



TOPIC: VOLCANOES

SUBJECT: Geology

LEVEL/AGE: Secondary Education - 13 years old

FOREKNOWLEDGE: Types of volcanoes, tectonic plates, materials and composites

LENGTH: 5 PAGES (DURATION: 60 MINUTES)

LEARNING OUTCOMES

At the end of this lesson, the pupils will know the formation, typology and location of volcanoes, as well as the hazards associated with volcanic eruptions.

**RESOURCES**

Maps, video projector and screen.

Homemade volcano:

Plastic bottle,
newspaper, tape,
baking soda, water &
vinegar.

TEACHING METHODS

Explanatory videos

Repetition of exercises

Maps

ACTIVITIES

INTRODUCTION (5 minutes)

A powerful and captivating introduction to volcanoes could start with a short video showing amazing images of real volcanic eruptions. You can use clips from nature documentaries or animations to illustrate how volcanoes erupt, spewing incandescent lava and forming mountains of smoke and ash (a couple of videos are included in the references).

You can also show an intriguing image of a famous volcano, such as Mount Fuji in Japan or Mount Vesuvius in Italy, and ask students to think about what they know about that particular volcano. This will serve as a smooth transition to the main part of the lesson, where they will explore in detail the different aspects of volcanoes.

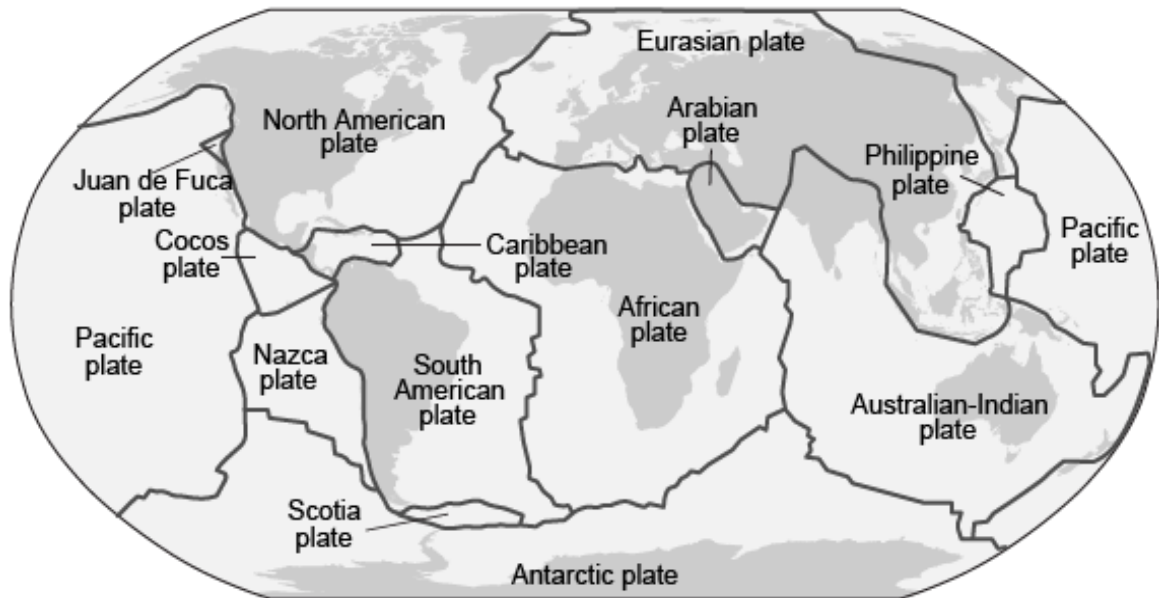
THEORY PART (15-20 minutes)

A volcano is a mountain or hill that forms when magma, a mixture of molten rocks, gases and minerals, rises from the Earth's crust to the surface. When this magma erupts through the vent at the top of the volcano, gases, ash and lava are released. Volcanoes can be classified into three main types:

- **Shield volcanoes:** They have a broad, rounded shape due to smoothly flowing fluid lava.
- **Composite volcanoes or stratovolcanoes:** These are tall and steep, with explosive eruptions that can be dangerous.
- **Cinder cone volcanoes:** They have a conical shape and are mainly formed by volcanic ash ejected during explosive eruptions.

Volcanic eruptions occur due to the pressure build-up of magma in the magma chamber that eventually finds an outlet through the crater. The composition of the magma and the amount of gases dissolved in it also influence the explosiveness of the eruption. These are usually found at the

edges of tectonic plates, where the plates separate, collide or slide past each other. The most active area is the area around the Pacific plate, known as the "ring of fire".



Volcanic eruptions can be dangerous because of the fiery lava, volcanic ash, pyroclastic flows, lahars (mudflows) and toxic gases they can release. It is important for people living near volcanoes to be prepared and know how to act in the event of an eruption.

HANDS-ON PART (20 minutes)

You can create a homemade volcano to provide a hands-on, educational experience to understand the basics of how volcanoes work.

