

# Igneous Rocks

Original lesson created by Janell Alvarez

## Focus on Inquiry

The student will use the appropriate tools and techniques to simulate the formation of igneous rocks.

## Lesson Overview

In this activity, students will simulate the formation of igneous rocks. They will then simulate how cooling rate affects the size of the crystals in igneous rocks.

<b>Duration</b> 2 -45 minute class periods	<b>Setting</b> Classroom	<b>Grouping</b> Groups of 4	<b>PTI Inquiry Subskills</b> <a href="#">3.6</a> , <a href="#">3.7</a> , <a href="#">4.2</a> , <a href="#">5.2</a>
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Lesson Components	Estimated Time	Inquiry Subskills Used	Technology Used	Level of Student Engagement	Brief Description
<i>Engage</i>	15 min Day 1	4.2	Video streaming/ TV	1	Students are engaged in a discussion of rocks and how they are created. Students will view a video on the importance of rocks and minerals.
<i>Explore</i>	20 min Day 1	3.7	None	3	Students simulate igneous rock formation.
	15 min Day 2	3.6			
<i>Explain</i>	10 min Day 1	N/A	Video streaming/ TV /Internet Access	1	Teacher led discussion on how igneous rocks form. Students watch a video on igneous rocks and look at images of landforms created by igneous rocks.
	5 min Day 2				
<i>Expand</i>	15 min Day 2	N/A	None	1	Teacher led discussion of the four different intrusive rock formations
<i>Evaluate</i>	10 min Day 2	5.2	None	2	Student-led discussion in groups on observations and conclusions.

**Level of Student Engagement**

1	Low	Listen to lecture, observe the teacher, individual reading, teacher demonstration, teacher-centered instruction
2	Moderate	Raise questions, lecture with discussion, record data, make predictions, technology interaction with assistance
3	High	Hands-on activity or inquiry; critique others, draw conclusions, make connections, problem-solve, student-centered

<p><b>National Science Education Standards – Inquiry</b> Use appropriate tools and techniques to gather, analyze, and interpret data.</p>	
<p><b>National Science Education Standards – Earth Science</b> Some changes in the solid earth can be described as the "rock cycle." Old rocks at the earth's surface weather, forming sediments that are buried, then compacted, heated, and often recrystallized into new rock. Eventually, those new rocks may be brought to the surface by the forces that drive plate motions, and the rock cycle continues.</p>	
<p><b>Louisiana Grade Level Expectations – Inquiry</b> Gr. 8, Inquiry GLE#6 - Select and use appropriate equipment, technology, tools, and metric system units of measurement to make observations (SI-M-A3) Gr. 8, GLE#7 - Record observations using methods that complement investigations (e.g., journals, tables, charts) (SI-M-A3) Gr. 8, GLE#11 - Construct, use, and interpret appropriate graphical representations to collect, record, and report data (e.g., tables, charts, circle graphs, bar and line graphs, diagrams, scatter plots, symbols) (SI-M-A4) Gr. 8, GLE#12- Use data and information gathered to develop an explanation of experimental results (SI-M-A4)</p>	
<p><b>Louisiana Grade Level Expectations Earth Science</b> Gr. 8, GLE#16 –identifying the characteristics and uses of minerals and rocks and recognizing that rocks are mixtures of minerals (ESS-M-A5) Gr. 8, GLE #18- explaining the processes involved in the rock cycle (ESS-M-A6)</p>	

## Materials List

### Materials per group:

- small candle
- heat source to light candle
- small dish
- Epsom salt water solution
- 2 glass slides
- eye dropper
- granite rock sample
- basalt or obsidian rock sample

### Materials per class:

- Computer
- Internet access

## Advance Preparation

1. Obtain materials from materials list. Teacher may want to mix Epsom salt water solution prior to students beginning the activity.
2. Sign up for a free membership to United Streaming website.
3. Locate video “Igneous Rock” from the United Streaming website. Go to [unitedstreaming.com](http://unitedstreaming.com) and search for the video by typing it in the search box.
4. Locate video “The Importance of Rocks and Minerals” on the United Streaming website.
5. Copy one [Blackline Master #1](#) per student.

## Other Information

### Learning Objective

The learner will:

- simulate the formation of igneous rocks and will distinguish between intrusive and extrusive igneous rocks.

### Prior Knowledge Needed by the Students

None

## Procedure

### **Engage** (Day 1: 15 minutes)

1. Engage students in a discussion on the uses of rocks. Create a word web of their ideas.
2. Show students the video, “The Importance of Rocks and Minerals.” This video shows how rocks and minerals have been useful to humans throughout history.
3. Discuss important uses of rocks learned from the video. Add any new ideas learned from the video to the word web.
4. Ask students if they know how rocks are created. Listen to all ideas. Then tell them that there are three basic ways in which rocks form. Inform them that in this activity they will simulate the formation of igneous rocks.

### **Explore** (Day 1: 20 minutes)

1. Students simulate igneous rock formation by melting candle wax and letting it cool and solidify. Follow instructions on [Blackline Master #1](#).
2. Students observe how quick solidification forms small crystals in intrusive igneous rocks, and slow solidification forms large crystals in extrusive igneous rocks.
3. Students describe their observations on [Blackline Master #1](#).

