

# Lava Layers

## **OBJECTIVE:**

Students will cause volcanoes to erupt numerous times to understand how lava layers and hardens to form different strata.

## **MATERIALS:**

- Various colors of Play-Doh or modeling clay
- Poster board or cardboard
- Bottle caps
- Vinegar
- Baking soda
- Red food coloring (if you want to color the vinegar red like lava)
- Clear straws cut into 2" lengths (one per student)
- Small containers to hold baking soda and vinegar

## **TO DO:**

- Create groups of three to four students. Discuss what students know about volcanoes.
- Pass out a sheet of poster board or cardboard, bottle caps, a container of baking soda, a container of vinegar and straws to each group. You can either have the Play-Doh in a central location or pass out some lumps of each color to each group.
- Have each group arrange their bottle caps on their poster board. Make sure they are near the middle of the poster board and not

on the edges. If you only give each group one bottle cap they can put it right in the middle of the board.

- Have one student from each group fill their bottle cap about three quarters full of baking soda.
- Have a different student from each group gently pour vinegar into the bottle cap until the chemical reaction takes place and the lava starts spilling over the sides.
- Have the next student select **ONE** color of Play-Doh or clay and spread it over the entire lava flow.
- Repeat these steps several times. Make sure each student does a different job after each rotation and that the student who is spreading the Play-Doh or clay selects a different color for each spread.
- When you have decided that the students have erupted their volcanoes enough times, have them each take a straw and stick it all the way through the Play-Doh or clay layers. When they pull the straw out, they will have a core sample of strata. Discuss with the class what they know about strata. Ask them if the layer on the bottom is older than the layer on the top.

## What's Going On?

Volcanic eruptions produce gas, ash and lava. Volcanoes that erupt explosively tend to quickly use up their fuel; volcanoes that erupt gradually will often continuously expel lava, ash and dust for days, weeks or even years. These gradually erupting volcanoes are often over what scientists call a hot spot. A hot spot is a fissure or crack in the earth's crust where magma will constantly seep through. After thousands (or millions) of years land will form. If magma continues to flow out of the crack, volcanoes will form. The intense pressure beneath the volcano will cause it to erupt and the lava will form new land. Volcanoes also form igneous rocks. The Hawaiian Islands were formed over a hot spot. As the plates moved and the continents drifted,

the hot spot shifted forming multiple islands. A new island is being formed as you read this!

Volcanoes form **igneous rocks**, one of the three rocks part of the **rock cycle**. After time, erosion and weathering can break down igneous rocks into tiny sediments. These sediments will stack on top of one another creating layers. The weight of the layers will compact the tiny sediments into a rock called a **sedimentary rock**. Igneous rocks and sedimentary rocks can be altered radically if they are subjected to intense heat and pressure. These rocks are called **metamorphic rocks**. Metamorphic rocks can also break down and become sedimentary rocks. All three types of rocks – igneous, sedimentary and metamorphic can melt in the intense heat of magma. When lava erupts from a volcano it hardens into igneous rock.

Core samples are often taken by scientists when they are doing research in a difficult environment. They will take a sample of something so that they can take it back to a lab and study it under sterile conditions. Scientists who study in Antarctica often take core samples of ice to determine how old the ice is and to study extremophile life. Extremophiles are life forms that live in harsh conditions.



# Rock Journal

## **OBJECTIVE:**

Students will learn the diversity of the rocks by keeping a daily journal of any rocks they collect at home and school.

## **MATERIALS:**

- Journal
- Pens, pencils, colored pencils and markers
- Computers and iPads
- Camera
- Pennies
- Glass
- Steel files (nails)
- Streak plates
- Various recyclables (for display box)
- Small baggies

## **To Do:**

- Students can either do this activity independently or with a group of classmates.

- In class, have your students design a rock journal that they can carry with them during recess, lunch, after school or at home.
- When your students are out of the classroom, make sure they carry a pencil with them so that they can do a quick sketch of any rocks they encounter and write down a few notes about the interesting characteristics of the rock. Students will also want to carry a few baggies to transport their rocks. If you have cameras available students can also take pictures of the rocks.
- While in class, students can use iPads or computers to research the rocks they have collected. If pennies, glass and steel files (nails) are available, students can perform Moh's test to determine the rocks hardness. If streak plates are available, students can also test for streak. By performing these tests, students can start to narrow down the name of the rock they have collected. Students can also build a box out of recyclable items so that they can display their rocks.
- Here is an example of mineral hardness:

Hardness	Mineral
1	Talc
2	Gypsum
3	Calcite
4	Fluorite
5	Apatite
6	Orthoclase
7	Quartz
8	Topaz
9	Corundum
10	Diamond

- Here is the hardness of your test items. If a collected rock is scratched with a fingernail it would have a hardness of **2.5** and fall

between gypsum and calcite. If it takes a steel nail to scratch the rock it will have a hardness greater than orthoclase.

**2.5** – Fingernail

**3** – Copper penny

**6-7** – Glass

**7+** - Steel File

## **What's going on?**

Geologists often take a journal when they are studying in the field. This way they can take detailed notes of rocks and minerals without disturbing, changing or harming the natural environment. Also, in many places where geologists want to study rocks, there are laws prohibiting the collection of any natural resource within the area. A journal and a camera come in mighty handy when you're in a National Park or protected preserve! Be sure to let your students know that if they are collecting rocks outside of school or their home that they are aware of these laws.

## **Vocabulary:**

**Igneous Rock** - Rocks formed by the cooling and solidifying of molten materials. Igneous rocks can form beneath the Earth's surface, or at its surface, as lava.

**Sedimentary Rock** - Rock that has formed through the deposition and solidification of sediment, especially sediment transported by water (rivers, lakes, and oceans), ice (glaciers), and wind. Sedimentary rocks are often deposited in layers, and frequently contain fossils.

**Metamorphic Rock** - Rock that was once one form of rock but has changed to another under the influence of heat, pressure, or some other agent without passing through a liquid phase.

**Rock Cycle** – A continuous process by which rocks are created, changed from one form to another, destroyed, and then formed again.

**Magma** - Molten material beneath or within the earth's crust, from which igneous rock is formed. Igneous rocks formed beneath the surface of the Earth are called intrusive.

**Lava** - The molten, fluid rock that issues from a volcano or volcanic vent. Igneous rocks formed above the surface of the Earth are called extrusive.

