BUBBLE ESCAPE AND DRAG RACE

Viscosity and Violent Volcanoes

There are many different types of volcanoes. Shield volcanoes have a broad rounded shape and gentle splattery eruptions often described as fire fountains. Strato volcanoes are sharp and steep sided in shape and have violent explosive eruptions. But what makes these two types of volcano look and erupt so differently? It is mainly controlled by how thick (viscous) or runny the magma in the volcano is…

In this experiment you can you use 3 fluids of different viscosity (thickness) to see what differences runny or thick magma can cause in volcanoes. This experiment can get a bit messy, so make sure you do it somewhere easy to clear up.

What you'll need:

- 3 plastic straws
- A chopping board or tray
- 50ml water
  (very runny fluid)
- 50ml honey (mid range viscosity fluid)
- 50ml golden syrup (very thick viscous fluid)
- 3 small clear containers (shot glasses/plastic cups)

Instructions

1 - **Gas Escape**

Put each of your liquids into a container. Take your straw and blow bubbles into each of the liquids.

Is it easier to blow into the thick viscous golden syrup or the runny fluid water? What does it look like when you blow into each liquid?

What if these fluids were actually magma… is it easier for gas to escape from thick viscous magma or runny magma? What would this mean for the style of the eruption?

What's happening?

The thick viscous golden syrup is very hard to blow bubbles in, while the runny water is very easy to blow bubbles in and very splattery. This means that when gases come out of magma they find if much harder to escape from thick viscous magma than runny magma. When the gas can't easily escape from viscous magma, pressure builds up causing explosive eruptions. Gas easily escapes from runny fluid magma causing splattery non-explosive (effusive) eruptions.

Instructions

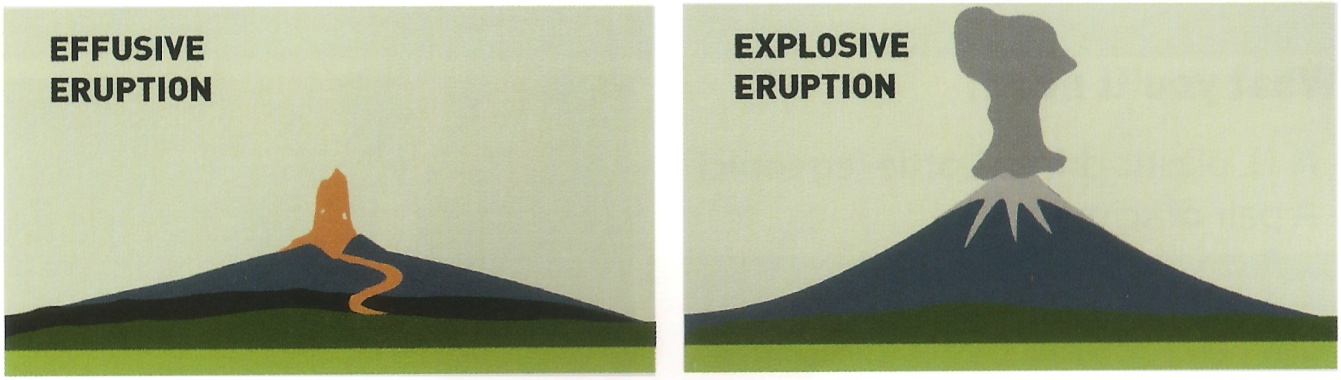
2. Viscous Vs. Runny Race

Take your chopping board and hold it at a steep angle. Take each of your fluids and pour them down the slope timing how long they take to get to the bottom.

Which fluid was fastest? The thick viscous golden syrup or the runny fluid water? What if these fluids were actually lava? As hot lava cools it solidifies and turns into solid rock. How far would a viscous or runny lava get before if cooled down and turned to rock? What would this mean for the shape of the volcano it formed?

What's happening?

The thick viscous golden syrup runs down the slope very slowly, while the runny fluid water runs down very quickly. If this were lava erupted from a volcano, this means that viscous lava couldn't travel very far from the vent before cooling and solidifying, whereas runny lava can go long distances before cooling. This means that volcanoes with runny lava can create broad shallow sloping volcanoes, whereas volcanoes with thick lava quickly build up steep sides.



FACT

Splattery non-explosive volcanic eruptions are called EFFUSIVE.
The scientific word for how runny or thick a fluid is, is VISCOUS. Thick fluids like golden syrup have a high viscosity and runny fluids like water have a low viscosity.

KEY POINTS

- Fluid runny lava, lets gas escape easily so creates splattery non-explosive (effusive) eruptions. Runny lava can travel a long way from the vent before cooling, so forms broad shallowly sloping volcanoes. Shield volcanoes are an example of this.
- Viscous lava traps gas, allowing pressure to build up until a violent explosive eruption happens. Viscous lava can't travel far from the vent before cooling, forming sharp steep sided volcanoes. Strato volcanoes are an example of this.

INFO FOR INTERESTED ADULTS

What makes magma runny or viscous?

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