

CH353 – Physical Chemistry I
Spring 2012, Unique 52135

Homework, Week 8

1. Problems 2,3,4,5,6 from last week.
2. Consider a system consisting of n_1 moles of component 1 and n_2 moles of component 2. Derive an expression for the Gibbs free energy of this system.
3. At 25°C, the density of a 50% (m/m) solution of ethanol and water is 0.914 g cm^{-3} . Given that the partial molar volume of water in the solution is $17.4 \text{ cm}^3 \text{ mol}^{-1}$, determine the partial molar volume of the ethanol.
4. What proportions of hexane and heptane should be mixed by mole fraction to achieve the greatest entropy of mixing?
5. When a solution of acetone (A) and methanol (M) are in equilibrium at 57.2°C at 1.0 atm, the mole fraction of acetone in the liquid phase was found to be 0.40, while the mole fraction of acetone in the vapor phase was found to be 0.516. Determine the vapor pressures of both liquids and comment on your answer. For these two components, $P_A^* = 105 \text{ kPa}$ and $P_M^* = 73.5 \text{ kPa}$.