

## Volcanic Eruption!

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Topic: Different types of Volcanoes and Volcanic Rocks

Age Group: 3-4

### LESSON OVERVIEW

This lesson is designed to teach students about different types of volcanoes and the rocks they produce. Also, this lesson will explain the cause of earthquakes and how earthquakes create landforms such as islands.

### SOURCES CONSULTED

- Getsinger, Sarah and Erin Nalepa. "Volcanoes and Society." Accessed on February 1, 2006 at <http://www.umich.edu/~gs265/society/volcanoes.htm>
- University Corporation for Atmospheric Research. Accessed on February 14, 2006 at [http://www.windows.ucar.edu/tour/link=/earth/interior/shield\\_volcanos.html](http://www.windows.ucar.edu/tour/link=/earth/interior/shield_volcanos.html)
- USGS. Accessed on February 14, 2006 at <http://volcanoes.usgs.gov/Products/Pglossary/CinderCone.html>
- Personal communication with Robert Barron, MTU Professor. February 14, 2006.

### OBJECTIVES

At the end of the lesson, students will be able to:

1. Define the three types of volcanoes.
2. Explain how the three volcano types are created and how they change in size and shape.
3. Explain the difference between plutonic and volcanic rocks.
4. Recognize/identify the five kinds of volcanic rocks and how each is formed.

### MATERIALS

Vinegar (1 gallon)

5 20 ounce bottles

Baking Soda (1 box)

Tissues (30)

5 plastic tubs

Rubber Corks (enough for all students to have one)

Handout for Volcanic Explosion (one for each student)

Magnifying Glasses (12)

Volcanic Rocks (pumice, obsidian, gabbro, tuff, granite, basalt) (2-4 samples of each)

Handout for Volcanic Rocks Activity (12)

Volcano Poster (depicting where volcanic and plutonic rocks come from within the volcano—inside or outside the Earth)

Pencils (12)

Whiteboard markers (5)

Chalk (1 box)

Volcano pictures (shield, cinder cone, composite cone)

Play-doh (10 regular-sized tubs)

Spaghetti sauce (lava) (2 jars)

Brown sugar (ash) (1 bag)

Straws (1 for teacher)

3 Plastic or aluminum trays

Tinfoil (enough to line each tray)  
Sand (1 container full)

## **ROOM SET-UP**

There are three stations. In the front of the room, hang posters on the board. Also in front of room, arrange three desks in a line for Volcanic Formations activity. Each desk will hold one tray. Students can gather around this to observe. Second station will be six desks arranged in a circle, for rock ID activity. Each desk is a station, and needs two chairs (so students can work together). In back of room (making sure to not have any light fixtures directly overhead), set up table or push desks together so students can all access at the same time, for the Eruption activity.

## **INTRODUCTION and ATTENTION-GETTER (5 mins)**

Hi! Welcome to Family Science Night! This great program is brought to you by the Western Upper Peninsula Math and Science Center. My name is Marie Prescott and I am an Ecology major at Michigan Tech. I study the outdoors, things like trees and birds and dirt. After I graduate in May, I hope to become a teacher and work at a nature center, where I can do things like lead nature walks and teach about plants and animals. (Introduce assistant if there is one)

Tonight, we're going to learn about volcanoes and the different rocks that come from them, and by the end of the night we'll be able to ...*list objectives that are written on board...*

Parents, please feel free to participate with your students at each station!

*Has anyone has ever seen a volcano?*

*Can anyone tell me how volcanoes are created?* (Tectonic plates move on top of each other, and the one underneath heats up and turns to magma. Heat causes pressure, and the magma finds a hole to escape through, causing a volcanic explosion.)

*Let's list some famous volcanoes.* (Mauna Loa, in Hawaii, which rises out of the ocean and is an island landform; Mt. St. Helens in Washington, Katmai in Alaska, Vesuvius in Italy, Santorini in Greece)

*What comes out of volcanoes?* (lava and ash)

*What are six different types of rock that come from volcanoes?* (pumice, obsidian, gabbro, tuff, granite, basalt)

## **Volcano Formations (5 mins)**

Materials- straw, sand, trays, tinfoil, play-doh, pictures of volcanoes, spaghetti sauce, brown sugar

Preparation- Line trays with tinfoil. Make two volcanoes from play-doh—a shield and a composite cone (use pictures to model shape). Each volcano can be made from 2-3 tubs of play-doh, depending on desired size. Make cinder cone volcano from sand. Have sauce and sugar next to composite cone tray, with sauce ready for the shield volcano tray. Have straws with the cinder cone volcano.

After demonstration, play-doh volcanoes can be rinsed and dried (quickly, so they don't dissolve in the water) to be re-used later, or can be folded into the tinfoil and disposed of. Sand can be put back into container to be re-used.

### Cinder Cone Volcano-

*What do you think will happen when I blow through this straw into the sand?* (make a hole)

Blow straw straight down onto a tray filled with sand. Show how a cinder cone volcano has a crater in the middle of it, and that it is formed from the sand falling back onto itself. Explain that venting gas comes from inside the Earth, not outside, as in the demonstration.

