

CHEM 1411 Lab 10: Which Reactant is Limiting? (The Reaction of Acid with Magnesium)

Introduction:

This experiment is an excellent classroom demonstration that the amount of product formed is limited by the amount of reactants available. The balanced equation for the reaction tells us that one mole of magnesium and two moles of hydrogen chloride yield one mole of the salt, magnesium chloride, and one mole of the gas hydrogen.



Determining the mass of magnesium chloride formed would be more complicated than measuring the quantity of hydrogen formed. We may easily trap the gas and measure it, and from the resulting volumes, we can find out if limiting the amount of magnesium or the amount of hydrogen chloride will limit the amount of product formed.

The limiting reactant is defined as the reactant that runs out first when a chemical reaction is carried out. The reaction stops at that point, and no more product is formed.

The excess reactant is defined as the reactant that does not run out first when a chemical reaction is carried out.

Excess or amount of excess reactant left over is defined as the quantity of the excess reactant that exceeds that which can react with the limiting quantity of another reactant or how much of the excess reactant is left over when the reaction has finished because all of the limiting reactant has been used up.

Equipment:

Three balloons of uniform size
3-125 mL Erlenmeyer flasks

Magnesium ribbon
150 mL of 1.0 M HCl

Parafilm
Wide stem funnel

Procedure:

1. Weigh 0.3, 0.6, and 1.2 g of Mg turnings
2. Place exactly 50 mL of 1.0 M HCl in each of three clean 125-mL Erlenmeyer flasks using a funnel so that you do not get the necks of the flasks wet with the acid.
3. Carefully drop one weighing of the magnesium into each balloon using a wide stem funnel. Without allowing the metal to cut the balloon or accidentally drop into the flask fit the rubber balloons over the necks of the flasks and fasten them with parafilm. Be sure no flames are nearby.
4. With your finger on the outside of the balloon, carefully push each weighing of magnesium until it falls into the acid, and observe and record what occurs. In each case, occasionally swirl the flask, and let it stand until no further reaction occurs. Record your observations and data on the Report Sheet. If the balloon breaks, place the flask in a fume hood (away from flames) until the reaction is complete. Dispose of waste in the appropriate container in the fume hood.

Chem 1411 Lab Manual Experiment 10 Answers

RC Schank

A decorative graphic consisting of a light blue horizontal bar with a rounded right end, and a red circular shape partially visible behind it.

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