

C202: Chemical Thermodynamics

1. **Recap:** Review of thermodynamics and chemical equilibrium. **Phase equilibrium: Multicomponent systems.** Ideal solution, Vapor-liquid equilibrium, Raoult's law, Henry's law, colligative properties. [8]
2. **Surfaces:** Thermodynamics of surfaces and interfaces, surface tension, vapour pressure; surface films on liquids, Gibbs adsorption equation; adsorption of gases on solids: Freundlich, Langmuir and BET adsorption isotherms; **determination of surface areas; colloids.** [7]
3. **Electrochemistry :** Arrhenius theory of electrolytic dissociation, Conductance of electrolytes in solutions, Debye-Huckel theory of electrolytes; ionic strength principle, activities of ions and activity coefficients, Debye-Huckel-Onsager theory of electrolytic conductance, ion association in electrolytic solution. [10]
Electrochemical cells and Electromotive Force(EMF), thermodynamics of cell reactions, Applications of EMF measurements: equilibrium constant, thermodynamic parameters, potentiometric titrations; basic principles of ion-selective membrane electrodes, batteries, **Bioelectrochemistry.** [8]
4. **Nonequilibrium Thermodynamics :** Conservation equations, linear transport processes, Onsager reciprocity relations, continuity and diffusion equations, steady states. [8]

Recommendend Books:

1. Physical Chemistry, I. Levine, Tata McGraw Hill, 5th Edn., 2007.
2. Physical Chemistry of Surfaces, A. W. Adamson and A. P. Gast, John Wiley and Sons, Inc., 1997.
3. Modern Electrochemistry, J.O.M. Bockris and A. K. N. Reddy, Springer, 2006.
4. Physical Chemistry, R. S. Berry, S. A. Rice and J. Ross, Oxford Univ. Press, 2nd Edn., 2000.
5. Thermodynamics of Irreversible Processes, R. Haase, Dover Publications, 1990.