



Ages 8+  
Adult Supervision Required

# LAVA-BLASTING VOLCANO KIT™



Erupts  
up to  
10 Times!



## WARNING:

This set contains chemicals that may be harmful if misused. Read cautions on individual containers carefully. Not to be used by children except under adult supervision.

# Lava-Blasting Volcano ó

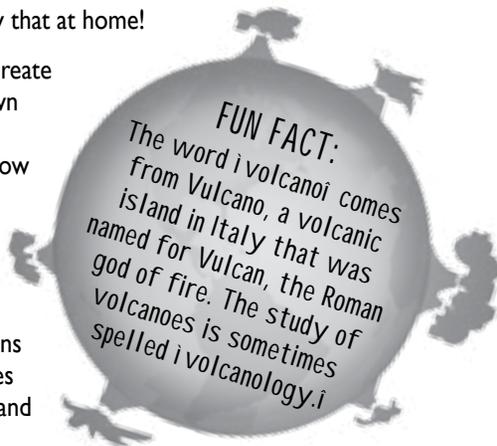
## ACTIVITY GUIDE

Volcanoes are one of the most awesome forces found in nature. When they erupt—watch out! They can shoot rocks and gases miles into the air and their lava flows can outrace a speeding car. Let's try that at home!

In this kit, you'll find everything you need to create an amazing volcanic blast. You'll cause your own eruption and watch the lava blow! Plus you'll learn some really cool science that explains how volcanoes form and why they explode.

In each activity, you'll get to act and think like a real volcano scientist, also known as a **volcanologist**. You'll compare things, you'll ask questions and you'll also make observations using your different senses: You'll use your eyes to see, your ears to hear, your nose to smell, and your hands and fingers to feel.

Let's blast some lava!



### What You'll Find in Your Kit:

Volcano mold— <i>cone and base</i>	Food coloring
Volcano stand	Measuring scoop— <i>1 Tablespoon</i>
Volcano plaster	Measuring cup— <i>100 mL</i>
Citric acid	Stir stick
Baking soda	

### What You need to get or use:

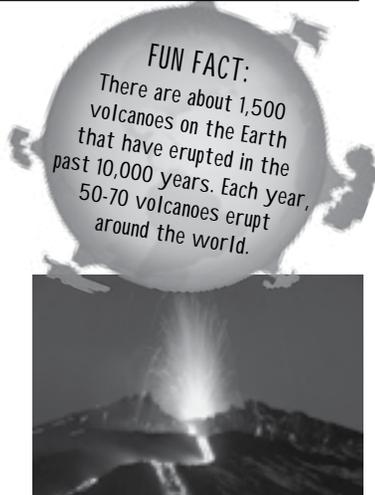
Newspaper	Paper <i>(optional)</i>
Water	Scissors <i>(optional)</i>
Mixing spoon <i>(disposable)</i>	Tape <i>(optional)</i>
Mixing bowl <i>(disposable)</i>	Pencil
Liquid dish soap	Small plate
Funnel <i>(optional)</i>	Non stick spray

**WARNING:** This kit contains citric acid. Avoid contact with eyes. In case of contact with eyes, flush well with water for 15 minutes and seek medical attention. Keep out of reach of young children.

When Water is added to a mixture of Citric Acid, vinegar, lemonade or lemon juice and Baking Soda, the mixture will quickly and intensely bubble which produces carbon dioxide gas. If the container is sealed, container can build pressure and burst. Always use open (unsealed) containers such as cups/bowls when working with mixtures of Citric Acid, vinegar, lemonade or lemon juice and Baking Soda near water.

**Adult supervision is required.**

**NOTE:** When making the volcano, it can get messy. Especially when using food coloring and plaster, protect your skin and work surface from spills. Wear old clothing and if you get any food coloring on your skin, wash it off with soap and water.



## Activity #1: Building a Volcano

Volcanoes can form over a few months or several million years. You're going to build yours in a matter of minutes!

