This is an example experiment used to write the following lab report.

FORMATION OF MAGNESIUM OXIDE

Objectives

- Calculate the theoretical yield and percent yield for a product in a chemical reaction.
- Write and interpret balanced chemical reactions.
- Draw conclusions based on experimental data.

Introduction

If you know the overall chemical equation for a reaction, the amount of product that can be theoretically produced from a known amount of reactant can be determined. This process is referred to as stoichiometry.

The flow chart provided below illustrates general formula for solving stoichiometry problems:

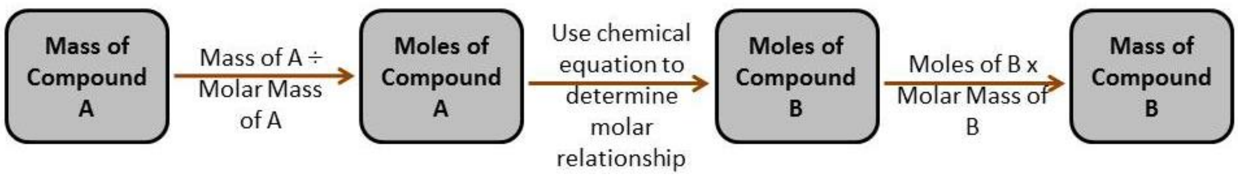

Figure 1
Flow chart for completing stoichiometric calculations

The maximum amount of product that can be produced is determined by using the reactant that will be consumed completely first. This chemical is called the *limiting reagent.* The limiting reagent can be determined mathematically or using observations made during the reaction.

In this experiment, you will produce magnesium oxide by reacting together magnesium metal and oxygen gas. You will calculate the theoretical and percent yield for your reaction using stoichiometry. The limiting reagent will be magnesium. The oxygen will come from the atmosphere.

Experimental Procedure

<u>Materials</u>

Crucible and cover	iron ring
crucible tongs	ring stand
~ 5cm magnesium ribbon	Bunsen burner
clay triangle	distilled water

CAUTION: A hot crucible will burn your fingers if you touch it.

1. Adjust the burner so that the burner flame is blue. Place the ring so that the bottom of the flame touches the bottom of the crucible in the clay triangle.
2. Heat the crucible and cover until the bottom is pink and continue heating for five minutes. Allow the crucible and cover to cool briefly and then determine their mass. All mass determinations should be to 0.001 g.

3. Loosely coil or fold the magnesium strip so that it fits into the bottom of the crucible. Put the magnesium strip in the crucible and determine the mass of the crucible, cover and magnesium.
4. Set the covered crucible on a clay triangle mounted over the Bunsen burner. Heat the crucible slowly at first and periodically lift the cover of the crucible slightly with the crucible tongs to allow a small amount of air into the crucible. If too much air is allowed in at one time, the magnesium will burn very brightly and the crucible should immediately be covered.
5. Continue heating and introducing air until the magnesium appears to be completely changed to ash. Then allow the crucible to completely cool on the lab bench.
6. Remove the cover and add a few drops of water. <u>If the crucible has not cooled enough, the cooler water will crack the hot crucible.</u> The purpose of the water is to substitute oxygen atoms for any nitrogen atoms that may have bonded to the magnesium atoms. The nitrogen is converted into ammonia.
7. Heat the crucible gradually to evaporate any water and then heat to as high a temperature as can be obtained with the burner. Allow the crucible to cool briefly and then determine it's mass.
8. Reheat the crucible and contents, cool briefly and again determine the mass. If the second mass determination disagrees with the first by more than 0.01 g, reheat. Continue reheating and cooling until two consecutive mass determinations are within 0.005 g. (This is called heating to a constant mass.)

Data Sheet
Record your data and calculations. Be sure to include the correct units.

Mass of crucible and cover	
Mass of crucible, cover and magnesium	
Mass of magnesium	
Mass of crucible, cover and magnesium oxide (First Heating)	
Mass of crucible, cover and magnesium oxide (Second Heating)	
Mass of magnesium oxide produced	

Reaction of Magnesium and Oxygen to Produce Magnesium Oxide

By Catherine Haslag

Introduction

The maximum amount of product that can be produced in a reaction can be determined using stoichiometry and is called the theoretical yield. The amount of product produced during a chemical reaction is called the experimental yield. The theoretical yield can also be related to the actual amount of product produced in a reaction. This is called the percent yield. The percent yield cannot exceed 100% because this would be a violation of the Law of Conservation of Matter.

In this experiment, magnesium metal will be reacted with oxygen gas to produce magnesium oxide. The theoretical yield will be calculated for this reaction. Using the theoretical yield and experimental yield produced during the experiment, we will calculate the percent for this reaction.

Reacting solid magnesium with oxygen produced magnesium oxide according to the following reaction:

$$Mg_{(s)} + O_{2(g)} \rightarrow MgO_{(s)}$$

Results

Table 1.0 presented below outlines the values obtained during the experimental procedure in this lab. The magnesium started as a shiny, silvery metal and appeared as a white powder once the reaction was complete. I produced 0.308g of magnesium oxide in this experiment.

Table 1.0

Experimental Data

Mass of crucible and cover	53.234g
Mass of crucible, cover and magnesium	53.452g
Mass of magnesium	0.218g
Mass of crucible, cover and magnesium oxide (First Heating)	53.544g
Mass of crucible, cover and magnesium oxide (Second Heating)	53.542g
Mass of magnesium oxide	0.308g

Conclusions

I determined the maximum amount of magnesium oxide that could be produced based on the amount of magnesium reacted is 0.363g. Since 0.308g of magnesium oxide was produced when the reaction was performed, the percent yield is 84.8%.

While I couldn't produce 100% of my theoretical yield, I produced relatively close to that amount. I know I didn’t violate the Law of Conservation of Matter because my percent yield did not exceed 100%.

Errors that affected my results could include losing a small amount of my product during transport to the scale (some of the powder may have blown out of the crucible) and not heating my magnesium long enough to react it completely.

References

Formation of Magnesium Oxide, Introduction to Chemistry Laboratory Manual, Riverland Community College, p 98.