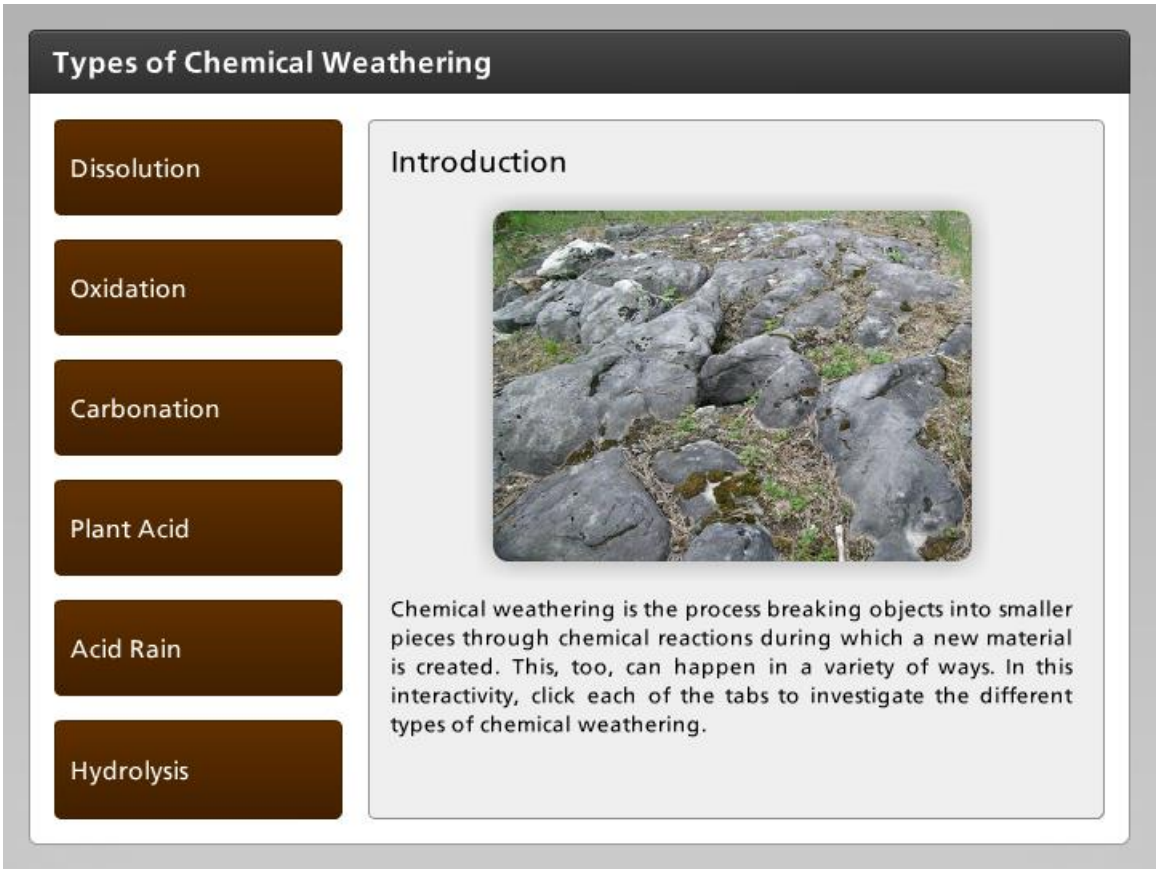
Module 8: Weathering, Erosion, and Groundwater

Topic 1 Content: Types of Chemical Weathering Notes

Introduction



Chemical weathering is the process breaking objects into smaller pieces through chemical reactions during which a new material is created. This, too, can happen in a variety of ways. In this interactivity, click each of the tabs to investigate the different types of chemical weathering.