### What You'll need from Your Kit:

Volcano mold— <i>cone and base</i>	Volcano plaster
Volcano stand	Measuring cup

### What You need to get or use:

Newspaper	Mixing bowl
Water	Non-stick spray
Mixing spoon	

### Let's get started!

**CAUTION:** Exploding volcanoes can get messy. You might want to wear old clothes or an apron. Be sure to set up your experiment in the kitchen, basement, garage or some other area away from furniture and carpeting.

**Step 1:** Choose your work surface—a clean area with a hard, flat surface. Cover it with newspaper to protect it from volcanic debris. Using non-stick spray, lightly spray inside of the base (piece with the hole in the center).

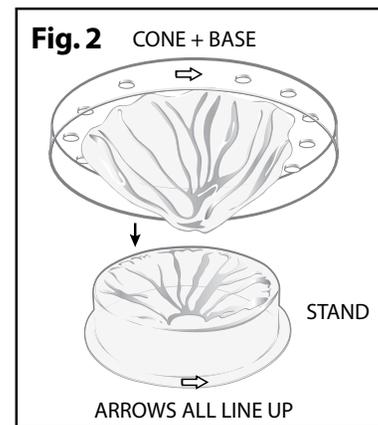
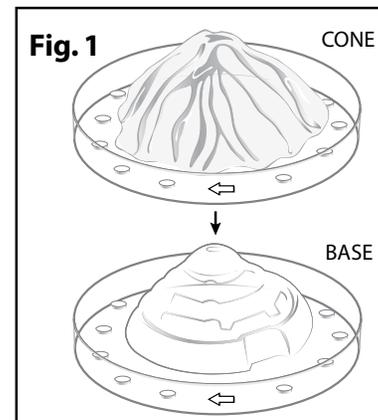
**Step 2:** Using non-stick spray, lightly spray inside of base.

**Step 3:** First, let's assemble your volcano mold. Line up the dimples and arrows on the cone and base and then snap the two halves together. (see Fig. 1)

**Step 4:** Place the mold in the volcano stand—cone pointing down—so that the three openings on the bottom of the base are facing up. Twist the stand until the texture of the mold and the stand match up and lock into place. Line up with arrows on the mold and stand. (see Fig. 2)

**Step 5:** Open the container of volcano plaster. Let's make some observations! What does it look like? How does it smell? How does it feel—smooth or gritty? Pour the volcano plaster into your mixing bowl.

**Step 6:** Add 1 1/3 cup of cold water to the volcano plaster. Since your measuring cup only holds 1/2 cup, you'll need to fill it 3 times—do this as fast as possible.





**FUN FACT:**

Iceland's capital city receives 70% of its heat and hot water from wells drilled into volcanic rock.

Using a mixing spoon, quickly stir together the water and plaster. (Your stir stick will not be strong enough for this job.) The mixture will start to harden, so stir as fast and as thoroughly as possible.

**Step 7:** Once the water and plaster have been completely combined, carefully pour the mixture into the mold. Divide the mixture evenly among the three openings until the mold is full. Be sure to tap the sides of the mold to get rid of any air bubbles and help the mixture settle.

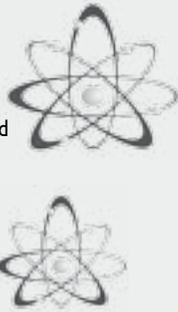
**Step 8:** Let the mold rest in the volcano stand for 15-20 minutes. This will give the plaster time to harden into volcanic rock. When the time is up, move on to the next activity.

**Caution:** Never rinse plaster from the bowl or spoon down the sink drain. It can harden in the pipes

**VOLCANOLOGY**

What is a volcano? A volcano is an opening in the Earth's surface, or **crust**. This opening allows hot molten rock, called **magma**, and gases to explode from below. The largest and heaviest bits of erupted lava and ash fall back to earth and help build the core of the volcano—they pile up to build a hill or mountain. The smaller and lighter bits travel farther and cover the surrounding area.

