CH-206 THERMODYNAMICS

Chemical thermodynamics: Scope and definitions; Isolated, closed and open systems; Intensive and extensive properties; State and functions of state;

First law; Internal energy U; Enthalpy H; Reversibility; Calorimetry; Enthalpies of formation and reaction; Bond dissociation energy and mean bond energy; Dependence of U and H on temperature; First law as applied to ideal gases; Isothermal; Isometric; isobaric; polytropic and adiabatic processes involving an ideal gas; P-V-T relationships for non ideal gases.

Second law**;** Entropy; Equilibrium and observable change; Changes in entropy with changes in P, V, and T. Helmholtz function A. Gibbs function (free energy) G. Fundamental equations for closed systems. Maxwell relationships.properties of mixtures of ideal gases.G for ideal and non-ideal gases.Fugacity.Partial molar quantities. Chemical potential.Excess Thermodynamic Functions.Third law of Equilibrium (reversible) and spontaneous (irreversible) change.

Phase equilibria: Phase rule; One component systems; Clapeyron and Clausius-Clapeyron equations. Two component systems.Liquid-vapor equilibria.Ideal and Non-ideal solutions; Composition of vapor in equilibrium with liquid; Azeotropes.Mixing.Liquid-solid equilibria.Eutectic.Compoundformation.Solid solutions.

Chemical equilibria; equilibrium constants for gas phase reactions. Temperature dependence of Gibbs free energy and equilibrium constants; factors affecting degree of conversions, condensed phases, solution equilibria, fuel cells, liquification.