How Magma Flows

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Grade: 4th
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Length of Lesson: 30 min.

Lesson Objective:
The goal of this lesson is to allow students to see how underground magma flows upward through porous rocks as a result of pressure.

Students should:
Understand and identify what all parts of this experiment represent.
Understand why magma moves upwards towards the surface as a result of pressure and the natural occurrence of heat rising.
Know the meaning of porosity as well as why it is important for the eruption of volcanoes.

Content Outline:
The content presented to students in this lesson will teach them the effects of pressure on magma and how it causes volcanic eruptions. The exercise requires students to observe how magma flows through porous rocks as a result of changing pressure. The food coloring

Key terms include:
Pressure – the continuous physical force exerted on or against an object by something in contact with it.
Magma – hot fluid or semi-fluid material below or within the earth's crust.
Lava – hot molten or semi-fluid rock erupted from a volcano.
Porous – having minute spaces or holes through which liquid or air might pass

Materials:

1 film roll canister with top
1 Alka-Seltzer tablet
Transparent plastic cups (enough to accommodate the number of groups)
Vegetable oil
Water
Food Coloring
Eye Droppers
Kitchen sponges (small enough to fit inside the cup – enough to accommodate the number of groups)
Magnifying lenses (enough to accommodate the number of groups)
Paper towels for cleanup

This activity can be conducted individually, in pairs, or in groups of 3-4 students. Each student/pair/group needs 1 cup filled ¾ of the way with water before adding a few drops of food coloring. Then 1 ½ tsp. of oil should be added to the sponge before the sponge is added to the cup. This setup should be used for every cup.

Engagement:

The teacher should fill the film roll canister ¾ of the way full with water before adding an alka-seltzer tablet and sealing with the lid. Shortly after this is done, pressure inside the canister should increase causing the lid of the canister to blow off the top. The teacher should take this opportunity to discuss/assess student's knowledge of pressure and what it means.

Exploration:

The activity involved in this lesson requires students to observe the porosity of rocks and how liquids/gasses can travel through them. The lesson begins by having students get cups filled with water and a few drops of food coloring. The teacher should then distribute the eye-droppers and allow each group to fill the dropper with vegetable oil before dripping a few (no more than 5) drops onto the sponge. The students then submerge the sponge in the water and observe (using magnifying lenses) what happens in the cup.

Explanation:

The video called "Volcanic Pressure" on the 2005 World-Book Encyclopedia computer program can be used to allow students to see the real application of what they saw in the cup. Many students might have never seen a volcano erupt and therefore would really enjoy the video as it provides a good connection between what they have done in class and in the video.

Elaboration:

After the students have started working with the sponges, the teacher should set up a demo cup using an actual rock. After the students are done talking about what they observed in their cup, the teacher should produce the cup with the rock in it to the students and ask to see what things they see that are similar to their sponge observations.

Evaluation:

Evaluation will take place though verbal assessment and general observations. Teachers can have students summarize their observations in their science journals or wherever they took notes during the activity.