A lot of these holes in the crust are found underwater. In fact, about 75% of volcanoes erupt on the ocean floor. Some of these build up and eventually poke above sea level; you probably have heard of a few of these volcanoes—Iceland and the Hawaiian Islands.

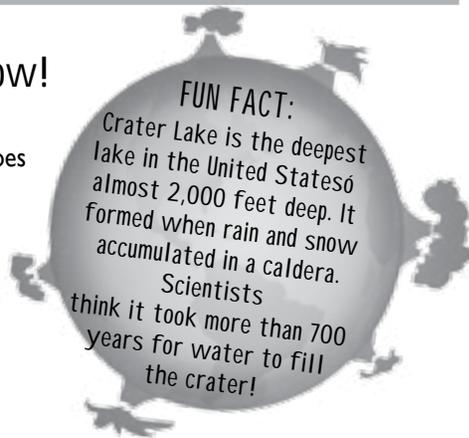


**Activity #2: Get Ready to Blow!**

Volcanologists spend a lot of time studying volcanoes to see if they're going to erupt. Does yours look like it's ready to explode?

**What You'll need from Your Kit:**

Volcano mold from previous activity



**FUN FACT:**

Crater Lake is the deepest lake in the United States almost 2,000 feet deep. It formed when rain and snow accumulated in a caldera. Scientists think it took more than 700 years for water to fill the crater!

Let's get started!

**Step 1:** Once your mold has set for 15-20 minutes, it's time to take a look at your volcano. Remove the mold from the volcano stand and flip it over, setting it down on a hard, flat surface.

**Step 2:** Carefully remove the top half of the mold. (Do NOT remove the volcano from the bottom half.) Let's make some observations. How does your volcano look? Did it set up evenly? Are there any cracks or bubbles? Does it smell? What color is it? Very gently touch your volcano. What does it feel like? How does this compare with the volcano plaster?

**Step 3:** Allow your volcano to dry completely while resting on a hard, flat surface. This will take at least 24 hours. You'll know your volcano is ready when it no longer feels cool and damp to the touch.

While you wait for your volcano to dry, let's catch up on some more volcanology.

**VOLCANOLOGY**

Right now, your volcano is in a **dormant** stage. That means it's quiet. Volcanoes are considered **active** if they erupt regularly or have the potential to erupt. **Extinct** volcanoes are ones that haven't erupted for 10,000 years. Because the lifespan of a volcano is so much longer than a human's, it can be very hard for scientists to know whether a volcano is extinct or not. Volcanologists thought Four-Peaked Mountain in Alaska was extinct—it hadn't erupted in more than 10,000 years. But then it erupted in 2006!



**SHAPE UP!**

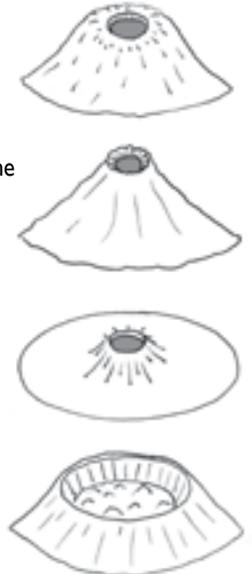
You probably think all volcanoes look alike—cone-shaped with steep, sloping sides. Not true! Volcanoes come in all sorts of shapes and sizes.

**Lava domes:** Lava domes have a circular, mound shape. They're built from slow eruptions of really thick lava that doesn't flow far from the volcano's vent. Mount St. Helens in Washington is a good example.

**Cinder cones:** During an eruption, globs of magma blast into the air and when they cool they harden into cinders. The smallest cinders get carried away on the wind but coarser, heavier cinders fall back to the ground to create a cone around the volcano's vent.

**Shield volcanoes:** These form during repeated, non-explosive eruptions of very fluid lava. They tend to be broad and gently sloped. Mauna Loa in Hawaii is one example.

