

If I am an Environmental Geologist...
I study the changes in the composition of the Earth.

Experiment 4

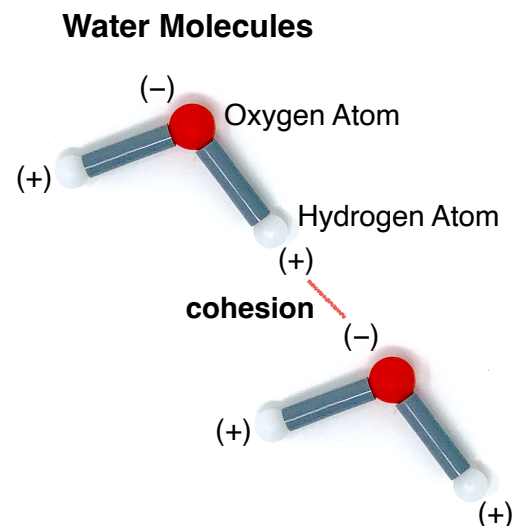
Weathering

You will need the beaker (H), measuring cup (K), water, a raw egg, and access to a freezer.

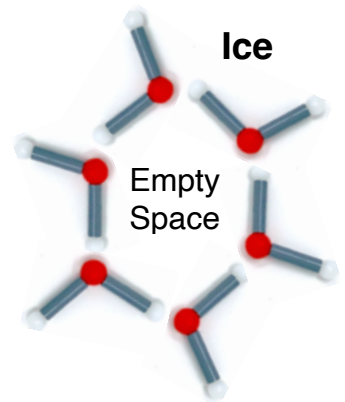
Things to Know:

Weathering is the breaking down of rocks and minerals through contact with wind, moving water, ice, chemicals, and biological organisms. When sandstone is weathered, sand is produced. Once a rock has been weathered, a process called erosion transports the bits of rock and mineral away.

Solar energy drives the weathering process. Freeze-thaw weathering occurs after water repeatedly freezes and melts inside tiny rock pores. Ice and water are made of a small molecule with one oxygen atom and two hydrogen atoms. The oxygen atom has a slight negative charge and the hydrogen atoms are slightly positive. Because opposite charges attract, the hydrogen atom of one water molecule is attracted to an oxygen atom of a second water molecule and the molecules stick together. The attraction between water molecules is called cohesion. Cohesion allows water molecules to stay connected to one another as the water flows and as ice freezes.



When the temperature changes to below 0°C, water freezes and the molecules are attracted into the shape of a hexagon. The hexagon shape of ice occupies more space than liquid water. As a result, water expands when it freezes and ice is less dense than liquid water. During the day, the ice will thaw and refreeze again when the temperature drops. This process widens the cracks in rocks and eventually breaks them apart.



What To Do

1. Add 60 mL of water to the measuring cup.
2. Carefully move the cup to the freezer.
3. When the water is frozen, remove the measuring cup from the freezer. What do you observe about the volume of ice in the measuring cup? Record all of your observations for this activity on the student sheet.

Do you think ice will sink or float in water?

4. Add 30 mL of water to the beaker.
5. Warm the outside of the measuring cup with your hands for 1 minute.
6. Carefully move the ice out of the measuring cup and into the water in the beaker. Record your observations.
7. Does the ice sink or float? Explain the behavior of ice in water.

Let's pretend that a raw egg is a rock. The egg shell represents a hard rock-like material. The liquid inside the egg represents a pore filled with water.

8. Predict what will happen to the raw egg if you put it in the freezer.
9. Place the raw egg in a plastic bag. Put the egg in the freezer and leave it in the freezer overnight. Record your observations.
10. Use your observations to predict the process of freeze-thaw weathering of rocks.
11. Answer the questions on the student sheet.

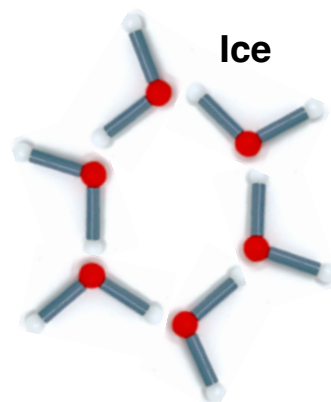
Name _____

Date _____

Experiment 4: Weathering

1. When the water in the measuring cup froze, what did you observe about the volume of ice?
2. Predict whether the ice will sink or float in water.
3. Describe what happened when you put the ice in the beaker of water?

4. Use the structure of ice to explain the behavior of ice when it is placed in liquid water.



5. Predict what will happen to the raw egg if you put it in the freezer.
6. Describe what happened to a raw egg when it froze.

7. Put the steps of the process of freeze-thaw weathering of rocks in order by placing the number 1 below the first step of the process. The last step of the process should be number 4.

Ice thaws and the water seeps deeper into the crack.



Repeated freezing and thawing causes the rock to split.



Water collects in a rock pore or crack.



Water freezes and expands, forcing the crack to widen.



8. Describe the flow of energy that drives the weathering process of rocks.

9. Describe how the weathering process of rocks is related to the rock cycle.