

How Nature Breaks Down Rocks by Weathering

Weathering is a process nature uses to breaks down rocks. Nature breaks down rocks by the use of temperature change, ice, water, wind, gravity, plants, animals, and dissolved acids in water.

Temperature Change

Experiment #1 Heat up a glass marble in a pan and put it immediately in ice water.

a. Results:

b. Explanation:

c. What does this tell us about sudden temperature changes from hot to cold on rocks and weathering?

Freezing Water

Experiment #2 Put a small balloon in cup that has liquid plaster in it and put it in a freezer overnight.

a. Results:

b. Explanation:

c. What does this tell us about water freezing in cracks of rocks and weathering?

Gravity Impact

Experiment #3 Drop a big rock a few feet high on some small rocks below.

a. Results:

b. Explanation:

c. What does this tell us about gravity pulling rocks down a mountainside and weathering?

Water Abrasion

Experiment #4 Put some rocks in a plastic bottle with water in it and shake it up.

a. Results:

b. Explanation:

c. What does this tell us about rocks in water moving downstream and weathering?

Wind Abrasion

Experiment #5 Stir some colored chalk in a container that has salt in it.

a. Results:

b. Explanation:

c. What does this tell us about wind blowing sand against rock structures and weathering?

Root Expansion

Experiment #6 Put some beans in cup that has liquid plaster in it, stir the beans, put it in a Baggie, and let sit overnight.

a. Results:

b. Explanation:

c. What does this tell us about root expansion and weathering?

Acid Water Dissolving

Experiment #7 Put some limestone in some vinegar and watch what is happening.

a. Results:

b. Explanation:

c. What does this tell us about water flowing over rocks and weathering?

d. What does this tell us about rain falling down in polluted air?

Animal Activity

Experiment #8 Think of ways how animals can cause weathering to happen?

a. Reason 1

b. Reason 2

Weathering Concepts

1. Temperature Change

During the seasons of spring and fall, there are big temperature changes in the mountains from the morning temperature that is usually below freezing to the evening temperature that is well above freezing. The air in the afternoon might be cool but the direct sunlight on the rocks can be up to 100 degrees Fahrenheit on the surface of the rocks.

2. Freezing Water

Whenever water runs into cracks of rock and the temperature drops below 32 degrees, it will freeze while in the rock. Water expands when it freezes. Therefore, it will break the rock apart.

3. Gravity Abrasion

Whenever parts of the rocks break off at the top of a mountain or on the edge of a cliff, the rocks will roll down because of gravity and finally hit the bottom. When the falling rock hits the ground or hits other rocks on the ground the falling can break apart.

4. Water Abrasion

Whenever water is running downhill, the rocks in the water will knock into each other resulting in breaking the up the rocks.

5. Wind Abrasion

Whenever the wind blows it carries with it sand and other sediments. These sediments hit objects that are stationary (not moving). When sediments hit these stationary objects, it can wear them down eventually to almost nothing.

6. Root Expansion

Plants grow in the cracks of plants. The roots get larger and larger and break open the rock.

7. Dissolving Rocks

As water is running down a hill, it dissolves minerals in the rocks causing the water to be acidic. As it is dissolving the minerals, it will also break down the rocks. The more acidic it is, the more it can break down the rocks.

8. Animal Activity

Animals will dig holes in the ground exposing the inside of the hole to temperature change, freezing any water inside, exposing rocks to the air, and seeds growing plants inside to break up the rocks inside.

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Answers

Weathering is a process nature uses to breaks down rocks. Nature breaks down rocks by the use of temperature change, ice, water, wind, gravity, plants, animals, and dissolved acids in water.

Temperature Change

Experiment #1 Heat up a glass marble in a pan and put it immediately in ice water.

a. Results:

The glass marble has cracks in it.

b. Explanation:

As the hot glass marble was put into the ice cold water, it contracted instantly not letting it cool slowly causing it to crack. The opposite happens too when hot things are put in cold things. The item will crack.

c. What does this tell us about sudden temperature changes from hot to cold on rocks and weathering?

When rocks are exposed in the higher mountains in the sun in direct sunlight, they get hot. At night they cool quickly causing them over time to crack.