**Calderas:** Calderas are the result of extremely explosive eruptions. Massive amounts of magma blow off the top of the volcano, which collapses into a depression. These depressions can fill with water to form lakes, which is what happened at Oregon's Crater Lake.



Take another look at your volcano. Based on its shape, what kind of volcano do you think it is?

# Activity #3: Lava Blast!

It's time to make your volcano explode!

## What You'll need from Your Kit:

Volcano from previous activity	Food coloring
Citric acid	Measuring scoop
Baking soda	Stir stick
	Measuring cup

## What You need to get or use:

Newspaper	Scissors (optional)
Water	Tape (optional)
Liquid dish soap	Small plate
Funnel (optional)	Pencil
Paper (optional)	



## Let's get started!

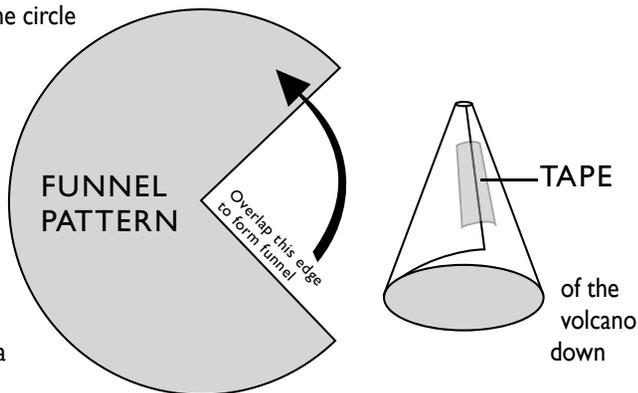
**Step 1:** Start by covering your work area with fresh, clean newspaper and set your volcano on top of it. Again, be sure to work on a hard, flat surface in the kitchen, basement, garage or some other area away from furniture and carpeting. This could get messy!

**Step 2:** To make sure the baking soda settles at the bottom of your volcano, you might want to use a funnel to help you pour. If you don't have a funnel lying around your house, don't worry, you can make one out of paper! Here's how:

Trace a small plate onto paper, cut out. Cut a triangle shape out of the circle. (Think of your circle like a pie, and you're going to cut a big slice out of it—one-quarter of the whole pie.) Make sure that you cut the sides of your triangle all the way to the center of the circle.

Fold over the edges of the circle so that they overlap; tape them together. You should have a cone shape with a hole at the tip. There's your funnel.

To use your funnel, place the narrow end cone into the top of the volcano and pour the baking soda the funnel.



**Step 3:** Open the container of baking soda. Let's make some observations! What does it look like? What color is it? How does it smell? How does it feel? Using your scoop, measure out 1 teaspoon of baking soda (there's a teaspoon marking inside your measuring scoop—it's basically at the halfway point.)

**Step 4:** Pour the baking soda into the volcano base.

**Step 5:** Fill your measuring cup with 80 milliliters of water. Open the container of citric acid. What does it look like? What color is it? How does it smell? How does it feel? How is it similar to or different from baking soda?

**Step 6:** Using your scoop, measure 1 teaspoon of citric acid and add it to the water. Also add 20 drops of red food coloring and 1 tablespoon of liquid dish soap (a tablespoon is a full measuring scoop). Using your stir stick, mix everything together in the measuring cup.

**Step 7:** Carefully pour this liquid mixture into the volcano base with your adult helper. Step back as it gets ready to erupt!

**Step 8:** What happened? Did your volcano explode? How high did the "lava" shoot? Did it flow down the sides? Did the volcano make any noise? Did it shake when it erupted?

