

Chemistry Lab #2 - Accuracy and Precision Lab (Hydrochloric Acid and Magnesium)

ROUGH DRAFT pre-lab (goal through procedure) DUE WEDNESDAY, 9/28/11
FINAL DRAFT of lab (title page through procedure) in lab book DUE FRIDAY, 9/30/11
LAB WILL BE ON FRIDAY, SEPTEMBER 30, 2011

Goal

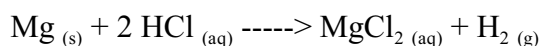
The goal of this lab is to determine the ratio of the mass of hydrogen gas to the mass of magnesium metal when magnesium reacts with an excess of hydrochloric acid.

Research Questions

1. What is the equation of the reaction that you will use to form the hydrogen gas?
2. This reaction is very exothermic. What does that mean?
3. What property of hydrogen gas makes it incompatible with exothermic reactions? What special safety precautions will you need because of this? [In other words, how will you keep your lab from blowing up?]
4. State the law of conservation of mass. How can it be used to measure the amount of hydrogen produced during the reaction without causing an explosion [Be specific!]
5. Define accuracy and precision. How will you know if your results are accurate? How will you know if your results are precise? [Be specific!]
6. What does “an excess of hydrochloric acid” mean? What do you predict will be left in the flask when the reaction has finished?
7. What does the 4 *M* mean when describing the hydrochloric acid?

Background Information

Many metals react with acids, causing the metals to form ionic compounds in solution. One such reaction is



This reaction states that magnesium (Mg) and hydrochloric acid (HCl) react to give dissolved magnesium chloride (MgCl₂) and hydrogen gas (H₂). The **2** in front of the HCl indicates that twice as many molecules of HCl react as atoms of Mg.

You will put this reaction to good use to help you learn about the numerical concepts of accuracy and precision. Analytical chemists are often concerned with these quantities so they can better evaluate their results. One always tries to get both accurate and precise measurements.

Precision is a comparison of several measured values to each other. You will pool four groups' results (your group plus three others) to use in evaluating the precision of the measurements. Determine if the four groups' ratios are precise (or not). Give a reason for your answer.

Accuracy is the comparison of a measured value to an actual value. You will measure the accuracy in this lab by comparing your ratio of mass of hydrogen gas produced to the mass of magnesium reacted to the **literature value of 0.08294** (no unit; it's a ratio of grams over grams). Report your accuracy as your percent error.

Guidelines

You should use approximately 1 m of magnesium and 40 mL of 4 *M* HCl. The magnesium comes in a very springy ribbon form. Be sure to mass both reactants before the reaction occurs!

There are **MANY** real hazards in this lab! Be sure to carefully read the MSDS sheets of the reactants and products to determine the hazards.

Use a 125 mL Erlenmeyer flask for the reaction. Be sure not to contaminate the magnesium with your hands/fingers, your lab table, or any wet or dirty equipment. Do not start the reaction while massing!

Calculate the amount of hydrogen gas produced by using the law of conservation of mass. There is no need to trap the gas to do this. [DO **NOT** TRAP THE GAS!!!]

Note: This is a one-day lab!