To do this, start by forming a cone around an empty plastic bottle using newspaper or cardboard, and secure the cone with tape, placing it on a large tray. Next, prepare an eruption mixture by combining baking soda, water, and optionally, red food colouring and liquid detergent in the bottle; this mixture will represent the lava inside the volcano. Finally, add vinegar to the bottle, which will trigger a chemical reaction that will release carbon dioxide and simulate a volcanic eruption, with bubbles and the overflowing of the "lava".

EXERCISE PART (5 minutes)

Can you label the different parts of the volcano?

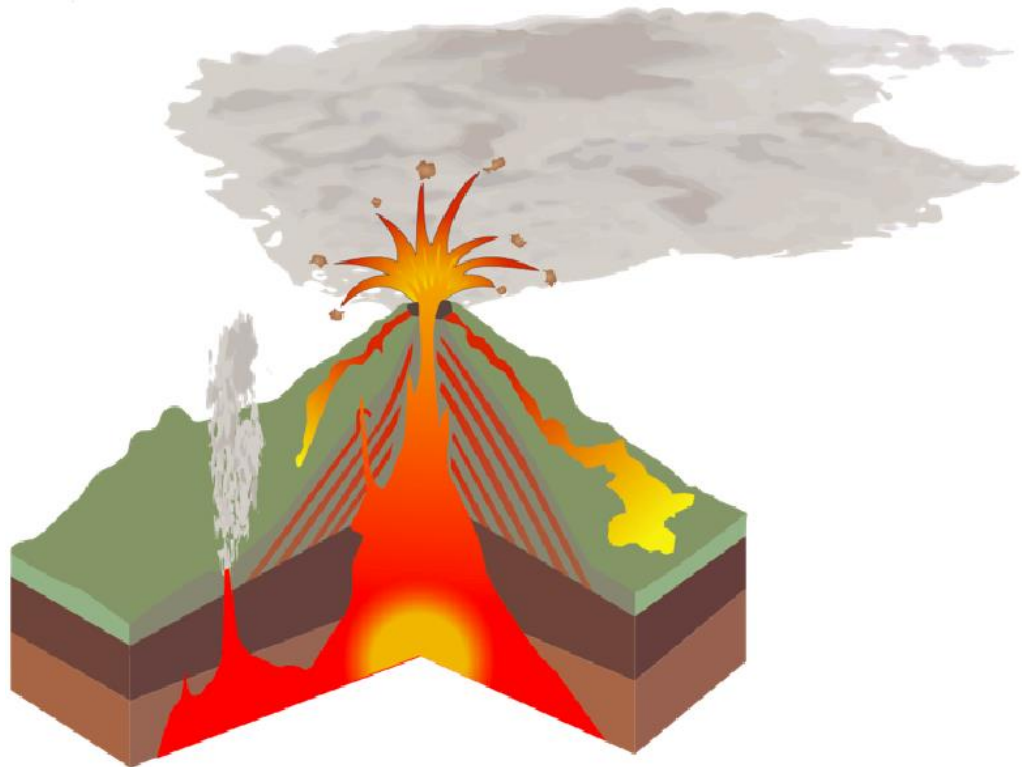


Image by William Crochot

magma chamber	crater	lava flow	ash cloud	secondary vent
volcanic bomb	throat	main vent	fumarole	layers of lava

CONCLUSION (5 minutes)

In conclusion, we have explored the fascinating world of volcanoes. We have learned that volcanoes are mountains formed by the accumulation of magma and molten rocks in their interior, each one being different in morphology and behaviour.

In addition, we discovered that volcanic eruptions can be dangerous due to lava flows, volcanic ash and other associated phenomena. Always remember that volcanoes are amazing natural phenomena, but they should also be treated with respect and caution.

SYNTHESIS/SUMMARY (5 minutes)

- Volcanoes are **unpredictable natural phenomena**, so it is essential to be prepared for possible eruptions in nearby areas.
- They form as magma rises **from the Earth's interior** to the surface, creating mountains or hills.
- There are different **types of volcanoes**, such as shield, composite and cinder cone volcanoes, each with its own specific characteristics.
- They are mainly found at the edges of **tectonic plates**, where plates separate, collide or slide against each other.
- Volcanic eruptions can range **from smooth and fluid to explosive and dangerous**, depending on the composition of the magma and the amount of gases present.
- During an eruption, **volcanic ash** is released, which can affect health, agriculture and climate in nearby regions.
- **Burning lava and pyroclastic flows** are dangerous and can cause serious damage on their way down from a volcano.
- The study of volcanoes is fundamental to understanding the **Earth's geology** and predicting eruptions, which can save lives.
- Appreciating the beauty of volcanoes is important, but we should always treat them with respect and **follow safety guidelines** in volcanic areas to ensure our safety and the safety of others.

BIBLIOGRAPHY & RESOURCES

- BBC Earth. (2021). *Kilauea Volcano eruption | A Perfect Planet | BBC Earth* [Video]. YouTube.
<https://www.youtube.com/watch?v=L4qDgsyFw7M>
- BBC Earth. (2012). *River of Lava | Benedict Cumberbatch narrates South Pacific | BBC Earth* [Video]. YouTube.
<https://www.youtube.com/watch?v=21bZx0vBI9s>