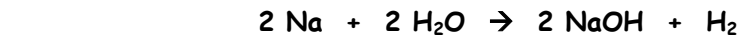
STOICHIOMETRY/LIMITING REACTANTS

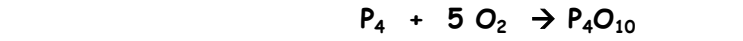
STOICHIOMETRY

1. How many moles of sodium will react with water to produce 4.0 mol of hydrogen in the following reaction?



$$2\ Na + 2\ H_2O \rightarrow 2\ NaOH + H_2$$

2. Phosphorus burns in air to produce a phosphorus oxide in the following reaction:

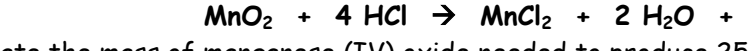


$$P_4 + 5\ O_2 \rightarrow P_4O_{10}$$

   a. What mass of phosphorus will be needed to produce 3.25 mol of P_4O_{10}?

   b. If 0.489 mol of phosphorus burns, what mass of oxygen must be used?

3. Chlorine gas can be produced in the laboratory be adding concentrated hydrochloric acid, HCl, to manganese (IV) oxide in the following reaction:



$$MnO_2 + 4\ HCl \rightarrow MnCl_2 + 2\ H_2O + Cl_2$$

   a. Calculate the mass of manganese (IV) oxide needed to produce 25.0 grams of chlorine.

   b. What mass of manganese (II) chloride is produced when 0.091 grams of chlorine is generated?

4. **Iron (III) oxide reacts with aluminum.**

   a. Complete and balance a chemical equation for the reaction above.

   b. According the balanced equation you have written, what mass of aluminum will react with 150 grams of iron (III) oxide?

   c. If 0.905 mol iron (III) oxide are reacted in the reaction, how many moles of each product are made?

   d. How many moles of iron (III) oxide will react with 99.0 grams of aluminum?

Limiting Reactants Name _____
Additional Practice

1. 83.4 grams of butane (C_4H_{10}) react with 45 grams of oxygen in a combustion reaction.

    a. Write the balanced chemical equation.

    b. What is the limiting reactant?

    c. What is the excess reactant?

    d. How many grams of excess reactant are left over?

    e. How many moles of water can be made?

    f. How many grams of carbon dioxide can be made?

2. 10 moles of calcium carbonate react with 15 moles of aluminum fluoride.
    a. Write the balanced chemical equation for the reaction.

    b. What is the limiting reactant?

    c. What is the excess reactant?

    d. What mass of the excess reactant remains?

    e. How many grams of **<u>each</u>** product can be made?