



CHEMISTRY
(Skill Development Course)
(1st Semester)

Course No.: **CHM-SEC-101**

Separation Techniques

Contact Hours: 60; Credits: 03

Full Marks = 100 [End Semester Exam (70) Internal Assessment (30)]

Pass Marks = 40 [End Semester Exam (28) Internal Assessment (12)]

Unit-1: Solvent based Techniques

Solvent extraction: Classification, principle and efficiency of the technique. Mechanism of extraction: extraction by solvation and chelation. Technique of extraction: batch, continuous and counter current extractions.

Unit-2: Chromatographic Techniques

Chromatography: Classification, principle and efficiency of the technique. Mechanism of separation: adsorption. Development of chromatograms: frontal, elution and displacement methods, R_f value. Qualitative and quantitative aspects of chromatographic methods of analysis: Paper, TLC, Column Chromatography and HPLC

Unit-3: Stereoisomeric separation and analysis

Measurement of optical rotation, calculation of Enantiomeric excess (ee)/ diastereomeric excess (de) ratios and determination of enantiomeric composition, Chiral solvents and chiral shift reagents. Chiral chromatographic techniques using chiral columns (GC and HPLC).

Unit-4: Ion exchange Chromatography

Introduction, classification, ion exchange resins, properties, mechanism of ion exchange process, factors affecting ion exchange, methodology and applications.

Unit-5: Case Studies (Demonstration suggested)

Techniques involved in separation and purification of components of binary solid mixture, Benzoic acid/p-Toluidine; p-Nitrobenzoic acid/p-Aminobenzoic acid; p-Nitrotoluene/p-Anisidine based on the solubility in common laboratory reagents.

Separation of a mixture of two amino acids by ascending and horizontal paper chromatography

Separation of a mixture of two sugars by ascending paper chromatography

Separation of a mixture of o-and p-nitrophenol or o-and p-aminophenol by thin layer chromatography (TLC).

Suggested Readings

- Khopkar, S.M. Basic Concepts of Analytical Chemistry. New Age, International Publisher, 2009.
- Skoog, D.A. Holler F.J. & Nieman, T.A. Principles of Instrumental Analysis, Cengage Learning India Ed.
- Mikes, O. Laboratory Hand Book of Chromatographic & Allied Methods, Elles
- Harwood Series on Analytical Chemistry, John Wiley & Sons, 1979.
- Ditts, R.V. Analytical Chemistry; Methods of Separation, van Nostrand, 1974