

Course Title: Electrochemical Techniques

Semester: VII

Course Code: CH-412

Credit Hours: 3-0

Pre-requisite: Nil

Course Objectives:

1. To improve comprehension of students about various electroanalytical techniques.

2. Recommended Books:

- a. Christian, G. D., *Analytical Chemistry*, 6th ed., John-Wiley & Sons, New York,(2006).
- b. Harris, D. C., *Quantitative Chemical Analysis* 8th ed.,W.H. Freeman andCompany, New York, (2009).
- c. Kealey, D. and Haines , P. J., *BIOS Instant Notes in Analytical Chemistry*, BiosScientific Publishers Limited, Oxford, UK, (2002).
- d. Sharma, B. K., *Instrumental Methods of Chemical Analysis*, 24th ed., GoelPublishing House, Meerut, India, (2005).
- e. Skoog, D. A. and West, D. M., *Fundamentals of Analytical Chemistry*, 8th ed., HotReinehart Inc., London, (2008).
- f. Fritz, Schulz, *Electroanalytical Methods: Guide to Experiments and Applications*.
2nd revised, Springer-Verlag Berlin, Germany, (2010).
- g. Monk,P.M.S, *Fundamentals of Electroanalytical Chemistry*, John-Wiley & SonsLtd, England, (2001).

Detailed Contents

3. Potentiometry. Electrode potential, Nernst equation and its use for measuring half- cell potential, different kinds of electrodes including glass and calomel electrodes, working ofpotentiometer and its applications including pH measurements, Ion selective electrode systems, Ion exchange membrane electrode, solid state membrane electrodes, and bio- membrane electrodes, Potentiometric titrations.

4. Coulometry and Electrogravimetry. Basic electrochemistry, principle, instrumentation of coulometry, principle, instrumentation of electrogravimetry, consequencesof electrogravimetry, Ohmic drop, activation over potential, concentration and gas polarization, basic difference and merits/demerits of coulometry and electrogravimetry.

5. Voltammetry and Polarography. Basic principle, voltammogram, polarizable and non-polarizable electrodes, solid electrodes, their scope and limitations, cyclic voltammetry, anodic stripping voltammetry. voltammetric equation, basic concept of polarography and interpretation of various polarographic curves, measurement of decomposition potential, diffusion and limiting currents, derivation of Ilkovic equation, logarithmic analysis of polarographic wave, advantages and limitation of dropping mercury electrode.

Course Outcomes

6. Students will acquire knowledge about the theoretical and instrumental aspects of potentiometry, coulometry, electrogravimetry, voltammetry and polarography.

Detail of Lab Work, workshop practice: Nil