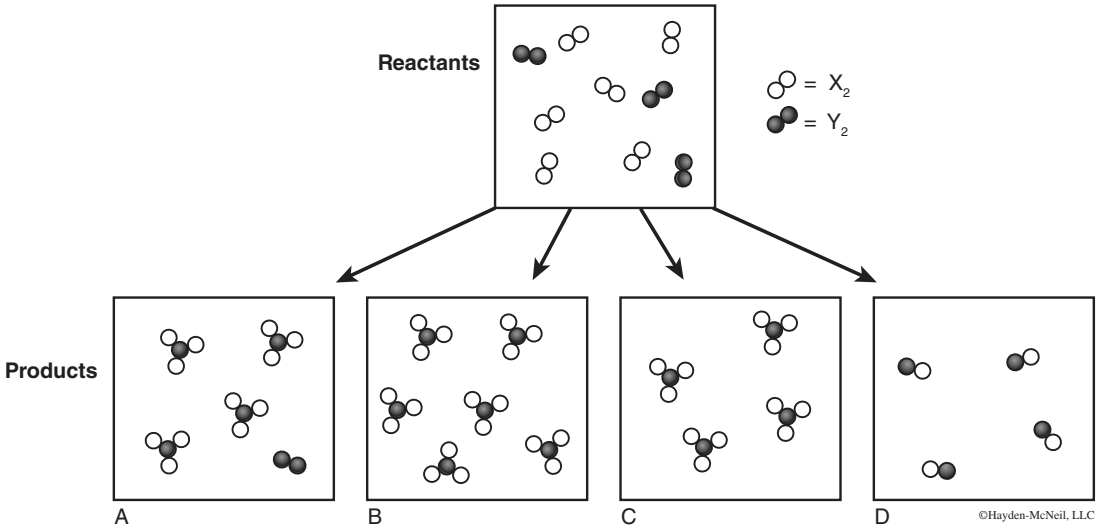
LIMITING REAGENTS

NAME SECTION

1. Analyze the following chemical reaction:



   a. Which box best represents what results when X_2 and Y_2 react?

   b. Write a balanced equation that describes this reaction in terms of X_2 and Y_2.

   c. Is there a limiting reagent? Explain.

2. Which equation, if any, best accounts for the reaction above?

   a. $N_2 + 3\ H_2 \rightarrow 2\ NH_3$

   b. $H_2 + Cl_2 \rightarrow 2\ HCl$

   c. $3\ N_2 + 6\ H_2 \rightarrow 4\ NH_3 + N_2$

   d. $6\ H_2 + 3\ Cl_2 \rightarrow 6\ HCl + 3\ H_2$

Student 1: *None, because one nitrogen mixed with three hydrogen only gives us one* NH_3.

Student 2: *c or d, because there was an additional substance left over.*

Student 3: *a, because one molecule of* N_2 *reacts with three molecules of* H_2 *to form two molecules of* NH_3.

Student 4: *a or b, because they are possible results when* X_2 *and* Y_2 *mix.*

Discuss with your partners which, if any, of these statements you agree with. Explain.

3. What else would you need to know in order to decide which reaction is correct?

4. If you were to double the amount of X_2 in the first box in Question 1, what would the result look like?

5. Propane, C_3H_8, is the fuel of choice in a gas barbecue. When propane burns, the reaction that occurs can be described by the following chemical equation:

$$\_\_\ C_3H_8 + \_\_\ O_2 \rightarrow \_\_\ CO_2 + \_\_\ H_2O$$

   a. Balance the chemical equation.

   b. What is the limiting reactant when cooking with a gas grill?

   c. If the grill will not light and you know that you have an ample flow of propane to the burner, what is the limiting reactant?

6. Aspirin is produced by the reaction of salicylic acid and acetic anhydride.

$$\_\_\ \underset{\text{salicylic acid}}{C_7H_6O_3(s)} + \_\_\ \underset{\text{acetic anhydride}}{C_4H_6O_3(l)} \rightarrow \_\_\ \underset{\text{aspirin}}{C_9H_8O_4(s)} + \_\_\ H_2O(l)$$

   a. Balance the chemical equation.

   b. If you mix 200 g of each of the reactants, what is the maximum mass of aspirin that can be obtained?