Thermodynamics of Mixtures Learning Objectives

At the end of this chapter you should be able to...

- Describe ideal solutions from a molecular perspective and predict if two substances will form ideal solutions when mixed.
- Describe ideal solutions using Raoult's Law and solve problems utilizing Raoult's Law.
- Determine changes in enthlapy, entropy, Gibb's free energy, and molar volume for ideal solutions.
- Build and describe pressure-mole fraction phase diagrams for two component systems involving equilibrium between liquid and vapor.
- Describe the composition of liquid and vapor phases using bubble point, dew point, and tie lines.
- Describe fractional distillations using ideal solution behavior and non-ideal behavior of azeotropic solutions.
- Show how colligative properties for solutions are derived.
- Solve problems involving colligative properties in solution (Boiling Point Elevation, Vapor Pressure Lowering, Freezing Point Depression, and Osmotic Pressure).
- Describe non-ideal solutions and interpret their behavior from a molecular perspective.
- Use activity and activity coefficients to describe non-ideal solutions.
- Use Henry's Law and Raoult's Law to define the ideal dilute solution.
- Determine activity coefficents for solvents and solutes using vapor pressure measurements and/or colligative property measurements.
- Solve problems and describe phase and reaction equilibrium involving solutions by using standard states and activities.
- Use fugacity to describe the non-ideality of gases.