Ch.3 Stoichiometry Practice **Name:** CALVIN **Date:** **Hour:**

1) In the reaction $2CO(g) + O_2(g) \rightarrow 2CO_2(g)$, what is the ratio of moles of oxygen used to moles of CO_2 produced?

1:2

2) How many moles of aluminum are needed to react completely with 5.2 mol of FeO?
$2Al(s) + 3FeO(s) \rightarrow 3Fe(s) + Al_2O_3(s)$

x mol 5.2 mol

$$\frac{5.2\ \text{mol FeO}}{3\ \text{mol FeO}} \left| \frac{2\ \text{mol Al}}{} \right. = 3.5\ \text{mol Al}$$

3) Iron(III) oxide is formed when iron combines with oxygen in the air. How many grams of Fe_2O_3 are formed when 26.7 g of Fe reacts completely with oxygen?
$4Fe(s) + 3O_2(g) \rightarrow 2Fe_2O_3(s)$

26.7 g x g

$$\frac{26.7\ \text{g Fe}}{55.85\ \text{g Fe}} \left| \frac{1\ \text{mol Fe}}{4\ \text{mol Fe}} \right| \frac{2\ \text{mol } Fe_2O_3}{1\ \text{mol } Fe_2O_3} \left| \frac{159.70\ \text{g } Fe_2O_3}{} \right. = 38.2\ \text{g } Fe_2O_3$$

4) How many moles of H_3PO_4 are produced when 21.0 g P_4O_{10} reacts completely to form H_3PO_4?
$P_4O_{10}(s) + 6H_2O(l) \rightarrow 4H_3PO_4(aq)$

21.0 g x mol

$$\frac{21.0\ \text{g } P_4O_{10}}{283.88\ \text{g } P_4O_{10}} \left| \frac{1\ \text{mol } P_4O_{10}}{1\ \text{mol } P_4O_{10}} \right| \frac{4\ \text{mol } H_3PO_4}{} \left. = 0.296\ \text{mol } H_3PO_4 \right.$$

5) How many grams of H_3PO_4 are produced when 30.0 moles of water react with an excess of P_4O_{10}?
$P_4O_{10}(s) + 6H_2O(l) \rightarrow 4H_3PO_4(aq)$

30.0 mol x g

$$\frac{30.0\ \text{mol } H_2O}{6\ \text{mol } H_2O} \left| \frac{4\ \text{mol } H_3PO_4}{1\ \text{mol } H_3PO_4} \right| \frac{98.00\ \text{g } H_3PO_4}{} \left. = 1.96 \times 10^3\ \text{g } H_3PO_4 \right.$$

6) Suppose 5.00 moles of Lithium Nitrate react with 5.00 moles of Magnesium Fluoride react. Find the *limiting reactant.*

LR XS

$2\ LiNO_3 + 1\ MgF_2 \rightarrow 1\ Mg(NO_3)_2 + 2\ LiF$

5.00 mol 5.00 mol

option A

$$\frac{5.00\ \text{mol } MgF_2}{1\ \text{mol } MgF_2} \left| \frac{2\ \text{mol LiF}}{} \right. = 10.0\ \text{mol LiF}$$

$$\frac{5.00\ \text{mol } LiNO_3}{2\ \text{mol } LiNO_3} \left| \frac{2\ \text{mol LiF}}{} \right. = 5.00\ \text{mol LiF}$$

$LiNO_3$ is LR

7) Aluminum oxide decomposes when heated to produce Aluminum and Oxygen. What is the mole ratio of aluminum to oxygen? $2Al_2O_3 \xrightarrow{\Delta} 4Al + 3O_2$

4:3

8) For the reaction represented by the equation $N_2 + 3H_2 \rightarrow 2NH_3$, how many moles of nitrogen are required to produce 18 mol of ammonia?

$$\frac{18\ mol\ NH_3}{2\ mol\ NH_3} \left| \frac{1\ mol\ N_2}{} \right. = 9.5\ mol\ N_2$$

(x mol N_2 : 18 mol NH_3)

9) When the limiting reactant in a chemical reaction is completely used, the
   a. excess reactants begin combining.
   b. reaction slows down.
   c. reaction speeds up.
   d. reaction stops.

10) To determine the limiting reactant in a chemical reaction, one must know the
   a. available amount of one of the reactants.
   b. amount of product formed.
   c. available amount of each reactant.
   d. speed of the reaction.

11) What is the maximum possible amount of product obtained in a chemical reaction?

theoretical yield

12) For the reaction represented by the equation $SO_3 + H_2O \rightarrow H_2SO_4$, calculate the percentage yield if 500. g of sulfur trioxide react with excess water to produce 575 g of sulfuric acid.

$$1SO_3 + 1H_2O \rightarrow 1H_2SO_4$$

500. g SO_3 ; x g H_2SO_4 ; 575 g H_2SO_4

$$\frac{500.\ g\ SO_3}{80.06\ g\ SO_3} \left| \frac{1\ mol\ SO_3}{1\ mol\ SO_3} \right| \frac{1\ mol\ H_2SO_4}{1\ mol\ H_2SO_4} \left| \frac{98.08\ g\ H_2SO_4}{} \right. = 613\ g$$

GO VIKINGS!!

$$\frac{\text{actual}}{\text{theoretical}} \times 100 = \frac{575\ g}{613\ g} \times 100 = 93.8\%$$