7. Volcanoes And Lava

1 hour

Children carry out and evaluate practical tasks to mimic lava flow.

OBJECTIVES

- Identifying scientific evidence that has been used to support or refute ideas or arguments
- To know that science is about thinking creatively to try to explain how living and non-living things work, and to establish links between causes and effects.
- To know that comparing Mars' key landscape features with similar features on Earth can help us to understand their formation.

RESOURCES

(Per group of 4 children unless otherwise stated)

Two methods are described for this activity. Option A mimics volcanic eruption and lava flow by using vinegar and sodium bicarbonate. Option B models lava flow by using melted chocolate. The teacher may choose either one. If choosing option A, teachers might want to point out to children that it is not a chemical change like this one that causes volcanoes to erupt but melting of the rock and pressure from within the Earth.

Option A: Vinegar and Sodium bicarbonate volcano	Option B: Chocolate volcano
Activity sheets 9-10	Activity sheets 9-10
A3 sheet of card	Large card or plate
Small egg cup or tealight container	Filter funnel or cardboard cone
1/2 cup bicarbonate of soda	3 x 100g baking chocolate (white, milk and dark
1/2 cup clear vinegar	3 small jugs or beakers
Teaspoon	Apple corer
2 Plastic cups or containers	Plastic straw
4 colours play dough* or plasticine	Microwave and 3 microwavable bowls or hob, pan and glass bowl
Cylinder	
2 waterproof markers	
Paper towes	
(5-10ml)ml measuring cylinder or syringe	
Pipette	
Large straw or transparent biro case	
Cocktail stick or match stick	
* there are many playdough recipes on the internet	

OPTION A: VINEGAR AND SODIUM BICARBONATE VOLCANO

ADVANCED PREPARATION

A die made or covered with the numbers 3, 4, 4, 5, 5, 6.

INTRODUCTION

The teacher explains that the children are going use vinegar and sodium bicarbonate to mimic the eruption of a volcano and flow of lava. A set of volcano facts cards (Activity sheet 10) is provided. A throw of a die will decide the number of 'eruptions' that the children will model.

ACTIVITY

Each group throws the die to determine how many eruptions there will be. The children then follow the first set of instructions on Activity sheet 9 to produce the 'foam' lava and record the flow with layers of coloured play dough. The teacher should encourage the groups to make a drawing of the distance, pattern and shape of each lava flow. Finally, a plastic drinking straw may be used to remove samples from the play dough layers.

SAFETY NOTES, PRACTICAL TIPS AND GUIDANCE

Ideally, more than one group will choose to try the volcano activity, and then on completion, the volcanoes and their lava layers may be swapped between groups. Each group can map and take samples from a volcano whose pattern of lava flow is different from their own. This will simulate more closely how geologists study the geologic history of an area or feature. The children are encouraged to look carefully at the model volcano and suggest how they could discover what is below the surface without lifting the play dough layers. They should decide where to drill for samples and how many they would need in order to obtain most information. Straws or transparent biro cases can be used to simulate the drill taking the samples. They should be pushed gently and deeply through all the layers of play dough at each sampling point. Extracting the sample requires care.

OPTION B: CHOCOLATE VOLCANO

ADVANCED PREPARATION

For the 'volcano' either block the tip of a filter funnel or make a small cone from card.

INTRODUCTION

The children follow the second set of instructions on Activity sheet 9 to produce layers of chocolate lava flow. A roll of the die determines the number of lava flows. The children could take photographs or draw the shape of the lava flow whilst waiting for the chocolate to begin to solidify. They can try putting obstacles , such as small stones in the lava path and observing the effect. When all thel ayers have been added, the children may then take samples of the chocolate lava layers, using an apple corer.

