Stoichiometry and Percent Yield

3C.7 extension

TEKS: 8Eiii

As you learned in the modeling matter, *Incomplete Combustion*, a limiting reactant would be the reactant that is used up first in a chemical reaction. In investigations it is difficult to have a perfect stoichiometric ratio of all reactants involved, so chemists will try to have one reaction in excess. You will learn more about how this influences the reaction going to completion in Unit 5, when you read about equilibrium. For now, just remember that even though you are given two (or more) quantities only one will often determine the amount of product formed in the reaction.

Chemists often express the amount of substance that should, mathematically, be formed in a chemical reaction using the term **theoretical yield**. This is determined by calculating the amount of product using the amount of limiting reactant. This value is NOT experimentally determined.

What is important to industrial chemists is the actual yield. This amount is measured after a process has been completed. It is almost always less than (and can NEVER be greater than) the theoretical yield. There are many reasons why the actual yield is not 100%. There may be a side reaction, the process may not go to completion and actually reverses after a critical mass of product is formed, or they may react in less desirable ways. In addition, it is not always possible to recover all of the product from the reaction mixture.

To determine the **percent yield** of a reaction, you must have the experimentally determined actual yield and the calculated theoretical yield:

