

IGNEOUS ROCKS

Objectives -

Describe/explain how igneous rocks are classified.

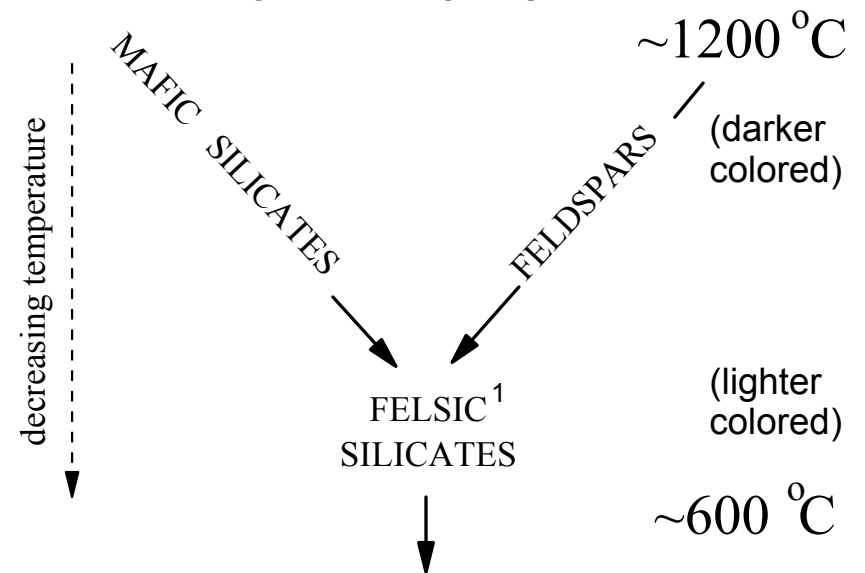
Define and list examples of mafic, felsic and ultramafic minerals.

Define and list examples of mafic, felsic and ultramafic rocks.

Describe how igneous rocks are identified.

Explain the origin of the six common igneous textures.

BOWEN'S REACTION SERIES* (simplified) SHOWING ORDER OF CRYSTALLIZATION FROM A MAFIC MAGMA



*know this diagram; understand this concept!

1-Note: felsic = silica-rich; mafic = silica poor, Fe/Mg rich

D? What do you think would happen to the remaining magma if, instead of slowly cooling it, you quenched the melt? Explain.

D? If there is a predictable relationship for the order of xtl., should there also be a predicatble relationship for the sequence of melting? If so, what? Explain.

Igneous rock textures & their origins

Rock type	<u>Cooling history</u>	<u>Texture</u>
{	volcanic	rapid cooling → fine grained (< 1mm)
	low prsr. + gas → vesicular	
	very rapid cooling → glassy (no xtls.)	
{	plutonic	slow cooling → coarse grained (> 1mm)
	slow + high H2O content → very coarse grained	
	mixed cooling history → porphyritic (mixed fine & coarse grains)	

D? Speculate on what environment & sequence of events might lead to a porphyritic texture.

Simplified Igneous Rock classification

Composition (+ silica content)

<u>Texture</u>	Felsic > 60% silica	Inter-mediate ~ 50-60%	Mafic 40- 50% silica	Ultramafic < 40% silica
Coarse grained	Granite	Diorite	Gabbro	Peridotite
Fine gr.	Rhyolite	Andesite	Basalt	---
(f.g. +) Glassy	←	Obsidian	→	---
(f.g. +) Vesicular	Pumice		Scoria	---
Porphyritic	Granite Porphyry	Diorite Porphyry	Gabbro Porphyry	---

D? The rocks in **bold type** are the most common and important igneous rocks because they compose most of the Earth's crust and mantle. Where are you most likely to find each of these rocks?

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Sample review questions*

Which crystallizes at a lower temperature, quartz or amphibole?
How do you know?

What genetic term applies to all coarse grain igneous rock? Fine grained? What does the texture imply about their environment (or rate) of formation?

What two characteristics distinguish each igneous rock?

What is the fine grained equivalent of a granite?

What do andesite & basalt have in common?

Compare and contrast a granite porphyry and a rhyolite porphyry.

Complete the following table by indicating what environmental factor causes the development of each of the textures listed below.

TEXTURE	CAUSE:
Glassy	
Vesicular	
Porphyritic	

*these questions are intended to give you an idea of the types of concepts you should be able to understand and interpret after reading the assigned material in the textbook & participating in lecture.

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