

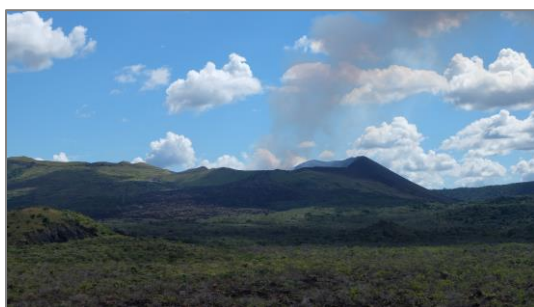
Effusive Volcano

Create an effusive eruption, a type of volcanic eruption where gas escapes slowly.

You can watch a video of this experiment at <https://earthandsolarsystem.wordpress.com/effusive-eruption/>.

How do volcanos erupt?

- Under the ground magma is kept under massive pressure which allows gases to be dissolved inside. If you have ever swam underwater and felt the pressure on your ears, you know what this is like!
- As magma ascends to the surface to erupt, this pressure decreases and the gas can bubble out, just like when you open a bottle of fizzy drink.
- How easy or difficult it is for the gas to escape can determine what sort of eruption we see.
- If the gas can escape easily, then it produces an *effusive eruption*. These are relatively gentle eruptions, often forming lava flows of the degassed magma once it is erupted.
- If the gas cannot escape the magma then it forms a much more violent explosive eruption, in which the magma is broken apart by the expanding gas to form volcanic ash. These eruptions are much more dangerous and can lead to other volcanic hazards such as pyroclastic density currents.



These two photos show effusive emissions of Masaya Volcano in Nicaragua.

Top – The passively degassing plume is visible in the distance.

Bottom – A close-up of the lava lake, showing some lava.

(Images: Ben Esse)



Experiment

- *In this experiment you will replicate an effusive eruption, using vinegar and bicarbonate of soda.*
- The bicarbonate of soda is an alkali and the vinegar contains a weak acid called acetic or ethanoic acid. When we these mix together they react and produce a gas called carbon dioxide.
- The carbon dioxide represents the gas being released from the magma as it gets near to the surface.
- The carbon dioxide forms bubbles in the magma, which erupts from the volcano often forming lava flows.
- If you look closely you will be able to see these bubbles, just like you can with real volcanic rocks!



Effusive Volcano

You'll need:

- 1 tbsp bicarbonate of soda.
- 1 tbsp washing up liquid.
- 2 tbsp water.
- Half a cup of vinegar.
- A few drops of red food colouring.
- 2 plastic cups or small plastic bottles.

How to make your effusive volcano:

1. Mix the bicarbonate of soda, washing up liquid and water together in one cup. You could use a plastic bottle with a narrower top for the bicarbonate of soda mix, this can help get a more exciting eruption!
2. In the other cup, add some food colouring to the vinegar to make it red.
3. Place your cup with the bicarbonate of soda on a flat surface.
4. Pour the vinegar and food colouring in and watch your volcano erupt!



The effusive eruption experiment should be done over something like a paddling pool or washing up bowl that will contain the eruption. (Image: Earth and Solar System)

Did you know...?

There are about 1500 potentially active volcanos worldwide.

Be Safe:

- Do not eat or drink any of the items you use.
- Do this somewhere where any spills can be easily cleaned up.
- Do this experiment in something like a paddling pool or washing up bowl that can contain any spills.
- Do this experiment outside if you can, ideally over a grassy area that will absorb any spills. If you are doing it inside, cover surfaces with newspaper, bin bags or plastic sheeting to make it easy to clean up.
- Take extra care when adding the food colouring. You may wish to wear protective clothing and cover any surfaces/furnishings to prevent them being stained by any spills
- Clean up any spills straight away, to make sure no-one slips on a wet or sticky floor.
- Be careful to avoid splashing the materials in your eyes or on your skin. Wear safety goggles if you have them.
- When you have finished, carefully dispose of the materials, and then wash your hands.

Questions to think about:

What is happening in this experiment?

- What is the reaction taking place between the vinegar and bicarbonate of soda? Can you write an equation for the reaction?
- What does the washing up liquid do?
- Can you think of examples of effusive eruptions?
- How does an effusive eruption differ from other types of eruptions, such as an explosive eruption?
- What types of volcanos are produced from effusive eruptions?



Effusive Volcano

Information for teachers, parents and carers

Experiment Summary:

- This activity aims to demonstrate an effusive volcanic eruption.
- A separate activity demonstrates an explosive eruption.
- An effusive eruption is a relatively gentle eruption, the gas is released from the magma slowly.
- The bicarbonate of soda and vinegar react to form carbon dioxide, which forms bubbles in the washing up liquid. The red food colouring just makes the bubbles look a bit more realistic, and can be omitted.
- This experiment can be done in any bottle, cup or other suitable container, but will work best in a bottle with a relatively small neck.

Safety

- The bicarbonate of soda, vinegar, washing up liquid and food colouring present no inherent risk, but to demonstrate good scientific practice they should not be eaten/drunk.
- The experiment should be carried out somewhere where spills can be easily contained. Something like a paddling pool or washing up bowl works well to contain spills.
- Any spills should be cleaned up immediately, to avoid slipping on a wet and sticky floor.
- You may wish to do the experiment outside, over a grassy area, so spills are absorbed.
- You may wish to cover surfaces with newspaper, bin bags or plastic sheeting to make it easy to clean up, especially if you are doing the experiment inside.
- Take extra care to avoid spills when adding the food colouring to the bottle, as it may cause staining or damage to clothing or furnishings. You may wish to wear protective clothing and cover furnishings and surfaces to protect them.
- You may be splashed on the skin or in the eyes with non-harmful materials. Safety goggles should be worn if available.

Links to curriculum:

Primary School

- Science – Comparing different types of rocks, key features of volcanoes.

Secondary School

- Chemistry – Composition and structure of the Earth.
- Geography – Landscape development.

GCSE or equivalent

- Chemistry – chemical changes, reactions of acids.
- Geography – types of volcanoes and lava flows, physical processes of volcanoes, and how they shape our world.

A-Level or equivalent

- Geography – types of volcanoes and lava flows.

Uniform Groups:

- This may be suitable for Cubs or Scouts working towards their Scientist Activity badges.

Further Information:

For further information or to contact us please visit our social media accounts.



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