**VOLCANO!**

SECTION 1

When you think of a **volcano**, you might picture a mountain top oozing or spewing fire or **lava** from the top. But some volcanoes, like the one in Yellowstone, are under Earth’s surface where we can’t see them, until they start simmering and eventually erupting. Volcanoes erupt many types of material. Earth’s thin outer layer is made of cool rock, but most of Earth is made of extremely hot rock and molten metal. Some of the heat inside Earth escapes to the surface through volcanoes.

A volcano may erupt violently or gently. A violent eruption can cause tremendous destruction even if not much molten rock reaches the surface. For example, a volcano might throw out huge amounts of rock fragments that start fires where they land or fall in thick layers on roofs, causing them to collapse. A volcano can erupt gently yet pour out rivers of molten rock that flow long distances. The violence of an eruption depends mainly on the type of magma feeding the volcano.

SECTION 2

### **Magma** A major portion of all magma is *silica*, which is a compound of silicon and oxygen. Magma that is high in silica resists flowing, so expanding gases are trapped in it. Pressure builds up until the gases blast out in a violent, dangerous explosion. Magma that is relatively poor in silica flows easily, so gas bubbles move up through it and escape fairly gently. Though an eruption of silica-poor magma can throw lava high into the air, forming lava fountains, visitors can usually watch safely nearby.Structure of a Volcano: Magma collects in a magma chamber before erupting through a volcano. Image shows a volcano above Earth's surface and below Earth's surface. At the bottom of the illustration is the magma chamber. The chamber has a few different openings from which magma rises. One of the openings has broken through Earth's surface at the top of a mountain. It looks like the top of the mountain is exploding. The opening at the top of the mountain spews what looks like fire but is formerly magma, now called lava. Lava flows down the sides of the mountains.

Magma rises toward Earth’s surface as long as it is less dense than the surrounding rock. Once magma stops rising, it can collect in areas called magma chambers. Magma can remain in a chamber until it cools, forming igneous rock, or it can erupt. Volcanic eruptions occur when, for example, a chamber is not large enough to hold additional magma that pushes in. When magma erupts and reaches Earth’s surface, it is called lava.

SECTION 3

### **Rock Fragments** A great deal of material erupts from volcanoes as rock fragments. The fragments form as:

* escaping gas bubbles pop, tearing magma apart
* larger pieces of **lava** are thrown into the air, cooling and hardening during their flight
* rocks of all sizes rip loose from **volcanoes**’ walls during eruptions

Tiny rock fragments form volcanic ash, which consists of particles ranging from the size of dust to about the size of rice grains. Ash can be carried long distances by winds—even all the way around Earth. Volcanic cinders contain holes and tunnels left by escaping gases. They are somewhat larger than volcanic ash. The largest fragments are volcanic bombs and blocks. Bombs are molten when they are thrown out and often have streamlined shapes. Blocks, which can be the size of houses, erupt as solid pieces of rock. Large rock fragments fall quickly.

SECTION 4

### **Volcanic Gases** What looks like smoke rising from a volcano is actually a mixture of ash and gases. The main gases in magma are water vapor and carbon dioxide. Some volcanic gases combine with water in the air to form acids.

During an eruption, volcanic gases can mix with rock fragments and stay near the ground. The mixture forms a **pyroclastic flow**. Such a flow can be as hot as 800°C (1500°F) and can travel faster than 160 kilometers per hour (100 mi/h). Pyroclastic flows are the most dangerous type of volcanic eruption.

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SECTION 5

### Most volcanoes form along plate boundaries. **Volcanoes** form in many places on Earth.

### **Where Plates Push Together:** Volcanoes are common along tectonic plate boundaries where oceanic plates sink beneath other plates. As a plate sinks deep into a subduction zone, it heats and begins to melt, forming magma. If the magma reaches the surface, it can build tall volcanic mountains.

* **Where Plates Pull Apart:** Volcanoes are common along tectonic boundaries where plates pull apart, allowing magma to rise from the mantle. However, much of Earth’s volcanic activity takes place underwater. Magma erupts along spreading centers in the ocean and cools to form new lithosphere.
* **Over a Hot Spot:** Less commonly, a volcano can form over a hot spot far from a plate boundary. Heat carried by material rising from deep in the mantle melts some of the rock in the lithosphere above it. Eruptions over a hot spot built the Hawaiian Islands.

SECTION 6

### **Volcanoes can have many shapes and sizes. Volcanoes** can have many shapes, including steep cones and nearly flat land. Most volcanoes erupt from openings in bowl-shaped pits called craters. Some volcanoes erupt from long cracks in the ground. The type of magma feeding a volcano determines its shape.

* **Shield Volcano:** A shield volcano is shaped like a broad, flat dome. It is built up by many eruptions of lava that is relatively low in silica and therefore flows easily and spreads out in thin layers. The largest volcano on Earth, Mauna Loa (MOW-nuh LOH-uh), is a shield volcano. It makes up much of the island of Hawaii. Mauna Loa is one of Earth’s most active volcanoes.
* **Cinder Cone:** A cinder cone is a steep, cone-shaped hill formed by the eruption of cinders and other rock fragments that pile up around a single crater. Cinders form as gas-rich magma erupts. Escaping gases throw small chunks of lava into the air, where they harden before landing. Cinder cones are tens to hundreds of meters tall. Many of them form on the sides of other types of volcanoes.
* **Composite Volcano:** A composite volcano is a cone-shaped volcano built up of layers of lava and layers of rock fragments. A composite volcano is steep near the top and flattens out toward the bottom. Because hardened lava flows add strength to the structure of a composite volcano, it can grow much larger than a cinder cone. Composite volcanoes have violent eruptions for two reasons. First, expanding gases trapped in rising magma tend to cause explosions. Second, hardened lava from earlier eruptions often plugs openings in these volcanoes. This rock must be blown out of the way before any more magma can escape.

**Dictionary**

**lava:** Molten rock that reaches a planet's surface through a volcano.

**pyroclastic flow:** A dense cloud of superheated gases and rock fragments that moves quickly downhill from an erupting volcano.

**volcano:** An opening in the crust through which molten rock, rock fragments, and hot gases erupt; a mountain built up from erupted materials.