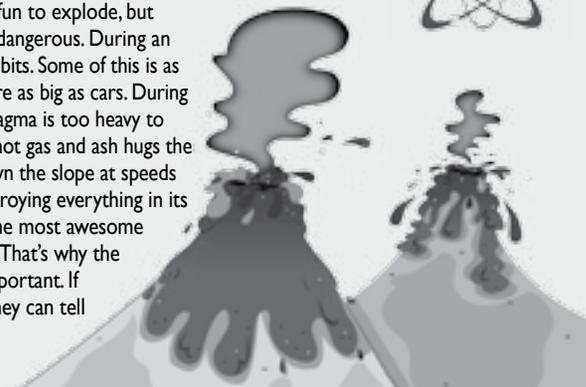
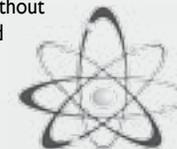
**Step 9:** Once the eruption has stopped, give the volcano a good shake. Does it start erupting again?

## VOLCANOLOGY

Why do volcanoes erupt? When magma is deep inside the earth it's under a lot of pressure. As it comes closer to the surface there is less pressure, and gases inside the magma start to form bubbles that get bigger and bigger. These gases expand so much that when they reach the surface they explode and blast the magma out of the volcano. The more gas in the magma, the bigger the eruption.

You didn't have any actual magma in your volcano, but you did create an explosive gas. When you combined citric acid and baking soda, a chemical reaction occurred. One of the products of this reaction was the gas carbon dioxide (or CO<sub>2</sub>), which you also find in real volcanoes. The CO<sub>2</sub> built up inside your volcano until it erupted. None of this would have happened without the water, which helped the acid and baking soda molecules move around and bump into each other for the reaction. The dish soap was added to create more spectacular foaming bubbles.

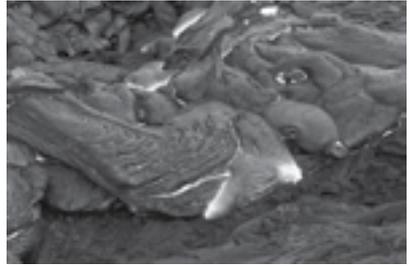
Your volcano sure was a lot of fun to explode, but real-life volcanoes can be very dangerous. During an eruption, magma is blasted into bits. Some of this is as fine as dust, but some chunks are as big as cars. During other kinds of eruptions, the magma is too heavy to blast into the air, so a cloud of hot gas and ash hugs the side of the volcano, rushing down the slope at speeds of up to 60 miles per hour, destroying everything in its path. This might not look like the most awesome eruption, but it is the deadliest. That's why the work of volcanologists is so important. If they can predict an eruption, they can tell people to get out of the way!



**Step 10:** When your volcano has finished erupting, rinse it out and wash your measuring cup and scoop. Repeat the activity as many times as you'd like—feel free to do some experimenting of your own. Change the amounts of water, citric acid, baking soda and dish soap. Add more or less—you're the scientist! How is each eruption different? Can you make the explosion bigger or smaller? Give it a try! See what works and what doesn't and try to figure out why.

## LAVA LESSON

During an explosive eruption (one with lots of gas), volcanoes spew ash into the air, which is pulverized rock and glass. During less explosive eruptions (less gas), you get lava, which is what magma is called once it comes to the surface. This molten rock oozes along the ground and even though lava is extremely thick, it can flow great distances until it cools and hardens into rock. There are different kinds of lava flows (some of them have Hawaiian names—can you guess which ones?):

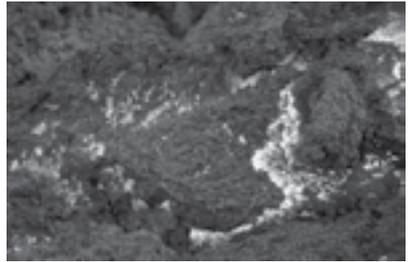


**Pahoehoe**—This kind of lava looks smooth and wavy and ropy. It is formed by more fluid lava.



**Aa-Aa**—These lava flows are thicker. They produce a loose, broken, sharp, stubby surface.

**Pillow lava**—Remember, a lot of volcanoes erupt underwater. When hot magma oozes out of the volcano and hits the cold water, it quickly freezes and forms pillow shapes.



What kind of lava erupted from your volcano?



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