



Royal Academy
of Engineering

THIS IS
ENGINEERING

ENGINEERING IN THE MOVIES

CHEMICAL ERUPTION

STEM

Science and Technology Focus



INTRODUCTION

Disaster movies are the favourite genre of many movie-goers. Such disasters include earthquakes, floods, asteroid collisions, shipwrecks and aeroplane crashes. The genre includes high-profile films such as **DANTE'S PEAK** (1997), **VOLCANO** (1997) and **2012** (2009), which all featured devastating volcano eruptions.

How do these eruptions happen? Complete this science and technology focused challenge to recreate the reaction of a volcano using baking soda (sodium bicarbonate) and vinegar (dilute acetic acid).



Everett Collection Inc / Alamy Stock Photo

CHALLENGE

- Teams of three
- 60 minutes
- KS2/3
- Apprentice

MATERIALS

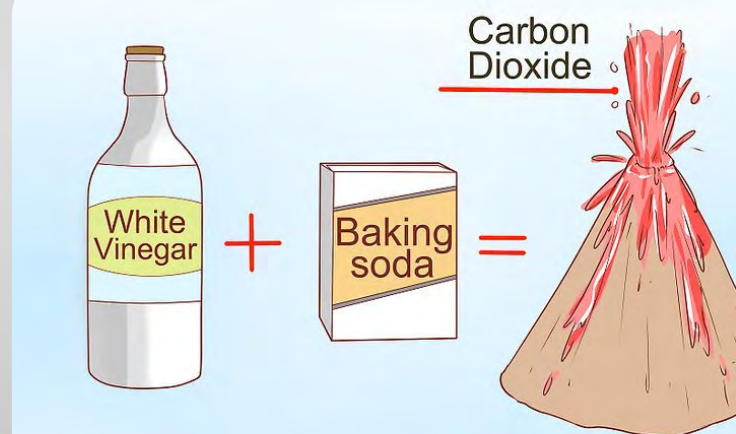
- Foam sheet
- Scissors
- Sticky tape
- Empty clear plastic bottles (x2)
- Vinegar
- Cooking oil
- Flour
- Salt
- Red food colouring
- Washing-up liquid
- Baking soda
- Plastic plate

OVERVIEW

The chemical eruption is a classic science project that can help you learn about chemical reactions and how volcanoes work.

THE CHALLENGE

1. Make a cone shape using the foam sheet and sticky tape.
2. Mix six cups of flour, two cups of salt, four tablespoons of cooking oil and two cups of water in the plastic bottle. The resulting mixture should be smooth and firm (more water may be added if needed).
3. Fill the bottle almost to the top with warm water and a bit of red food colouring.
4. Add six drops of washing-up liquid to the bottle. This will trap the bubbles produced by the reaction so you get better lava.
5. Add two tablespoons of baking soda to the liquid.
6. Slowly pour vinegar into the bottle. Watch out – eruption time!



WHAT'S HAPPENING?

As the carbon dioxide gas is produced, pressure builds up inside the plastic bottle until the gas bubbles (thanks to the washing-up liquid) out of the volcano.

YOUTUBE GUIDE

www.thoughtco.com/baking-soda-volcano-science-fair-project-602202

EXTENSION

Can you think of ways to change the volcano to make the eruption higher or last longer?

This might involve changing the chemicals or the shape of the volcano. It helps to record numerical data, such as the volume of liquid, the height of the 'lava', or duration of the eruption.



QUESTIONS

What happens if you change the amount of baking soda or vinegar? Record and analyse the effect.

Does it affect your volcano if you use a different kind of chemical to colour the volcano? You could use powder paint or try using tonic water instead of regular water to get a volcano that glows under black light.

What happens if you substitute other acids instead of vinegar or other bases instead of baking soda? Examples of acids include lemon juice or ketchup. Examples of bases include laundry detergent and household ammonia. Use caution if you substitute chemicals because some mixtures can produce hazardous gasses. Don't experiment with bleach or bathroom cleaners.

**NOW TRY
MAKING YOUR
OWN 'DARK
ARTS' MAGIC
POTIONS!**



Entertainment Pictures / Alamy Stock Photo



Royal Academy of Engineering

The Royal Academy of Engineering is harnessing the power of engineering to build a sustainable society and an inclusive economy that works for everyone.

In collaboration with our Fellows and partners, we're growing talent and developing skills for the future, driving innovation and building global partnerships, and influencing policy and engaging the public.

Together we're working to tackle the greatest challenges of our age.

What we do

Talent & diversity

We're growing talent by training, supporting, mentoring and funding the most talented and creative researchers, innovators and leaders from across the engineering profession.

We're developing skills for the future by identifying the challenges of an ever-changing world and developing the skills and approaches we need to build a resilient and diverse engineering profession.

Innovation

We're driving innovation by investing in some of the country's most creative and exciting engineering ideas and businesses.

We're building global partnerships that bring the world's best engineers from industry, entrepreneurship and academia together to collaborate on creative innovations that address the greatest global challenges of our age.

Policy & engagement

We're influencing policy through the National Engineering Policy Centre – providing independent expert support to policymakers on issues of importance.

We're engaging the public by opening their eyes to the wonders of engineering and inspiring young people to become the next generation of engineers.