

## • VISCOUS VOLCANOES! •

- In this activity, we're going to learn a little bit about volcanoes, then we'll make some slime and investigate the influence of lava viscosity on volcano shape. *Activity adapted from Geoscience Australia*

**EXPLORE VOLCANOES** • Volcanoes come in many shapes and sizes. To see the variety of volcano shapes, look up photos of some volcanoes around the world. Here are a few:

### AFRICA

- Mount Kenya, Kenya
- Mount Kilimanjaro, Tanzania

### THE AMERICAS

- Kilauea, USA
- Mauna Loa, USA
- Mount St. Helens, USA
- Mount Pelée, Martinique
- Nevado del Ruiz, Colombia

### ANTARCTICA

- Mount Erebus, Antarctica
- Big Ben, Heard Island, Australia

### ASIA

- Krakatoa, Indonesia
- Mount Tambora, Indonesia
- Mount Pinatubo, Philippines
- Mount Aso Nakadake, Japan
- Mount Fuji, Japan

### EUROPE

- Mount Etna, Italy
- Mount Vesuvius, Italy

### OCEANIA

- Mount Taranaki, New Zealand
- Mount Ruapehu, New Zealand

## VOLCANIC EXPERIMENT!

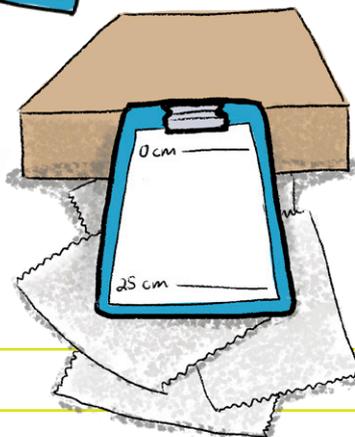
Let's see how fast your homemade lava flows!

### MATERIALS

- Ruler
- Pen, pencil, or marker
- 1 sheet A4 paper
- Clipboard
- Sticky tape (if clipboard does not have a suitable clip)
- Photocopy paper box lid (to support clipboard)
- Paper towels
- Protractor
- Three identical small clear plastic containers (e.g. snack food boxes, disposable cups)
- ¼ cup measure
- 100 g cornflour
- One cup of water
- Syringe with 50 ml capacity
- Three spoons
- Red food colouring (optional)
- Paper
- Stopwatch/timer
- Camera/camera phone

### SET UP

- Using a ruler, draw a horizontal line near the top of your paper.
- Label it 0 cm. This will be your start line.
- Draw another horizontal line 25 cm below the first line.
- Label it 25 cm. This is your finish line.
- Attach the paper to the clipboard using the clip or sticky tape.
- Place the top of the clipboard on the edge of the box lid, and make sure the clipboard is resting at an angle between 35 and 40 degrees.
- Place a few paper towels underneath the bottom of the clipboard.



### MAKE "LAVA"

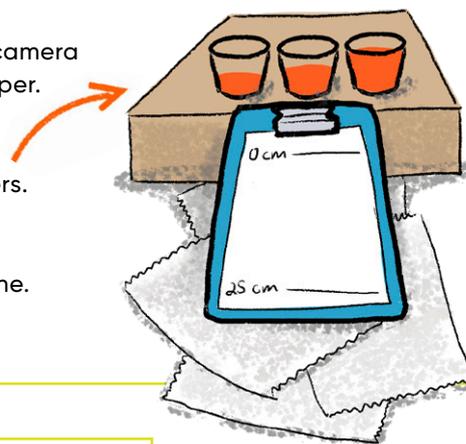
Using cornflour and water, make three "lavas" with differing viscosities to represent three types of lava.

- Put ¼ cup (30 g) of cornflour in each of the three plastic containers.
- Using the syringe, add 30 ml water to the first container, and mix very slowly.
- Using the syringe, add 35 ml water to the second container, and mix very slowly.
- Using the syringe, add 45 ml water to the third container, and mix very slowly.
- Optional: Add red food colouring, if you have some handy, and stir to incorporate. Make sure to add the same number of drops to each container.
- Write down your hypothesis (educated guess) about which lava will flow most quickly and which will be the slowest and why.

CONTINUED ON NEXT PAGE

### LET IT FLOW!

14. Set up the camera so it faces the paper on the clipboard. Make sure the camera can capture the whole view from the top line to the bottom line on the paper.
15. For this step, you will need an extra set of hands. Find a friend, sibling, parent, or carer. Line up the three containers on the box, in front of the top of your clipboard. You and your helper will prepare to tip the containers.
16. Press record on the camera to start filming.
17. Say "1, 2, 3, go!" At "go!", you and your helper will tip the containers so the top edge of each container rests at the top of the clipboard, near the 0 line. Hold the bottom of your container(s).
18. Observe the flow of the lavas.



