GEOLOGY TEST 1 STUDY GUIDE

MINERALS

8 most abundant elements:	Common ionic form:	Relative Ionic Size:	Coordination #:
Oxygen (O)	O-2	1.4	depends on size
Silicone (Si)	Si+4	.26	4
Aluminum (Al)	Al+3	.39	4 or 6
Iron (Fe)	Fe+2	.63	6
Calcium (Ca)	Ca+2	1.00	8
Sodium (Na)	Na+1	.99	8
Potassium (K)	K+1	1.37	8 or 12
Magnesium (Mg)	Mg+2	.72	6

Crystalline vs Non-crystalline:
A crystalline solid has its molecules (or atoms) arranged in a lattice. That is, they are arranged in a regular fashion with equal spacing and angular relationships in all three directions.

A non-crystalline solid, also called amorphous, has no such regular arrangement of molecules.

Silicate Minerals:
olivines - (Mg,Fe)2SiO4 ; independent tetrahedra

pyroxenes - (Mg,Fe)2Si2O6) ; single chain

amphiboles - (W,X,Al)7-8(Z4O11)2(OH)2 ; double chains

biotite mica - K(Mg.Fe)3(AlSi3O10)(OH)2 ; sheet silicates

muscovite mica - KAl2(AlSi3O10)(OH)2 ; sheet silicates

alkali feldspars - KAlSi3O8---NaAlSi3O8 (solid solution series) ; framework silicates

plagioclase feldspars - NaAlSi3O8---CaAl2Si2O8 (solid solution series) ; framework silicates

quartz - SiO2 ; framework silicates

Mafic- rocks low in silicon
Felsic- rocks high in silicon

EARTH'S HEAT

Heat Transfer:
Radiation- Electromagnetic waves that directly transport ENERGY through space.
Conduction- transfer of energy through matter from particle to particle
Convection- transfer of heat by the actual movement of the warmed matter.

Origin of Earth's Heat:
comets, asteroids, and other smaller masses

Geothermal Gradient: rate at which the temperature increases with depth in the Earth
Geobarometric Gradient:

MAGMAS

Melting of Silicate rocks: Volatiles (water)- Temperatures of minerals are reduced under high water pressure. Wet rocks melt at lower temps that do dry rocks.

Factors influencing viscosity- silica content and temperature.

Crystallization of magmas:

Fractional Crystallization- Rapid cooling, crystal settling or mineral overgrowth inhibiting diffusion prevents melt reacting with crystals

Equilibrium Crystallization- slow cooling allows previously formed crystals to react with melt to bring them into equilibrium as melt composition changes

Magma rise to shallow crustal levels:
1. The most obvious is an increase in temperature.
2. The introduction of water into rock. Water lowers the melting point of rocks.
3. A decrease in pressure of rocks that are already hot will cause them to melt.

Magma originate: crust or mantle

IGNEOUS ROCKS

Volcanic rocks (small crystals) – basalt- mafic, fine grained, dark color, **andesite**- intermediate, fine grained, **rhyolite**- felsic, fine grained, light color

Plutonic rocks (large crystals) – peridotite- ultramafic, coarse grained, **gabbro**- mafic, coarse grained, dark colored, **diorite**- intermediate, coarse grained, **granite**- felsic, coarse grained, light colored

Textures of rocks-

Batholith- a very large igneous intrusion extending deep in the earth's crust.

Dike- a long wall built to prevent flooding from the sea

Extrusive- igneous rocks that have been forced out in a molten or plastic condition upon the surface of the earth.

Intrusive- having been forced while in a plastic state into cavities or between layers

Pluton- body of intrusive igneous rock that is crystallized from magma slowly cooling below the surface of the Earth.

VOLCANOES

Types of Volcanoes:
Volcanic fields- small eruptions occur over a wide area
Cone Volcano- succession of small moderate eruptions from one location
Caldera Volcano- infrequent but moderate large eruptions
Cinder Volcano- steep conical hill with straight sides, explosive
Shield Volcano- very gentle slopes, convex upward, quiet
Strato Volcano- gentle lower slopes, steep upper slopes, concave upward, explosive

Volcanic Eruptions: