

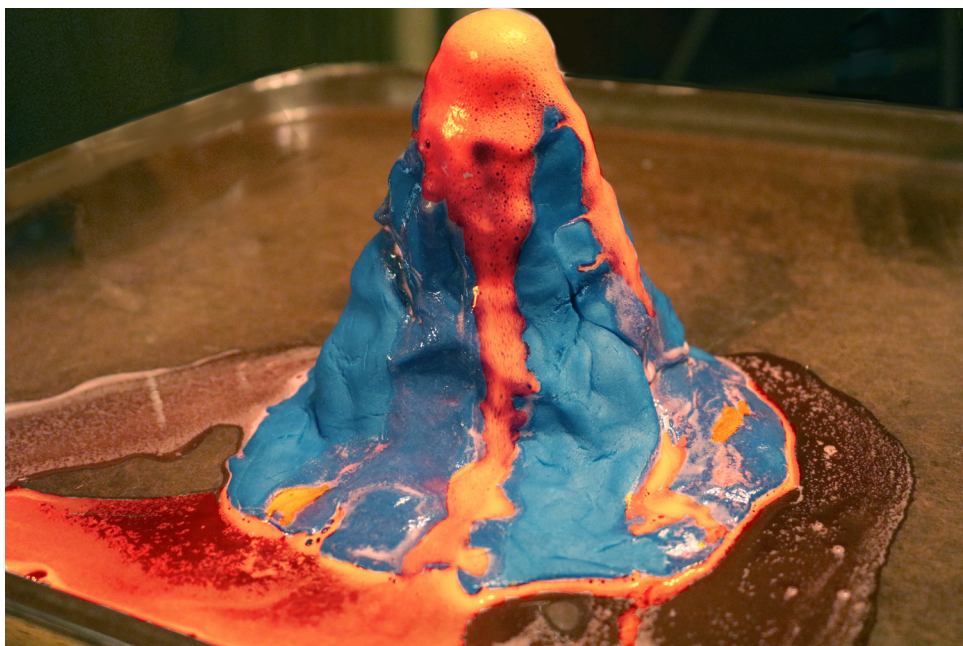
# TAKE & MAKE KIT

## Volcano

TIME: 20 min

ADULT SUPERVISION ADVISED

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Whakaari / White Island, an active stratovolcano in New Zealand



Kīlauea, an active shield volcano in the Hawaiian Islands

## What's in this kit?

Have you ever made a volcano that actually erupts? If you haven't, you will today! This kit is going to teach you to create a safe but explosive chemical reaction using household products. Let's take chemistry to the next level!

### You will learn:

- Geology
- Volcano Eruptions
- Chemical Reactions

## Let's Get Started!

### Materials

Plastic 12 oz bottle  
Vinegar  
Dish soap  
Tempera paint  
Play doh  
Baking soda

### Tools

Mixing Containers

## Did You Know?

### There are three major kinds of volcanoes

Although all volcanoes are made from hot magma reaching the surface of the Earth and erupting, there are several different kinds of volcanoes.

Shield volcanoes have lava flows with low viscosity that flow dozens of kilometers; this makes them very wide with smoothly sloping flanks.

Stratovolcanoes are made up of different kinds of lava. The lava that flows from them is highly viscous, and cools and hardens before spreading very far. Their eruptions of ash and rock grow to enormous heights.

Cinder cone volcanoes are usually smaller and come from short-lived eruptions that only make a cone about 400 meters high.

### The difference between an active and a dormant volcano:

An active volcano is one that has had an eruption in the last few thousand years. A dormant volcano is one that has erupted in historical times and has the potential to erupt again, it just hasn't erupted recently. An extinct volcano is one that scientists think probably won't erupt again.

Today you'll be creating your own volcano, learning what makes an actual volcano erupt, and experimenting with a cool chemical reaction that will make your own volcano appear to erupt.

### STEP 1: Form our volcano

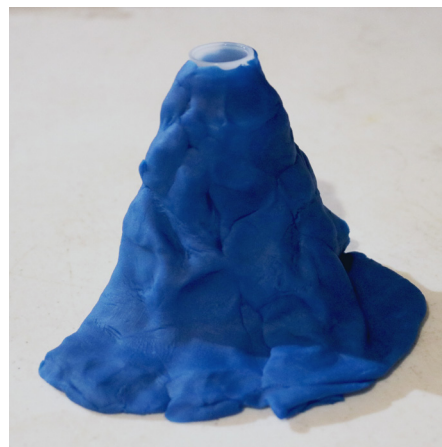
Pour the soap out of the small cylinder bottle and into a separate container.

