

CURIOSITY AT HOME

DISSOLVING SEA SHELLS



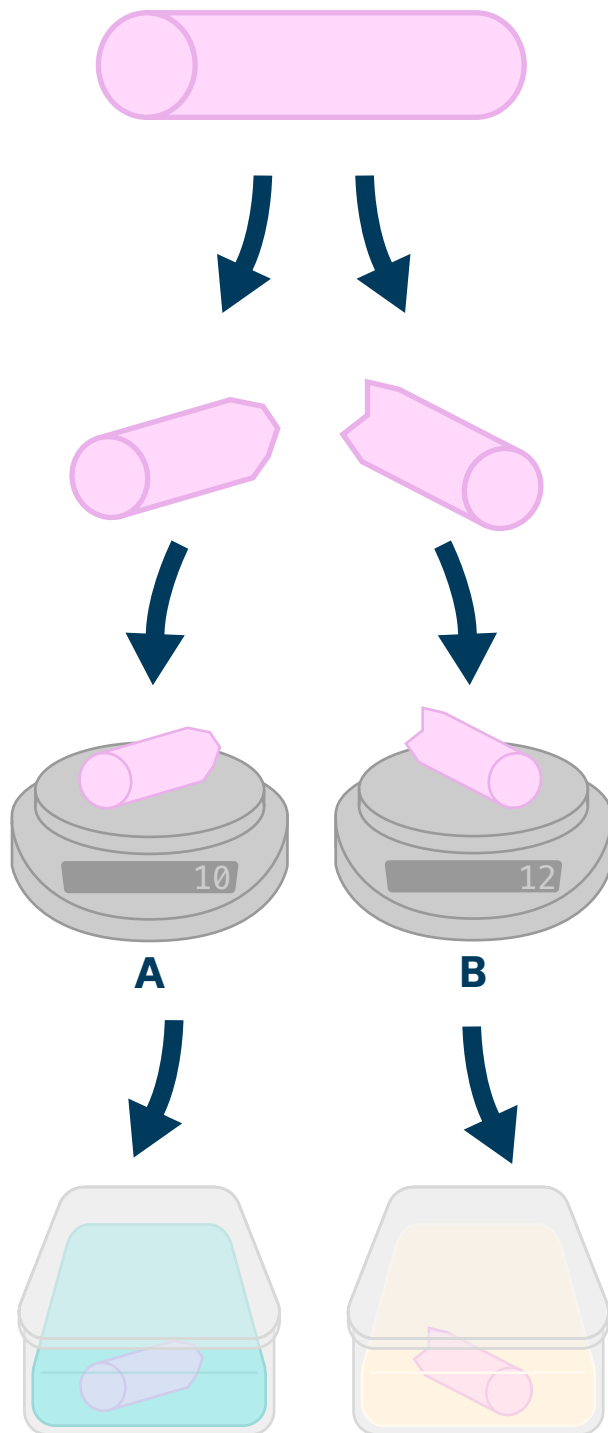
What happens to shellfish when ocean water becomes more acidic? Find out in this experiment using chalk to represent sea shells and vinegar to represent an acidic environment.

MATERIALS

- Sidewalk chalk
- Clear vinegar (examples: white vinegar or rice vinegar)
- Room temperature water
- Paper towel
- Two jars or containers with lids (substitute: cups and plastic wrap)
- Piece of tape for labelling (example: blue painter's tape)
- Scale capable of measuring in grams or fractions of ounces (example: kitchen scale)
- Science notebook or paper
- Something to write with

PROCEDURE

- Break a piece of chalk into smaller pieces of about the same size.
- Weigh one piece of chalk and record its weight in your science notebook as "chalk piece A".
- Put chalk piece A into one container and use the tape to label this container "A".
- Repeat by weighing and recording a second piece of chalk as "chalk piece B" and placing it in a container labelled "B".
- Fill container A with room temperature water. Make sure the chalk is totally underwater.
- Fill container B with room temperature vinegar. Ensure the chalk is totally covered by vinegar.
- If you are using cups, cover the top with plastic wrap at this point.
- Use your science notebook to record observations of the chalk pieces in the different liquids. Is there anything different between the two pieces of chalk, or do they look the same?
- Place containers in an out-of-the-way location, such as a windowsill, kitchen counter or bookshelf.