### Shield Volcano-

*What do you think will happen to the shape of the volcano if I pour mud over it? (get wider, not taller)*  
Make a rounded volcano from play-doh. Have student pour sauce over the volcano. Explain that the sides get bigger but the volcano never gets much taller or steeper.

#### Composite Cone Volcano-

*What do you think will happen to the volcano's shape if I pour both mud and sand over it? (get taller and wider).* On tray, have students pour sugar and sauce alternately, to make a volcano that grows both in height and width. Explain that composite volcanoes are made from violent eruptions.

#### **Volcanic Rock Activity (15 minutes)**

Materials: volcanic rocks, magnifying glasses, handouts, volcano poster

Preparation: Have volcanic rocks set up at each 'station.' Have students rotate around, comparing texture, color, and density.

Explain the difference between plutonic and volcanic rocks (plutonic is from underground, volcanic is from aboveground). Explain that big-grained rocks cool slowly, underground. Fine-grained rocks cool quickly, aboveground. Show what the grain is—bubbly, different colors, big, small, etc.

Explain that these rocks formed under different processes. Intrusive rock is formed from magma that stays underground. Extrusive rock is formed from volcanic eruptions.

#### Volcanic (extrusive, fine-grained, fast-cooling)-

Basaltic lava is formed when parts of the mantle layer melt due to high temperatures deep within the earth.

Obsidian cooled very quickly, formed from melted rock coming in contact with water.

Scoria is formed from lava that is full of gas (explain that air bubbles are formed from gas, and aren't actually grains).

Tuff is made from ash.

#### Plutonic (intrusive, coarse-grained, slow-cooling)-

Gabbro is formed by magma that cools very slowly into hard rock.

Granite forms when hot liquid rock cools.

Use poster to show where the rocks came from within the volcano (pointing out plutonic and volcanic).

Have students use magnifying glasses to look at rocks, and record observations on handout (How Do Different Ways of Cooling Form Different Types of Rocks?).

*What does the grain of each rock look like? (Bubbly, big, small, can't see it)*

*Where do the rocks with big grains come from? (Intrusive; cooled slowly inside the Earth)*

*Where do rocks with small grains come from? (Extrusive (outside), i.e. volcanic, cooled quickly. We see them now because erosion is exposing them)*

#### **DEMONSTRATION AND SAFETY (3 mins)**

Discuss safety concerning 'volcanic explosions' as far as baking soda/vinegar reaction goes. Make sure to tell students to wear safety glasses and not put anything in their mouths. Explain that vinegar might splash during the eruption.

#### **Volcanic Explosion Activity (5 mins)**

Tell students they're going to make an explosion! Ask why volcanoes erupt (because pressure builds up from the hot magma). Explain that as magma rises in the volcano, the pressure builds, and eventually causes an explosion. Have everyone add baking soda and cork their bottles (which are in tubs), and then

stand back. The cork will fly off! (stay away from lights overhead). Quickly reinsert the cork for a second eruption.

### **CONCLUSION (3 mins)**

- How are the three volcanoes formed, and how do they change?
- List five kinds of rocks which come from volcanoes.
- What is the difference between volcanic and plutonic rock, or intrusive and extrusive volcanic rock?
- What makes the cork fly off the bottle in the eruption experiment?

Thanks for coming to Family Science Night! I hope you all had a great time! Parents, if you could please fill out the evaluation forms, I would really appreciate it. Students, if you'd like to keep the rubber stopper so you can do the explosion again at home, go ahead! There is a handout by the door, explaining how to do it at home! Thanks again!

### **CLEAN UP**

Rinse play-doh volcanoes for re-use. Dry quickly, so they don't dissolve. Smooth sand volcano out. Replace tinfoil on trays. Make sure rock ID stations are still set up properly; put clean handouts out. Remove used bottles and replace with new, prepared bottles for eruption activity.

### **FILLER**

Have students come to white/chalk board and draw the three types of volcanoes (cinder cone, composite cone, shield). Write these volcano names on the board and label them (a, b, c). Have students label their drawings, and compare at end to see that everyone understands the three types.

## **ERUPTION!!!**

**\*Make sure to ask your parents before you do this!!!\***

You will need:

20 ounce bottle  
Rubber cork  
Vinegar  
Baking Soda  
Tissue  
Safety Glasses  
Plastic tub

Directions:

1. Make sure there are no lights overhead.
2. Fill bottle with 2-3 inches of vinegar.
3. Place bottle in plastic tub.
4. Wrap one tablespoon of baking soda in tissue.
5. Put safety glasses on.
6. Add tissue with baking soda to bottle.
7. Put cork in, but not too tightly.
8. Stand back.
9. Watch explode!
10. Replace cork quickly and watch pressure build for another explosion.

## How Do Different Ways of Cooling Form Different Types of Rocks?

Name of Rock	Describe what you see. Grain size, gas bubbles, weight?	Location of Formation (Aboveground or Belowground?)	Intrusive or Extrusive?	Plutonic or Volcanic?	Rate of Cooling (Fast or Slow?)
Obsidian					
Scoria					
Gabbro					
Tuff					
Granite					

<b>Basalt</b>					
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