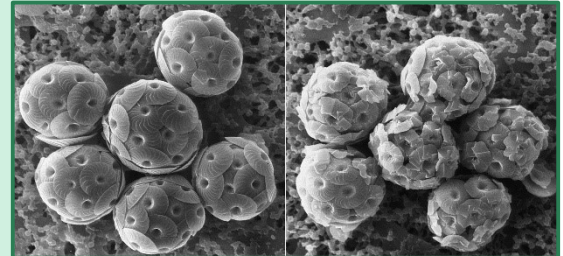


Activity 9 – The Acidification of the Oceans

Why does CO₂ make the oceans acidic and what are the consequences?

Background:

Measurements of the pH value in the oceans show an increasing acidification of the water. If the content of the greenhouse gas CO₂ in the Earth's atmosphere rises (for example due to the burning of fossil fuels), it will also increasingly be dissolved in seawater, where it chemically reacts to carbonic acid ($\text{H}_2\text{O} + \text{CO}_2 \rightleftharpoons \text{H}_2\text{CO}_3$). This has fatal consequences for the life of algae and animals living there, which are not adapted to the increasingly acidic environment. In addition, the shells of calcareous algae, for example, become thinner (see figure) and corals lose their calcareous skeleton. The CO₂ fixing of the oceans is decreasing overall.



Calcareous algae: on the left side today's ocean, on the right side ocean with high CO₂ content. [Source: IFM-GE-

Materials:

- ✓ Two 50 ml beakers
- Universal indicator with pH-value chart
- Citric acid, sodium bicarbonate and water
- Erlenmeyer flask with rubber stopper and tube



Experimental setup

Implementation:

Put 50 ml of water into a beaker and add 15 drops of the indicator until the solution changes its colour significantly.

Note the pH value of the solution.

Pour half of the solution into the second beaker.

Mix one teaspoonful each of citric acid and baking soda in the Erlenmeyer flask, then carefully add some water and conduct the resulting CO₂ (carbon dioxide) with the tube into the water in the second beaker (see illustration).

Note the pH value of the solution in the second beaker.

Describe the test result in one sentence!

Evaluation:

Answer the following questions with the help of the background text for Experiment 1 and with an internet search under the QR code shown on the right:

To what extent do oceans seem to contribute to a slowdown of the man-made greenhouse effect?

What consequences does acidification of the oceans have for its creatures?

Do not pour away:
You need the solution in
the second beaker for
activity 10!

