Chemistry Module 11 Homework

Assignment #1
Read pages 353 – 368

1. What is different about how ionic compounds dissolve compared to covalent compounds?

2. What is a saturated solution?

3. What is a precipitate?

4. Explain why adding more sugar to a glass of tea that already has crystals of sugar on the bottom doesn't make the tea taste any sweeter. (Where does the extra sugar go?)

5. What kind of solute (solid, liquid, gas) dissolves best under high temperatures?

6. What kind of solute (solid, liquid, gas) dissolves best under low temperatures?

7. What kind of solute (solid, liquid, gas) dissolves best under high pressure?

8. Explain, <u>from a chemistry point of view</u>, what happens to the bubbles in your soda when you leave the soda in a hot car.

9. Define exothermic process.

10. Define endothermic process.

11. Very dilute solutions can be measured in parts per million (ppm). Calculation the ppm of each solution. $$ppm\ of\ component = \frac{mass\ of\ solute}{total\ mass\ of\ solution}\ x\ 10^6$$

    a. 0.02 grams NaCl in 50.0 grams of water.

    b. 3.5 grams of glucose ($C_6H_{12}O_6$) in 500.0 grams of water.

12. Calculate the molality of each solution: $$molality = \frac{moles\ of\ solute}{kg\ of\ solvent}$$

    a. 1.25 moles of salt (NaCl) dissolved in 0.2 kilograms of water.

    b. 180.0 grams of Epsom salt ($MgSO_4$) dissolved in 30 kilograms of water.

    c. 12.0 grams of sugar ($C_{12}H_{22}O_{11}$) dissolved in 400.0 grams of tea.

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Assignment #2
Read pages 369 – 375

13. How many milliliters of 2.5 M HNO_3 are needed to completely dissolve an old copper penny with a mass of 3.94 g?

    $3\ Cu + 8\ HNO_3 \rightarrow 3Cu(NO_3)_2 + 2\ NO + 4\ H_2O$

14. You are conducting a lab experiment in which you mix a solution of sodium sulfate with a solution of aluminum nitrate. If 354 mL of 1.75 M aluminum nitrate are added to excess sodium sulfate, how many grams of aluminum sulfate will be produced?

    $3Na_2SO_4\ (aq) + 2\ Al(NO_3)_3\ (aq) \rightarrow Al_2(SO_4)_3\ (s) + 6\ NaNO_3\ (aq)$

15. What is the difference between a 1 M solution and a 1 m solution?

16. A solution is prepared by dissolving 0.2 moles of $CaBr_2$ in 750 g of water. Calculate the molality of the solution.

17. A solution is prepared by dissolving 2.50 g of K_2CrO_4 in 23.2 g of water. Calculate the molality of the solution.

18. The i in the formula for change in boiling point or freezing point stands for the number of ions that the molecule would break into as it dissolves. What would the i values be for these molecules?
    a. $MgCl_2$
    b. $Be(NO_3)_2$
    c. Na_2SO_4
    d. CH_4

19. A solution made by mixing 50.0 grams of NH_3 with 400.0 grams of water? K_f= 1.86, K_b= 0.512
    a. What is the change in the water's freezing point?
    b. What is the change in the water's boiling point?

20. Alcohol boils at 83.4°C. You add 50.0 grams of $MgCl_2$ to 800.0 grams of alcohol. K_b = 1.19
    a. What is the molality of the solution?
    b. Calculate the change in boiling point.
    c. At what temperature will the solution boil?

21. How much NaCl would have to be dissolved in 1500. g of water to raise the boiling point 2.0°C.

22. Assume that all of the solutions made with the compounds below have the same molality. If you wanted to protect water from freezing, which solution would accomplish this best? Explain why.

    $NaNO_3$, $Mg(NO_3)_2$ or $Al(NO_3)_3$