Modeling Volcanoes

Making a model of a volcano can go beyond the standard baking soda and vinegar activity! This model shows the movement of magma within a volcano. It can be used to illustrate the magma chamber, or it can “erupt.”

Adapted from Gelatin Volcanoes: http://www.spacegrant.hawaii.edu/classActs/GelVolTe.html.

Grades: K-2

Time frame: One 20-30 minute lesson, depending on discussion and extension activities. Materials need to be prepared in advance.

Student Grouping: Whole Class

National Science Education Standards: Science as Inquiry, Earth and Space Science content standards

Teacher Background Knowledge

A volcano is simply an area where magma, or molten rock, from the earth's mantle reaches the earth's surface, becoming lava. Most volcanoes occur at plate boundaries, where two plates are moving away (diverging) or together (converging). A few volcanoes like the Hawaiian Islands form from a hot spot, or a weak spot in earth's crust, where magma forces its way to the surface.

Magma moves up from underground reservoirs through a volcano through fractures in the surrounding rock. Fractures may be pre-existing or created by the erupting magma. Inside a volcano is a magma chamber, or large reservoir of magma. When a volcano erupts, the magma moves up through the top (and sometimes out the sides) of the volcano.

Materials

- Unflavored gelatin, 1 ounce (28 gm) box containing four packages
- Spoon
- Bowls or bread pans, 2 liter (or 2 quart) capacity
- Red food coloring
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- Syringe for injecting magma (a plastic variety, found at pet stores, designed for feeding birds)

- Peg board, 16 x 24 inches (40 x 60 cm), with 3/16 inch (5-mm) diameter holes spaced 1 inch (2.5 cm) apart. (Or a large, disposable aluminum pan with holes punched into it.)

- Two bricks, 12 inches (30 cm) high

- Large knife

- Tray

- Rubber gloves (optional)

Procedure

Prior to the lesson, complete steps 1 and 2. Complete steps 3-9 with the students.

1. Prepare gelatin for the volcano model by mixing two cups of cool water with four packages of unflavored gelatin in a large bowl. Stir for 30 seconds. Then add six cups of boiling water and stir until gelatin is dissolved. Transfer mixture to a 2-liter bowl, smaller bowls, or bread pans. Refrigerate gelatin at least three hours or until set.

2. Prepare "magma" by mixing water in a glass with enough red food coloring to make a very dark liquid.

3. Loosen the gelatin by dipping the bowl briefly in a larger bowl of hot water.

4. Transfer the gelatin upside down to the center of the peg board and lift off the bowl. The gelatin cast will settle somewhat after being removed from the bowl. It should resemble a colorless to milky, shimmering volcano. There should be no cracks in the gelatin, but it's OK to proceed if one develops during unmolding.

5. Place the peg board on top of the two bricks. Place the tray under the peg board to catch any drips.

6. Fill a syringe with red water. Remove air bubbles from the syringe by holding it upright and squirting out a small amount of water. Air tends to fracture the gelatin.
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7. Insert the syringe through a hole in the peg board into the center of the gelatin cast. Inject the red water slowly, at a rate of about 20 cc/minute (2/3 ounce/minute), and watch carefully. *Rapid injection drives the fluid straight up and creates an eruption, but will not show the formation of the magma reservoirs (dikes) within the volcano.*

8. Refill and insert the syringe several times. Compare magma migration each time.

9. View by looking directly down on the gelatin cast. For a cross section view, use a knife to cut the mold in half.

10. Ask students to draw a picture of what they observe in the cross section. Use nonfiction children’s books and web sites to label the parts of a volcano.

Lesson Extensions

1. Use children’s literature to learn more about volcanoes. Have students create question-and-answer books to record what they’ve learned.

2. Plot the locations of active volcanoes worldwide. Is there a volcano in your area?

3. Bring in igneous rock samples (rock formed by hardening lava) such as obsidian, pumice, and basalt. Help students connect volcanic eruptions to the formation of these rocks.

4. Have students create and paint clay models of volcanoes.

Assessment

*This lesson provides many opportunities for assessment, including:*
- Student engagement and participation in the lesson (observation and anecdotal notes)
- Understanding of scientific concepts (student drawings or question-and-answer books)