Ocean acidification in a cup

Dr. Helen Findlay measures the gas exchange through the sea ice between the air and ocean

Summary

This experiment shows how water becomes more acidic when carbon dioxide is bubbled through it. It also references respiration. It is best to use distilled water rather than tap water, as tap water can be quite hard (i.e. containing a lot of dissolved calcium carbonate). This hardness can slow down the acidification process as the carbonate ions attempt to buffer it.

You can create a seawater substitute by dissolving 32g of table salt in 1 litre of water. This represents the average salinity of the oceans.

Equipment needed per group of 2:

- Boiling tube or beaker containing 100ml distilled water – labeled 'fresh water'
- Boiling tube or beaker containing 100ml 'sea water' – labeled 'sea water'
- 2 straws
- pH indicator (either Universal Indicator or Hydrogen Carbonate Indicator) or pH meter
- Watch or timer
- Activity Sheet – Ocean acidification pupil sheet

Overview

Pupils will start by estimating the pH of the two types of water and creating a hypothesis about what will happen when they blow through the solutions.

Pupils will record how the pH of the two types of water changes as they blow through the straw into the waters for 2.5 minutes at 30 second intervals.

A plenary activity can be based around what changes they have observed and why they think that this has happened.

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Underwriting Ambition

Ocean acidification pupil sheet

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You are going to have a look at the pH of two different types of water: fresh water and sea water. Then you are going to blow through a straw and bubble your breath through the two types of water and see what happens.

Before you start, try to answer the following sentences in your book.

1. I think that the pH of the fresh water will be pH ___, because…
2. I think that the pH of the sea water will be pH ___, because…

Now add 5 drops of pH indicator to each water sample. Were your predictions for the pH levels right?

The next step is to see what happens when you blow through each solution.

3. How do you think the pH of the water will change when you blow through it? Can you think of reasons for your answer?

Now take it in turns to count the time and blow through the straw. Copy and complete the table, making a note of how the pH changes after every 30 seconds. Start with the fresh water and then test the sea water.

Time	Fresh water pH	Sea water pH
0 seconds		
30 seconds		
60 seconds		
90 seconds		
120 seconds		
150 seconds		

Now think about what happened.

4. What changes did you observe?
5. Is this what you expected to happen? Why? Why not?
6. Was there a difference in what happened between the fresh water and the sea water? Why do you think this is?