WORKSHEET 10

EXPERIMENT: DECOMPOSITION OF A CARBONATE

Syllabus reference 8.2.4

INTRODUCTION

Compounds are pure substances made up of two or more different elements combined in fixed proportions.

Carbonates are one group of compounds that are commonly found in the Earth's crust. Common carbonates are calcium carbonate (limestone), magnesium carbonate (magnesite) and iron carbonate (siderite).

Metal carbonates can be decomposed to produce a metal oxide and carbon dioxide, then reacted further to produce the metal.

For example:

$$CuCO_3(s) \rightarrow CuO(s) + CO_2(g)$$

$$CuO(s) + C(s) \rightarrow Cu(s) + CO(g)$$

AIM

To investigate the decomposition of a carbonate.

[Bubbling CO_2 through limewater ($Ca(OH)_2(aq)$) is a test for carbon dioxide. In the presence of CO_2 the limewater turns milky due to the formation of $CaCO_3(s)$.]

EQUIPMENT

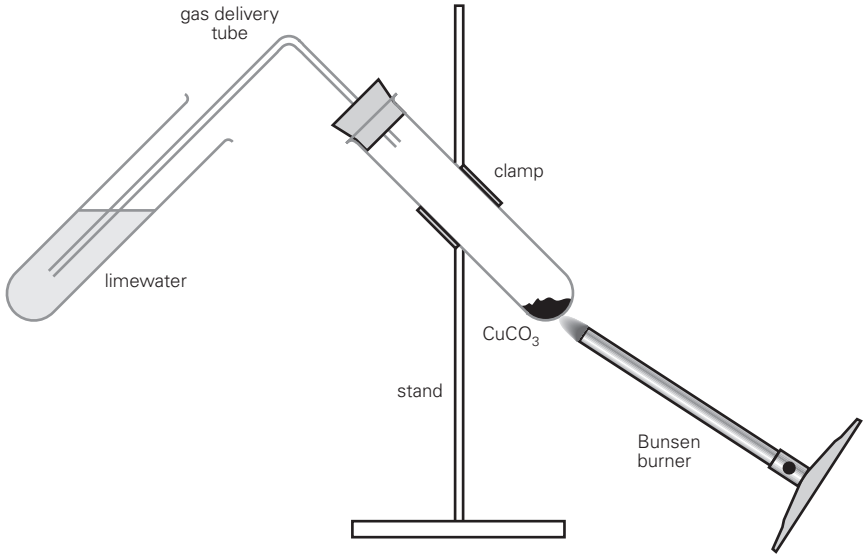
- copper carbonate (approx 2 g)
- limewater (saturated $Ca(OH)_2$ solution)
- Bunsen burner
- matches
- test tubes
- stand and clamp
- gas delivery tube and stopper
- 10 mL 1 mol/L hydrochloric acid (HCl) or sulfuric acid (H_2SO_4)
- spatula

SAFETY: Safety glasses must be worn at all times. Acids are corrosive so avoid contact with skin. If contact occurs wash thoroughly with water. After heating the copper carbonate remove the limewater before removing the Bunsen burner.

PROCEDURE

A Decomposition of a carbonate

1 Place a small amount of the carbonate in a large test tube and fit it with the gas delivery tube and stopper. Clamp the test tube to a stand.



2 Half fill another test tube with limewater and place the gas delivery tube in it.

3 Using a small blue flame gently heat the carbonate. Observe the carbonate and the limewater carefully. Record your observations.

Remove the limewater solution before removing the Bunsen burner.

4 Allow to cool.

B Comparing the product of decomposition with the original sample

5 Add 5 mL of the HCl or H_2SO_4 to the solid residue from Part A. Record your observations.

6 Transfer a small amount of the original carbonate to a clean, dry test tube and add the same amount of acid. Record your observations.

RESULTS

QUESTIONS

1 Write the equation for the reaction that occurred when the copper carbonate was heated.

2 What caused the change in the limewater? Write an equation for this reaction.

3 Compare the result of the tests with acid and explain the difference.

4 Why is it important to remove the delivery tube from the limewater before it is allowed to cool?