Freezing Water

Experiment #2 Put a small balloon in cup that has liquid plaster in it and put it in a freezer overnight.

a. Results:

The balloon popped through the plaster and it also cracked the plaster in many places.

b. Explanation:

As water freezes, it expands. As it expanded it broke through the plaster and causing the plaster to break.

c. What does this tell us about water freezing in cracks of rocks and weathering?

As water gets into the cracks of rocks during the wintertime, the water freezes and expands. As the ice expands it causes the rock to break apart where the crack was.

Gravity Impact

Experiment #3 Drop a big rock a few feet high on some small rocks below.

a. Results:

The rocks below break.

b. Explanation:

As the rock is falling, gravity gives energy to the rock. When the big rocks hits the rocks below, it will break them apart since the impact is so strong.

c. What does this tell us about gravity pulling rocks down a mountainside and weathering?

As rocks fall hundreds of feet from the tops of mountain through the air, the more distance they travel, the more energy they will get from gravity. With this energy given to the rock, the rocks on the ground are broken up into pieces.

Water Abrasion

Experiment #4 Put some rocks in a plastic bottle with water in it and shake it up.

a. Results:

The water is dirty and there are sediments at the bottom of the bottle.

b. Explanation:

As the bottle is being shaken, the rocks move around inside the bottle and hit each other. As they hit each other, they break small pieces of rock off each other rounding them off and getting smaller.

c. What does this tell us about rocks in water moving downstream and weathering?

As water is flowing downstream and the force of the stream is strong enough, smaller rocks roll with the water and bump and hit each other. While bumping and hitting each other, they break little pieces of rock off each other putting them in the water as sediments.

Wind Abrasion

Experiment #5 Stir some colored chalk in a container that has salt in it.

a. Results:

The salt turned the same color as the chalk used to stir the salt.

b. Explanation:

As the colored chalk is stirred in the salt, the salt is sharp enough to scratch the chalk to put the powder in the salt to color it.

c. What does this tell us about wind blowing sand against rock structures and weathering?

As the wind is blowing, it carries sand. As the strong winds blow sand into the upright rock structures (hoodoos) the sand scratches little bits of the rock structure off wearing it down little by little. After many years it gets smaller and smaller.

Root Expansion

Experiment #6 Put some beans in cup that has liquid plaster in it, stir the beans, put it in a Baggie, and let sit overnight.

a. Results:

The plaster is all broken up into pieces.

d. Explanation:

When beans are put in water, they soak in water and expand. The plaster has water in it and the beans soaked in the water. The beans expanded and as they expanded, they broke the plaster.

e. What does this tell us about root expansion and weathering?

As seeds and dirt are blown into the cracks of rocks and then with a little rain they germinate and start to grow. As they grow, their roots go deeper into the cracks of the rocks and split them apart and break away.

Acid Water Dissolving

Experiment #7 Put some limestone in some vinegar and watch what is happening.

e. Results:

There are tiny bubble coming off the rock like the vinegar is eating it away. When the rock is left for a long time in the vinegar, there are rock granules like sediments at the bottom of the jar.

f. Explanation:

The vinegar is a light acid that will dissolve organic material. Because there is organic material in limestone, the vinegar dissolves the organic material away and produces a carbonic gas that floats to the top. After a while after the organic material has dissolved away, it loosen the rock sediments and they fall to the bottom of the jar.

g. What does this tell us about water flowing over rocks and weathering?

As water is flowing over rocks, the water will dissolve the rock material and put a weak acid in the water. As the water becomes more acidic, it will dissolve rock even faster and break them down little by little.

h. What does this tell us about rain falling down in polluted air?

As rain is falling through the air, it will pick up the pollution in the air and become acidic called acid rain. As the acid rain falls on rocks on the ground, it will slowly dissolve rocks away especially limestone.

Animal Activity

Experiment #8 Think of ways how animals can cause weathering to happen?

b. Reason 1

Animals dig holes in the ground. rocks in the hole are exposed to the air outside, the cold, wind, and water can break them down little by little.

c. Reason 2

Animals can dig hole and cause them to cave in breaking the rocks that are inside the hole.

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