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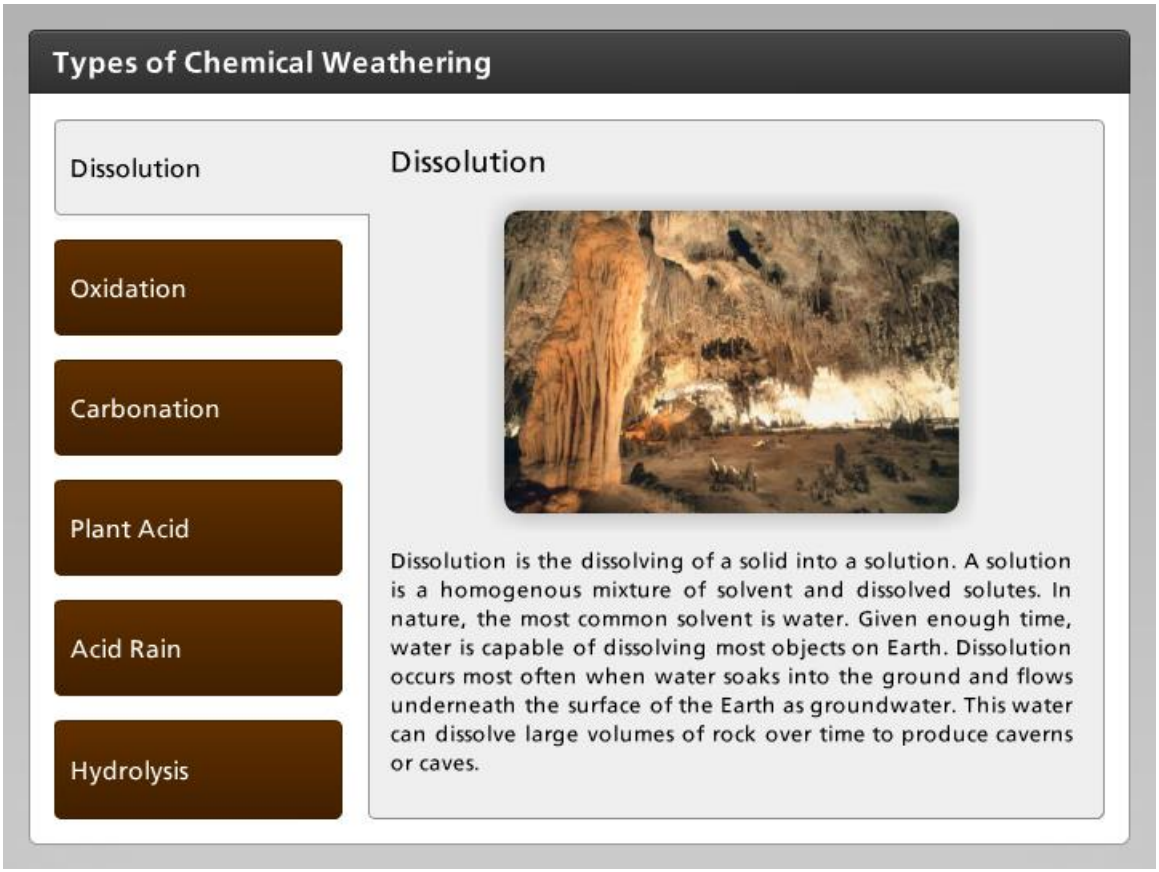
Dissolution



Dissolution is the dissolving of a solid into a solution. A solution is a homogenous mixture of solvent and dissolved solutes. In nature, the most common solvent is water. Given enough time, water is capable of dissolving most objects on Earth. Dissolution occurs most often when water soaks into the ground and flows underneath the surface of the Earth as groundwater. This water can dissolve large volumes of rock over time to produce caverns or caves.

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Oxidation

Oxidation occurs when oxygen from the atmosphere bonds with iron present in rocks. This process is accelerated in the presence of water. You may think that by bonding oxygen to the surface of the rock, that the rock would become stronger. The opposite is true. When the oxygen bonds to the iron, an iron oxide is produced and the structure of the rock is compromised, causing it to break. This iron oxide is known as rust. As you know, rust will even cause metals to wear and break over time. Oxidation is best observed in rocks that contain iron. After oxidation occurs, the iron oxide will turn the rock reddish in color.

