Name: _____ Date: _____ Pd: ___ Teacher: Ms. Wagner

Chapter 12 Problem Set Regular Chemistry

Mole-Mole

1. Carbon disulfide is an important industrial solvent. It is prepared by the reaction of coke with sulfur dioxide.

$$5C(s) + 2SO_2(g) \rightarrow CS_2(l) + 4CO(g)$$

   a. _____How many moles of CS_2 form when 2.7 mol C reacts?
   b. _____How many moles of carbon are needed to react with 5.44 mol SO_2?

Mole-Mass, Mass-Mole

For problems 2-4, use and balance the following equation:

$$2\ Fe + 6\ HCl \rightarrow 2\ FeCl_3 + 3H_2$$

2. _____How much Fe is required to generate 6 moles of H_2 gas?

3. _____If 7.0 moles of HCl is added to enough iron that the HCl is completely used up, how much hydrogen gas will be produced?

4. _____How much HCl is required to completely react with 2.8 moles of Iron?

Mass-Mass

For problems 5 and 6, use the following balanced equations:

$$2\ NH_3 + 2\ O_2 \rightarrow N_2O + 3\ H_2O$$

5. _____If 80.0 grams of O_2 are reacted in the above reaction, how many grams of N_2O will be produced?

$$MnO_2 + 4\ HCl \rightarrow Cl_2 + MnCl_2 + 2\ H_2O$$

6. _____Given 145.7 grams of manganese (IV) oxide, how much hydrochloric acid (HCl) is needed to use up the MnO_2 completely?

Mixed Stoichiometry

7. Ammonium nitrate will decompose to form nitrogen, oxygen, and water vapor.
   a. Write the balanced chemical reaction:

   b. _____Determine the total number of liters of oxygen gas formed when 228 g NH_4NO_3 is decomposed. Assume STP.

8. In the unbalanced reaction

   $$3\ Ag_{(s)} + 4\ HNO_{3\,(aq)} \rightarrow 3\ AgNO_{3\,(aq)} + 2\ H_2O_{(l)} + NO_{(g)}$$

   a) Calculate how many grams of silver nitrate can be made from 2.55 grams of nitric acid.

   b) Calculate how many L of nitrogen monoxide can be made, starting with 4.25 grams of silver.

Limiting Reagent and Percent Yield:

9. For a party, Susie has 15 buns, 12 hamburgers and 30 pieces of cheese.
   a. How many cheeseburgers can Susie make?

   b. What is in excess and by how much?

   c. What is limiting?

10. Heating an ore of antimony (Sb_2S_3) n the presence of iron gives the element antimony and iron (II) sulfide.

    $$Sb_2S_3(s) + 3Fe(s) \rightarrow 2Sb(s) + 3\ FeS(s)$$

    When 15.0 g Sb_2S_3 reacts with an excess of Fe, 9.84 g Sb is produced. What is the percent yield of this reaction? _____

Be able to define:

Stoichiometry
Mole ratio
Limiting Reagent
Excess reagent
Theoretical yield
Actual yield
Percent Yield