

Physical Geology 1330
116-S&R 1
Lecture 6: Igneous Rocks
9/16/02

Dr. Mike Murphy
mmurphy@mail.uh.edu
333-S&R-1
www.uh.edu/~mamurph2/homepage.html

Today's Outline

- Magma Generation
- Crystallization
- Bowen's Reaction Series
- Forms of Intrusive Igneous Bodies

Magma may be generated in two ways:

1.

2a.

b.

Geothermal Gradient – the change in temperature with depth.

Melting Curve – minimum temperatures at specific depths required to melt a rock.

Fractional Crystallization

The modification of magma by crystallization and removal of mineral phases.

Because only certain elements will go into a given mineral, this will tend to change the composition of the remaining liquid.

Bowen's Reaction Series – Sequence of mineral crystallization from a cooling basaltic magma

Discontinuous Reaction Series -

Olivine → Pyroxene → Amphibole → Biotite

Continuous Reaction Series -

Ca-rich Plagioclase → Na-rich Plagioclase

<i>Temperature Regime</i>	<i>Bowen's Reaction Series</i>	<i>Igneous Rocks</i>
<i>High Temperature, first to crystallize</i>		<i>ultramafic</i>
		<i>basaltic</i>
		<i>andesitic</i>
<i>granitic</i>		
<i>Low Temperature, last to crystallize</i>		

Chemical Composition	granitic felsic	andesitic (intermediate)	basaltic (mafic)	ultramafic
Dominant Minerals	quartz K-feldspar	amphibole, intermediate plagioclase feldspar	pyroxene, Ca-rich plagioclase feldspar	olivine, pyroxene
Color	light	medium	dark	dark
phaneritic				
aphanitic				
porphyritic				
glassy				

Forms of Intrusive Igneous Bodies