

What Happens to CO₂ Stored Underground?

Teacher Notes



Activity Description	The students consider and test what happens to CO ₂ when it is stored underground for long periods of time.
Time	1 hour
Learning Outcomes	<ul style="list-style-type: none">To understand the basic chemistry of CO₂-rock-water interactionsTo understand that over time mineral precipitation secures injected CO₂
Student Organisation	Groups
Materials Needed	What Happens to CO ₂ Stored Underground Student Worksheet

Talking Point

- What does the CO₂ do underground?
- Does it stay in a gaseous state?
- Does it move?
- Does it react with its surroundings?



What Happens to CO₂ Stored Underground Experiment

You will need:

- A 400–500ml beaker
- 200ml calcium hydroxide solution (limewater)
- A straw per student

Instructions:

- Fill up the small beaker with 100–200ml of calcium hydroxide solution
- Make a note of the state of the liquid at the start of the experiment
- Begin to blow bubbles gently through the straw into the solution – take turns to try this

BEWARE: MAKE SURE THE PUPILS DO NOT SUCK – CALCIUM HYDROXIDE IS DANGEROUS TO INGEST – WARN THEM APPROPRIATELY



Extension

If you have somewhere safe to store the beaker for a week then encourage the students to do so. They can come back to the beaker and see that the calcium carbonate will have precipitated out – leaving a 'limestone' layer on the base of the beaker.

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Student Worksheet



This experiment will show you one of the things that can happen to CO₂ when it is stored in formations containing salty, undrinkable water.

You will need:

- A 400–500ml beaker
- 200ml calcium hydroxide solution (limewater)
- A straw per student



Instructions:

1. Fill up the small beaker with 100–200ml of calcium hydroxide solution.
2. Make a note of the colour of the liquid at the start of the experiment .
3. Begin to blow bubbles gently through the straw into the solution – take turns to try this.

DO NOT SUCK – CALCIUM HYDROXIDE IS DANGEROUS TO INGEST

4. Make a note of any observed changes in the liquid.

Colour of the liquid before experiment:

Colour of the liquid after the experiment:



When you blow CO₂ into the calcium hydroxide solution, it causes a chemical reaction to occur and calcium carbonate, or limestone, precipitates.

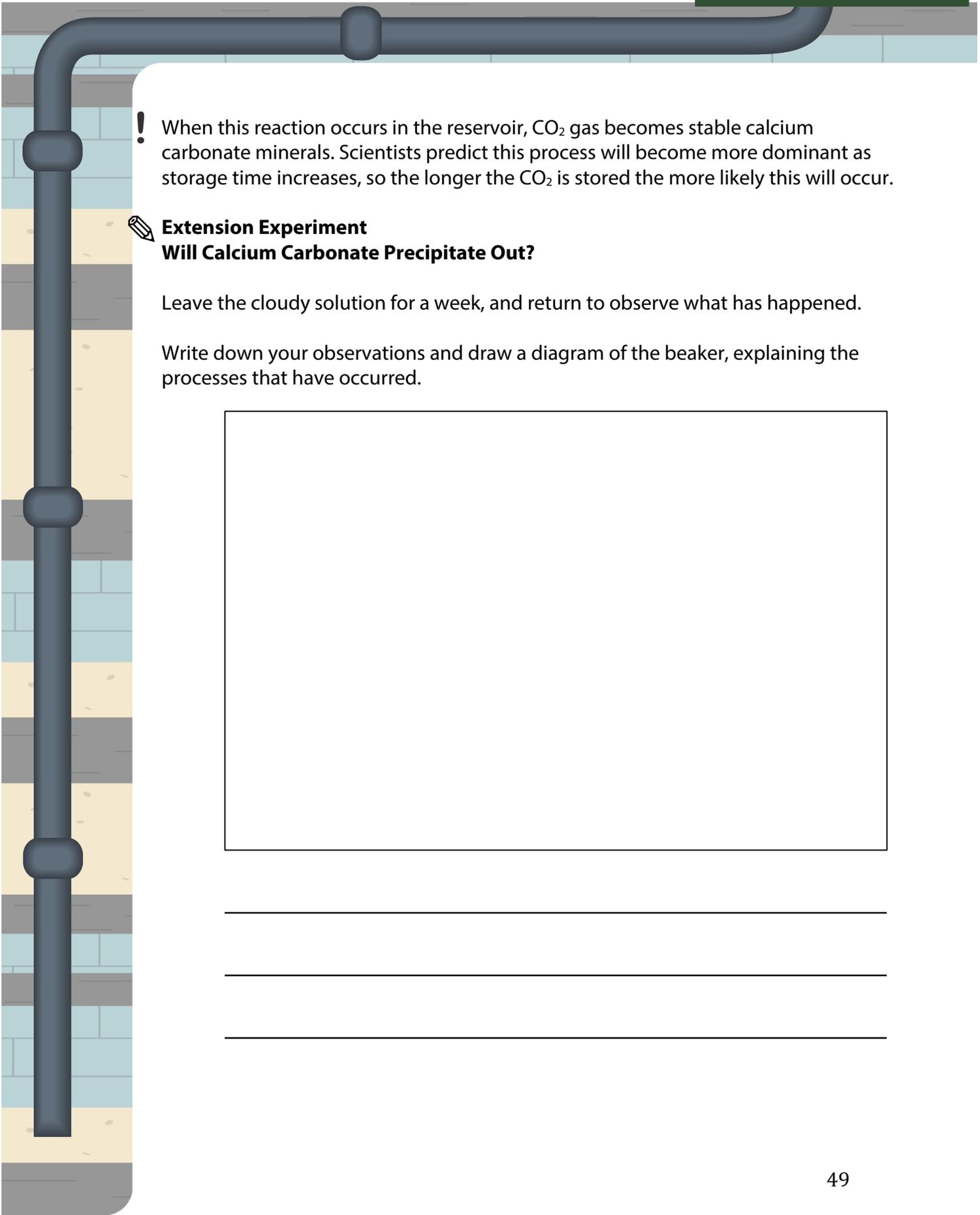
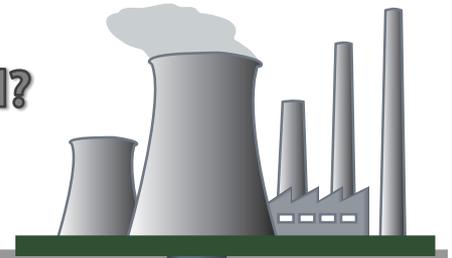
The chemical equation for this reaction is:



Follow the path of the CARBON atoms (highlighted in red). They are initially present as a gas, and are then locked into the solid structure of the CaCO₃.

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! When this reaction occurs in the reservoir, CO₂ gas becomes stable calcium carbonate minerals. Scientists predict this process will become more dominant as storage time increases, so the longer the CO₂ is stored the more likely this will occur.

 **Extension Experiment**
Will Calcium Carbonate Precipitate Out?

Leave the cloudy solution for a week, and return to observe what has happened.

Write down your observations and draw a diagram of the beaker, explaining the processes that have occurred.
