Biophysical Chemistry

Week 7 Problems

To be handed in by Friday 10th May 2013, 17:00
(either at my office 01/05 under the door or at the secretary's office 3rd floor)

1. The vapour pressure of a solution consisting of 10g of an involatile substance A in 75 g propanone was 2.974×10^4 N/m^2 at 298 K. The vapour pressure of pure propanone at this temperature is 3.055×10^4 N/m^2. Calculate the relative molar mass of the substance A given the following relative molar masses: C, 12; O, 16; H, 1. (NB: you must also calculate the relative molar mass of the propanone.)

2. AgCl dissolves in pure water at 25 °C to a concentration of 1.26×10^{-5} mol/L.

(a) Calculate the standard Gibbs free energy of the reaction:

$AgCl(s) \rightarrow Ag^{+}_{(aq)} + Cl^{-}_{(aq)}$ (is an equilibrium, so can calculate K_s)

(b) Calculate also the solubility of AgCl in 0.02 mol/L $K_2SO_{4(aq)}$

Note: calculate the ionic strength 'I' assuming [AgCl] is small and from 'I' calculate $\log_{10}\gamma$. The solubility is then $(\sqrt{K_s})/\gamma$.

(c) What type of effect is being observed when having more 'salt' in the system?