

AMMR-04: Thermodynamics and Kinetics of Materials

Course Details:

Heterogeneous & homogeneous systems, Extensive & intensive properties, Simple equilibrium. First law of thermodynamics, constant volume & constant pressure processes, Spontaneous process, Entropy quantification of irreversibility, Properties of heat engines, Second law of thermodynamics, Criterion for equilibrium, Entropy & disorder, most probable microstate. configurationally entropy & thermal entropy, Auxiliary functions, Maxwell's relations, Gibbs Helmholtz equation, Third law of thermodynamics, Variation of Gibbs energy with temperature & pressure, Clausius-Clapeyron equation, Thermodynamic properties of mixtures of ideal & imperfect gases, Ellingham diagrams, Raoult's & Henry's laws, activity of a component, Gibbs — Duhem equation, Non-ideal solutions, Regular solutions, Quasi-chemical model of solution, activity & alternative standard states, Gibbs phase rule, Binary systems involving compound formation, Solubility of gases in metals, Formation of oxide phases of variable composition, relation between chemical & electrical driving forces, Nernst equation, Thermodynamics of point defects.

Text Books and Reference:

1. Introduction to Thermodynamics, Y. V. C. Rao
2. Textbook of Materials and Metallurgical Thermodynamics, A. Ghosh (PHI)

