

Please be sure to look over the study guides for the midterms, and your review questions and the keys for those (from the course webpages).

Vocabulary

A'a

Accretionary wedge

Active continental margin

Andesitic composition

Anticline

Atom

Atomic mass number

Atomic number

Basaltic composition

Basin

Batholith

Bowen's reaction series

Brittle failure

Caldera

Cinder cone

Cleavage

Coarse-grained texture

Columnar joint

Composite cone

Continental volcanic arc

Crater

Crystal

Crystal settling

Crystallization

Decompression melting

Deformation

Dike

Dip-slip fault

Dissolved gases

Dome

Ductile deformation

Electron

Element

Fault

Fault scarp

Fault-block mountains

Feldspar

Felsic

Fine-grained texture

Fissure

Fissure eruption

Flood basalt

Fold

Fracture

Geothermal gradient

Glassy texture

Graben

Hardness

Horst

Intermediate composition

Igneous rock

Intrusive

Ion

Island arc

Isostasy

Isostatic adjustment

Joint

Laccolith

Lahar

Lava

Luster

Mafic

Magma

Mantle plume

Mineral

Mohs hardness scale

Monocline

Neutron

Normal fault

Nucleus

Orogenesis	Silicon-oxygen tetrahedron
Orogeny	Sill
Partial melting	Specific gravity
Pahoehoe	Stratovolcano
Passive continental margin	Streak
Pluton	Strike-slip fault
Plutonic	Syncline
Porphyritic texture	Terrane
Proton	Texture
Pyroclastic flow	Thrust fault
Pyroclastic materials	Transform fault
Quartz	Ultramafic composition
Reverse fault	Vein deposit
Rock	Vent
Rock cycle	Viscosity
Rock forming minerals	Volatiles
Scoria	Volcanic island arc
Shield volcano	Volcanic neck
Silicate	Volcano

Minerals are naturally-occurring, inorganic crystalline solids with definite chemical formulas. Physical properties important for mineral identification include cleavage, crystal form, hardness, luster, and some special properties like magnetism or effervescing in weak acid. The largest group of minerals is the silicates. Quartz and feldspar are the most common silicate minerals. Other rock-forming silicate minerals are biotite, hornblende, pyroxene, and olivine. Common non-silicates include halite, calcite and gypsum.

Rocks are composed of minerals or mineral-like solids. There are three main classes of rocks: igneous, sedimentary, and metamorphic. Each can form from any of the others. Know how each forms.

Igneous rocks are divided on the basis of composition, and on grain size (texture). Know the implications of the texture of an igneous rock. Know the differences of granite, diorite, gabbro, rhyolite, andesite and basalt. Each compositional group occurs in a distinct tectonic environment.

Know that basalt is the most common volcanic rock, has predominantly passive eruptions, from hot-spots or diverging plates. Know that granite is the most common plutonic rock, and occurs chiefly within continental volcanic arcs at convergent margins.

Minerals are composed of elements: the smallest unit of matter that retains the properties of the material. Atoms are composed of protons, neutrons and electrons. The mass is contained in the nucleus: which has the protons and the neutrons.

Protons have positive charge, and determine which element the atom is. There are varying numbers of neutrons within the nuclei of the same element. The electrons have a negative charge, and are responsible for the atoms bonding to other atoms: if an atom loses an electron, it becomes positively charged, and is called a CATION; if an atom gains an electron, it becomes negatively charged, and is called an ANION.

Magma is generated by partial melting of the mantle, by pressure release or by addition of water as a flux. Know where (in terms of plate tectonics) each of these events occurs. Two distinct types of magma are formed: basaltic (mafic) and granitic (felsic); intermediate types occur by assimilation of continental material in basaltic magma. The two types of magma lead to different styles of volcanic eruptions. Know the difference, and where each is likely to occur.

What affects the viscosity of magma, and how do these variations affect the viscosity? Basalt is fluid, and commonly flows as pahoehoe. Felsic magma often is explosive, and commonly erupts violently with a large outpouring of pyroclastic material.

Shield volcanoes are the largest type of volcanic peak, composed of basalt, and usually have quiet eruptions. Composite cones (stratovolcanoes) are also large, have interbedded lava and pyroclastic deposits, and can have violent eruptions, including nuee ardente flows. Cinder cones are the smallest, short-lived, steep sided, and composed nearly completely of pyroclastic material. Most volcanoes are associated with plate boundaries, however remember hot-spots.

Magma chambers feed volcanoes via conduits or pipes, that may remain after the volcanoes erode away as volcanic necks. Intrusive features of plutonic rocks solidified below Earth's surface include dikes, sills, laccoliths, stocks and plutons. Know the differences of these.

Deformation can be ductile or brittle. Ductile deformation includes various styles of folding: know the names of the kinds of folds, and that folds form as a result of compressive forces. Domes and basins are regional features associated with crustal uplift or subsidence.

Brittle deformation can be faulting, where appreciable movement occurs on the break, or joints, without appreciable movement on the breakage plane.

Faults can be dip-slip or strike-slip. Dip-slip faults that have movement of the hanging wall down the fault plane are called 'normal'. Normal faulting is the result of tensional forces, often at diverging tectonic plates or as a consequence of regional uplift. If the hanging wall has moved up the fault plane, it is called 'reverse'. Reverse faults with a low angle fault plane ($<45^\circ$) are classed as thrust faults. Reverse faults are the result of compressional forces, often where tectonic plates are converging. Thrust faults can move crustal blocks tens or hundreds of kilometers.

Strike-slip faults have movement parallel to the trend of the fault plane. The best-known strike-slip fault is the San Andreas Fault, in California, where right-lateral movement between the Pacific Plate and the North American Plate has offset rocks for at least the past 29 million years. Many strike-slip faults link offsets in the mid ocean ridge, where their motion accommodates displacement of lithospheric plates.

Mountain belts are created along plate boundaries. Where plates converge, the generation of magma, and the deformation of the rocks will lead to folded mountain belts with plutonic cores. Aleutian type mountain belts are the result of convergence of two oceanic plates, where an oceanic volcanic arc is created. Andes type mountain belts occur where the convergence is between an oceanic plate and a continental plate. There is emplacement of felsic and andesitic magma, a continental volcanic arc, and deformation of the accretionary wedge of sediment deposited on the continental margin and in the oceanic trench. Himalayan type mountain belts occur where two continental plates collide. There is little magma generation in this type of mountain building event. Continents are built by successive mountain-building events, and by addition of accreted terrane: fragments of crust within ocean basins may be added to continents when the crustal fragment does not subduct, and becomes attached to the continent.

Lithospheric plates rise and fall on the mantle surface, depending upon their density and their thickness. Thickening by mountain building, or removal of material by erosion results in an 'isostatic adjustment' of the lithosphere.