Carbon cycle: releasing dinosaur breath in the lab (for pupils)

Introduction

Animals get their carbon by eating plants and/or other animals. When oxygen combines with food in cells during respiration, carbon dioxide is released into the atmosphere during exhalation.

Some of the carbon dioxide from the atmosphere is stored in the ocean which acts as a carbon sink. Some of this dissolved carbon dioxide is used by marine organisms to make their hard parts of calcium carbonate. Limestone, including natural chalk, is made of the remains of marine organisms that lived and died millions of years ago. When limestone and chalk are formed, carbon can be locked away (as calcium carbonate) for millions of years.

What you need

Eye protection

Crushed natural chalk

Vinegar (alternatively use dilute hydrochloric acid (1 mol dm^{-3}), which has the advantage of not smelling)

Flask

Balloon

Test tube

Limewater (calcium hydroxide solution)

Safety

Wear eye protection

What to do

1. Pour limewater into the test tube to a depth of 2 cm
2. Place the crushed chalk in the flask.
3. Add vinegar (or hydrochloric acid) to the flask and quickly place the balloon over the flask neck making sure there are no gaps.
4. When the reaction has stopped (when the fizzing stops) pinch the balloon tightly at the neck so no gas can escape and remove it from the flask.
5. Move the balloon over to the test tube and squeeze the balloon so the gas goes into it.
6. Observe the limewater.

Questions

Q 1.	What colour was the limewater to begin with?
Q 2.	What happened to the limewater when you added the gas from the balloon?
Q 3.	Where did the gas in the balloon come from?
Q 4.	What reaction was responsible for creating it?
Q 5.	What gas was released from the chalk by the reaction?

Extension questions

Q 1.	Where did dinosaurs get their carbon from?
Q 2.	Why could you say that “dinosaur breath” was released from the chalk? How did it get there?
Q 3.	Draw a dinosaur on the geological carbon cycle diagram and draw arrows to show the steps from how the dinosaur got carbon to how carbon dioxide got from the dinosaur into the chalk.