ENGR 3520
Extra Problem Set B

1. 65.0 g of $SrCl_2$ and 66.7 g of $FeCl_3$ are mixed with a volume of water to make a 1.0 liter solution. The density of the solution is found to be 1.0356 g/mL.

   a. Find the mole fraction of chlorine (i.e., chloride) in the solution.
   b. Find the number of moles of water in 1.0 liters of solution.

2. Air (79% N_2, 21% O_2 mole basis) at 0°C and 3.0 atm is bubbled into 1.0 L of pure water in a container without headspace until equilibrium is achieved, and then the container is closed. The container is warmed to 40°C and at this temperature opened to the atmosphere. Determine the mass of oxygen and nitrogen that bubbles out of the solution to achieve a new equilibrium when the container is opened.

3. The weatherman states that the current temperature is 95°F and the dew point is 74°F. What is the current relative humidity?

4. A metal is made by melting together 9.0 g Au, 12.0 g Ag, 15.3 g Hg and 15.7 g Cu. Find this mixture's average molecular weight.

5. 50.0 g of ethanol (C_2H_5OH), 5.0 g of acetone (C_3H_6O) and 90.0 g of methanol (CH_4O) are mixed (as a liquid).

   a. Find the mixture's average molecular weight
   b. Based on Raoult's Law, find the total vapor pressure of this mixture at 25°C.
   c. What is the likelihood that Raoult's Law will estimate pressures accurately? Explain.
   d Describe (showing an equation with one unknown) how to find this mixture's boiling point at atmospheric conditions.