SAFETY NOTES, PRACTICAL TIPS AND GUIDANCE

The tables can be covered with newspapers or plastic sheeting. The children should wear aprons, old shirts or lab coats to protect clothes. Melt the chocolate in either a microwave oven or on the hob in a bowl over a pan of hot water. Stirring a little warm water into the melted chocolate improves its runniness, and reduces the amount of chocolate needed. Have 3 small beakers or jugs available for the children to collect the chocolate. As a guide, a minute in the microwave oven on full power should be sufficient to melt 100g chocolate.

PLENARY

The children look again at the images N and S and read the information about Volcano Ceraunius Tholus provided by the experts (Activity sheet 12). They report upon the success of their models and sampling and consider:

- *What have they learned about lava flow patterns and layering?*
- *Did the lava always flow in the same direction or as far?*
- *Did they observe any lava flow patterns similar to the image on Mars?*
- *Do they agree with the experts' opinions on how Ceraunius Tholus was formed?*
- *Do they believe that the rover should take samples from this area?*

They should realise that the oldest flows are the deepest layers on the model and the newest are on the surface. They could reflect upon whether the process was similar to real life.

BACKGROUND INFORMATION

Photo geologists use images taken by planes and satellites to interpret the history of a planet's surface. If they can get to the surface, they take samples and draw maps.

Not all lava flows are buried by the next. Sometimes older flows can be visible. The direction of the lava flow can be affected by previous flows, by old lava or channels on the surface, and also by the speed of the eruption. The energy of an eruption can determine how far the lava can flow and how easily it passes obstructions. In real field studies, geologists would, of course, be unable to take such deep samples through all the lava layers. On Mars, scientists hope that a new rover will drill below the surface in order for samples to be collected and analysed.

Landscape

Images can be downloaded from www.cciproject.org/topicbank/space.htm

Image K

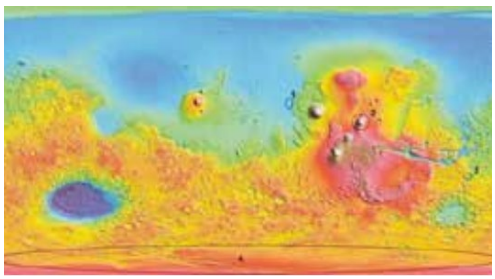


Image of Mars with landscape features for pupils

Image Q

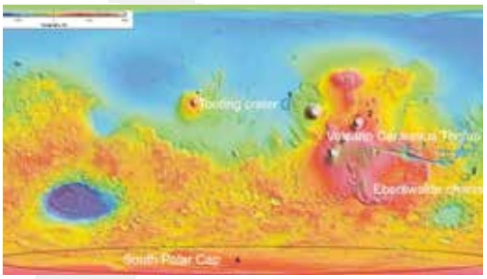
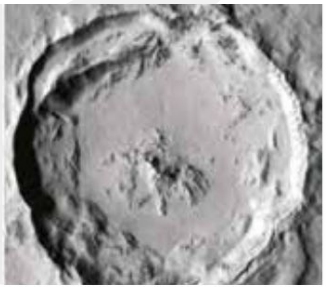


Image of Mars with landscape features marked and named for teachers pupils

Image L

Tooting Crater

Image M

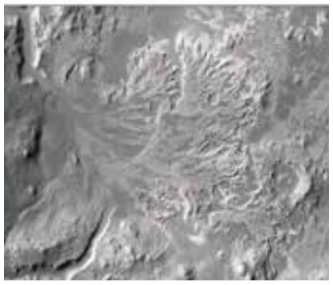


Tooting Crater close up

Image N

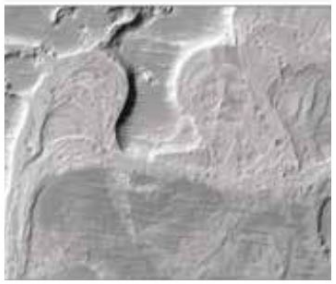
Volcano Ceraunius Tholus

Image O



Eberswalde Channels

Image P



Eberswalde Channels close up

Image R

Crater on Earth viewed from space

Image S

Volcano on Earth

Image T

Water channels on Earth

Image U

River delta on Earth viewed from space