

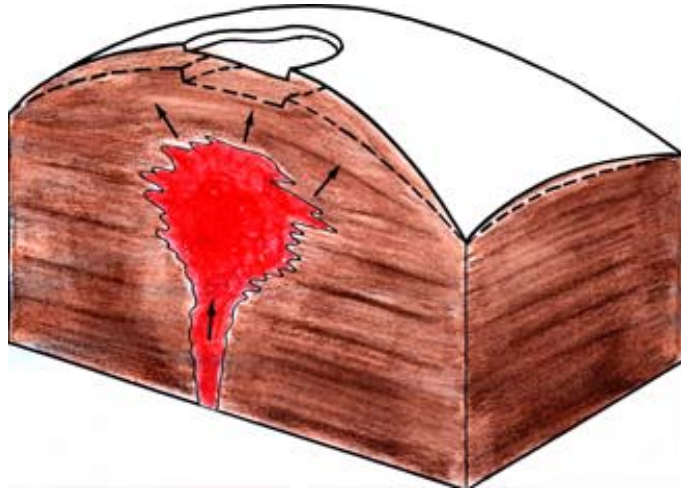
Igneous Rocks

(A Hot Topic)

Before we start: what do we call it?

Magma:

melted, or molten, rock when it is under the ground.



Lava:

melted, or molten, rock when it is at Earth's surface.



Now, go to your Graphic Organizer:

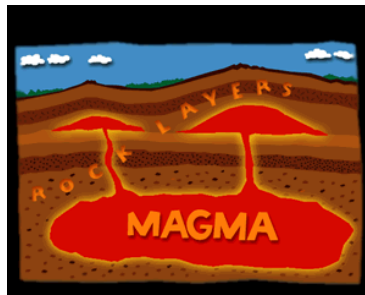
Igneous Rock

- Forms when natural, molten rock-forming material cools and turns into a solid.
- Composed of one or more kinds of minerals.
- Divided into two categories based on where it formed

A) **INTRUSIVE**: magma never reaches the surface.

Solidifies under ground.

Also called *PLUTONIC*



B) **EXTRUSIVE**: magma reaches the surface and becomes lava

Usually associated with volcanoes

Cools very quickly.

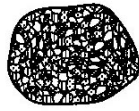
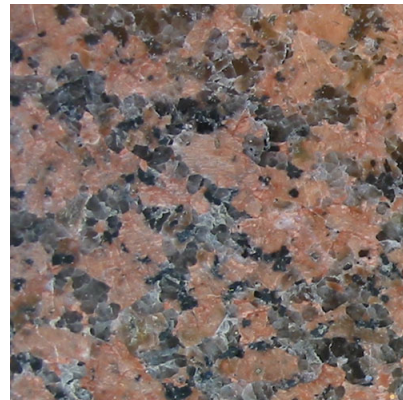


Solidification

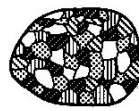
Magma cools from a liquid back into a solid. Most igneous rocks are formed this way.

Crystallization: magma cools slowly.

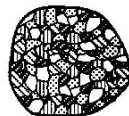
Mineral crystals form an inter-grown structure.



(1)



(3)



(2)



(4)

Glasses: magma cools quickly.

There is no time for mineral crystals to form.

Minerals stay mixed together.



Textures of Igneous Rocks

- Part of how we identify an igneous rock
- Size of mineral crystals depend on how and where the rock formed--mostly by the speed of cooling.
 - bigger crystals = slower cooling
 - smaller crystals = faster cooling
- Type of mineral crystals give information about the chemical composition of the rock.

Names of Textures

- Glassy: (usually shiny)
No crystals.
Rocks cooled very quickly at Earth's surface.
Usually extrusive.



- Fine (less than 1 mm--usually not shiny)
Crystals are very small (you need a microscope or hand lens to see them)
May have cooled at or near Earth's surface.
Intrusive **OR** extrusive



Names of Textures, Continued

- Coarse (1 mm - 10 mm)
Crystals are large and inter-grown
(stuck together like legos)
Almost always intrusive and slowly cooled.



- Very Coarse (10 mm or larger)
Crystals are extremely large--up to a meter in diameter!
Intrusive and **VERY** slowly cooled.



Two Other Texture Words

Vesicular

- rock has round openings caused by frozen gas bubbles.
- usually extrusive or formed very close to Earth's surface.



NON-Vesicular

- rock does not have frozen gas bubbles in it.



Igneous Rock Identification

A) Texture:

What size are the crystals?
Range is given on your ESRT.

B) Composition:

What minerals make up the rock?
Can be identified using the eyes, hand lens, or a microscope.
Can also be determined using density and color to give clues.

FELSIC:

high in Aluminum (Al) and Silicon (Si).
Tend to be less dense and lighter color.

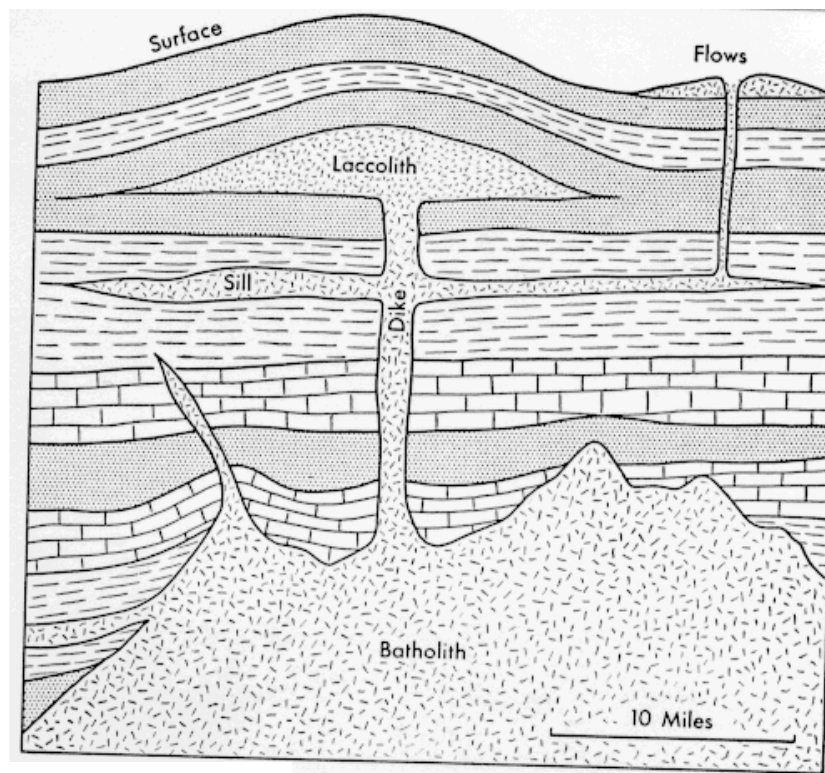


MAFIC:

high in iron (Fe) and magnesium (Mg).
Tend to be darker in color.



Igneous Intrusions and Extrusions



Steps to Identify Igneous Rocks

Use your ESRT p. 6

Read from the upper right

1. Vesicular or Non-Vesicular?
Gas bubbles or none?
2. What is the texture?
Glassy/Fine/Coarse/Very Coarse
Grain sizes shown in mm.
3. Felsic/Mafic?
Low Density/High Density
Light Colored/Dark Colored

To determine the mineral composition: read **DOWN**.
Each pattern is a different mineral.

To determine **PERCENT** composition, read
DOWN AND LEFT.