Use one of the small cylinder bottles to flatten out the dough as much as possible so that it can cover more space.



Surround the small bottle that had soap in it with playdoh and create a volcano of any shape you wish. Make sure not to cover the opening on the top.

Don't be afraid to get a little creative and add textures or designs to your dough to mimic the natural cracks and fissures you would see on the side of a real volcano.



### Mini Challenge!

What type of volcano are you making, a shield volcano, a cinder cone volcano, or a stratovolcano? Why?

## Why and how do volcanoes erupt?

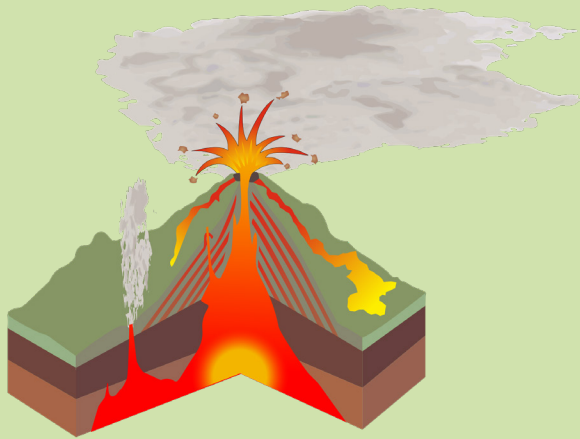
Volcanoes erupt when molten rock called magma rises to the surface. Magma is formed when the earth's mantle melts. Melting may happen where tectonic plates are pulling apart or where one plate is pushed down under another.

Magma is lighter than rock, so it rises towards the Earth's surface. As the magma rises, bubbles of gas form inside it. Runny magma erupts through openings or vents in the earth's crust before flowing onto its surface as lava.

If magma is thick, gas bubbles cannot easily escape and pressure builds up as the magma rises. When the pressure builds to a point where it cannot be contained, an explosive eruption can happen. These explosions can be dangerous and destructive.

Another way an eruption happens is when water underneath the surface interacts with hot magma and creates steam. This steam can also build up enough pressure to cause an explosion.

In this project, we'll be creating a mock eruption using some simple ingredients that you can get at any grocery store!



This SVG image was created by Medium69. Credit to William Crochot.

## STEP 2: Mix our chemicals!

Mix a quarter of the cup of baking soda together with about half the container of paint in a bowl or cup.



Add a few drops of dish soap to the mix. This will make the reaction happen slower and last longer.

Add a small amount of water if the mixture is too thick. Just an ounce or two will loosen it up.



Place the volcano on your tray.

Pour the mixture into the volcano.

Pour a quarter (1 ounce) of the vinegar into the volcano opening and watch the volcano erupt!

Keep adding vinegar a little at a time until the volcano no longer erupts.



## Challenge

Take a picture of your finished volcano or a video of the mock eruption you created and post it with the hashtag #MPLCreates to show off your amazing project!

## HOW DOES IT WORK: Chemical Reactions

A chemical reaction between baking soda and vinegar is what drives the force behind the mock eruption of the volcano you'll be making.

### Why does a chemical reaction happen with baking soda and vinegar?

Baking soda and vinegar react chemically because one is a base and the other is an acid. Baking soda is a basic compound called sodium bicarbonate. Vinegar is a diluted solution that contains acetic acid.

The baking soda and vinegar reaction is actually two separate reactions. The first reaction is the acid-base reaction. When vinegar and baking soda are first mixed together, hydrogen ions in the vinegar react with the sodium and bicarbonate ions in the baking soda. The result of this initial reaction is two new chemicals: carbonic acid and sodium acetate.

The second reaction is a decomposition reaction. The carbonic acid formed as a result of the first reaction immediately begins to decompose into water and carbon dioxide gas.

Just like carbon dioxide bubbles in a carbonated drink, the carbon dioxide produced in the decomposition process rises to the top of the mixture. This creates the bubbles and foam you see when you mix baking soda and vinegar. Think of what happens if you shake up a soda. The gas gets very excited and tries to spread out. There is not enough room in the bottle for the gas to spread out so it leaves through the opening very quickly, causing an eruption

## Go Beyond

With leftover ingredients, you can take the experiment even further! Change the variables and create different reactions.

Here are some more experiments to try:

1. Does the amount of vinegar change the eruption?
2. Does the amount of baking soda change the eruption?
3. Does adding more dish soap change the eruption?
4. Does adding more water change the eruption?

5. If you change the container to something with a smaller opening, how does the eruption change?

6. What if you use a different container from the kit?



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