

KEY CONCEPT

Mechanical and chemical forces break down rocks.

Weathering breaks rocks into smaller pieces.

Think about the tiniest rock you have ever found. How did it get so small? It didn't start out that way! Over time, natural forces break rocks into smaller and smaller pieces. If you have ever seen a concrete sidewalk or driveway that has been cracked by tree roots, you have seen this process. The same thing can happen to rocks.

Weathering is the process by which natural forces break down rocks. In this section you will read about two kinds of weathering. One kind occurs when a rock is physically broken apart—like the cracked sidewalk. Another kind occurs when a chemical reaction changes the makeup of a rock.

Chemical weathering changes the mineral composition of rocks.

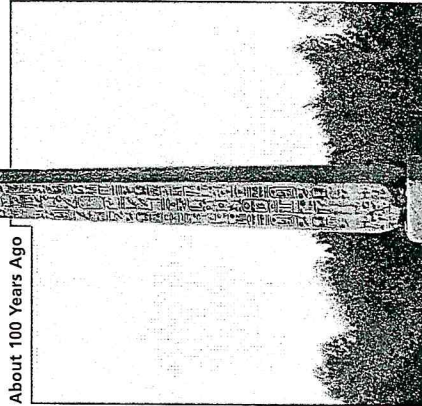
If you have seen an old rusty nail, you have witnessed the result of a chemical reaction and a chemical change. The steel in the nail contains iron. Oxygen in air and water react with the iron to form rust.

Minerals in rocks also undergo chemical changes when they react with water and air. **Chemical weathering** is the breakdown of rocks by chemical reactions that change the rocks' makeup, or composition. When minerals in rocks come into contact with air and water, some dissolve and others react and are changed into different minerals.

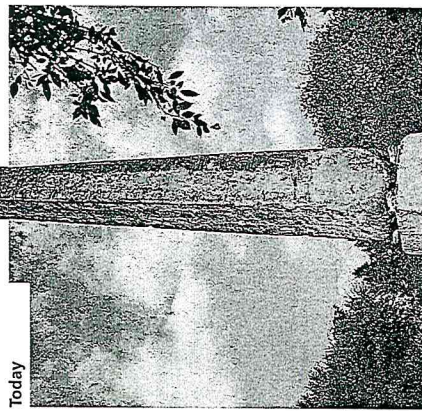
Dissolving

Water is the main cause of chemical weathering. Some minerals completely dissolve in ordinary water. The mineral halite, which is the same compound as table salt, dissolves in ordinary water. Many more minerals dissolve in water that is slightly acidic—like lemonade. In the atmosphere, small amounts of carbon dioxide dissolve in rainwater. The water and carbon dioxide react to form a weak acid. After falling to Earth, the rainwater moves through the soil, picking up additional

About 100 Years Ago



Today



READING VISUALS

INFER This ancient stone monument was moved from a desert in Egypt to New York City in 1881. How and why has it changed?

carbon dioxide from decaying plants. The slightly acidic water breaks down minerals in rocks. In the process, the rocks may also break apart into smaller pieces.

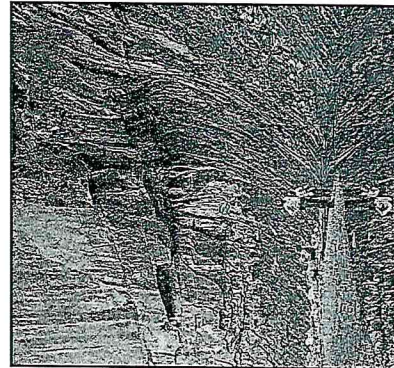
Air pollution can make rainwater even more acidic than it is naturally. Power plants and automobiles produce gases such as sulfur dioxide and nitric oxide, which react with water vapor in the atmosphere to form acid rain. Acid rain causes rocks to weather much faster than they would naturally. The photographs above show how acid rain can damage a granite column in just a hundred years.

Rusting

The oxygen in the air is also involved in chemical weathering. Many common minerals contain iron. When these minerals dissolve in water, oxygen in the air and the water combines with the iron to produce iron oxides, or rust. The iron oxides form a coating that colors the weathered rocks like those you see in the photograph of Oak Creek Canyon in Arizona.

READING

How is air involved in chemical weathering?



The rocks in Oak Creek Canyon are reddish because iron in the rocks reacted with water and air to produce iron oxides.