

Alkaline Earth Metals

PROBLEM

Why are group 2 metals classified as alkaline earth metals?

INTRODUCTION

Alkaline refers to anything with a pH above 7. It is the opposite of acid. In this laboratory exercise, you will examine the properties of calcium and magnesium, two metals from group 2, to determine why they are referred to as alkaline.

MATERIALS (per group)

Bunsen burner; calcium turnings; magnesium; medicine dropper; phenolphthalein; pH paper; safety goggles; scoop; steel wool; stirring rod; test tube holder; test tubes; wood splint

PROCEDURE

1. Put on safety goggles. Light your Bunsen burner.
2. Pour about 5 mL of water into a clean test tube.
3. Using a scoop, pick up a piece of calcium and drop it into the test tube. Observe what happens. Record your observations on the next page.
4. When bubbles begin to form, collect the gas being released by covering the mouth of the test tube with your thumb for several minutes.
5. After you have collected the gas for several minutes, light a wood splint with a Bunsen burner. Turn the test tube sideways, lift your thumb from the mouth of the test tube, and immediately insert the splint as shown in Figure 1. Record your observations.

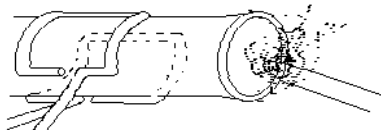


Figure 1

6. Insert a stirring rod into the liquid in the test tube. Using the stirring rod, put a drop of the liquid onto a piece of pH paper. Note the pH of the liquid. Record the results.
7. Put a drop of phenolphthalein into the test tube containing the calcium. Record the color.
8. Polish a 10 cm strip of magnesium with steel wool. Tear it into several pieces and put it in a clean test tube containing about 5 mL of water.
9. Place the test tube in a water bath set up like the one shown in Figure 2 on the first page. Add a drop of phenolphthalein to the test tube. Observe the color in the test tube as it heats. Record your observations below.

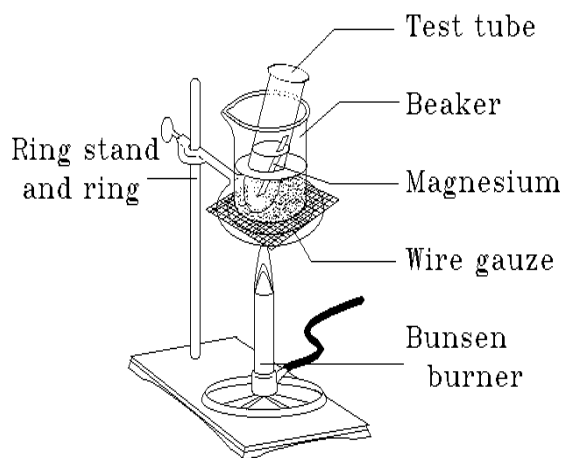


Figure 2

OBSERVATIONS

Calcium

Reaction description: _____

Wood splint test description: _____

pH: _____ Color of phenolphthalein: _____

Magnesium

Color of phenolphthalein: _____

CONCLUSIONS

1. Water is composed of hydrogen and oxygen. The gas that forms when the metal reacts with water, therefore, must be hydrogen or oxygen. Hydrogen explodes with a pop when exposed to a flame. Oxygen causes a flame to burn more brightly. Based on your observations, which gas is formed? _____
2. Based on your observations, which metal is more active, calcium or magnesium? _____
3. Based on your observations, what color is phenolphthalein in an alkaline solution? _____
4. Based on your observations, why are calcium and magnesium classified as alkaline earth metals? _____
5. How do you think the rest of the elements in group 2 would react with water? _____