Teacher Version

Shell-Shocked

How is sea life affected as the oceans become more acidic?

Key Concept

More acidic oceans make it harder for sea life to build their protective shells or exoskeletons.

What You Should Know

- More than 80% of all life on Earth is in the oceans
- The oceans have absorbed about half of all the extra carbon dioxide people have put into the air over the last 150 years
- All the extra carbon dioxide going into the oceans is making them slightly more acidic

Materials (per student or group of students)

- Tall clear cup
- White vinegar
- Piece of cuttlefish bone, seashell or chalk
- Sheet of paper towel
- Paper
- Plastic spoon

The Prediction

We're going to put this shell in vinegar for an hour. What do you think will happen to it?

Investigation

1) Trace your shell on a piece of paper and save it.
2) Lightly press down on the shell. How firm is it?
3) Fill a cup halfway with vinegar (aka acetic acid).
4) Place the shell in vinegar and leave it for at least an hour.
5) Lift the shell out of the vinegar with a spoon onto a paper towel.
6) Lightly press down on the shell with your thumb and observe what's happened to it.
7) Do another shell-tracing next to the original. Has it changed?

Discussion

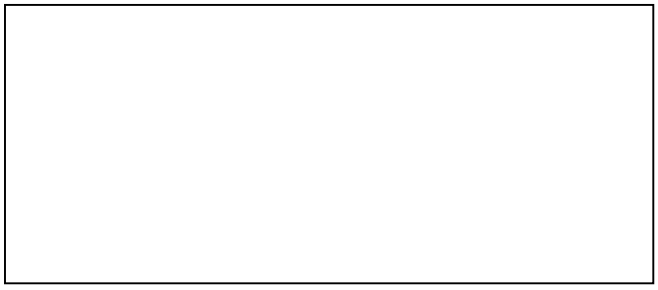
1) When did you notice bubbles rising from the shell? What are these?
2) Was the shell weaker after being in the vinegar? Smaller?
3) Since vinegar is an acid, what does that mean about the acidity of our oceans?

What's Happening?

Sea shells are primarily made of calcium carbonate, $CaCO_3$, which is one of the most common compounds on Earth. Acid is an enemy of calcium carbonate. Vinegar, a weak acid, begins to dissolve the shell. The bubbles coming off the shell are carbon dioxide bubbles. When calcium carbonate reacts with an acid, the calcium dissolves and the carbonate becomes the gas, carbon dioxide.

Shell-Shocked Data Sheet

Trace the shell (cuttlefish bone or chalk) before placing it in the cup of vinegar.



Gently press down on the shell with your thumb. Does is feel strong?
Place the shell in a cup of vinegar and leave it there for at least half an hour.

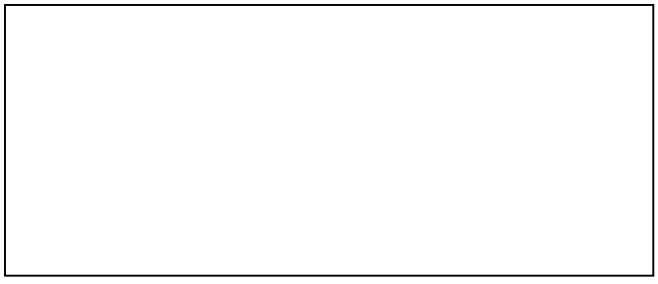
Prediction

What do you predict will happen to your shell?

Record Your Data

What's happening to the shell after being placed in the vinegar?

Lift your shell out of the vinegar with a spoon. Trace the shell again.



Place it on a paper towel and gently press down on the shell with your thumb. What's happened to the shell?