Practice Problems

Solution Chemistry

Name: _____

Student ID: _____

Date: _____

1. Of Br_2, Ne, HCl, HBr, and N_2, which is likely to have:

   a. the largest intermolecular dispersion forces?

   b. the largest dipole–dipole attractive forces?

   c. The highest boiling point?

2. In which of the following substances is hydrogen bonding likely to play an important role in determining physical properties: methane (CH_4), hydrazine (H_2NNH_2), methyl fluoride (CH_3F), or hydrogen sulfide (H_2S)?

3. Water bugs can walk on the surface of water (H2O). Would you expect them to be find it easier or harder to walk on the surface of di-methyl ether (CH3OCH3). Why?

4. Electrolytes in solution can undergo a double displacement reaction. Each of the two substances below are electrolytes. If the two are mixed, predict whether a reaction will occur and what it's products would be. Show your answer as a chemical equation.

   a. Sodium Chloride and Potassium Nitrate

   b. Hydrochloric Acid and Sodium Hydroxide

   c. Iron (III) Bromide and Sodium Hydroxide

   d. Iron (III) Bromide and Sodium Carbonate

   e. Hydrochloric Acid and Sodium Carbonate

   f. Iron (III) Bromide and Lead (II) Nitrate

5. Translate each written description below into a complete chemical equation.

· You do not need to balance the equation.
· Complete means don't leave out any product or reactant.
· You may need to use your knowledge of displacement reactions to predict products.

a. Aqueous solutions of magnesium chloride and lead (II) nitrate are mixed, a bright yellow solid appears in the solution.

b. Sodium hydroxide solution and ammonium chloride solution are mixed under a strip of litmus paper. The litmus paper turns blue and the flask begins to smell like ammonia (NH_3).

c. A chunk of magnesium metal is dropped into a solution of sulfuric acid, the solution bubbles as the metal disappears.

6. When sulfuric acid and potassium hydroxide solution are mixed the flask gives off heat.

    a. What is the <u>balanced</u> molecular equation for this reaction?

    b. What is the net ionic equation for this reaction?

    c. What are the spectator ions in this reaction?

    d. Is this a precipitation, neutralization, or gas evolution reaction?

7. How many milliliters of a stock solution of 11.2 M HNO_3 would you have to use to prepare 0.360 L of 0.370 M HNO_3?

8. If you dilute 25.0 mL of a stock solution of 11.2 M HNO_3 to a final volume of 0.440 L, what will be the concentration of the diluted solution?

9.List the substances $BaCl_2$, H_2, CO, HF, and Ne in order of increasing boiling points.

10.What is the molarity of 12.5 grams of NaOH dissolved in 255 mL of water?

11.How many moles of silver ions are in 15.0 mL of 0.200 M $AgNO_3$?

12.In the following reaction, how many liters of 4.0 M phosphoric acid would you need to consume 0.60 moles of sodium hydroxide?

$$H_3PO_4 + 3\ NaOH \rightarrow Na_3PO_4 + 3\ H_2O$$
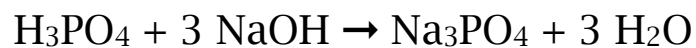
13. Given the following balanced equation, solve each stoichiometry problem below. Use dimensional analysis and show your calculation in each case.

$$4\ KClO_3 \rightarrow 3\ KClO_4 + KCl$$

a. If 0.237 moles of potassium chloride is produced, how many moles of potassium chlorate would be consumed?

b. If you decomposed 12.2 grams of potassium chlorate, how many grams of potassium perchlorate would be produced?

c. To produce 6.15 grams of potassium chloride, how many liters of 2.0 M potassium chlorate would you need?