

Course Title: General Chemistry

Course Code: CHEM 101

Credit Hours: 3

Course Description:

The course familiarizes the students with the basic concepts of chemistry applied to engineering.

Course Contents:

Unit 1: Mole Concept and Properties of Solutions

Mole concept, Phase equilibria, energetics of phase change, liquid-vapour equilibrium, the equilibrium state, temperature dependence of vapour pressure, types of solution, concentration unit, the ideal solution, boiling and freezing points of solutions, solutions of two volatile components, non ideal solutions, osmosis, solubility, effect of temperature on solubility

Unit 2: Chemical Equilibrium

Introduction, the nature of chemical equilibrium, the equilibrium constant and calculations with the equilibrium constant, external effects on equilibria

Unit 3: Ionic Equilibria in Aqueous Solutions

Sparingly soluble salts, selective precipitation, acids and bases: different concepts of acid and base, strength of acid and base, pH scale, self ionization of water, weak acids and bases, hydrolysis, buffer solution, indicators, acid-base titrations,

Unit 4: Oxidation-Reduction Reactions

Oxidation states, the half-reaction concept, balancing Redox reactions, galvanic cells, Nernst equation, redox titration, electrolysis, electrochemical application

Unit 5: Chemical Thermodynamics

Introduction, system, state and state function, work and heat, -the first law of thermodynamics, thermochemistry, criteria for spontaneous change, entropy and the second law, molecular interpretation of entropy, absolute entropies and the third law, free energy, criteria for equilibrium, free energy and equilibrium constant, electrochemical cells, temperature dependence of equilibria

Unit 5: Chemical Kinetics

Introduction, concentration effect, differential and Integrated rate laws, experimental determination of rate laws, order and molecularity, reaction mechanisms, elementary processes, mechanism and rate laws, the steady state approximation, chain reactions, reaction rate and equilibria, collision theory of gaseous reactions, temperature effect on reaction rate, rates of reactions in solutions, problems, catalysis - homogeneous, heterogeneous and Enzyme catalysis

References:

1. H Mahan, *University Chemistry*, 3rd Edition, Narosa Publishing house