

Pre-Visit Activity #1

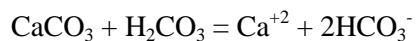
Limestone

- Overview** Limestone is a sedimentary rock that is highly soluble when it comes into contact with an acid. The dissolution of limestone by carbonic acid is a major factor in the formation of some caves (called solution caves). This activity demonstrates the dissolution of limestone in an acid.
- Objective** Students will simulate how limestone forms by imitating layers of seashells on the ocean floor and investigate what happens when acid reacts with limestone.
- Subjects** Science
Social Studies
- TEKS (5.7) Earth and space. The student knows Earth's surface is constantly changing and consists of useful resources. The student is expected to:**
- A. explore the processes that led to the formation of sedimentary rocks and fossil fuels;
 - D. identify fossils as evidence of past living organisms and the nature of the environments at the time using models.

Discuss

Part A: Limestone

- Materials** Several seashells (whole, broken, and crushed)
Piece of limestone with imbedded fossil
- Background** Limestone is a sedimentary rock consisting of the mineral calcium carbonate, which is contained in the shells of aquatic fauna. When these animals died, their carcasses sank to the bottom of the ocean. Over a long period of time, the buildup of shells and sediment compressed the lower layers, forming limestone. The calcium carbonate of the limestone reacts with acid to produce carbon dioxide and a calcium bicarbonate solution, as shown by the following chemical equation:



Everyday products containing limestone will react in this same way.

Procedure

1. Ask students, "What is limestone? What type of rock is limestone?" Review the three different rock types. (Igneous, metamorphic, and sedimentary.) How are sedimentary rocks formed? (Deposited in a body of water.)
2. Ask the students if they have ever collected seashells on a beach. Where do the shells come from? (Animals that live in the water.) What are these shells made of? (Calcium carbonate.) Discuss the seas that covered many parts of the United States in prehistoric times. Shelled animals also lived in these ancient seas. Show the students several examples of shells and pass them around.
3. Have the students ever found broken seashells? What might cause them to break? Discuss the force of waves in the ocean. Show the students several examples of broken shells. Some are crushed into a fine powder. What will happen to the shells or shell pieces over time? Where will they go? (They settle to the ocean floor.)
4. Over a long period of time (thousands or millions of years) the shells and shell pieces at the bottom of the ocean will pile up into thick layers. Some of these layers can be thousands of feet thick.
5. How would it feel to be a shell at the bottom of the pile? How heavy would the shells above you be? Discuss football players and how the person on the bottom of a pile-up feels. Have the students create a human pyramid and have the people at the bottom discuss what it feels like. Discuss how pressure from the weight of the shells causes the shells to cement together over time. The resulting rock is limestone, composed of calcium carbonate.
6. Show the students the piece of fossiliferous limestone. What do they see imbedded in the rock? Fossils are found in limestone wherever the shells were not completely broken.
7. What might cause an ocean to recede? Discuss freezing (water being contained in glaciers), changes in topography (such as uplift), filling by sediments, and evaporation. What will be left behind when the ocean dries up or moves? A bed of limestone!

Experiment

Part B: Bubbles

Objective Students will prove that the constituents of limestone (shells made of calcium carbonate) chemically interact with acid.

Materials	Seashells Vinegar A glass (or other clear container)
Background	Vinegar is an acid and seashells are made of calcium carbonate, a mineral. Calcium carbonate chemically changes into several new substances when it comes in contact with an acid. One of the new substances formed is carbon dioxide gas, and it is the bubbles of this gas that are seen rising in the glass of vinegar. Acid can be used to test for the presence of limestone in rocks. If limestone is present in a rock, bubbles form when an acid comes into contact with the rock.
Procedure	Fill a glass with enough vinegar for your students to easily see the bubbles. Add the seashells.

Assessment: Predict

Part C: Rock Eater

Objective	The students will use the previous information and experiment to predict what will happen when chalk comes into contact with an acid.
Materials	Chalk Fresh vinegar A glass
Background	Explain to your students that chalk is made of limestone.
Procedure	<ol style="list-style-type: none"> 1. Explain to your students that limestone is used in many commercial products (chalk, concrete, fertilizer, even toothpaste). Allow your students to discuss whether or not the chalk will react with the acid even though these products look different and the limestone is combined with other materials. 2. Drop the chalk into the vinegar so the students can observe if their predictions were correct.