Volcanic Gas and Viscosity Student Activity

Aim

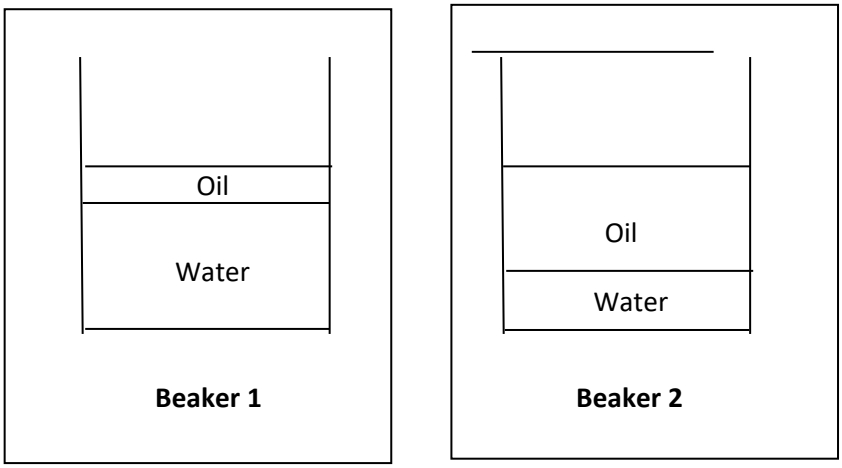
To demonstrate how viscosity affects the amount of gas retained in magma.

Equipment

- Vegetable oil (~60 ml)
- 2x beakers or transparent plastic cups (200 mL+)
- Red food colouring
- 2x Aspro Clear tablets

Procedure

1. Pour water into one of the beakers until it is 1/2 full and into the other to about 1/5
2. Add several drops of food colouring
3. Add about 1/5 volume of oil to the first beaker and 1/2 volume oil to the second
4. Wait about five minutes for the oil and water to separate completely.
5. Drop an Aspro Clear tablet into both beakers and see what happens.



Observations

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Explanation

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Notes

As you can see from the table below basaltic magmas have less silica so therefore a lower viscosity, allowing them to retain less gas. This results in more gentle eruptions. Andesitic and rhyolitic magmas have more silica, a higher viscosity and therefore retain more gases, resulting in more violent reactions.

Which of your beakers represented each type of magma? Did they react as expected?

	Basic ← Basaltic	Andesitic	Rhyolitic → Acidic
Silica (%)	40	50	60 70+
Viscosity	Low	→	High
Gas	Least (1-2%)	→	Most (4-6%)
Eruption	More frequent, but gentle	→	Less frequent but violent
Material	Lava/steam	→	Pyroclastics, gases and lava

(Tompkins, 2011)

References:

Tompkins, D.E. (Ed.), 2011, Exploring Earth and Environmental Science Stages 1, 2 and 3, Earth Science Western Australia