

Igneous Rocks

Identification of Igneous Rocks:

1. determine the texture of the rock
2. determine the color of the rock
3. identify rock using classification scheme
4. determine the origin of the rock based on identification

Classification Textures: *The texture of the rock is primarily controlled by the cooling rate.*

Coarse-grained rocks form from cooling slowly within the Earth and are called PLUTONIC rocks. Slow cooling allows large crystal grains to grow, making most of the grains visible without the aid of a hand-lens. These are also called INTRUSIVE rocks.

Fine-grained rocks form from molten materials and lava cooling quickly at the Earth's surface before larger crystals have a chance to grow. These VOLCANIC rocks have a groundmass or matrix of small crystals that are sometimes too small to see even with a hand-lens. These are also called EXTRUSIVE rocks.

Other Textures:

Igneous rocks may also be PORPHYRITIC in texture. These rocks began as plutonic rocks, cooling slowly underground, then were extruded to the surface where they then cooled quickly. This produces a texture with a combination of coarse-grained crystals in a fine-grained matrix.

Sometimes during extrusion, the rock has trapped gas bubbles. This leads to a frothy VESICULAR texture, where the gas escapes but the rock cools so quickly that the small cavities remain.

A GLASSY texture occurs because the volcanic material cooled so rapidly after extrusion that no minerals had time to grow. It forms a dense, black rock.

Color: *The color of the rock is primarily controlled by the mineral composition.*

FELSIC rocks are light-colored rocks rich in feldspar, Na-plagioclase, and quartz. They are silica-rich (greater than 65% silica). A volcanic eruption with felsic magma tends to be very explosive (due to higher volatile content), and the lava tends to be highly viscous (flows sluggishly).

INTERMEDIATE rocks are those that vary somewhere between felsic and mafic.

MAFIC rocks usually have no quartz, are low in silica, and are rich in olivine, pyroxene, Ca-plagioclase, and sometimes amphibole. Because these minerals contain lots of iron and magnesium, mafic rocks are usually very dark. Volcanic eruptions with mafic magmas tend to be less violent than felsic eruptions, and the magma flows more easily.

ULTRAMAFIC rocks are almost exclusively made up of olivine with some pyroxene. These are mantle rocks that crystallize at very high temperatures.

Classification Scheme Based on Classification Textures and Color

<i>Texture</i>		<i>Color (Mineral Composition)</i>			
		<i>Light or Felsic (silica-rich)</i>	<i>Medium or Intermediate</i>	<i>Dark or Mafic (silica-poor)</i>	<i>Ultramafic (<45% silica)</i>
Classification Texture	Other Texture				
<i>Plutonic (Intrusive)</i>	<i>Coarse-grained</i>	Granite	Diorite	Gabbro	Peridotite
<i>Volcanic (Extrusive)</i>	<i>Fine-grained</i>	Rhyolite	Andesite	Basalt	
	<i>Vesicular</i>	Pumice/Scoria			
	<i>Glassy</i>	Obsidian			
	<i>Fragmental</i>	Tuff			

Please fill in the table after reviewing the rocks set out:

	Classification Texture	Other Texture	Color	Name of Rock	Cooling Rate, Type of Origin
1					
2					
3					
4					
5					
6					
7					
8					