

# Volcanoes: Magma Rising - Volcanic Eruptions

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## What Causes Volcanoes to Erupt?

Earth's crust, or outer shell, is broken into big pieces called tectonic plates. These plates fit together like a puzzle. They are moving very slowly all the time, as slow as fingernails grow! When the edges of the plates meet, plates can collide, separate, or grind against each other.

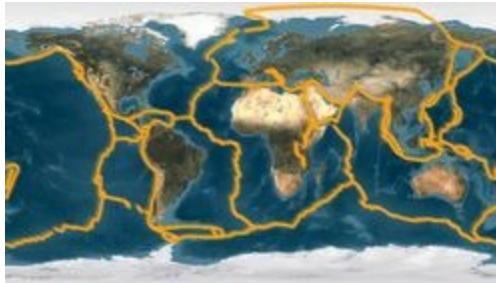


Illustration Credit: AMNH

*Tectonic Plate Boundaries*

Nearly every Caribbean island has its own active volcano. That's because these islands lie above subduction zones, where one tectonic plate sinks, or subducts, beneath another.

## Find Out How Subduction Causes Volcanoes to Form

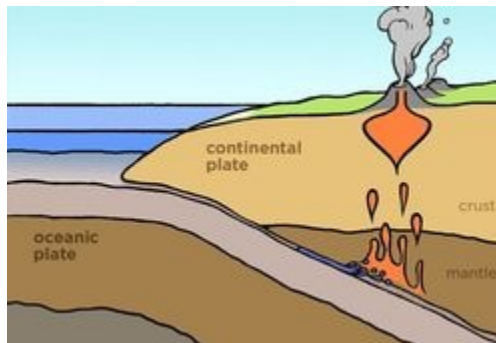


Illustration Credit: AMNH

1. When an oceanic plate collides with a continental plate, it sinks into the mantle below.
2. As the oceanic plate sinks, fluid is squeezed out of it.
3. The fluid flows up into the mantle rock above and changes its chemistry, causing it to melt.

This forms magma (molten rock).

4. The magma rises and collects in chambers within the crust.

5. As magma fills the chamber, pressure grows. If the pressure gets high enough, the magma can break through the crust and spew out in a volcanic eruption. Most explosive volcanoes occur above subduction zones.

### Why Are Some Volcanoes So Explosive?

"Mt. Pelée was incredibly explosive. It's like twisting off the top of a soda bottle!"



JIM WEBSTER, volcanologist Photo Credit: AMNH

It's all a matter of chemistry. The way a volcano erupts depends on the amount of gas and silica (a molecule of silicon oxygen) in the magma below. Magma with lots of silica is thick and gooey, while magma low in silica is thin and runny. And in magma with lots of gas, bubbles form as it rises. The more bubbles that form, the more explosive the eruption!

Mt. Pelée was the most explosive type of volcano: it was high in silica and high in gas. This type of volcano is called a stratovolcano.

### Explore How Different Shapes of Volcanoes Have Different Kinds of Eruption



Photo Credit: © USGS

*A cinder cone volcano, like Tavurvur in Papua New Guinea, forms when erupted fragments harden and fall to the ground, accumulating around the vent in a cone shape. The lava is low in*

*silica, so the lava is runny. High gas levels make for the explosive eruptions that send lava flying. Cinder cones typically form at the beginning of eruptions, and lava flow follows.*



Photo Credit: © USGS

*The most explosive eruptions come from stratovolcanoes, like the Augustine Volcano in Alaska. When they erupt, stratovolcanoes blow huge columns of gas and ash into the air that can collapse in hot, fast-moving clouds called pyroclastic flows.*



Photo Credit: Courtesy of Nula666, Wiki Commons

*A shield volcano, like Mauna Kea in Hawaii, has gentle slopes formed by oozing, runny lava. The magma is low in silica and low in gas, so it doesn't erupt explosively.*



Photo Credit: © USGS

*A lava dome, like the one of Chaitén Volcano in Chile, forms when thick lava oozes from a vent, piles up, and cools into a steep mound. The lava is thick because it's high in silica, and it oozes instead of explodes because it's low in gas. Sometimes lava domes form after explosive eruptions.*

**Name:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**1.** The way a volcano erupts depends on the amount of two things in the magma below. One of those things is silica. What is the other thing?

**2.** The amount of gas in the magma affects whether a volcano erupts explosively or not.

Support this conclusion with at least two pieces of evidence from the text and images.

**3.** What is the main idea of this text?

**4.** How does the amount of silica in magma affect the lava that erupts out of a volcano?

Support your answer with evidence from the text.

**5.** Imagine a volcano that erupts explosively with runny lava. What conclusion would you draw about the amount of silica and gas in that volcano's magma?

Support your answer with evidence from the text and images.