CHAPTER 6
THE PROPERTIES OF MIXTURES
CHAPTER OUTLINE

HW: Questions are below. Solutions are in separate file on the course web site.

Sect. **Material**

1. Measures of Concentration
2. Chemical Potential
3. Raoult's Law
4. Colligative Properties
5. Osmotic Pressure
6. Dialysis
7. Colligative Properties of Real Solutions
8. Colligative Properties of Electrolyte Solutions

Chapter 6 Homework

6.1 What mass of glucose ($C_6H_{12}O_6$, M=180) should you use to prepare a 0.112 m glucose solution using 250. g of water?

6.2 What is the mole fraction of alanine [$CH_3CH(NH_2)COOH$] in a 0.134 m aqueous alanine solution?

6.3 What mass of sucrose ($C_{12}H_{22}O_{11}$, M=342) should you dissolve in 100. g of water to obtain a solution in which the mole fraction of sucrose is 0.124?

6.4 Calculate the freezing point of 150 cm^3 of water to which 7.5 g of sucrose ($C_6H_{12}O_6$, M=180) has been added.

6.5 The freezing point of tetrachloromethane (CCl_4) is -9.3 ^oC. The freezing point depression constant of CCl_4 is K_f = 30 K/m (= 30 ^oC/m).

When 28. grams of an unknown compound is added to 750. g CCl_4, the freezing point of the solution is lowered to -14.7 ^oC. Calculate the Molar Mass of the compound.

6.6 The osmotic pressure of an aqueous solution of Urea at 27 ^oC is 120. kPa. Calculate the freezing point of the solution. **Note:** You may assume that, in dilute aqueous solution, m(Urea) = c(Urea).

6.7 75 grams of Sucrose (M=342 g/mol) is added to 140 grams of water. The density of the solution is 1.23 g/mL.
(a) Calculate the mole fraction of sucrose in the solution.
(b) Calculate the molality of sucrose in the solution.
(c) Calculate the Molarity of sucrose in the solution.

6.8 When 0.15 grams of lysozyme is dissolved in 100 mL of water, the measured osmotic pressure of the solution is 2.00 torr at 25 ^oC. Calculate the molar mass of lysozyme.

6.9 When 15 grams of the strong electrolyte Na_3PO_4 [M=164 g/mol] is dissolved in 120 grams of water, the volume of the solution is 132 mL.
(a) Calculate the boiling point of the solution [K_b=0.51 ^oC/m].
(b) Calculate the osmotic pressure of the solution at 40 ^oC (in bar).