

# How

# Nature

# Breaks Down

# Rocks By

# Weathering

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

- Temperature change can cause rocks to get hot and cold causing cracks to form and could eventually break them down.
- Temperature change can cause snow to melt, causing water to fill in the cracks in the rocks. Later, the water freezes and expands resulting in breaking the rocks apart.
- If expanding ice breaks off rocks on a cliff, the falling rock will break apart. If it hits other rocks on the ground it could break them too.
- If rocks fall off of a cliff, gravity causes it to fall to the bottom causing it to hit other rocks and breaking.
- Running water can cause the rocks in a stream to hit against each other resulting in breaking them down and rounding them off.
- Wind can pick up sand and blow it into a huge sand dune and break it down.
- After soil fills in cracks in the rocks by the wind, the wind will also carry seeds and embed them in the soil. The seeds begin to grow. The roots will expand many years later and crack the rocks apart.

## 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.

### **Experiment #1      The Expanding Brass Ball**

- 1 You have a brass ring and brass ball. Slide the brass ball through the ring. What do you see happening?

*The brass ball slides in and out of the ring.*

2. Put the brass ball above a flame or a heating unit. Hold it above the heat for a couple of minutes. Twirl it while you are holding it. What do you think is happening to the brass ball?

*It is expanding.*

- 3 After two minutes, try to put the ball through the brass ring. What happened?

*It wouldn't go through the brass ring.*

- 4 Put the brass ball in ice water for a minute. What do you think is happening to the brass ball?

*It is contracting.*

- 5 Take the brass ball out of the ice water and put try to put it through the brass ring. What happened?

*It went through the brass ring again.*

- 6 Explain why the brass ball did what it did.

*Metal expands when heated and contract when cooled. All metals will do this.*

### **Experiment #2      Cracking the Glass**

- 1 Examine the glass object that is given to you. Describe below what you notice about it.

*It is clear without hardly any blemishes in the glass.*

- 2 Drop the glass object into the pan. Put the pan on the burner and turn on the burner. Let the pan heat up between 10 and 15 minutes. What do you think will happen to the glass object when it is heated?

*The glass will expand.*

- 3 Pour the glass object into a bowl of ice water. What do you think is happening to the glass object now?

*It is contracting quickly because the colder the water the faster it will contract.*

- 4 Take the glass object out of the ice water when it has cooled. Describe below what you observed.

*The glass object has a lot of cracks inside the glass but not on the outside.*

- 5 Explain why the glass object did what it did.

*The glass expanded in the heat. Then when it was put in the ice water, it contracted so fast that it cracked the glass. If it would have had time to cool, then it wouldn't have cracked.*

### 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.

### **Experiment #3      The Distorted Bottle**

- 1 Here is a bottle with water in it. Describe how the bottled water feels when you press on it.

*It is very easy to press in the bottle.*

- 2 Inspect what it looks like on the outside.

*The parts that go in are deep and the ridges that go out are high. The bottom goes in.*

- 3 Put it in the freezer for 24 hours.

- 4 Take it out of the freezer. Describe how it feels when you press on it.

*It is very hard and very hard to press in.*

- 5 Describe what the bottle looks like on the outside.

*The bottle is pushed out and distorted. The deep parts and the ridges are not as deep and high. They are almost the same level.*

- 6 Describe what the bottle looks like on the inside.

*The bottom is pushed out. It is also very foggy inside.*

7. Explain why the bottle looks like this.

*As the water expanded when it froze pushing the bottle to be bigger on the sides and the bottom. When it expanded, air took up the space of the water. The foginess is that air.*

## **Experiment #4      Balloon Power**

- 1 Put some liquid Plaster of Paris into a small cup. Now put a small water balloon into the plaster so the whole balloon is covered.
- 2 Put the cup with the balloon in it into the freezer for at least 12 hours. What do you think will happen?

*The balloon will freeze inside and expand and possible break the plaster apart.*

- 3 After 24 hours, take the cup out of the freezer. Tear off the paper of the cup. Examine the outcome. Describe what happened.

