

Physical Chemistry II (Chem 252/442)

Topics Endterm Exam 3 (Materials covered in L16-L23)

1. Thermodynamics of real matter

Equation of state of real matter, corresponding states
Van der Waals' & other gas models,
Compressibility factor, virial expansion, heat capacity,
Energy, activity, fugacity of real matter, gases & liquids
Phase coexistence, equilibria, latent heat,
Dependence of Phase Domains on free energy, pressure,
Clausius-Clapeyron Equation application, van't Hoff plots
Ideal mixtures & solutions,

2. Elements of Statistical Mechanics

Statistical entropy, independent degrees of freedom, S_{max} ,
The Boltzmann factor, probability distributions,
Important constraints: probability, total energy, particle number,...
The partition function/sum/integral, T dependence,
Number/multiplicity of μ states, Boltzmann low-density limit,
Quantum corrections
Gibbs stability criteria, equilibrium,
Thermodynamic variables from PFs, entropy, heat capacity,
Partition functions for different degrees of freedom,
Translational PF for ideal & real gases,
Rotational & vibrational PFs,

3. Mathematical Tools

Taylor/Maclaurin expansion series,
Maximizing multivariate functions under constraints.