

# DISSOLVING LIMESTONE WITH ACID

Adapted from: *Caves and Karst Curriculum and Resource Guide*.  
American Cave Conservation Association, Inc. 1994

## **GRADE LEVEL:**

Intermediate/Secondary

**NOTE:** This experiment involves the use of a mild acid, which can burn skin and clothing. The teacher should do this as a demonstration for young students. If students perform this experiment, they should do so only in a fully equipped science lab with an eyewash and under the supervision of an experienced teacher.

**SUBJECTS:** Science (Unifying Concepts, Physical, Earth)

## **Related Colorado Content**

**Standards:** SC(7-12).1, SC(7-12).2, SC(7-12).4, SC(7-12).6

**TIME:** 45 Minutes

**OBJECTIVE:** Students will apply the trial and error method to investigate the effects of acid with limestone, seashell and other rocks.

## **MATERIALS:** (for each group of students)

Bottle of hydrochloric acid (HCL)

Jar or beaker

Eye dropper

Safety glasses

Rock samples:

- Limestone
- Granite
- Sandstone
- Seashells

Paper Towels

Student worksheets

**BACKGROUND:** Caves found in limestone are usually formed when the rock is dissolved by slightly acidic water. In this demonstration the students will see an immediate reaction. When a solution of hydrochloric acid (HCL) comes in contact with limestone, the limestone bubbles, smokes and fizzes. A chemical reaction is taking place. The “smoke” students see is largely a product of the reaction. It is carbon dioxide (CO<sub>2</sub>) gas. Explain to students that it is a far weaker acid (carbonic acid) that dissolves limestone in the process of making caves.

## **PROCEDURE:**

**Important: Explain safety procedures to be followed.**

1. Distribute the student worksheets.
2. Help students formulate questions, hypothesis and predictions.
3. Mix a solution of HCL and water in a ratio of 10 parts water to 1 part HCL.
4. Label rock samples “A”, “B”, and “C”.
5. Using the eye dropper, place one drop of hydrochloric acid on each rock sample and on the seashell.

## **DISSOLVING LIMESTONE WITH ACID**

**(Continued)**

1. Observe what happens and have students record observations in the proper column.
2. Place the seashell in a bottle of acid and observe for several weeks. Have students predict what will happen to the seashell. Observe what happens to the seashell.
3. Wipe acid droplets off samples with paper towels, being careful not to allow the acid to touch the skin.
4. Have students write their conclusions and pose a follow-up question based on their observations and conclusions.

### **QUESTIONS for REFLECTION:**

What did we learn about the effect of acid on limestone?

How is the effect of acid on a seashell and limestone related?

Why aren't caves found in all types of rocks?

### **FOLLOW-UP ASSIGNMENT:**

Write up the investigation. Include question, hypothesis, method used including materials, observations, results, conclusions, and further ideas for investigation.

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## Student Worksheet

**Question:** \_\_\_\_\_

**Hypothesis (prediction):** \_\_\_\_\_

**Materials Needed:**

Bottle of hydrochloric acid (HCL)

Jar or beaker

Eye dropper

Safety glasses

Paper Towels

Rock samples:

- Limestone
- Granite
- Sandstone
- Seashells

**Procedure:**

**(CAUTION: Acid will burn skin and clothing. Discuss safety procedures to be followed in the classroom.)**

1. Mix a solution of HCL and water in a ratio of 10 parts water to 1 part HCL.
2. Label rock samples "A", "B", and "C".
3. Using the eye dropper, place one drop of hydrochloric acid on each rock sample and on the seashell. **WARNING:** Be careful with acid. Acid will burn skin and clothing.
4. Observe what happens and record your observations.
5. Place the seashell in a bottle of acid and observe for several weeks. Observe what happens to the seashell.
6. Wipe acid droplets off samples with paper towels, being careful not to get acid on your hands.

Rock Samples	Acid Reaction	No Reaction
A.		
B.		
C.		
Seashell		

**Conclusion:** \_\_\_\_\_

\_\_\_\_\_