

RS•C

51. Reactions of calcium carbonate

Topic

Common reactions of chalk and limestone.

Timing

40 min.

Description

Students heat calcium carbonate to form calcium oxide. This is dissolved in water to form calcium hydroxide (limewater). Students then blow bubbles through this to form a cloudy suspension of calcium carbonate.

Apparatus and equipment (per group)

- ▼ Tripod
- ▼ Gauze
- ▼ Bunsen burner
- ▼ Tongs
- ▼ Two boiling tubes
- ▼ Drinking straw
- ▼ Universal Indicator solution
- ▼ Dropping pipette. Use the type of teat pipette (usually fitted to Universal Indicator bottles) that does not allow squirting. – eg Griffin.
- ▼ Filter paper
- ▼ Filter funnel.

Chemicals (per group)

- ▼ Calcium carbonate (small sample of chalk).

Teaching tips

A sample of soft chalk (calcium carbonate) reacts better than a marble chip. Blackboard chalk is not always calcium carbonate.

Background theory

A reminder about limewater and its reaction with carbon dioxide is advisable.

Safety

Wear eye protection. Remind students not to suck the calcium hydroxide into their mouths.

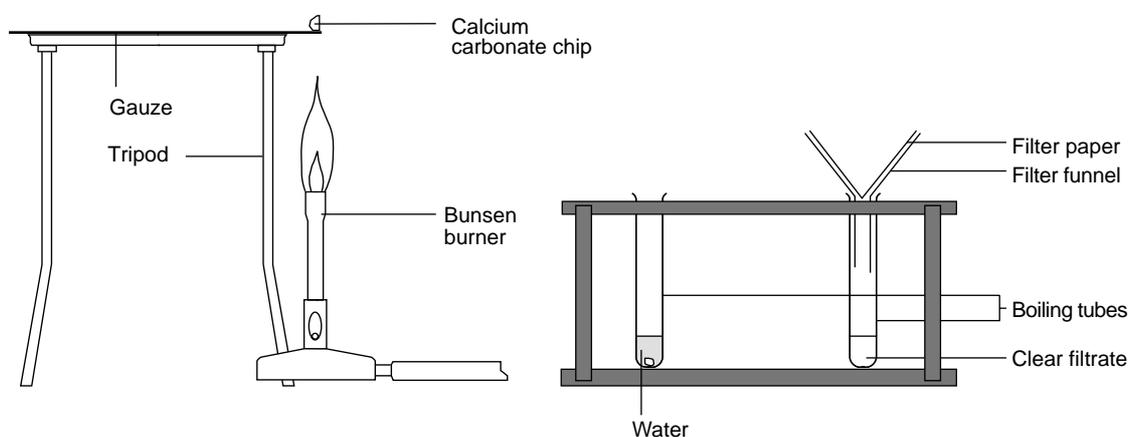
Answers

1. Calcium carbonate \rightarrow calcium oxide + carbon dioxide
2. Calcium oxide + water \rightarrow calcium hydroxide
3. Calcium hydroxide + carbon dioxide \rightarrow calcium carbonate + water
4. $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$
5. $\text{CaO} + \text{H}_2\text{O} \rightarrow \text{Ca(OH)}_2$
6. $\text{Ca(OH)}_2 + \text{CO}_2 \rightarrow \text{CaCO}_3 + \text{H}_2\text{O}$

Reactions with calcium carbonate

Introduction

Limestone and chalk are mainly calcium carbonate. In this experiment, calcium carbonate is heated to form calcium oxide. This is reacted with a few drops of water, and the resulting calcium hydroxide is dissolved in water. Carbon dioxide is bubbled through the water and the milky suspension of calcium carbonate characteristic of limewater and carbon dioxide is observed.



What to record

Observe what happens at each stage. Complete the table.

Method	Observation
Heat for 10 mins	
Add 2–3 drops of water	
Blow bubbles through solution	
Add Universal Indicator	

What to do

1. Set the chip of calcium carbonate, CaCO_3 , on a gauze. If your gauze has a coated circle use the edge where there is no coating. Heat strongly for 10 minutes.
2. Let the chip cool and use tongs to move to a boiling tube. Add 2–3 drops of water with a dropper.
3. Add about 10 cm^3 more water to the solid. Then filter half the mixture into the other boiling tube.
4. Gently blow a few bubbles through the filtrate.
5. Test the remaining half with Universal Indicator solution.

Safety

Wear eye protection. Take care not to suck the limewater into your mouth.



Questions

Write word equations for the reactions that occur at the following stages.

1. Calcium carbonate is heated.
2. Water is added to the product.
3. Carbon dioxide is bubbled through limewater.

Write formula equations for the reactions that occur at these stages.

4. Calcium carbonate is heated.
5. Water is added to the product.
6. Carbon dioxide is bubbled through limewater.