Name: _____

Stoichiometry Practice

(to prevent boredom over break)

Directions:

Complete the following problems - show all work in dimensional analysis to receive credit. Include units and don't forget sig figs. Answers posted on my website.

1. Balance these equations:

   a. $H_{2(g)} + O_{2(g)} \rightarrow H_2O_{(g)}$

   b. $C_2H_{2(g)} + O_{2(g)} \rightarrow CO_{2(g)} + H_2O_{(l)}$

   c. $K_{(s)} + H_2O_{(l)} \rightarrow KOH_{(aq)} + H_{2(g)}$

2. The formation of aluminum oxide from its constituent elements is represented by this equation:

$$4\ Al + 3\ O_2 \rightarrow 2\ Al_2O_3$$

   a. How many moles of aluminum are needed to form 3.7 mol of Al_2O_3?

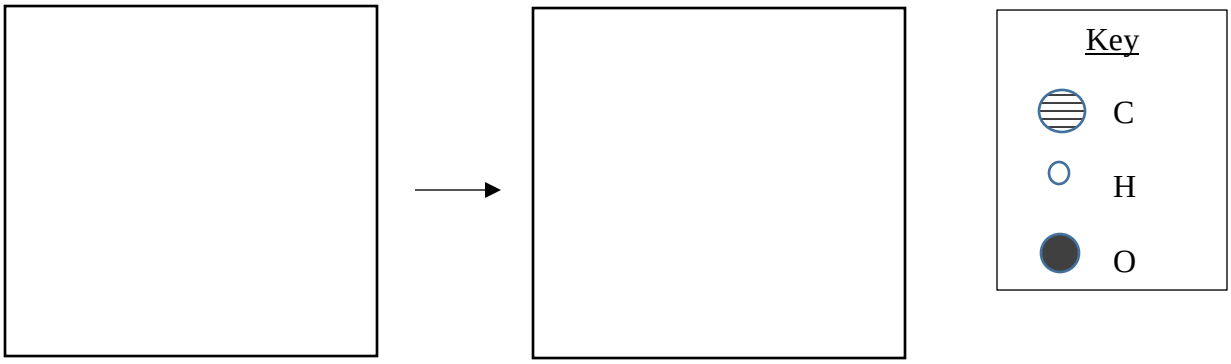
   b. How many moles of oxygen are required to react completely with 14.8 mol of Al?

   c. Calculate the number of moles of Al_2O_3 formed when 0.78 mol of O_2 reacts with aluminum.

3. The combustion of acetylene gas is represented by this equation:

$$2\ C_2H_{2(g)} + 5\ O_{2(g)} \rightarrow 4\ CO_{2(g)} + 2\ H_2O_{(g)}$$

a. Draw a particle representation of the reactants and the products.



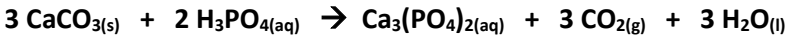
Reactants *Products*

b. How many grams of CO_2 and grams of H_2O are produced when 52.0 g of C_2H_2 burns?

c. How many grams of oxygen are required to "burn" 52.0 g of C_2H_2?

d. Use the answers from (b) and (c) to show that this equation obeys the law of conservation of mass.

4. Calcium carbonate reacts with phosphoric acid to produce calcium phosphate, carbon dioxide, and water.



$$\mathbf{3\ CaCO_{3(s)} + 2\ H_3PO_{4(aq)} \rightarrow Ca_3(PO_4)_{2(aq)} + 3\ CO_{2(g)} + 3\ H_2O_{(l)}}$$

   a. How many grams of calcium chloride will react with 25.0 mL of 1.00 M solution of phosphoric acid (H_3PO_4)?

   b. Assuming STP conditions, how many liters of carbon dioxide are produced when 5.74 g of $CaCO_3$ reacts with H_3PO_4?

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

$$_{5}\quad C_{(s)} + 2\,SO_{2(g)} \rightarrow CS_{2(s)} + 4\,CO_{(g)}$$

If 85.0 g of carbon reacts with 67.5 L of sulfur dioxide gas at STP,

a. What mass of carbon disulfide is produced?

b. What is the limiting reagent? Excess reagent?

c. How many molecules of excess reagent are left over?