

# Pyroclastic Flows

## Chapter 6

**P**yroclastic flows are one of the most dangerous natural events that occur on our planet. They can travel at hurricane speeds down the slopes of a mountain, destroying everything in their path. They travel at speeds up to 80 km/h. The temperature of the rocks in the flows is between 200°C and 700°C.

### **Inside a pyroclastic flow**

Pyroclastic flows carry tons of superheated materials down the slope of a volcano in large eruptions.

The pyroclastic flows destroy entire forests and manmade structures in their path.

They carry ash, lapilli, and lava bombs inside their turbulent clouds which are almost silent. The only sounds are produced by the collision of material within the cloud.

Pyroclastic flows created by large eruptions can travel over 100 km from their source.

### **How pyroclastic flows start**

Pyroclastic flows are produced in three ways.

1. Eruption column collapse
2. Lava dome collapse
3. Magma starts to froth

### **Eruption column collapse**

During a Plinian eruption, heavier particles in the bottom part of the eruption column fall back toward the vent. The eruption column collapses causing the falling materials to avalanche down the side of the volcano.

### **Lava dome collapse**

A collapsing lava dome will also trigger pyroclastic flows when the pressure in the lava dome is relieved allowing pyroclastic material to flow down the slope of the volcano.

### **Magma starts to froth**

Magma moving upward during an eruption begins to froth. The gases inside the magma expand as the pressure inside the throat of a volcano decreases. The magma boils out of the vent creating a pyroclastic flow. This is like soup boiling over the side of a pot when it gets too hot.



1980 pyroclastic flow on Mt. St. Helens that stretches from the crater to the valley floor. P. W. Lipman USGS

Name \_\_\_\_\_

Date \_\_\_\_\_

# Pyroclastic Flows

## Quiz 6

### Fill in the blanks using words from the Word Bank

1. \_\_\_\_\_ are rocks that fuse together when ash flow particles fall to the ground and solidify.
2. Pyroclastic flows can destroy nearly everything in their path as they move at hurricane speeds down the \_\_\_\_\_ of a mountain.
3. Pyroclastic flows are produced when the \_\_\_\_\_ particles in the bottom part of an eruption column collapses.
4. Domes can collapse due to \_\_\_\_\_ or an earthquake.
5. The upper flow is called an \_\_\_\_\_ surge and moves even faster than the heavier fragments at the bottom.
6. Crater Rock is a 200-year-old lava \_\_\_\_\_ perched on the side of Mount Hood and the site of numerous pyroclastic flows in the past.
7. Pyroclastic flows \_\_\_\_\_ at speeds up to 80 km/h and the temperature of the rock material in the flows is between 200°C and 700°C.
8. Unzen Volcano in \_\_\_\_\_ was the source of numerous pyroclastic flows between 1991 and 1995.
9. \_\_\_\_\_ is a fast-moving dense glowing cloud of hot volcanic ash and gas erupted from a volcano.
10. Lava domes spreading over the edge of a crater become unstable on the steep slopes of \_\_\_\_\_.

### Word Bank

ignimbrite	slopes	Japan	stratovolcanoes	dome
ash-cloud	nuée ardente	gravity	travel	heavier

# Pyroclastic Flow Eruption

## Activity 6

### Introduction

Volcanoes erupt because gases contained in magma begin to expand near the vent of a volcano. The molten rock flows out in a lava flow or creates a pyroclastic flow.

This activity uses a bottle for the magma chamber and the top of the bottle is the throat of a volcano. You will be able to see what happens when the magma begins to froth and expand until it flows out of the volcano.



Preparing for an eruption

### Materials

- ◆ Plastic bottle that is clear
- ◆ Cookie sheet
- ◆ Water
- ◆ Fresh baking soda (Old baking soda loses its fizz)
- ◆ Liquid detergent (dish washing soap)
- ◆ Vinegar
- ◆ Red food coloring

### Directions

#### **Step 1 Setting up and conducting the experiment**

1. Fill the plastic bottle half full of water.
2. Add a spoon full of baking soda to the water.
3. Put the cap on the bottle and shake it until the baking soda is dissolved.
4. Add a few drops of liquid detergent and red food coloring to the mixture.
5. Shake the contents gently so they don't flow out of the bottle when you are mixing these ingredients into the water and baking soda.
6. Predict what you think will happen when you add vinegar to the solution.

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