

Name: _____

Date: _____

Field Investigation: Testing Rocks for Calcite

Learning goals

After completing this activity, you will be able to ...

- Determine if a rock sample contains calcite.
- Demonstrate proper use of safety equipment.
- Follow rules of safety in a field investigation.

Introduction: When geologists investigate an area, the first thing they do is identify the types of rocks that they find. This task can be very difficult because many rocks have a similar appearance, especially if they have been exposed on Earth's surface a long time.

Two important types of rocks, limestone and marble, can be identified by a unique chemical reaction. Both of these rocks are composed of calcium carbonate. When hydrochloric acid is added to calcium carbonate, the resulting reaction produces carbon dioxide. This gas causes the hydrochloric acid to fizz and bubble. If you add hydrochloric acid to a rock, the presence of bubbles and foam indicates that the rock is limestone or marble.

In this activity, you will be taken to a field location that contains a variety of rock types. Test each rock with HCl to see if you can identify limestone or marble!



Procedure: To test a rock sample for calcium carbonate, do the following.

1. Put on goggles and rubber gloves. Check that you are wearing long pants and closed-toe shoes.
2. Obtain a rock sample. If the rock sample is very dirty, you can try to rinse it off with a bit of water or break it with the rock hammer.
3. Carefully place one or two drops of dilute HCl on the freshest possible surface of the rock sample. In the results table, record whether the acid fizzes or not. If HCl touches your skin, rinse it off immediately with water.
4. Rinse the HCl off of the rock sample with water. Place the rock sample in a plastic bag and label the plastic bag with a letter.
5. Wash your hands before removing your gloves.

Equipment

- Small plastic dropper bottle filled with dilute HCl solution (0.1 M HCl)
- Large (2 L) plastic bottle of water.
- Plastic bags for collecting rock samples.
- Scotch tape and marking pen.
- Rock hammer (optional)

Safety Equipment

- Goggles
- Rubber gloves
- Wear long pants and closed-toe shoes

Results:

Describe each rock sample you collect, list the reaction to HCl (fizz or no fizz?) and state whether the rock sample contains calcium carbonate.

| Sample | Description | HCl reaction | Calcium carbonate? |
|--------|-------------|--------------|--------------------|
| A | | | |
| B | | | |
| C | | | |
| D | | | |
| E | | | |
| F | | | |
| G | | | |

Analysis

1. How many of your samples contained calcium carbonate? _____

What did these samples have in common? _____

2. Marble tends to be very smooth and is often white in color with dark stripes. Limestone is more commonly found and usually tan or brown in color. Based on these descriptions, which of your rock samples do you think were limestone? Which were marble?

3. Which safety procedures did you follow during this activity, and why were they important?

Note to teachers

This field activity will be most effective if you can bring students to a field site that contains a variety of rock types including limestone and/or marble. You may wish to encourage students to test concrete, which does contain calcium carbonate and will bubble in acid.

Before sending students out to collect rock samples, review general safety guidelines such as staying with partners and in sight of chaperones, avoiding poisonous plants, and so forth. (See the *Teacher-Led Discussion: Safety in the Field* document for details.) Also, demonstrate the procedure for testing rock samples for calcium carbonate with proper safety equipment. Emphasize the importance of rinsing rock samples with water after they have been tested and washing hands thoroughly before removing gloves. Be sure that all acid bottles and water bottles are clearly labeled.

Dilute HCl is a dangerous substance that should be treated with respect. Any skin or eye contact should be thoroughly flushed with water immediately.