

**Stoichiometry Review:** *Be sure to show your work for each problem!*

1. Based on the following equation:  $4 \text{ Al} + 3 \text{ O}_2 \rightarrow 2 \text{ Al}_2\text{O}_3$

a) How many moles of  $\text{Al}_2\text{O}_3$  will be formed from 17 moles of Al?

(ans. 8.5 moles  $\text{Al}_2\text{O}_3$ )

b) How many grams of oxygen are needed to burn 42.0 g of Al?

(ans. 37.4 g  $\text{O}_2$ )

2. Magnesium reacts with hydrochloric acid (HCl) to produce magnesium chloride and hydrogen gas.

a) Write the balanced equation for this reaction.

b) If you start with 25.0 g of magnesium, how many grams of hydrogen gas will form?

(ans. 2.08 g  $\text{H}_2$ )

c) If you start with 140.0 g of HCl, how many moles of magnesium will react?

(ans. 1.920 mole Mg)

3. Based on the following equation:  $4 \text{ NH}_3 + 5 \text{ O}_2 \rightarrow 4 \text{ NO} + 6 \text{ H}_2\text{O}$

a) If you start with 80.0 g of  $\text{O}_2$  and 70.0 g of  $\text{NH}_3$ , how many grams of NO will you produce?

(ans. 60.0g NO)

Limiting reactant =  $\text{O}_2$

b) How many grams of  $\text{H}_2\text{O}$  will you make?

(ans. 54.0g  $\text{H}_2\text{O}$ )

4. For the following equation:  $\text{Fe}_3\text{O}_4 + 4 \text{ CO} \rightarrow 3 \text{ Fe} + 4 \text{ CO}_2$

a) How many grams of Fe are made if 0.576 moles of  $\text{CO}_2$  are produced?

(ans. 24.1 g Fe)

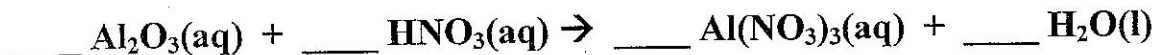
b) 100.0 g CO reacted with excess  $\text{Fe}_3\text{O}_4$ . If only 141.3 grams of Fe were produced, what was the percent yield?

(ans. 94.52% yield)

### Stoichiometry Review Problems for Chapter 9 Test

Complete the following 6 problems. To earn an extra credit point for the Chapter 9 test, your answer must be fairly close to mine and you must **show all work**. I need to see the correct number of conversion factors for the type of calculation required.

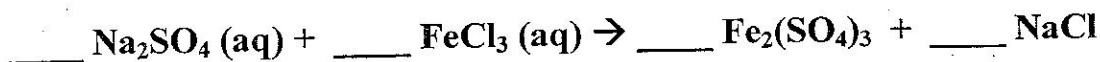
Balance the following equation and then use for #1 & #2:



1) How many **moles** of water are formed when 6.50 **moles** of aluminum oxide react with nitric acid ( $\text{HNO}_3$ )?

2) How many **grams** of nitric acid ( $\text{HNO}_3$ ) are needed to produce 4.67 **moles** of aluminum nitrate?

Balance the following equation and then use for #3 & #4.



3) How many **grams** of sodium chloride are produced when 367.8 **grams** of sodium sulfate react with iron chloride?



## STOICHIOMETRY

### PRACTICE PROBLEMS

In your notebook, solve the following problems.

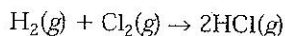
#### SECTION 9.1 THE ARITHMETIC OF EQUATIONS

Use the 3-step problem-solving approach you learned in Chapter 4.

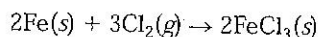
1. An apple pie needs 10 large apples, 2 crusts (top and bottom), and 1 tablespoon of cinnamon. Write a balanced equation that fits this situation. How many apples are needed to make 25 pies?
2. Two moles of potassium chloride and three moles of oxygen are produced from the decomposition of two moles of potassium chlorate,  $\text{KClO}_3(s)$ . Write the balanced equation. How many moles of oxygen are produced from twelve moles of potassium chlorate?
3. Using the equation from problem 2, how many moles of oxygen are produced from 14 moles of potassium chlorate?
4. Two molecules of hydrogen react with one molecule of oxygen to produce two molecules of water. How many molecules of water are produced from  $2.0 \times 10^{23}$  molecules of oxygen? How many moles of water are produced from 22.5 moles of oxygen?

#### SECTION 9.2 CHEMICAL CALCULATIONS

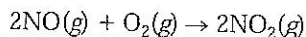
1. Calculate the number of moles of hydrogen chloride produced from 10 moles of hydrogen.



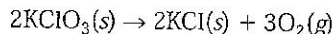
2. Calculate the number of moles of chlorine needed to form 14 moles of iron(III)chloride.



3. Calculate the number of grams of nitrogen dioxide that are produced from 4 moles of nitric oxide.

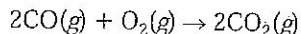


4. Calculate the mass of oxygen produced from the decomposition of 75.0 g of potassium chlorate.



5. Calculate the mass of silver needed to react with chlorine to produce 84 g of silver chloride. *Hint:* Write a balanced equation first.

6. How many liters of carbon monoxide at STP are needed to react with 4.80 g of oxygen gas to produce carbon dioxide?



7. Calculate the number of liters of oxygen gas needed to produce 15.0 liters of dinitrogen trioxide. Assume all gases are at the same conditions of temperature and pressure.

