



Approved in 38th BoA Meeting (22-01-2021)

Course No: IC-131

Course Name: Applied Chemistry for Engineers

Credits: 2-0-2-3

Prerequisites: None

Distribution: Institute core for B. Tech. (all Branches)

Preamble

Chemistry is the study of substances in terms of their composition, structure, properties and reactions. The course is designed as a blend of both theoretical and practical aspects in a complementary fashion. The objective of the course is to primarily reinforce the chemical concepts that the students have learned in school. However, the major focus would be to give a perspective on the application of those concepts in real life technologies. This course will replace the two existing courses, Applied Chemistry for engineers (IC130) and Chemistry practicum (IC130P).

Outline

Chemical bonding concepts will be discussed on the context of materials having different particles sizes and shapes. Spectroscopic principles and their technological applications in sensors, imaging devices, diagnostic tools will be discussed. Applications of electrochemical concepts in energy generation and storage devices will also be introduced.

Theory: [28 h]

Chemical bonding; MO theory; LCAO molecular orbitals; structure, bonding and energy levels of diatomic molecules, 3D, 2D, 1D and 0D materials. [7h]

Intermolecular Forces; Potential energy surfaces-Rates of reactions; Steady state approximation and its applications; Catalysis. [4h]

Spectroscopy- Introduction and classification; Basic principles, instrumentation and technological applications of - Ultra Violet-Visible Spectroscopy; Infra-Red Spectroscopy; Raman Spectroscopy; and Nuclear Magnetic Resonance Spectroscopy. [10h]

Electrochemistry and its applications in Fuel cells; Batteries; and Supercapacitors. [7h]

Lab: [28 h]

Experiments illustrating the concepts of:

1. Chemistry in real life: analysis of food, soil and water quality.
2. Synthesis of materials and their characterisation using analytical tools.
3. Electrochemistry.

Text Books

1. Engineering Chemistry by Wiley India Pvt. Ltd.
2. Engineering Chemistry by Shashi Chawla



Reference Books

1. Fundamentals of molecular spectroscopy by Colin Banwell and Elaine McCash, Tata McGraw Hill Education Pvt. Ltd.
2. Fundamentals of Electrochemistry, Second Edition by V. S. Bagotsky, John Wiley & Sons Inc, 2005