How are materials from the earth broken down?

Conditions and processes in the environment cause stone and other earth materials to break apart. Weathering is the term used to describe the breaking of rocks into smaller fragments. Weathering changes things around us gradually over long periods of time. Over millions of years, it wears mountains down to hills. Weathering affects both naturally formed rocks and human-made structures such as buildings and streets. Weathering is different from erosion in that weathering describes changes that occur in place. Erosion is a term used to describe the removal and transport of earth materials from one location to another.

In this Virtual Lab, you will examine the effects of two kinds of weathering: mechanical and chemical. Mechanical weathering breaks apart rocks without changing their chemical composition. The growth of vegetation such as tree roots can result in broken rocks and pavement and damages to streets and houses, and is an example of mechanical weathering. Ice wedging is another example of mechanical weathering. When water freezes in cracks, it expands and forces rocks to break apart. The process is repeated when the ice melts or thaws and the water freezes again increasing rock fractures.

Chemical weathering is where water, air and other substances react with minerals in rocks, and change the chemical composition of the minerals. Water is the main agent of chemical weathering. Water mixes with carbon dioxide in the air to form a weak acid that dissolves limestone and other rocks. Over thousands of years, this acid can dissolve enough limestone to form caves. Chemical weathering also results from exposure to oxygen in air, causing oxidation. Oxidation occurs when a metal such as iron is exposed to oxygen and water. Rusting of cars and other metal objects are examples of objects undergoing oxidation.

In this Virtual Lab, you will investigate the effects of different types of weathering in four different scenes.

Objectives:

* Identify the different types of conditions for mechanical and chemical weathering of earth materials
* Observe how different weathering conditions effect earth materials

Procedure: Prepare a Data Table… See below

1. Click the Weathering Fact Book button to learn more about the types of weathering and the symbols used on the screen.
2. Select one of the scenes to observe a weathering effect.
3. Click the Hear Button below the Before Weathering image to learn more about the scene.
4. Click one of the two Weathering buttons that is active for the scene you chose: vegetation, freeze/thaw, water, or oxidation, and observe the weathering effects that occur in your scene.
5. Click the Hear button below the After Weathering image to learn more about the weathering changes that took place.
6. Click the Labels button if you want to see the After Weathering image labeled.
   1. Click the Weathering button again to view the weathering changes again.
7. Record your observations in the Table.
   1. Click the other active Weathering button to view another weathering effect.
8. Investigate weathering effects in the other three scenes in the same way and record your findings.
9. Use the Data from the Table to answer the Journal questions.

Data Collection: Prepare a data table with the headings shown below. Add enough rows to record data from each scene.

|  |  |  |  |
| --- | --- | --- | --- |
| Scene Number | Before Weathering | Weathering Effect | After Weathering |
|  |  |  |  |

Journal Questions: How are materials from the earth broken down?

1. Which scenes that you observed show examples of mechanical weathering?
   1. Why?
2. Which scenes that you observed show examples of chemical weathering?
   1. Why?
3. What do you think would be the weathering effects of moving a rock sculpture from a dry climate to a wet climate?
4. What effect do small burrowing animals and earthworms have on the rocks and soil in the ground?
5. In terms of weathering, explain what will happen to a set of metal tools left outdoors in the rain for a long time?
6. Is it possible for any of the earth materials scenes to be affected by both mechanical and chemical weathering?
   1. If so, describe the scene and situations.