

Materials Needed

Crackers (enough to have one per student)

Demonstrating Mechanical and Chemical Weathering using Crackers



Summary

In this activity, students will learn the difference between mechanical and chemical weather.

Background Information

Weathering is a process that helps shape the Earth's surface. It affects rocks in place and does not involve the movement of materials to other locations. This is what distinguishes weathering from erosion. There are two types of weathering: mechanical and chemical. Simply put, mechanical weathering is the breaking down of rocks into smaller pieces. With mechanical weathering, the composition of the rocks does not change. There are several types of mechanical weathering. Freeze-thaw occurs when liquid water seeps into cracks in the rocks and then freezes and expands. This expansion causes the cracks to grow and the rock to break apart. Another way mechanical weathering can take place is by shrink-swell. As rocks heat up, they expand and then shrink as they cool. This process can cause the rock to again break down into smaller pieces. Salt can also cause mechanical weathering. Salt water can fill cracks

in rocks and the salt is left behind when the water evaporates. As the salt crystals grow, they push the rock further and further apart.

Chemical weathering involves a change in the chemical composition of the rocks. There are three main types of chemical weathering: Dissolution, Oxidation and Hydrolysis. Dissolution occurs when acidic waters dissolve limestone rock formations. Oxidation is a process similar to rusting in which the iron found in rocks becomes oxidized. Hydrolysis causes the weathering of silicate minerals into clays.

Vocabulary*

Erode (Erosion): To wear away, or remove, rock or soil particles by water, ice, and/or gravity

Weather (Weathering): To break down rocks and minerals at or near Earth's surface into smaller particles and soil

Chemical Weathering: The breaking down of rocks by changing the chemical composition of the rocks

Mechanical Weathering: The breaking down of rocks by physical means

**from www.soils.4teachers.org/glossary*

Methods/Procedure

1. Give each student a cracker.
2. To demonstrate mechanical weathering, use your hands to break the crackers into smaller pieces. Record observations in your science journal.
3. To demonstrate chemical weathering, put the cracker pieces in your mouth and chew but DO NOT swallow. Record observations in your science journal.

Notes

If you cannot use food items in your classroom, this lab can be done using antacid tablets instead of crackers and a cup of water instead of your mouth.





Analysis Questions

1. Explain what happened when the cracker went through the process of mechanical weathering.
2. When the cracker went through mechanical weathering was it still a cracker? Why or why not?
3. Explain what happened when the cracker went through the process of chemical weathering.
4. When the cracker went through chemical weathering was it still a cracker? Why or why not?

Conclusion Questions

1. Explain how this demonstration can be applied to actual rocks on the Earth's surface.

Sources

Achieve, Inc. (2014, March 26). *Next Generation Science Standards*. Retrieved from Next Generation Science Standards: <http://www.nextgenscience.org/>

Boudreau, D., Costa, H., Hall, H., Hunt, J., McDaniel, M., Ramroop, T., . . . Teng, S. (2014, March 26). *Weathering*. Retrieved from National Geographic Education: http://education.nationalgeographic.com/education/encyclopedia/weathering/?ar_a=1

Mechanical and Chemical Weathering. (2014, March 26). Retrieved from Eastern Illinois University: <http://www.ux1.eiu.edu/~cfjps/1300/weathering.html>

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Next Generation Science Standards

2nd grade | 4th grade | 5th grade | Middle School | High School

- 2-ESS1-1.** Use information from several sources to provide evidence that Earth events can occur quickly or slowly.
- 2-ESS2-1.** Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.
- 4-ESS2-1.** Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.
- 5-ESS2-1.** Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.
- MS-ESS2-2.** Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.
- MS-ESS2-1.** Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.
- MS-ESS3-1.** Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.
- HS-ESS2-1.** Develop a model to illustrate how Earth's internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features.
- HS-ESS2-5.** Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.

Enduring Understandings

- Earth events can occur quickly or slowly.
- Solutions can be developed to slow or prevent changes in the landscape.
- Water, ice, wind and vegetation effect the rates of weathering and erosion.
- The geosphere, biosphere, hydrosphere, and atmosphere interact in various ways.
- Different processes change the Earth's surface at time and spatial scales that can be large or small.
- Earth's materials move in a cycle.
- Earth's resources are limited and unevenly distributed.
- Water effects Earth's materials and surfaces processes

Essential Questions

- How can changes in the landscape be slowed or prevented?
- How are the rates of weathering and erosion effected by wind, ice, water, and vegetation?
- How do the geosphere, biosphere, hydrosphere, and atmosphere interact?
- What processes shape the Earth's surface?
- Why are the Earth's resources limited and unevenly distributed?
- How does water effect Earth's materials and surface processes?

Additional Resources

www.soils4teachers.org



Soil Science Society of America
www.soils.org

