

# WORKSHEET 12

Chemistry 110

Name \_\_\_\_\_

(last)

(first)

Due date: \_\_\_\_\_

Solve the following problems, giving complete set-ups, including all units, and using correct significant figures. Show all work.

A. Answer the following questions with respect to the equation:  $2 \text{ZnS} + 3 \text{O}_2 \longrightarrow 2 \text{ZnO} + 2 \text{SO}_2$

[Molar masses:  $\text{ZnS} = 97.46$     $\text{O}_2 = 32.00$     $\text{ZnO} = 81.39$     $\text{SO}_2 = 64.06$ ]

1. How many moles of oxygen are required to make 0.0116 moles of sulfur dioxide? 1. \_\_\_\_\_

2. How many moles of oxygen must be used to produce 49.26 grams of zinc oxide? 2. \_\_\_\_\_

3. If 9.25 kg of sulfur dioxide are produced in the reaction, how many grams of zinc oxide are produced? 3. \_\_\_\_\_

4. How many grams of oxygen are needed to react with  $8.75 \times 10^{22}$  formula units of zinc sulfide? 4. \_\_\_\_\_

B. Silver oxide and carbon dioxide react to produce silver carbonate. [Molar masses: silver oxide = 231.74, carbon dioxide = 44.01, silver carbonate = 275.75]

1. Write the balanced equation for the reaction.  
\_\_\_\_\_

2. How many grams of silver carbonate are produced when 25.0 g silver oxide react completely with carbon dioxide? 2. \_\_\_\_\_

C. Phosphorus trichloride reacts with chlorine to produce phosphorus pentachloride. [Molar masses: phosphorus trichloride = 137.33, phosphorus pentachloride = 208.24]

1. Write the balanced equation for the reaction.

\_\_\_\_\_

2. How many grams of phosphorus pentachloride are produced from 3.0 mg of phosphorus trichloride? 2. \_\_\_\_\_

D. Answer the following questions with respect to the equation:  $\text{Al}_4\text{C}_3 + 12 \text{H}_2\text{O} \longrightarrow 4 \text{Al}(\text{OH})_3 + 3 \text{CH}_4$   
[Molar masses:  $\text{Al}_4\text{C}_3 = 143.96$   $\text{H}_2\text{O} = 18.02$   $\text{Al}(\text{OH})_3 = 78.00$   $\text{CH}_4 = 16.04$  ]

1. How many grams of  $\text{Al}_4\text{C}_3$  are needed to react with 1.045 moles of water? 1. \_\_\_\_\_

2. How many grams of  $\text{Al}_4\text{C}_3$  react to produce  $6.21 \times 10^{11}$  formulas units of aluminum hydroxide? 2. \_\_\_\_\_

3. How many grams of  $\text{CH}_4$  are produced when 18.66 g of aluminum hydroxide are formed.? 3. \_\_\_\_\_

E. Answer the following questions with respect to the equation:  $\text{CH}_4 + 3 \text{CO}_2 + 4 \text{NH}_3 \longrightarrow 4 \text{HCN} + 6 \text{H}_2\text{O}$   
[Molar masses:  $\text{CO}_2 = 44.01$   $\text{NH}_3 = 17.03$   $\text{H}_2\text{O} = 18.02$   $\text{CH}_4 = 16.04$   $\text{HCN} = 27.03$  ]

When 275 grams of ammonia were added to carbon dioxide and methane,  $\text{CH}_4$ , there were still 42 grams of ammonia remaining, unreacted, when the reaction was over.

1. How many grams of ammonia reacted? 1. \_\_\_\_\_

2. How many moles of water were produced? 2. \_\_\_\_\_

3. How many grams of methane reacted with the ammonia? 3. \_\_\_\_\_