

MME 314: Metallurgical Thermodynamics and Kinetics

Thermo-chemistry: First law of thermodynamics. Reversible and irreversible processes, enthalpy function, equation of state. Heat of reactions types, thermomechanical equations, Hess's law of summation, Kirchoff's law. Zeroth's law of thermodynamics. Chemical equilibria. Concept of free energy. Review of thermodynamic functions. Dependence of free energy on pressure and temperature Fugacity, activity and activity coefficient. Free energy and equilibrium constant for ideal and non ideal reactions system. Solution thermodynamics. Ideal , real and dilute solutions. Raoult's law and application. Henry's law and application. Concept of activity and standard states. Changes of standard states. Partial and integral thermodynamic properties of solutions. Mechanisms of a reaction sequence. Nature of elementary reactions and concept of rate controlling step. Arrhenius equation and activation energy. Element treatment of absolute reactions rate theory. Brief introduction of diffusion phenomena and applicable laws via Fick's first and second laws.