Preparation of Magnesium Oxide

Learning Goals

1. Use a crucible and burner to heat magnesium metal to burning.
2. Determine the percent composition of a Magnesium Oxide product.
3. Use the percent composition information to find the empirical formula of your product.

Abstract

Metal oxides are formed when a metal is reacted with oxygen. In this lab, you will convert Magnesium metal (an element) to magnesium oxide (a compound). Magnesium is an alkaline earth metal, which reacts vigorously when heated in the presence of oxygen to produce magnesium oxide and magnesium nitride. The addition of water to the product causes a second reaction which leaves magnesium oxide as a solid product. Based on the weights of the reactants and the product, the percent composition of the product can be found. Using this information, the empirical formula of the magnesium oxide, Mg_xO_y can be determined.

Pre-lab Assignment

1. In your lab notebook, prepare your lab write-up to the data table section.

Procedures:

Chemicals	Equipment & Supplies	Instruments
Magnesium ribbon distilled water	Ceramic crucible & cover Bunsen Burner Ring stand clay triangle wire gauze crucible tongs	Balance

Burning magnesium produces a very bright white flame. DO NOT look directly at the flame, it can damage your eyes.

1. Place a clean, dry crucible and crucible cover on a clay triangle on a ring stand over a Bunsen burner. Adjust the height of the ring so the bottom of the crucible will be in the hot part of the flame. Place the cover so it is slightly ajar, allowing air to leave the crucible.
2. Heat the covered crucible for about 10 minutes. The bottom of the crucible should be red-hot. Turn off the burner and allow the crucible to cool for 15 minutes.
3. When the crucible is cooled to room temperature, transfer it to the balance with crucible tongs and record the mass.

Record the mass of the empty evaporating dish.

4. Do not touch the crucible with your hands or place on the lab bench, this may result in contamination.
5. Obtain about 0.15-0.2g of magnesium ribbon. If the metal is not shiny, rub it with steel wool to remove oxidized metal. Wipe the metal with a paper towel to remove the oxide dust. Weigh the clean metal to the nearest 0.0001g and record the mass.

Record the mass of the magnesium ribbon.


Magnesium is an ingredient in many types of fireworks. Combined with aluminum to make an alloy, it produces a bright white flame.

6. Fold the magnesium ribbon so it fits in the crucible. Place in the crucible. Cover the crucible and reweigh it. Place the crucible on the clay triangle over the Bunsen burner.
7. Carefully lift the edge of the crucible so you can see the crucible's contents. Start heating the covered crucible. Do not open the lid too far, doing so will cause the magnesium to enflame, carrying some oxide product away as smoke. The metal should glow brightly without flames.
8. Continue heating until no metal remains and the sample no longer glows. Turn off the burner and allow the crucible and its contents to cool to room temperature.
9. Remove the lid and place it on a wire gauze. Add 5 drops of distilled water to the crucible. Cover again with the crucible cover. Heat the crucible with the top slightly open for 8-10 minutes, until the product is dry. Allow the covered crucible and its contents to cool. Obtain the mass of the covered crucible. Reheat the crucible for three minutes on the burner, cool, and weigh again. If the the

weight differs by more than 0.02g, repeat the heating process until a constant mass is achieved.


Record the final mass of the iron oxide.

10. Clean your crucible and dispose of the waste in the correctly labeled waste container.

Data Collection:

The following measurements should be recorded in a data table:

initial mass of magnesium
final mass of magnesium oxide
mass of empty crucible after heating

Calculations:

1. Determine the percent composition of your product.

$$\% \text{ Magnesium (Mg)} = \frac{\text{initial mass Mg}}{\text{mass of magnesium oxide}} \times 100$$

$$\% \text{ Oxygen } (O_2) = \frac{\text{mass of Mg Oxide - initial mass of Mg}}{\text{mass of Mg oxide}} \times 100$$

2. Using the percent composition data and examples from class, calculate the empirical formula of the Mg_xO_y product.

Conclusion: