Chemistry II Worksheet
Limiting Reactants & % Yields

NAME _____

INSTRUCTIONS: Work these problems on theoretical yield & limiting reactants. Use scratch paper as needed. A Periodic Table would be most useful here, but please *try* to do these *without* your Yellow Card. As always, the only resource you *may not* use is *each other*.

1. The reaction between solid sodium and iron (III) oxide is one in a series of reactions that inflates an automobile bag.

$$Na + Fe_2O_3 \rightarrow Na_2O + Fe$$

If 100.0 g of Na and 100.0 g of Fe_2O_3 are used in this reaction, determine the

a) the mass of the solid iron produced

b) the mass of the excess that remains after the reaction is complete

2. Photosynthesis reactions in green plants use carbon dioxide and water to produce glucose ($C_6H_{12}O_6$) and oxygen.

$$CO_2 + H_2O \rightarrow C_6H_{12}O_6 + O_2$$

If a plant has 88.0 g of carbon dioxide and 64.0 g of water available for photosynthesis, determine the

a) mass of the glucose produced

b) mass of the excess reactant left over after the reaction is complete

3. An alkaline battery produced electrical energy according to the following equation:

$$Zn + MnO_2 + H_2O \rightarrow Zn(OH)_2 + Mn_2O_3$$

Determine the mass of $Zn(OH)_2$ produced if 25.0 g Zn and 30.0 g MnO_2 are used.

4. Iron is obtained commercially by the reaction of hematite (Fe_2O_3) with carbon monoxide. How many grams of iron are produced if 75.0 of hematite react with 85.0 g of carbon monoxide?

$$Fe_2O_3 + CO \rightarrow Fe + CO_2$$

5. Lithium reacts spontaneously with bromine to produce lithium bromide. How many grams of lithium bromide will be produced if 25.0 g of lithium and 25.0 grams of bromine react?

$$Li + Br_2 \rightarrow LiBr$$

6. Ethanol is produced from the fermentation of sucrose in the presence of enzymes.

$$C_{12}H_{22}O_{11} + H_2O \rightarrow 4C_2H_5OH + 4CO_2$$

Determine the theoretical and % yields of ethanol if 684 g of sucrose undergoes fermentation and 349 g of ethanol is obtained.

7. Lead (II) oxide is obtained by roasting galena, lead (II) sulfide in air.

$$PbS + O_2 \rightarrow PbO + SO_2$$

Determine the theoretical yield & % yield of PbO if 200.0 g of PbS are heated and 170.0 g of PbO are obtained.

8. Upon heating, calcium carbonate decomposes to produce calcium oxide and carbon dioxide.

$$CaCO_3 \rightarrow CaO + CO_2$$

a) Determine the theoretical yield if 235.0 g of $CaCO_3$ is heated.

b) Determine the % yield if 97.5 g of $CaCO_3$ is obtained.