Worksheet – Stoichiometry (mole-mole; mole-mass)

Name_____
Period_____
Date_____

Answer each of the following questions using the equation provided. BE SURE TO BALANCE EACH EQUATION BEFORE SOLVING ANY PROBLEMS. **SHOW ALL WORK and BOX IN YOUR ANSWERS**

1. In a reaction between the elements aluminum and chlorine, aluminum chloride is produced.

$$__Al + __Cl_2 \rightarrow __AlCl_3$$

a. How many grams of $AlCl_3$ will be produced if 2.50 moles of Al react?

b. How many moles of Cl_2 must react to produce 12.3 g of $AlCl_3$?

c. How many grams of aluminum will react with 3.4 moles of chlorine?

d. If 17 grams of aluminum react, how many moles of aluminum chloride will be produced?

2. The ammonia (NH_3) used to make fertilizers for lawns and gardens are made by reacting nitrogen and hydrogen according to the following reaction.

$$__N_2 + __H_2 \rightarrow __NH_3$$

a. Determine the mass in grams of NH_3 formed from 1.34 moles of nitrogen.

b. What is the mass in grams of hydrogen required to react with 1.34 moles of nitrogen?

c. How many moles of nitrogen are required to produce 11.7 moles of NH_3?

d. How many moles of nitrogen are required to produce 11.7 grams of NH_3?

e. How many grams of hydrogen are required to form 3.5 moles of NH_3?

3. The first step in the industrial manufacture of nitric acid involves the catalytic oxidation of ammonia according to the following BALANCED equation.

$$4NH_3\ (g) + 5O_2\ (g) \rightarrow 4NO\ (g) + 6H_2O\ (g)$$

a. How many moles of NO are formed if 824 g of NH_3 react?

b. How many grams of water are formed if 2.5 moles of ammonia are oxidized?

c. How many moles of oxygen are needed to react with 4.6 moles of ammonia?

4. Mercury (II) oxide decomposes into mercury and oxygen gas according to the following UNBALANCED equation.

_____HgO →_____ Hg + _____O_2

a. How many moles of mercury (II) oxide are needed to produce 125 g of oxygen?

b. How many moles of mercury are produced if 24.5 moles of mercury (II) oxide decompose?

c. How many grams of oxygen will be produced if 2.3 moles of mercury are produced?

5. Use the following equation to answer the questions below.

_____Cu + ____O_2 → ____CuO

a. If 101 grams of copper are used, how many moles of copper (II) oxide will be formed?

b. If 5.25 moles of copper are used, how many moles of oxygen must also be used?

c. If 78.2 grams of oxygen react with copper, how many moles of copper (II) oxide will be produced?

6. Use the following equation to answer the questions below.

$$____C_4H_{10} + ____O_2 \rightarrow ____CO_2 + ____H_2O$$

a. How many moles of butane, C_4H_{10}, are needed to react with 5.5 moles of oxygen?

b. How many grams of carbon dioxide will be produced if 2.5 moles of O_2 react?

7. Use the following equation to answer the questions below.

$$____Mg + ____HCl \rightarrow _____MgCl_2 + ____H_2$$

a. What mass of HCl is consumed by the reaction of 2.50 moles of magnesium?

b. What mass of $MgCl_2$ is produced if 3.67 moles of HCl react?

c. How many moles of hydrogen gas are produced when 3.0 moles of magnesium react?

8. Use the following equation to answer the questions below.

$$_____NH_3 + ____O_2 \rightarrow ____N_2 + ____H_2O$$

a. How many moles of oxygen react with 0.23 moles of NH_3?

b. How many grams of water will be produced if 0.55 moles of oxygen react?

c. How many moles of nitrogen gas will be produced if 12.6 grams of ammonia react?