

DEPARTMENT OF CHEMISTRY

**SYLLABUS
FOR
VALUE ADDED COURSE
(UG LEVEL)**

LAB TECHNIQUES

&

SOP OF LAB EQUIPMENTS



RAMA DEVI WOMEN'S UNIVERSITY

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LAB TECHNIQUES & SOP OF LAB EQUIPMENTS

VAC code : VAC-CH-01

Upon successful completion of the course students will be able to

CO1: Have awareness about safety measures in Lab and Professional Ethics

CO2: To learn about preparation of Standard Solutions and procedures of Calibration

CO3: To gain knowledge on the Qualitative and Quantitative Analysis

CO4: To know about the Standard Operating Procedure of Commonly used instruments.

CO5: To develop the practical skills and entrepreneurship attitude.

Unit-I

Safety aspects in Chemical Laboratory; Emergency procedures; Safe handling and calibration of glassware; safety in storage and handling of materials and precautions; Handling of balances, Assembling of distillation apparatus. Application of Material Safety Data Sheet (MSDS) in Lab.

Unit-II

Mole concept and Concentration – Normality, Molarity, Molality, percentage (v/v, w/v, w/w), preparation of solutions of solid and liquid compounds standardization procedures and dilution. Preparation of buffer solution, principles of quantitative analysis (Acid base, iodometric, iodimetric and complexometric titration and gravimetric analysis)

Unit-III

Basic principles and instrumentation of commonly used instruments – pH meter, conductometer, colorimeter, spectrophotometer, potentiometer: Calibration, Standard operating procedures and its applications, recording of observations and graphical representations

References

1. Text Book of Quantitative Analysis : AI Vogel
2. Text Book of Qualitative Analysis : AI Vogel

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GREEN CHEMISTRY FOR SAFER ENVIRONMENT



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GREEN CHEMISTRY FOR SAFER ENVIRONMENT

VAC code :VAC-CH-02

Upon successful completion of the course students will be able to

CO1: Comprehend the principles, limitation of green chemistry.

CO2: Design the chemical synthesis by using green approach.

CO3: Synthesize some real world reaction by using green method.

CO4: Have the idea of future trends in research by using green approach.

CO5: Synthesize some compounds by green methods. Use safer chemicals for different synthesis.

Unit-I

What is Green Chemistry? Need for Green Chemistry. alternative to Bhopal Gas Tragedy (safer route to carcarbaryl) and Flixiborough accident (safer route to cyclohexanol); real-time, in-process monitoring and control to prevent the formation of hazardous substances; development of green analytical techniques to prevent and minimize the generation of hazardous substances in chemical processes; Goals of Green Chemistry.

UNIT-II

Principles of Green Chemistry and Designing a Chemical synthesis-I

Twelve principles of Green Chemistry. Explanations of principle with special emphasis on - Designing green synthesis processes: Prevention of Waste/ by-products; maximize the incorporation of the materials used in the process into the final products (Atom Economy) with reference to rearrangement, addition, substitution and elimination reactions; Prevention/ minimization of hazardous/ toxic products; Designing safer chemicals; Use of safer solvents and auxiliaries (e.g. separating agent) - green solvents (supercritical CO₂, water, ionic liquids), solventless processes, immobilized solvents.

Selection of starting materials (use of renewable feedstock); avoidance of unnecessary derivatization (e.g. blocking group, protection groups, deprotection); Use of catalytic reagents (wherever possible) in preference to stoichiometric reagents; designing of biodegradable products use of chemically safer substances for prevention of chemical accidents, inherent safer design greener.

UNIT-III

Safer Trends in Green Chemistry

Oxidizing and reducing reagents and catalysts; multifunctional reagents; Combinatorial green chemistry; Proliferation of solventless reactions; Green chemistry in sustainable development. (Bio-diesel, bio-ethanol and biogas).

Green Synthesis of the following compounds: adipic acid, catechol, methyl methacrylate, urethane, disodium iminodiacetate (alternative to Strecker synthesis), paracetamol, furfural.

Microwave assisted reactions: Applications to reactions (i) in water: Hofmann Elimination, hydrolysis (of benzyl chloride, methyl benzoate to benzoic acid), Oxidation (of toluene, alcohols); (ii) reactions in organic solvents: Diels-Alder reaction and Decarboxylation reaction.

Ultrasound assisted reactions: Applications to esterification, saponification, Simmons-Smith Reaction (Ultrasonic alternative to Iodine).

Development of Fully Recyclable Carpet: Cradle to Cradle Carpeting

1. Kumar V., An Introduction to Green Chemistry, Vishal Publishing Co., (2015).
2. Ojha K. K., Green Chemistry, Himalaya Publishing House.