 9

Introduction to Green Chemistry, Important Industrial processes (petro, pharma, agri based), Toxicity of chemicals in the environment, chemical accidents, The need for Green Chemistry, Goals of green chemistry, Innovations for a cleaner world, Green Chemistry and its 12 principles.

UNIT II GREEN SOLVENTS FOR A SAFE WORLD 9

Solvents, Advantages and disadvantages of different solvents, Working without solvents, CO₂ as a solvent, Properties, Super critical CO₂ (Sample reactions involving super critical CO₂, limitations), Usage of solvents in extruders, Examples, Water as a reaction medium, Super critical water, Examples, Limitations.

UNIT III ENERGY AND THE ENVIRONMENT 9

Introduction, Radiant energy from the sun, Storage and release of energy by chemicals, Energy sources, Energy related problems, Heating, Cooling, Lighting Buildings, Renewable energy for electricity and transport, Use of less common forms of energy for chemical reactions.

UNIT IV GREEN TREATMENT OF WASTEWATER 9

Introduction, Sources of wastewater, Nature of impurities, Oxidation technologies, Photocatalytic oxidation (Mechanism and reactors used), Fenton chemistry, Hybrid processes (Ultrasound / Ozone, UV / Ozone), Conditions for wastewater treatment, Dye removal, Chemical method (Oxidative process), Physical method (Adsorption, membrane filtration).

UNIT V CHEMISTRY OF RECYCLING 9

Waste, Recycling (Paper, glass, plastics and rubber), Methods and incentives for source reduction (Throwaway items and the consumer, making more with less material and containers & packaging), Utilization of feedstocks, Biological feedstocks.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

Upon completion of the course, the student will be able to

- CO1: understand the basic principles of Green Chemistry
- CO2: infer the need and use of safer chemicals
- CO3: illustrate the importance of renewable energy sources
- CO4: infer the technologies for the treatment of effluents
- CO5: outline various methods for recycling

TEXTBOOKS:

1. Matlack A. S., An Introduction to Green Chemistry, Marcel Dekker, 2001
2. Rashmi Sanghi, M. M Srivastava, Green Chemistry, Environment Friendly Techniques, Narosa Publishing House, Fourth Reprint, 2009

REFERENCES:

1. S. E. Manahan, Green Chemistry and the Ten Commandments of Sustainability, ChemChar Research, Inc Publishers, Columbia, Missouri U.S.A., 2006.
2. V. Kumar, An Introduction to Green Chemistry, Vishal Publishing Co., 2010.