7. Limestone and rainwater reactions

Aim

Students undertake an experiment that demonstrates the effect of rainwater on limestone. They will be able to use these observations to better understand the chemical processes that have shaped the Port Campbell coastline over many years.

Materials

- 2 beakers.
- Limestone sample.
- Granite sample.
- Dilute hydrochloric acid (HCl). (See safety note).
- Pipette.
- Tongs.
- Resource sheet: Limestone and rainwater reactions.

Activities

1. Place the limestone sample in one beaker and the granite sample in the other beaker.

2. Cover each sample with hydrochloric acid, using a pipette, so that the acid just covers the sample.

3. Note what happens to each sample, and record your observations at various time intervals in a table similar to the one below.

4. Leave the beakers with the rock samples in them until your next lesson. Add another observation to the table in your book. Before handling the samples, remove them from the acid and wash them in tap water. Dispose of the acid in a liquid waste container, not down the sink.

5. Did the two different rock types react differently in the acid? Write a brief summary of your findings.

6. What type of weathering have you investigated in this activity? Read Resource sheet: Limestone and rainwater reactions to help you support your evidence.

7. How do your results help to explain the features along the Port Campbell National Park cliff line?

8. What might happen if rainwater and underground water were to become more acidic?

9. What risk and safety issues have to be considered by the managers of Port Campbell National Park with? (Hint: Think of the continual weathering of limestone and what might happen to roads or tracks if they are close to drainage lines.)

Time of observation	**Reaction noted** (bubbling, fizzing etc.)	**Sediment loosened from sample**

Safety note

Follow safety procedures for handling and disposing of the HCl. Teachers may prefer to conduct this activity as a teacher led demonstration rather than as student experiments.

7. Limestone weathering

Weathering

Rocks are changed, very, very slowly by exposure to air or water. Weathering can be defined as the erosion or disintegration of rock as a result of exposure to the weather.

There are two main types of weathering.

Physical weathering

This is a wearing away of rock similar to sandpaper's abrasive effect on wood. Other examples of physical weathering are water freezing in cracks of rocks and temperature changes.

Chemical weathering

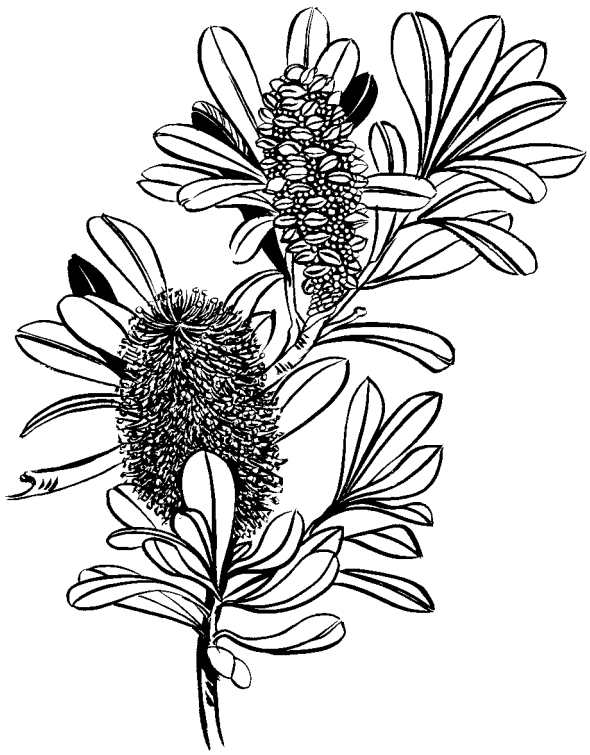
This involves chemical changes in the rock. When air or moisture comes into contact with rocks, chemical changes may take place. These changes generally soften the rock and break it down. Some rocks contain minerals which dissolve in water, while others, such as limestone, may be affected by acids.

Rainwater (H_20) may become slightly acidic by picking up carbon dioxide (CO_2) from the air. The following equation shows how CO_2 can dissolve in rainwater to produce a weak carbonic acid.

$$CO_2 + H_20 \rightarrow H_2CO_3$$

Acidic water is one cause of chemical weathering. It can take many years to have significant effect on rocks. In the laboratory however, it is possible to speed up the process by using a stronger acid such as hydrochloric acid (HCI) in place of rainwater.

Limestone is a sedimentary rock formed by the compaction of organic and inorganic particles or fragments. It is very soft compared to rocks such as granite which does not allow water to soak into it. In the Port Campbell area the limestone is formed from marine deposits of shells and skeletons.



Coast Banksia ©MT