### **Explore** (Day 2: 15 minutes)

1. Refer back to the [Blackline Master #1](#) to complete the observations and conclusions.

**Explain (Day 1: 10 minutes and Day 2: 5 minutes)**

1. Have students share their analyses and conclusions from the lab reports and discuss the results.
2. Explain to students that igneous rocks are formed around volcanoes where hot molten rock cools and solidifies.
3. When a volcano erupts, lava reaches the earth's surface where it quickly solidifies. This forms extrusive igneous rocks. The crystals form quickly and are so small they cannot be seen. They are fine grained and the rock appears glassy.
4. Sometimes magma rises close enough to the earth's surface that it slowly cools and solidifies beneath the surface. The crystals form slowly, so they are large and the rock is coarse grained.
5. Allow the students to view the video "Igneous Rocks" from the United Streaming website.
6. Show students pictures of landforms created by igneous rocks. Several pictures can be found on the website:  
[http://www.uwsp.edu/geo/faculty/ritter/geog101/uwsp\\_lectures/lecture\\_igneous\\_rocks.html](http://www.uwsp.edu/geo/faculty/ritter/geog101/uwsp_lectures/lecture_igneous_rocks.html)

**Expand**

1. There are four different intrusive rock formations. They are batholith, dike, laccolith, and sill.
2. Allow students to view a diagram of the different intrusive rock formations. Pictures and descriptions can be found on the website: [http://www.uwsp.edu/geo/faculty/ritter/geog101/uwsp\\_lectures/lecture\\_igneous\\_rocks.html](http://www.uwsp.edu/geo/faculty/ritter/geog101/uwsp_lectures/lecture_igneous_rocks.html)
3. Have students describe the key differences between the four different intrusive rock formations.

**Evaluate**

1. Student responses on [Blackline Master #1](#) can be used for evaluation through a discussion led by each group.
2. Students can create a Venn diagram comparing and contrasting intrusive and extrusive igneous rocks.

**Blackline Master**

1. [Igneous Rocks](#)

**Supplementary Resources**

Igneous Rock Formation

[http://www.geocities.com/RainForest/Canopy/1080/igneous\\_formation.htm](http://www.geocities.com/RainForest/Canopy/1080/igneous_formation.htm)

This website contains general information about the formation of igneous rocks.

Earth Materials and Landforms: Igneous Rocks

[http://www.uwsp.edu/geo/faculty/ritter/geog101/uwsp\\_lectures/lecture\\_igneous\\_rocks.html](http://www.uwsp.edu/geo/faculty/ritter/geog101/uwsp_lectures/lecture_igneous_rocks.html)

This website contains information on the formation of intrusive and extrusive igneous rocks. It also contains descriptions and pictures of landforms created from igneous rocks.

Name: \_\_\_\_\_

Date: \_\_\_\_\_ Class Hour: \_\_\_\_\_

### Igneous Rocks

**Focus Question:** How are Igneous Rocks formed?

**Hypothesis:** \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**Materials:** (per group of students)

- Small candle
- Heat source to light candle
- Small dish
- Epsom salt water solution
- 2 Glass slides
- Eye dropper
- Granite rock sample
- Basalt or Obsidian rock sample
- Computer with Internet Access

**Procedure:**

**Part 1.**

1. Place a candle on a hard surface, such as a desk or a lab table.
2. Observe the candle **before** it is lit. What does the wax look like, feel like, etc. Use your observational skills.
3. Record your observations in the Data table below in the appropriately titled section, “before candle is lit.”
4. Your teacher will light the candle.
5. Observe the candle **while (during)** it is lit. Record your observations of the candle wax in the appropriately titled section, “during/while candle is lit.”
6. After several minutes, pour melted wax from the candle into the small dish.
7. Allow the wax to cool. Record your observations in the data table.



**Part 2.**

1. Using the eyedropper, place 3-4 drops of Epsom salt-water solution onto one glass slide. Let this slide sit overnight.
2. Repeat Step 1 of Part 2, but instead of letting it sit overnight, hold this slide over the lit candle (over the flame, not in the flame) until all the liquid evaporates.
3. Put the slide down onto your table or desktop.
4. Blow the candle out.
5. Proceed to the Analysis Section of **Blackline Master #1** to answer questions in complete sentences. You may answer the question about the slide that sat overnight the following class period.



**Data table for observations of candle wax:**

Before Candle is Lit	During/While Candle is Lit	After Blowing the Candle Out

**Analysis:**

1. Looking at the slide that was held over the candle flame, describe the size and shape of the crystals on the slide after it was held over the lit candle. (You can draw a picture to complement your written description).
2. Looking at the slide that has sat overnight, describe the size and shape of the crystals on the slide after it sat overnight? (You can draw a picture to complement your written description).
3. Which crystals had more time to form, the ones on the overnight slide or the ones on the slide held over the candle flame?
4. Extrusive igneous rocks form quickly, because they form outside of the earth's surface. Intrusive igneous rocks form slowly, because they form inside the earth's surface. Which glass slide represents crystals formed from intrusive igneous rock and which slide represents crystals formed from extrusive igneous rock?
5. Observe the crystals in Granite and Basalt. Describe the size and shape of the crystals in each igneous rock.
6. Which igneous rock do you think is extrusive, the granite or the basalt, and why? Which igneous rock do you think is intrusive, the granite or the basalt, and why?

**Conclusion:**

What did you learn by doing this experiment? Describe how the igneous rocks are formed, the two types, and examples of each.