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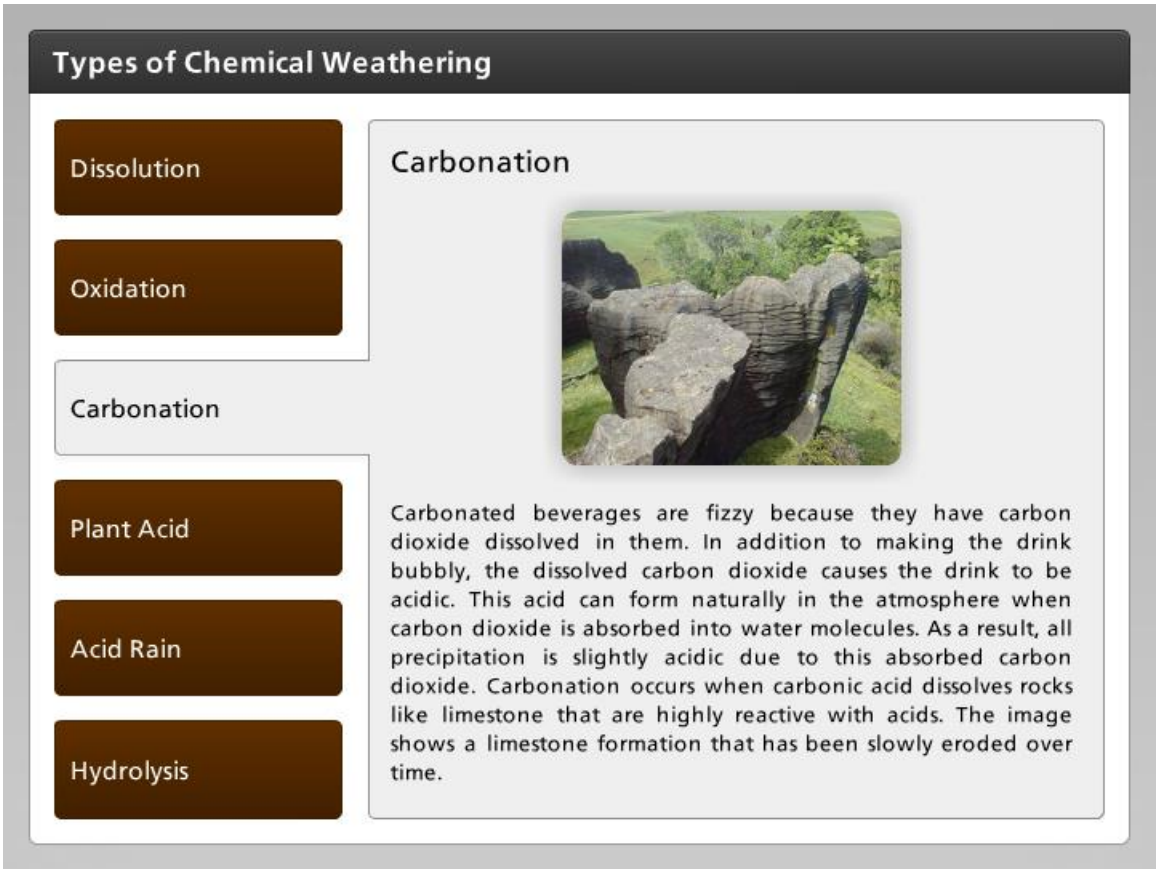
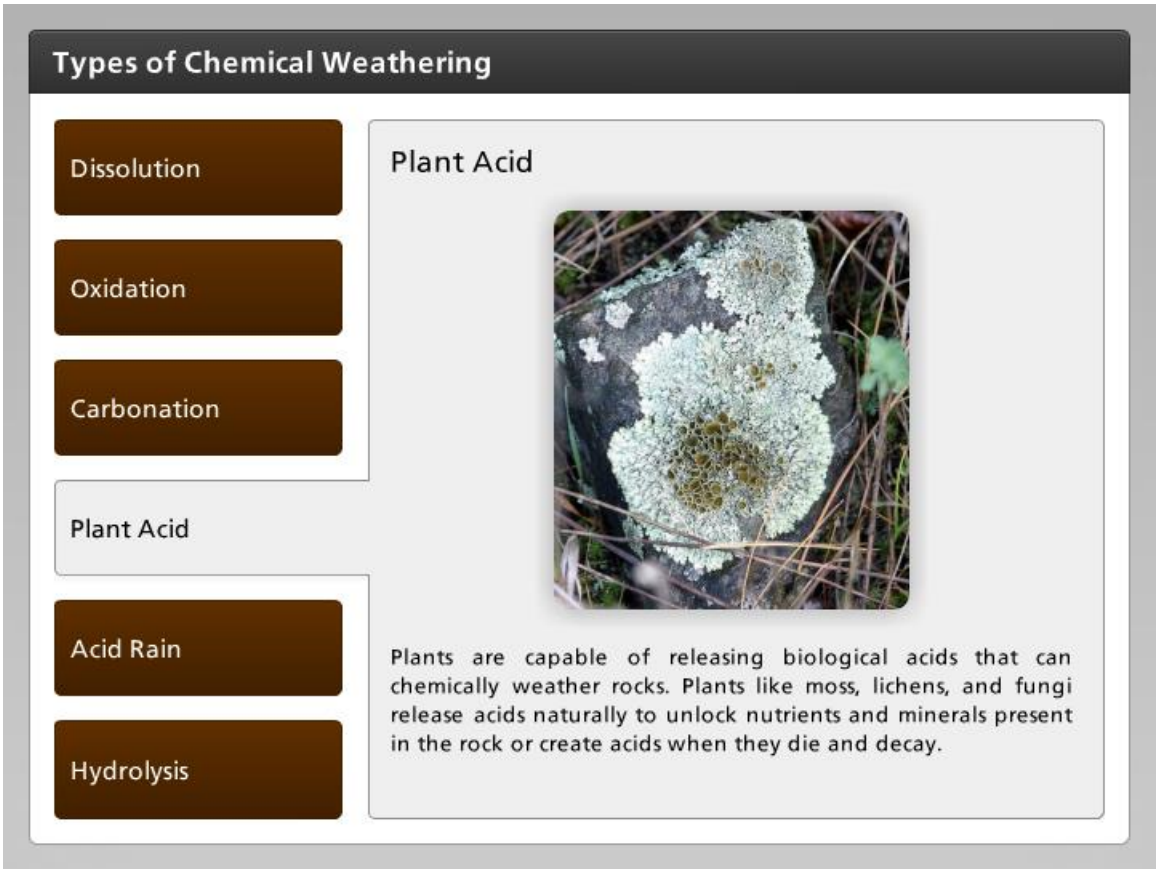
Carbonation