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- How do you think these pieces of chalk will change after a week in their respective liquids? Record your prediction in your science notebook.
- Every day for a week, check on your chalk pieces. Make visual observations of any changes and write or draw what you observe in your science notebook.
- After a week, remove chalk piece A from container A. Place the chalk on a piece of paper towel labelled A. Remove chalk piece B from container B, and place on paper towel B. Let the pieces of chalk dry for several hours to a day.
- Weigh chalk piece A with the food scale, and record the new weight in your science notebook. Weigh chalk piece B and record its weight as well.
- Calculate the changes in weight for each piece of chalk by subtracting the new weight from the old weight. Did the pieces of chalk gain or lose weight? Which piece of chalk changed weight more? Why might this be?

EXPLORE MORE

- Repeat the experiment, but add temperature as a variable. Set up four containers with pieces of chalk labelled 1A, 1B, 2A, and 2B. Fill containers 1A and 2A with water and containers 1B and 2B with vinegar. Put containers 1A and 1B in the fridge and put containers 2A and 2B on a sunny windowsill where they will get warm. How does temperature affect the speed at which the chalk dissolves?
- Repeat the experiment, but use sea shells instead of pieces of chalk. What happens this time?

WHAT'S HAPPENING?

Many liquids have the property of being either acidic or basic. Some examples of acids include lemon juice, vinegar, and battery acid. Some examples of bases include soap, bleach, and ocean water. As human-made carbon dioxide dissolves into our oceans, sea water is acidifying, or becoming less basic. In our experiment, we modeled how the chemical calcium carbonate, which is found in both chalk and sea shells, dissolves more quickly in acidic environments. Acidifying ocean water leads to thinner and weaker shells for shellfish like oysters, clams, mussels and crabs, making it more difficult for them to survive. While the ocean is not becoming as strongly acidic as vinegar, even small changes in acidity have big impacts on marine life.



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K-2 GRADE EXPLORATION

- Why do you think shellfish (like clams and oysters) have shells?
- Which ocean would you prefer to live in if you were a clam – one that is more acidic or one that is more basic?
- Draw an ocean food chain with shellfish in it. What is one thing shellfish eat? What is one creature that eats shellfish? Use a book or ask an adult to help you go online to find the answer.
- How would creatures that like to eat shellfish be affected if there were less clams or oysters to eat?
- The carbon dioxide released into the atmosphere and the ocean by people comes from vehicles like cars and trucks. What are some ways people can use cars less often?



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3–5 GRADE EXPLORATION

Explore the following questions and write your responses in your science notebook.

- The piece of chalk that was placed in vinegar became lighter. Where do you think the missing chalk went?
- Why do you think shellfish (like clams and oysters) have shells?
- Shellfish are an important food source for many ocean creatures. Draw an ocean food web including shellfish in your science journal. Then make a prediction on what would happen if there were less shellfish in an ocean ecosystem.
- The carbon dioxide released into the atmosphere and the ocean by people comes from sources like cars, factories, farms, and power plants. What are some things people can do to make sure less carbon dioxide ends up in the ocean and atmosphere?



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6–8 GRADE EXPLORATION

Explore the following questions and write your responses in your science notebook.

- A seashell and a piece of chalk are both made of calcium carbonate molecules. When exposed to an acid, a chemical reaction happens and some of the molecules are broken off and dissolved into the liquid. Draw a diagram to explain this process to someone else.
- If the overall mass of the piece of chalk decreased, what would have happened to the mass of the liquid? (Note: Because some liquid ended up absorbed into the paper towel, you will not be able to get an accurate measurement of the total mass of liquid).
- Human-caused release of carbon dioxide into the atmosphere is responsible for ocean acidification. What are some things humans can do to reduce ocean acidification or otherwise prevent it from harming shellfish populations?



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