

ENGINEERING CHEMISTRY

Course Objectives:

Course Outcomes:

1. Explain the preparation, properties, and applications of some plastic materials.
2. Categorize the reasons for corrosion and study some methods of corrosion control
3. Understand the importance of materials like nano materials and fullerenes and their uses.
4. Understand the importance of semiconductors and molecular machines
5. Understand the principles of different analytical instruments.

UNIT I: POLYMER TECHNOLOGY

Polymerization:-Introduction-methods of polymerization

Plastics: Compounding-fabrication (compression, injection)- preparation, properties and applications of Polyethylene, Bakelite

Elastomers:- Natural rubber-drawbacks-vulcanization-preparation, properties and applications of synthetic rubbers (Buna S, Buna N).

Composite materials: Conducting polymers (Poly acetylene)-biodegradable polymers (Poly vinyl alcohol and Poly lactic acid)

UNIT II: ELECTROCHEMICAL CELLS AND CORROSION

Single electrode potential-galvanic cell-Electrochemical series and uses of series-standard hydrogen electrode, calomel electrode.

Batteries: Dry cell, Ni-Cd cells (sintered type) and Fuel cells: H₂-O₂, CH₃OH-O₂.

Corrosion: Definition-theories of corrosion (chemical and electrochemical)-galvanic corrosion, galvanic series, waterline corrosion- stress corrosion-factors influencing rate of corrosion-corrosion control (cathodic protection)- Protective coatings: cathodic and anodic coatings (galvanizing and tinning)

UNIT III: CHEMISTRY OF MATERIALS

Nano Materials: Introduction-chemical reduction method- types, preparation, properties and applications -carbon nano tubes and fullerenes

Refractories: - Definition, classification, properties (refractoriness, refractoriness under load, porosity and thermal spalling), failure of Refractories.

Lubricants: Definition, mechanism (thick and thin) of lubricants and properties (flash and fire point, cloud and pour point, mechanical stability and aniline point) (definition and importance).

Cement: Constituents, manufacturing, parameters to characterize the clinker formation: lime saturation factor (LSF), silica ratio (SR) and alumina ratio (AR), chemistry of setting and hardening.

UNIT IV: FUELS

Introduction-calorific value-HCV and LCV-problems using Dulong's formula-Bomb calorimeter-proximate and ultimate analysis of coal sample-significance of these analysis-problems-Petroleum (refining-Catalytic cracking) -petrol knocking-diesel knocking-octane and cetane ratings-anti-knock agents- Natural gas, LPG, CNG)

UNIT V: WATER TECHNOLOGY

Hardness of water –types-boiler troubles (priming and foaming, scale formation, boiler corrosion) -softening of hard water (lime soda process, zeolite process and ion exchange process), Portable water and its specifications-steps involved in purification of water-chlorination, break point chlorination-reverse osmosis and electro dialysis.

Text Book:

1. Engineering Chemistry by Dr. Bharati Kumari, VGS Publications.

Prescribed Text Books:

1. Engineering Chemistry by Jain and Jain; Dhanpat Rai Publications Co. Latest edition
2. Engineering Chemistry by Shikha Agarwal; Cambridge University Press, 2019 edition.
3. A text book of engineering Chemistry by S. S. Dara; S. Chand & Co Ltd., Latest Edition
4. Engineering Chemistry by Shashi Chawla; Dhanpat Rai Publications Co. Latest edition