

# LAVA FLOWS ACTIVITY SHEET

2017  
**YEAR OF  
RISK**

 The Geological Society  
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Lava is molten rock that is erupted from a volcano. Some volcanoes erupt lava that can flow for many kilometres, whilst others produce lava domes or huge ash columns with no runny lava at all. Whether or not lava flows when it erupts depends on its viscosity – its resistance to flow. Factors that control how viscous lava will be when it erupts include temperature, crystal content and the amount of SiO<sub>2</sub> (silica) in the lava.

Lava type	Basalt	Andesite	Rhyolite
SiO <sub>2</sub> content	45-55%	55-65%	> 65%
Temperature	1000 - 1200°C	800 - 1000°C	650 - 800°C.
Viscosity	Low	Medium	High

## TEST 1: TEMPERATURE

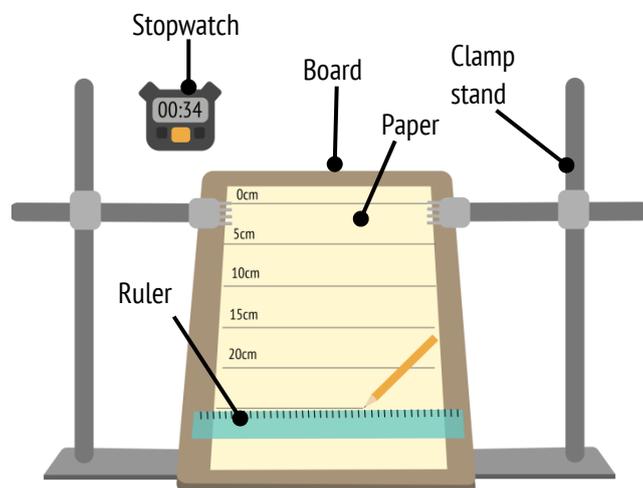
This experiment will look at the effect temperature has on the viscosity of lava flows.

1. Write your hypothesis

2. Set up your equipment as in the diagram opposite. Use a ruler and pencil to draw lines on your paper every 5cm. You may want to set up your equipment in a tray or on newspaper as it will get messy.

3. Heat up beakers of syrup/glycerol in water baths at a range of temperatures (35, 40, 45 and 50°C) using heat controlled water baths or creating water baths using beakers of hot water and thermometers. Leave one beaker out at room temperature. Make sure spoons are in the syrup as it's heating up otherwise they will cool the syrup later.

4. Once heated use the heated spoons to pour 1 tablespoon of each sample of syrup on the 0cm line at the top of the paper (one at a time). Start your stopwatch as soon as the syrup reaches the 5cm line and time how it takes for the syrup to reach each 5cm increment. Record your results in the table and then work out the speed of each lava flow and rank the viscosities.



## YOU WILL NEED:

- Clamp stand + clamps
- Cutting board
- Paper
- Glass beaker x5
- Heat controlled water baths/ large beakers to create water baths
- Water
- Thermometer
- Golden syrup or glycerol
- Stopwatch
- Tablespoon x5
- Sand 50ml
- Measuring cylinder

Temperature	Room temperature	35°C	40°C	45°C	50°C
Time taken to reach 10cm (s)					
Time taken to reach 15cm (s)					
Time taken to reach 20cm (s)					
Speed (m s <sup>-1</sup> )					
Viscosity (rank lowest – highest)					

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## TEST 2: SLOPE ANGLE

This experiment will look at the effect volcano slope angle has on the viscosity of lava flows.

1. Write your hypothesis

2. Set up the same equipment as in Test 1. This time you will be keeping the temperature constant but changing the slope angle. Using the syrup/glycerol heated to 45°C in the water bath, carry out same procedure as in Test 1 changing the slope angle of the board for each test. Use a protractor to record your different slope angles.

Slope Angle					
Time taken to reach 10cm (s)					
Time taken to reach 15cm (s)					
Time taken to reach 20cm (s)					
Speed (cm s <sup>-1</sup> )					

## TEST 3: CRYSTAL CONTENT

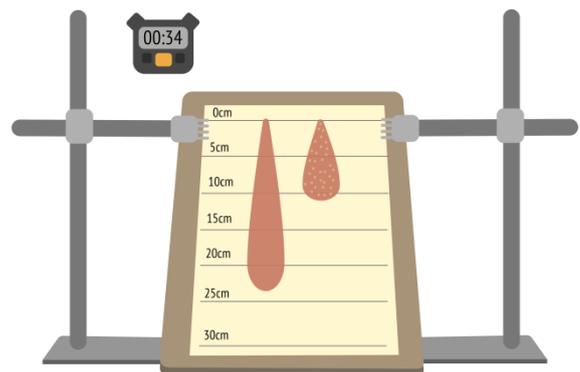
This experiment will look at the effect the variable of crystal content (sand) has on the viscosity of lava flows.

1. Write your hypothesis

2. Use the same equipment set up in Test 1.

3. Use the syrup/glycerol to 45°C in a water bath. Heat a beaker of sand to the same temperature. Once heated measure 5ml of sand in a measuring cylinder and add this to the syrup and stir it in.

4. Pour 1 tablespoon of sandy syrup on the 0cm line and the top of the paper. Record the time taken using the same procedure as in Test 1. Repeat this 3 more times, adding a further 5ml of sand each time to the syrup. Record your results below.



Sand	0ml	5ml	10ml	15ml	20ml
Time taken to reach 10cm (s)					
Time taken to reach 15cm (s)					
Time taken to reach 20cm (s)					
Speed (m s <sup>-1</sup> )					
Viscosity (rank lowest - highest)					

5. Use graph paper to plot your results from Test 1, 2 and 3 and then write up your conclusions about what the different test show about lava flow viscosity.