Carbonated beverages are fizzy because they have carbon dioxide dissolved in them. In addition to making the drink bubbly, the dissolved carbon dioxide causes the drink to be acidic. This acid can form naturally in the atmosphere when carbon dioxide is absorbed into water molecules. As a result, all precipitation is slightly acidic due to this absorbed carbon dioxide. Carbonation occurs when carbonic acid dissolves rocks like limestone that are highly reactive with acids. The image shows a limestone formation that has been slowly eroded over time.

Plant Acid



Plants are capable of releasing biological acids that can chemically weather rocks. Plants like moss, lichens, and fungi release acids naturally to unlock nutrients and minerals present in the rock or create acids when they die and decay.

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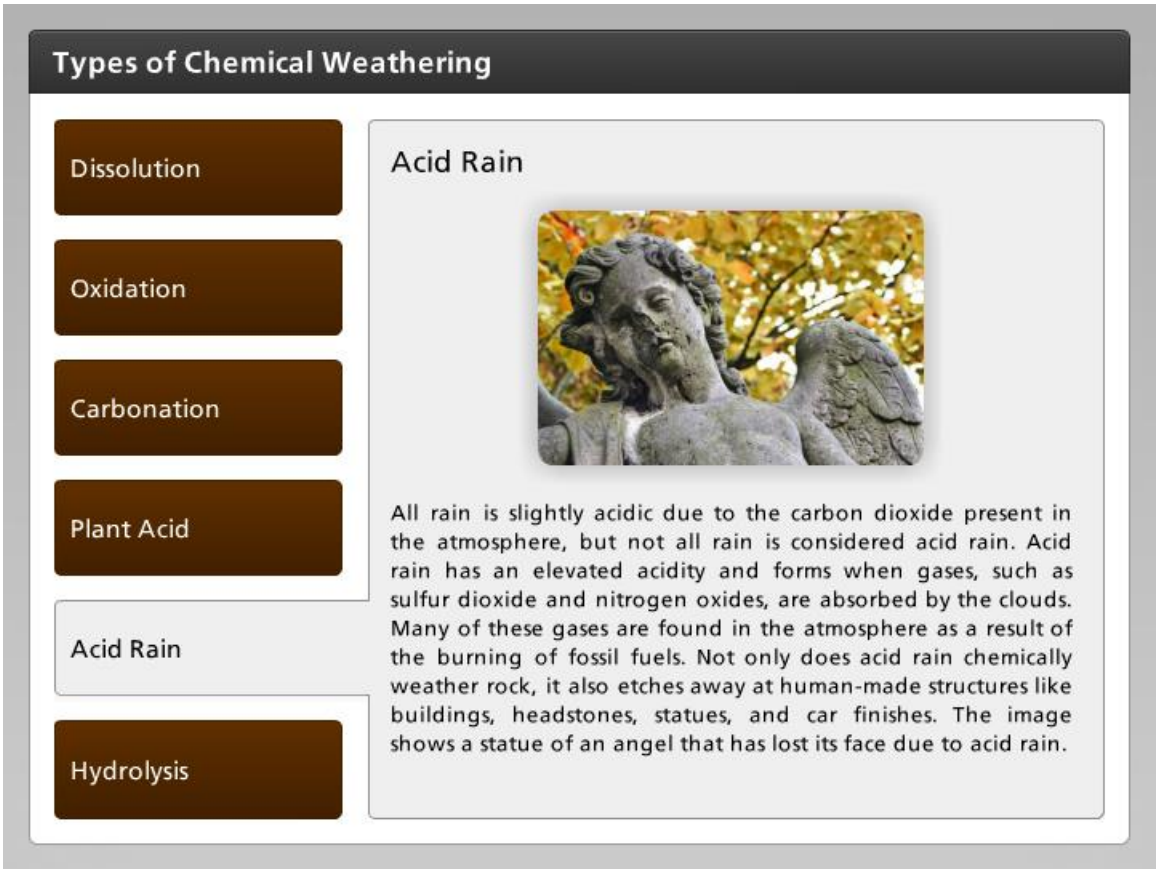
Acid Rain