### COLLECT AND ANALYSE YOUR DATA

19. Review your film footage.
20. Time how long it takes each lava flow to reach the finish line or finish flowing. Record your data in the chart below.

DATA	Lava 1 (30 ml water)	Lava 2 (35 ml water)	Lava 3 (45 ml water)
Distance Lava Flows (0 to 25 cm)			
Time Taken to Reach This Distance (in seconds)			

21. Calculate the speed of each of the lava flows using this formula:

$$\text{SPEED} = \text{DISTANCE} \div \text{TIME}$$

For example:  $\text{speed} = 25 \text{ cm} \div 2 \text{ seconds} = 12.5 \text{ cm/sec}$

SPEED OF LAVA	Lava 1 (30 ml water)	Lava 2 (35 ml water)	Lava 3 (45 ml water)
Speed			
Viscosity of Lava (circle one)	Very runny Slightly runny Not runny	Very runny Slightly runny Not runny	Very runny Slightly runny Not runny

22. Which was the fastest lava? Which was the slowest lava? How does the viscosity of the liquid relate to the speed of the flow?

### BONUS!

You can use this activity to compare the viscosity of all sorts of fluids. If you want to, repeat the experiment using different liquids, such as water, oil, washing-up liquid, chocolate sauce, ketchup, honey, maple syrup, and shampoo.

### ★ VISCOSITY AND VOLCANIC CONES

Viscosity refers to how easily a fluid is able to flow.

A runny fluid has low viscosity, while a thick, sticky, or semifluid substance is more viscous.

- Very runny = **low viscosity**
- Slightly runny = **medium viscosity**
- Not runny/thick/sticky = **high viscosity**

### LAVA SPEED

What does lava viscosity have to do with volcanoes? Some volcanoes erupt lava that is very runny. It moves quickly and can flow over large distances. Others produce lava that is very sticky. It moves slowly and cannot flow very far before it solidifies. In this activity, the viscosity of "lava" was influenced by the amount of water you added. In volcanoes, the viscosity is largely controlled by the chemistry of the lava. In general, the more silica there is in lava, the more viscous it is.

### ★ SLOPE SHAPE

Lavas low in silica content have a low viscosity. They can flow for long distances away from the vent, or opening in the Earth's surface. Over time, this type of lava develops gently sloping volcanoes called **shield volcanoes**. Mauna Loa, Kilauea, and Piton de la Fournaise are examples of shield volcanoes.

Lavas with higher silica content are more viscous. They barely flow and form steep-sided plugs over the vent called a lava dome. Pressure builds against this blockage, and explosions, as part of eruptions, throw solid fragments (called pyroclastics) into the air that settle on the sides of the volcano. These volcanoes are known as **stratovolcanoes** or **composite volcanoes**. Some examples are Mount Mayon, Mount Fuji, and Mount Ruapehu.



## THANK YOU! WE HOPE YOU ENJOYED THIS ACTIVITY.

*This activity was adapted from Geoscience Australia.*



Rebel Girls, a certified B Corporation, is a global, multi-platform empowerment brand dedicated to helping raise the most inspired and confident generation of girls. The brand purposefully creates content, products, and experiences to empower Generation Alpha girls and equip them with the knowledge and tools they need to thrive. Because confident girls will radically transform the world.

[rebelgirls.com](http://rebelgirls.com)



Founded in 1917, the Royal Australian Chemical Institute (RACI) pairs a rich legacy of scientific excellence with a commitment to advancing the chemical sciences for the betterment of Australia and beyond. Our institute is a vibrant community of passionate individuals from education, academia, industry, and government, united by a common purpose: to foster the understanding and application of chemistry for the benefit of society. At the heart of what we do is the pursuit of knowledge, innovation, and collaboration. Please join us on this journey, where knowledge meets innovation, and together, we can shape the future of chemistry. [raci.org.au](http://raci.org.au)

### PRINCIPAL GOVERNMENT PARTNER



**Australian Government**  
**Department of Industry,  
Science and Resources**

*The views expressed herein are not necessarily the views of the Commonwealth of Australia, and the Commonwealth of Australia does not accept responsibility for any information or advice contained herein.*

### PRINCIPAL HIGHER EDUCATION PARTNER



### PARTNERS



**UNSW**  
SYDNEY



**DEAKIN**  
UNIVERSITY



This work is supported financially through the Royal Society of Chemistry Inclusion and Diversity Fund. The views expressed herein do not necessarily reflect those of the RSC.