WEATHERING CHALK

PURPOSE: Students will investigate the effects of chemical weathering on a piece of chalk. Natural chalk or black board chalk can be used in this activity.

BACKGROUND: When looking at the rock cycle and discussing the three types of rocks. Many teachers assume that students understand weathering and erosion which are necessary to completely understand the formation of sediments. Erosion involves the movement of sediments from one location to another. Weathering is required to produce the sediments. There are basically two types of weathering physical or mechanical weathering which involves the physical breaking of rocks into smaller pieces and chemical weathering which occurs through both biologic and environmental means. Regardless of the type of weathering the amount of acid in the environment, the surface area being weathered and the temperature of the surrounding environment all effect the rate that weathering occurs. At the Fall Zone there are two types of materials: the large igneous and metamorphic rocks that are being broken down and the small sedimentary rocks. This activity gives students the opportunity to control the variables that contribute to the rate of weathering and make inferences to real world environments.

References

VIRGINIA STANDARDS OF LEARNING

ES.1 The student will plan and conduct investigations in which volume, area, mass, elapsed time, direction, temperature, pressure, distance, density, and changes in elevation/depth are calculated utilizing the most appropriate tools; scales, diagrams, charts, graphs, tables, imagery, models, and profiles are constructed and interpreted; variables are manipulated with repeated trials; and current applications are used to reinforce Earth science concepts.

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WEATHERING CHALK

Time: 45 minutes

Chalk is a type of limestone made of the shells of microscopic organisms. In this lab, we will use chalk to simulate the factors that affect chemical weathering. The three factors we will investigate will be acidity, surface area and temperature.

Materials:

6 pieces of chalk	water	white vinegar (100 mL)
2 small beakers	hot plate	thermometer
Metric ruler		

Procedure:

Acidity Test:

1. Measure out 100 mL of vinegar into one of the beakers. Measure 100 mL of water into the other beaker.
2. Break a piece of chalk into two equal sized pieces. Place one piece into each beaker.
3. Observe each beaker for at least one minute and record your observations on the data table on the back of this page.
4. Pour the water and vinegar down the drain and **throw away** the chalk. Rinse each beaker.

Surface Area Test:

1. Break another piece of chalk into two equal pieces. Place one piece into one of the beakers.
2. Break the second piece into smaller pieces. Place all the pieces into the other beaker.
3. Pour 100 mL of vinegar into each beaker.
4. Observe each beaker for at least one minute and record your observations on the data table on the back of this page.
5. Pour the vinegar down the drain and **throw away** the chalk. Rinse each beaker.

Temperature Test:

1. Pour 100 mL of vinegar into each of the beakers.
2. Place one of the beakers on the hot plate and heat it to 75 F.
3. Break another piece of chalk into two equal pieces. Place one piece into the heated vinegar and one piece into the room temperature vinegar.
4. Observe each beaker for at least one minute and record your observations on the data table on the back of this page.
5. Pour the vinegar down the drain and **throw away** the chalk. Rinse each beaker.

Test	Amount of Reaction (how many bubbles)			Observations
	None	Some	More than the other beaker	
Acid Test				
Chalk in Water				
Chalk in Vinegar				
Surface Area Test				
Whole Chalk				
Broken Chalk				
Temperature Test				
Room Temperature				
Heated Vinegar				

Conclusions:

Answer these questions in complete sentences!

1. What type of weathering did this lab model?

2. Why would the amount of surface area make a difference in the rate of chemical weathering?

3. How does heat affect the rate of chemical weathering?

4. What does this imply about weathering in the tropics compared to weathering in the polar regions?

5. What type of rock is chalk? What mineral does it contain that reacts with the acid (vinegar)?

6. Based on your observations in this lab, describe the conditions that would cause the MOST chemical weathering to occur. Where on Earth might you find these conditions?

7. When looking at the Fall Zone in Virginia, which rocks weather and erode more slowly, the rocks in the Piedmont or the rocks in the Coastal Plain?

8. How does this differential weathering effect the topography at the Fall Zone?