CH-334 Advanced Analytical Chemistry

Credit Hours: 2-1

Prerequisite: Nil

Course Objectives

1. To familiarize students with various titration techniques for chemical analysis including Gravimetric Methods of Analysis, Acid-Base Titrations, Redox Titrations and Complexometric Titrations and thermal analysis

Detailed Contents

2. Gravimetric Methods of Analysis. Precipitation Gravimetry, Gravimetric Titrations, Calculation of Results from Gravimetric Data and Applications of Gravimetric Methods
3. Titrations in Analytical Chemistry. Some Terms Used in Volumetric Titrations, Standard Solutions, Volumetric Calculations, Titration Curves
4. Principles of Neutralization Titrations: Solutions and Indicators for Acid/Base Titrations, Titration of Strong Acids and Bases, Titration Curves for Weak Acids, Titration Curves for Weak Bases, The Composition of Solutions During Acid/Base Titrations
5. Complex Acid/Base Systems**:** Mixtures of Strong and Weak Acids or Strong and Weak Bases, Polyfunctional Acids and Bases, Buffer Solutions Involving Polyprotic Acids, Calculation of the pH of Solutions of NaHA, Titration Curves for Polyfunctional Acids, Titration Curves for Polyfunctional Bases, Buffer Solutions, The Henderson-Hasselbalch Equation, Titration Curves for Amphiprotic Species, Composition of Polyprotic Acid Solutions as a Function of pH, Applications of Neutralization Titrations.
6. Thermal Analysis**.** This section covers the general principles of thermal analysis, its Instrumentation, Thermogravimetric Analysis (TGA), and Differential Scanning Calorimetry (DSC).

Course Outcomes

7. After studying this course students will be able to perform chemical analysis by various gravimetric, acid/base, redox, complexometric titrations and thermal analysis.

Relevant Experiments

8. Two experiments based on gravimetric analysis
9. Three experiments based on acid-base titrations
10. Three experiments based on redox titrations
11. Two experiments based on non-aqueous titrations
12. Two experiments based on Karl-Fischer titrations
13. Thermogravimetric analysis and interpretation of a TGA / DSC curve.

Recommended Books

14. Fundamentals of Analytical Chemistry by Douglas A. Skoog, Donald M. West, F. James Holler and Stanley R. Crouch, Mary Finch Publications USA. 9th Ed. 2014, ISBN-13: 978-0-495-55828-6
15. Analytical Chemistry by Gary D. Christian Wiley Publisher, 6th Ed. 2014.