Practice Quiz: Solutions and Colligative Properties - Key   Name_____

1. Which of the following aqueous solutions will have the lowest freezing point:

    a. 0.1 m sodium chloride   b. 0.2 m sucrose   c. 0.1 m aluminum nitrate
    d. All of these solutions freeze at the same temperature

2. Determine the molar mass of an ionic substance with a van't Hoff factor of 2.000 using the following data: 29.25 g of the substance is dissolved in 1.000 kg of water and the freezing point of the solution is measured to be -1.860 °C. (The K_f for water is 1.860°C/m).

    a. 1.000   b. 2.000   c. 58.50   d. 29.25   e. 1.860

3. What is the boiling point of a 4.00 molal solution of potassium chloride in water?
   (The K_b for water is 0.5000 °C/m)

    a. 373 K   b. 369K   c. 273 K   d. 377 K   e. none of these

4. Benzene has a higher vapor pressure than Toluene. Which compound has the higher boiling point?

    a. Benzene   b. Toluene   c. It is not possible to determine this from the given information

5. If 10.0 grams of ethanol (molar mass = 46 g/mol) are mixed with 15 grams of water, what if the mole fraction of ethanol in the mixture?

    a. 0.21   b. 0.67   c. 0.26   d. 1.5   e. none of these

6. The vapor pressure of a pure substance is measured to be 812 mmHg at a specific temperature. A non-volatile solute is added to this substance and the vapor pressure is measured to be 400. mmHg. What is the mole fraction of the non-volatile solute?

    a. 0.493   b. 0.507   c. 2.03   d. 2.97   e. 0.970

7. At 25°C the osmotic pressure of a 0.0100 M solution of a compound is 0.466 atm. Calculate the approximate van't Hoff factor.

    a. 1   b. 2   c. 3   d. 4   e. 5

8. Calculate the molality of a solution that contains 5.00 g of naphthalene, $C_{10}H_8$, in 100. mL of carbon tetrachloride. (The density of pure carbon tetrachloride is 1.58 g/mL)

    a. 0.050   b. 0.247   c. 0.0862   d. 0.0247   e. 0.025

9. Calculate the boiling point of a solution of 215.0 g of magnesium bromide dissolved in 800.0 g of water. (The K_b for water is 0.5000 °C/m)

    a. 373.0 K   b. 377.8 K   c. 273.0 K   d. 368.2 K   e. none of these

10. List the four colligative properties and, in a short sentence, state what "colligative property" means.
   Freezing Point Lowering, Boiling Point Elevation, Vapor Pressure Lowering, Osmotic Pressure
   A colligative properties depends on the number of particles and not on the identity of the solute.