All rain is slightly acidic due to the carbon dioxide present in the atmosphere, but not all rain is considered acid rain. Acid rain has an elevated acidity and forms when gases, such as sulfur dioxide and nitrogen oxides, are absorbed by the clouds. Many of these gases are found in the atmosphere as a result of the burning of fossil fuels. Not only does acid rain chemically weather rock, it also etches away at human-made structures like buildings, headstones, statues, and car finishes. The image shows a statue of an angel that has lost its face due to acid rain.

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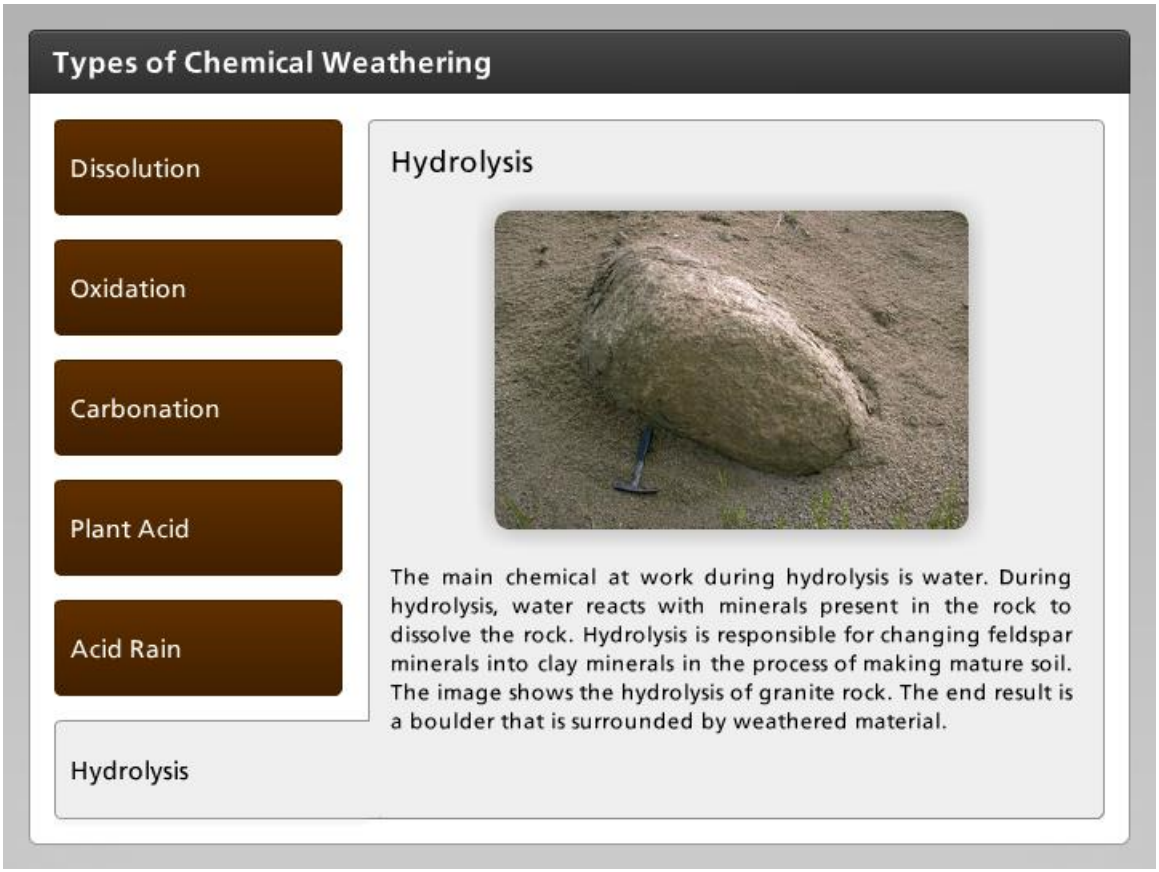
Hydrolysis



The main chemical at work during hydrolysis is water. During hydrolysis, water reacts with minerals present in the rock to dissolve the rock. Hydrolysis is responsible for changing feldspar minerals into clay minerals in the process of making mature soil. The image shows the hydrolysis of granite rock. The end result is a boulder that is surrounded by weathered material.