

# Lecture Notes: More Limiting Reactant Practice and Percent Yield

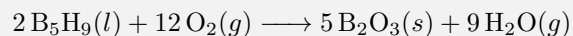
Wallace D. Derricotte

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## More Involved Limiting Reactant Problems

### **Problem 1: Limiting Reactant Problems “in disguise”:**

A potential fuel for rockets involves the reaction of  $\text{B}_5\text{H}_9$  and  $\text{O}_2$ . They react according to the following balanced chemical equation:



If one tank in a rocket holds 126 g  $\text{B}_5\text{H}_9$  and another tank holds 192 g  $\text{O}_2$ , what mass of water will be produced in this process.

### **Problem 2: Dealing With More Than Two Reactants**

Titanium tetrachloride ( $\text{TiCl}_4$ ) is an important intermediate in the production of titanium metal. It is a major product of the following reaction:



Given that 12.0 g of  $\text{TiO}_2$  and 14.5 g of C react in a cylinder containing 30.0 g of  $\text{Cl}_2$ . How much titanium tetrachloride will be produced in this process?

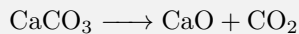
## Percent Yield

**Theoretical Yield:** The amount of a product formed when the limiting reactant is completely consumed

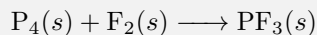
$$\frac{\text{Actual Yield}}{\text{Theoretical Yield}} \times 100\% = \text{Percent Yield}$$

**Problem 3: Calculating Percent Yield When Given Actual Yield**

For the balanced equation shown below, if the reaction of 20.7 grams of  $\text{CaCO}_3$  produces 6.81 grams of  $\text{CaO}$ , what is the percent yield?

**Problem 4: Calculating Necessary Amount of Reactant Given Percent Yield**

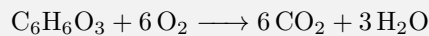
Consider the following unbalanced reaction:



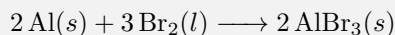
What mass of  $\text{F}_2$  is needed to produce 120 g of  $\text{PF}_3$  if the reaction has a 78.1% yield?

**Problem 5: Calculating Amount of Product Formed Given Percent Yield**

For the balanced equation shown below, if the reaction of 40.8 grams of  $\text{C}_6\text{H}_6\text{O}_3$  produces a 39.0% yield, how many grams of  $\text{H}_2\text{O}$  would be produced?

**Problem 6: Calculating Percent Yield Given Volume and Density**

Aluminum reacts with bromine to produce aluminum bromide:



In a certain experiment, 20.0 mL of bromine (density = 3.10 g/mL) was reacted with excess aluminum to yield 50.3 g of aluminum bromide. What is the percent yield for this experiment?