

ACHARYA NAGARJUNA UNIVERSITY

DEPARTMENT OF CHEMISTRY

M.Sc. CHEMISTRY :: SEMESTER-II

PAPER-III: ESSENTIAL LAB TECHNIQUES FOR INDUSTRY (R22CH23)

(For the students admitted from the A.Y. 2022-2023 onwards)

Max. Marks: 100

(Internal-30M & External-70M)

SYLLABUS

Learning Objectives:

- ✓ To know the fundamentals in separation analysis using various chromatographic techniques.
- ✓ To know the techniques involving reliable separation by HPLC & GC instrumental techniques.
- ✓ To know the purification by ion exchange chromatography.
- ✓ To know the instrumentation and applications of AAS & ICP-OES.
- ✓ To know the basic principles, instrumentation and advantages UV, IR, NMR, ESR, TEM, SEM-techniques in structural analysis.

UNIT-I

14H

Chromatography-Adsorption and Partition

- 1) **Introduction to Chromatography:** Different types of Chromatography. Adsorption chromatography- adsorbents, solvents, solutes, apparatus. Column Chromatography-stationary phase, Mobile phase, packing of column, advantages and disadvantages.
- 2) **Thin Layer Chromatography:** Basic Principles. Common stationary phases, Methods of preparing TLC plates, Selection of mobile phase, Development of TLC plates, Visualization methods, R_f value. Application of TLC in monitoring organic reactions.
- 3) **Paper Chromatography:** Basic Principles. Ascending and descending types. Selection of mobile phase, Development of chromatograms, Visualization methods. Application of paper chromatography in the identification of sugars and amino acids. One and two dimensional paper chromatography.

UNIT-II

14H

High Performance Liquid Chromatography (HPLC): Basic Principles. Normal and reversed Phases. Selection of column and mobile phase. Instrumentation. detectors; RT values. Applications in the separation, identification and quantitative estimation of organic compounds. Concepts on HPLC method development.

UNIT-III

12H

Gas Chromatography: Basic Principles. Different types of GC techniques. Selection of columns and carrier gases. Instrumentation. detectors; RT values. Applications in the separation, identification and quantitative analysis of organic compounds.

Ion Exchange Chromatography: Basic Principles. Preparation of cross linked polystyrene resins. Different types of cation and anion exchange resins. Application in the purification of carboxylic acids and amines.

UNIT-IV **10H**

AAS: Principle, instrumentation and applications

ICP-OES: Principle, instrumentation, applications and advantages over AAS.

UNIT-V **10H**


UV, IR, NMR, ESR, TEM, SEM-Basic principles, instrumentation and advantages.

Reference Books:

- 1) Principles of Instrumental Analysis by D. A. Skoog, F. J. Holler and T. A. Nieman, Harcourt College Pub.
- 2) Separation Techniques by M. N. Sastri, Himalaya Publishing House (HPH), Mumbai.
- 3) Bio Physical Chemistry by A. Upadhyay, K. Upadhyay and N. Nath, (HPH), Mumbai.
- 4) A Hand Book of Instrumental Techniques for Analytical Chemistry- Ed-F. A. Settle, Pearson Edn.,
- 5) Delhi. Introduction to Organic Laboratory Techniques-D. L. Pavia, G. M. Lampman, G. S. Kriz and R. G. Engel, Saunders College Pub. (NY).
- 6) Instrumental methods of Chemical Analysis by B. K. Sharma, Goel Publish House, Meerut.
- 7) Instrumental methods of Chemical Analysis by H. Kaur, Pragati Prakasan, Meerut.

Learning Outcomes:

- ✓ The student will understand advantage of chromatographic separation and application on various reactions.
- ✓ The student will understand the advantage of HPLC & GC techniques over conventional separation techniques.
- ✓ The student will know the exchange of ions taking place in ion exchange chromatography.
- ✓ The student will know the procedure of analysing the elements using AAS & ICP-OES.
- ✓ The students understand the working principles and advantages of the UV, IR, NMR, ESR, TEM, SEM- techniques.


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