*The balloon broke the plaster and even tore through the cup in some cases.*

- 4 Explain why this happened.

*The water expanded when it froze and broke open the plaster.*

## **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 rock can break and brake the existing rocks on the ground apart too.

## **Experiment #5      Hitting Rock Bottom**

- 1 Get some large rocks about 5 inches in diameter. Examine each one for chips or marks. Put three or four smaller rocks on the ground. Drop each of the big rocks, one at a time on the smaller rocks. Examine each one after it is dropped. When all the rocks are dropped, describe what you notice about the rocks that were on the ground and the rocks that were dropped.

*The rocks on the ground especially broke and chipped. The rocks that dropped mostly chipped.*

- 2 Tell why you think the rocks chipped or broke?

*The gravity pulls on the rocks. The bigger they are the more energy they have to break the rocks on the ground.*

## **Water Abrasion**

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

## **Experiment #6      Striking Distance**

- 1 Each group has two rocks. Examine them as to what they look like.

*They are rounded on the edges. They are also smooth. They are not sharp.*

2 Why do you think they have the shape they have?

*They have been in the water.*

3 Take the two rocks and hit them together over a piece of white paper for a minute or two. Describe what you observed.

*There are small sediments on the paper. They call also be felt.*

4 Describe the comparison to this experiment to what really happens in a stream.

*As they roll down with the water, the water makes them hit each other. As they hit they knock off small pieces of rock little by little making them round.*

#### **Experiment #7      Shake and Break**

1 Examine the rocks placed in front of you. What kind of rocks do you see in?

*They are all sizes and shapes. Some are soft and some are hard.*

2 Now put the rocks in the bottle and then add water to the top of the bottle. Put the lid on the bottle. Shake the bottle as viciously as you can for about 5 minutes.

3 Look at the bottle. What does the bottle look like inside?

*The water is dirty. There are sediments at the bottom of the bottle.*

4 Pour the contents of the bottle out into a filter with a bottle under the filter. Put water into the bottle to make sure all the contents of the bottle are put onto filter. Take the rocks out of the filter. Describe what you found in the filter.

*There are small broken pieces of rock and small sediments about the size of sand and smaller.*

5 Tell why this happened.

*As the rocks hit each other in the bottle the rocks would be chipped and the small pieces would fall to the bottom.*

#### **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.

## Experiment #8      Stirring As The Wind

- 1 There is a small container of white salt and a piece of colored chalk in front of you. You are going to stir the colored chalk in the salt. (Instead of having the salt blow and hit against the chalk you are going to do the opposite—use the chalk to stir the salt.) Stir the salt with the chalk for about three minutes. Describe what you see happening.

*The salt is beginning to turn the color of the chalk.*

- 2 Why is the salt doing this?

*The sharp edges of the salt is digging into the chalk and scraping the chalk and its color off and putting it into the sand.*

- 3 Look at the end of the piece of chalk. Describe what it looks like.

*It is all scratched up by the salt.*

- 4 Tell how this is like the wind carrying sand and hitting against an object.

*Just like the salt, sand is sharp too. Sand is made up of quartz and quartz is sharp. As the sand blows through the air, it hits rock objects in its way and scratches them. Day after day as the wind blows, it tears off little pieces of rock the size of sand. The broken off sand will blow away with the wind hitting other things in its way.*

## Root Expansion

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

## Experiment #9      Getting to the Root Of Things

- 1 Examine the beans and describe them.

*They are rounded and hard.*

- 2 Put some Plaster in a cup. Stir the beans in the plaster. Let it sit over night.

- 3 Take the paper cup off the plaster. Describe what happened to the plaster.

*The plaster is all broken up into pieces.*

- 4 Explain why this happened to the plaster.

*Beans, when they are wet, absorb water. As it absorbs water they expand. The expanding of the beans broke the plaster.*

- 5 How is this like roots breaking rocks?

*Just like beans, when a plant grows the roots get larger. Sometimes, plants grow in cracks of rocks. One day they will be roots get big, they will break apart the rocks they are growing in.*