Unit 6 – Chapter 11: Solutions & IMFs **Name _____**

Assignment #1: Beer's Law Pre-Lab – Molarity, Molality, Mole Fraction, % Solution Period _____

1) A solution of phosphoric acid was made by dissolving 10.0 g of H_3PO_4 in 100.0 mL of water. The resulting volume was 104 mL. Calculate the items listed below. Assume water has a density of 1.00 g/cm^3.
    a. density
    b. mole fraction
    c. molarity
    d. molality

2) An aqueous antifreeze solution is 40.0% ethylene glycol ($C_2H_6O_2$) by mass. The density of the solution is 1.05 g/cm^3. Calculate the values listed below for the ethylene glycol.
    a. molality
    b. molarity
    c. mole fraction

3) Common commercial acids and bases are aqueous solutions with the following properties:
    Hydrochloric acid (HCl) density (g/cm^3) = 1.19; mass percent of solute = 38
    Nitric acid (HNO_3) density (g/cm^3) = 1.42; mass percent of solute = 70

    Calculate the following:

    a. molarity
    b. molality
    c. mole fraction

4) A bottle of wine contains 12.5% ethanol by volume. The density of ethanol (C_2H_5OH) is 0.789 g/cm^3. Calculate the concentration of ethanol in wine in terms of mass percent and molality.

5) Calculate the molarity and mole fraction of acetone in a 1.00 *m* solution of acetone (CH_3COCH_3) in ethanol (C_2H_5OH). (Density of acetone = 0.788 g/cm^3; density of ethanol = 0.789 g/cm^3.) Assume that the volumes of acetone and ethanol add.