

Sec: _____ Name: _____

Experiment: Mechanical Weathering of Rocks
(E. Science 9-7-1b)

Purpose: To see how mechanical (physical) weathering break down rocks. To see how increasing surface area increases rate of chemical reaction.

Materials: **Part A:** pan balance water
100 g limestone or shale samples goggles
plastic bottle with cap wire strainer
Part B: 2 sugar cubes 100 ml beaker
50 mL graduated cylinder

Methods: **Part A: Mechanical Weathering**

1. Determine the mass of the presoaked limestone or shale using the pan balance record as original mass under each of the times in chart.

2. Place the chips into the plastic bottle and add enough water so that the bottle is about half - filled. Seal the bottle with the cap.

3. Before continuing, make a list of the factors that you think will affect the weathering rate of the rocks. **Caution: (Wear goggles).**

4. Shake the bottle vigorously for two minutes. Uncap the bottle and pour the water and rock through the strainer. Rinse the rocks off, and again determine the mass of the rock material. Record this value under final mass for the two minute time.

5. Repeat steps 2 and 4 until 20 minutes of shaking time have been complete, broken into shaking intervals of two minutes each. Record the original mass and the final mass of the rock material at each shaking time.

6. Note the change in the angular rock chips are the experiment progresses.

Part B: Surface Area Factor

1. Work in groups of four. One set of lab partners will work with a regular sugar cube, the other set of lab partners will work with a crushed sugar cube.

2. Place each sugar cube (or sediments of) in a 100 mL beaker & add 50 mL of water.

3. Gently stir each of the beakers the same amount and record how long it takes to dissolve the sugar. Record the time it takes to dissolve the sugar for each beaker.

Results:

Part A: Mechanical Weathering

3. Factors affecting weathering rate: _____

shaking time (min)	2	4	6	8	10	12	14	16	18	20
original mass										
final mass										
change in mass										



6. Change in angular rock: _____

Part B: Surface Area Factor

Time to dissolve solid sugar cube: _____ sec. crushed sugar cube: _____ sec.

Conclusions:

1. What happened to the mass of the rock material after each period of shaking?
2. What was the total change in mass of the rock from the beginning to the end of the 20 - minute shaking time?
3. Calculate the percentage of loss of original mass for each 2 minute time using the following equation. Record this percent for each time.

$$\% \text{ of mass loss} = \frac{\text{change in mass}}{\text{original mass}} \times 100$$

shaking time (min)	2	4	6	8	10	12	14	16	18	20
percentage of loss										

4. When did the "mechanical weathering" in this experiment occur most efficiently, near the beginning couple of minutes or near the twenty minute mark?
5. Explain why this (question number 4) occurs.
6. What were some of the factors in this activity that affected the rate that the rock was mechanically weathered?
7. Does a sugar cube that is crushed have more surface area or less?
8. Explain why the sugar cube that was crushed dissolve (chemical change) quicker?

Discussion:

1. Where on Earth would you find rocks undergoing weathering similar to this activity?
2. What are some factors that would affect the physical weathering rate of rocks in a natural weathering situation outside of your classroom?
3. Explain why there is sand at the bottom of many river beds?
4. If the world was to last this long, explain how the Appalachian Mountains may look like in several thousands of years?
5. How do plants (trees) cause mechanical weathering?
- 6a. Today we have studied the process of mechanical weathering and realize that this is a great force in nature. In Isaiah 45: 1- 5 God is making a promise to his chosen people. Comment on what God will do to the mountains, and gates that may block that path of his chosen people.
 mountains
 gates
- 6b. How does God's power compare to the power behind the forces of mechanical weathering?