Mechanical Weathering

Introduction

How does a large boulder become sediment? Through a process called weathering, larger particles are broken down by chemical and physical means.

Concepts

- Mechanical weathering
- Erosion

Background

Weathering is a breakdown of the materials that form the Earth's crust, the breaking down of rock into smaller and smaller particles. The movement of these particles by water, wind, ice, or gravity is called erosion. The two primary types of weathering are chemical and mechanical. Chemical weathering generally occurs when the Earth's crust is exposed to acidic water in the form of groundwater or precipitation (rain or snow). Mechanical weathering, on the other hand, involves physical forces such as freezing and thawing, the movement of water, prying by roots, abrasion, or wind.

Weathering is an important part of the weather cycle. The particles that result are called sediments and are the basis for all soils. This activity focuses on one form of mechanical weathering called abrasion, which is the result of breaking or grinding rock through collisions with moving particles. A sugar cube will be used to represent a boulder undergoing mechanical weathering.

Materials

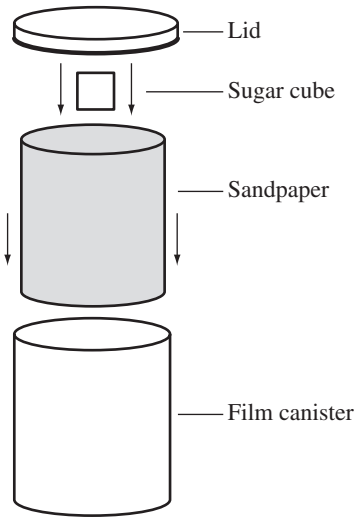
Sandpaper, 100 grit
Balance, 0.01-g precision
Film canister, 35 mm
Stopwatch or clock
Sugar cube

Safety Precautions

Although the materials in this activity are considered nonhazardous, please observe all normal laboratory safety precautions. Wash hands thoroughly after performing laboratory experiments. All food-grade items brought into a laboratory are considered chemicals and should not be consumed.

Preparation

1. Obtain a 35 mm film canister.
2. Cut the sandpaper into strips that will line the inside of a film canister. The strips should be as wide as the inside height of the film canister and as long as its circumference.



Procedure

1. Line the film canister with the cut sandpaper. The grit should be facing toward the center of the canister
2. Using a balance, measure and record the mass of one sugar cube in grams.
3. Place the sugar cube in the film canister and secure the lid.
4. Vigorously shake the film canister for 1 minute.
5. Remove the sugar cube and, using a balance, find and record the new mass in grams.
6. Observe the shape of the sugar cube. Pay particular attention to the straight edges. Record any changes in the appearance of the sugar cube.

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7. Replace the sugar cube into the canister, replace the lid, and repeat steps 4–6 for a total of ten trials.
8. Graph the mass of the sugar cube versus "weathering time" using either a bar graph or a scatter plot (line chart).

Disposal

Please consult your current *Flinn Scientific Catalog/Reference Manual* for general guidelines and specific procedures, and review all federal, state and local regulations that may apply, before proceeding. Materials in this activity may be placed in the trash according to Flinn Suggested Disposal Method #26a.

Tips

- Ensure that the lid is on the canister tightly and hold the canister firmly when shaking to avoid it or the sugar cube from becoming a projectile.
- Compare various grit sandpapers to see which will weather the sugar cube "boulder" faster. Set up a control using no sandpaper in the film canister.
- Film canisters may be obtained from a photo processing facility, commonly found in drug stores and super stores. Sugar cubes can be found in most grocery stores.

Connecting to the National Standards

This laboratory activity relates to the following National Science Education Standards (1996):

Unifying Concepts and Processes: Grades K–12
Evidence, models, and explanation
Constancy, change, and measurement
Content Standards: Grades 5–8
Content Standard B: Physical Science, properties and changes of properties in matter.
Content Standard D: Earth Science, structure of the Earth system, Earth's history.
Content Standards: Grades 9–12
Content Standard B: Physical Science, structure and properties of matter.
Content Standard D: Earth and Space Science, energy in the Earth system, origin and evolution of Earth system.

Materials for *Mechanical Weathering* are available from Flinn Scientific, Inc.

Catalog No.	Description
S0165	Sandpaper, 9" × 11" sheets, 4
AP1572	Timer, Stopwatch

Consult your *Flinn Scientific Catalog/Reference Manual* for current prices.