

INSTITUTE	FACULTY OF SCIENCE
PROGRAM	MASTER OF SCIENCE (CHEMISTRY)
SEMESTER	2
COURSE TITLE	ANALYTICAL CHEMISTRY-II
COURSE CODE	02CY1454
COURSE CREDITS	6

Objective:

- 1 To understand the scope, principle and general aspect of various Separation methods, Solvent Extraction methods, Electro Gravimetric methods.
- 2 To understand the role of Environmental chemistry and environmental issues in our day to day life.

Course Outcomes: After completion of this course, student will be able to:

- 1 Recognized basic principle of various Extraction techniques.
- 2 Explain different Separation methods and also get idea about how to clean up sample from complex mixture.
- 3 Extend skills for Separation methods as well as Extraction methods for analytical tasks.
- 4 Capable to provide practical experience towards selected Thermal method of analysis and Electroanalytical techniques.
- 5 Realize the role of chemist for solve various kind of Analytical issues. .
- 6 Troubleshoot various Extraction technique based issues.

Pre-requisite of course: Understanding of instruments and analysis data

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
5	0	2	50	30	20	25	25

Contents : Unit	Topics	Contact Hours
1	General aspects of Separation Methods Introduction, Objectives, Separation methods, Basic separation methods, Classification of separation methods, Scope of separation methods, Classification based on property resulting in separation (Volatility, Solubility, Partition, ion Exchange, Surface Activity, Molecular Geometry, Electromigration) Classification based on equilibrium and rate processes, Criteria for selection of separation methods (Selectivity, Detectability, Reproducibility, Yield, Speed and Convenience, Capability for Hyphenation, Ease in scaling up and economics)	15

Contents : Unit	Topics	Contact Hours
2	Solvent Extraction Techniques The distribution law, Extraction process, Liquid-liquid extraction, Extractants, Factors affecting extraction, Techniques for solvent extraction, Completion of analysis, Classification, Types of extraction system, Transition of substances from an aqueous phase into an organic phase, Advantages of solvent extraction, Numericals	15
3	Thermal methods of analysis Introduction of thermal analysis, Types of thermal analysis, Principle, theory and instrumentation of TGA, DTA, DSC, Types and characteristics of thermo balance and sample holders, Factor affecting to the results of TGA, TDA and DSC, Advantages and Applications of TGA, DTA and DSC	15
4	Coulometric, Polarography and Voltammetry methods of analysis Introduction, Principle and theory of Coulometry, Polarography and Voltametry, Ilkovic equation, Dropping mercury electrode. Advantages and Disadvantages of DME, Polarographic measurement, Coulometer, Silver coulometer, Iodine coulometer, Various coulometric techniques, Coulometric titration, Potential errors in coulometric titration, Advantages of Coulometry and Polarography	15
Total Hours		60

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	Experiments Experiment 1, Experiment 2, Experiment 3, Experiment 4, Experiment 5, Experiment 6, Experiment 7, Experiment 8	45
Total Hours		45

Textbook :

- 1 A Textbook of Analytical Chemistry, Y. Anjaneyulu, B.S. Publications, 2006
- 2 Analytical Chemistry, A Practical Approach, E. Hywel Evans, Mike E. Foulkes, Oxford University Press, 2019
- 3 Thermal Methods of Analysis- Principles, Applications and Problems, P.J. Haines, Springer Netherlands, 2012

References:

- 1 Analytical Chemistry, Analytical Chemistry, Gary D. Christian, Purnendu K. Dasgupta, Kevin A. Schug, Wiley, 2020
- 2 Instrumental Methods of Chemical Analysis, Instrumental Methods of Chemical Analysis, B. K. Sharma, GOEL Publishing House, 2000
- 3 Fundamental of Analytical Chemistry , Fundamental of Analytical Chemistry , D. A. Skoog, D. M. West and H. J. Holler, Cengage, 2014

References:

- 4 Instrumental methods in Analytical Chemistry, Instrumental methods in Analytical Chemistry, Gurdeep Chatwal, Krishna Prakashan, 1981
- 5 Solvent Extraction-Classical and Novel Approaches, Solvent Extraction-Classical and Novel Approaches, Vladimir S Kislik, Elsevier Science, 2011

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking
10.00	15.00	15.00	25.00	20.00	15.00

Instructional Method:

- 1 The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.
- 2 The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.
- 3 Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.
- 4 Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory.
- 5 Use of hazardous/toxic chemicals should be avoided as far as possible in laboratory.
- 6 All students in the laboratory must wear safety goggles and lab coats during lab session.

Supplementary Resources:

- 1 <http://www.nptel.ac.in/courses/104103069/#>
- 2 <http://ocw.mit.edu/courses/chemistry/>
- 3 <http://vlab.amrita.edu/index.php?sub=2>
- 4 http://www.vlab.co.in/ba_labs_all.php?id=9