

Igneous Processes and Igneous Rocks – Chapter Questions

1. **How does magma differ from lava?
2. **What two criteria do we use to classify igneous rocks?
3. Igneous rocks are divided into four main compositions. Be sure you know these four compositions, their primary chemical differences, mineral compositions, and rock names.

Composition	Name	Mineral composition	Intrusive rock names	Extrusive rock names
< 45% Si	Ultramafic	Major: Olivine Minor: Pyroxene, Plagioclase	Peridotite	NONE EXIST ON PLANET EARTH
45 – 55% Si	Mafic	Major: Pyroxene, Ca-rich Plagioclase Minor: Olivine, Hornblende	Gabbro	Basalt, Scoria
55 – 65% Si	Intermediate	Major: Hornblende, Biotite, Na-rich Plagioclase Minor: Pyroxene	Diorite	Andesite, Pumice, Tuff
> 65% Si	Felsic	Major: Quartz, K-Feldspar, Muscovite Minor: Biotite, Hornblende, Na-rich Plagiocl.	Granite	Rhyolite, Pumice, Tuff, Obsidian

4. Igneous rocks are divided into five main textures. Describe those five textures.
5. **What is viscosity?
6. What characteristics of a magma can increase viscosity?
7. What three major factors increase the crystal size of minerals in igneous rocks?
8. **How do **pegmatites** form? Why are their crystals so exceptionally large?
9. **Under what circumstances will no crystals form when a melt solidifies? What do we call such a product?
10. Explain why the composition of a rock with no crystals is always felsic.
11. **What is **porphyritic** texture? What does it indicate about the formation of an igneous rock?
12. How do magmas of identical compositions produce rocks of different compositions? (What processes change a magma's composition after it forms?)
13. Explain how magmas' physical and chemical characteristics change as they rise to the surface and progress through Bowen's Reaction Series:

Temperature		Si, K, Na content		Fe, Mg, Ca content		Viscosity	
Water content		Quartz content		Olivine content		Plagioclase content	

14. According to Bowen's reaction series, what minerals crystallize first as magmas cool? Last? What minerals will you never find together? Always find together?
15. **Compare and contrast extrusive and intrusive rocks. Be sure you understand what features and textures are found in each
16. **What is a pluton? Compare and contrast these three kinds of common plutons.

	Sill	Dike	Batholith
Parallel to surrounding bedding (concordant) or cross-cutting (discordant)	Parallel	Cross-cutting	Cross-cutting
Shape: tabular or massive	Tabular	Tabular	Massive
Size	5-30 m thick	0.5-30 m thick	100s of km wide

17. For each of these igneous rock types, describe its texture and composition: **Andesite, Basalt, Diorite, Gabbro, Granite, Obsidian, Pumice, Rhyolite, Scoria, Tuff**