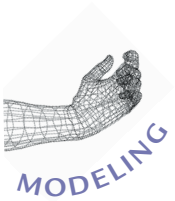
37 Volcanic Landforms



Most people think of volcanoes as destructive. The high temperature of volcanic lava can burn almost everything in its path. Volcanoes also release large amounts of gas and ash that can cause other types of damage. But volcanoes can also be constructive because they form rocks that can eventually result in new landforms.

Millions of years ago, explosive volcanoes erupted in the Yucca Mountain area. These eruptions released ash and hot liquid rock called magma. As this material cooled, it formed the layers of rock that make up Yucca Mountain. Not all volcanic eruptions are the same. Some of the rock found in the Yucca Mountain area is from later volcanic eruptions. These eruptions were smaller and much less explosive. The force of an eruption is affected by the amount of gas in the magma.

CHALLENGE

How do volcanic eruptions vary?

Some volcanic eruptions are explosive, while others release magma more slowly.

MATERIALS

For the class

- 1 sample of basalt rock
- 1 sample of pumice rock

For each group of four students

- 1 vial of baking soda
- 1 60-mL bottle of less gassy "magma" (red)
- 1 60-mL bottle of more gassy "magma" (colorless)
- 1 cup of water
- 1 plastic volcano model with base
- 1 clear, colorless plastic tube
- 1 rubber stopper
- 1 white plastic scoop
- 1 30-mL graduated cup
- paper towels and/or a sponge

For each student

- 1 pair of safety goggles

SAFETY

Both types of "magma" contain dilute acid. Wear safety goggles and avoid direct contact with skin and eyes. Wash your hands after completing the activity.

PROCEDURE

Part A: Eruption of Less Gassy Magma

1. In your science notebook, make a table like the one below.

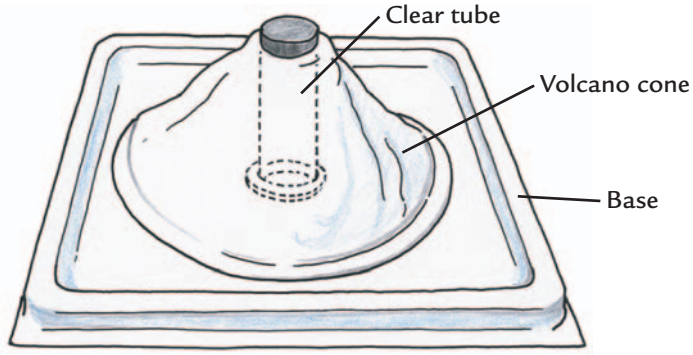
Observing Eruptions

Type of Eruption	Trial 1	Trial 2
Less gassy "magma"		
More gassy "magma"		

2. Work with your group to set up your volcano model as shown below by following these steps:

   a. Gently push the clear tube into the mouth of the white volcano cone.

   b. Set the base of the clear tube into the hole of the square plastic tray.



3. Place 1 scoopful of baking soda into the bottom of the volcano tube.

4. Use the graduated cup to measure and pour 5-mL of less gassy "magma" into the tube.

5. Without disturbing the model, observe it carefully for two minutes.

6. Record your observations in your science notebook.

7. Rinse your volcano model.

8. Then repeat Steps 3–7. Be sure to switch roles among your group members.

Part B: Eruption of More Gassy Magma

9. Use the graduated cup to measure and pour 2.5 mL of more gassy "magma" into the volcano tube.

10. Dip your finger into water and use it to moisten the bottom of the rubber stopper.

11. Dip the bottom of the stopper into the baking soda so that a thin layer of baking soda sticks to it.

12. Gently cap the volcano tube with the stopper. Try not to spill any baking soda and insert the stopper snugly into the tube.

13. Quickly turn the entire volcano model upside-down and then put it back on the table right-side up.

    Hint: Balance the volcano model on the palm of one hand. Use the other hand to hold the stopper and tube in place. Turn the model upside-down and right-side up, as shown below. Quickly set the model on the table right-side up.

14. Without disturbing the model, observe it carefully for two minutes.
15. Describe what you observe in your science notebook.
16. Rinse your volcano model.
17. Repeat Steps 9–16. Be sure to switch roles among your group members.
18. Your teacher will pass around two types of rock formed from cooling magma: basalt and pumice (PUM-is). Compare the two rocks. In your science notebook, record which rock is more likely to have been formed from: (a) less gassy magma and (b) more gassy magma. Explain your reasoning.

ANALYSIS

1. **a.** Describe the similarities and differences between the eruptions of less gassy and more gassy magma.

   b. Which type of magma produced a more explosive eruption?

2. Over time, there have been both very explosive and less explosive eruptions in the Yucca Mountain area. Which type(s) of volcanic rock might you find there? Explain your reasoning.

3. Imagine a volcano erupting many times over a period of years. Which of the following landforms is most likely a result of volcanic eruptions: a valley, a mountain, or a canyon? Explain.

4. What were the strengths and weaknesses of the volcano model? **Hint:** Think about ways in which the model did or did not represent real volcanic eruptions.