

GEOL 103 Writing Assignment 2. Rock Cycle

1. How do each of the three major rock types form? Include the source of the material and the rock-forming process.
 - Igneous rocks form from the hi-temperature (650-1200 °C) melting of other rocks (ign. mmorphic, or sed), following by cooling, possibly with crystallization of minerals if sufficient time is available
 - Metamorphic rocks form by solid state (no melting) recrystallization of minerals in other rocks (ign. mmorphic, or sed) due to high temperatures and or pressures.
 - Clastic sedimentary rocks form by weathering of other rocks (ign. mmorphic, or sed), transport of sediments by water, wind, or glaciers, deposition of sediments, (often) burial by other sediments, followed by compaction and lithification. Chemical sedimentary rocks form by chemical weathering of other rocks (ign. mmorphic, or sed), transport of dissolved ions by water, chemical precipitation of minerals, (often) burial by other sediments, followed by compaction and lithification.
2. What's the difference between magma and lava?
 - Magma is molten rock below the surface of the Earth. Lava is the same thing, above the surface of the Earth.
3. What do the terms intrusive and extrusive (used only for igneous rock) mean? What do they imply for the size of mineral grains expected in an intrusive or extrusive rock? Why?
 - Intrusive = molten rock cooled below the surface of the Earth, usually slowly enough to allow for growth of visible mineral grains. Crystals require adequate time and space to grow; slow cooling provides adequate time for mineral growth.
 - Extrusive = molten rock cooled above the surface of the Earth, usually rapidly enough that large mineral grains did not form.
4. What's an outcrop? Give an example from your experience of rocks found at the Earth's surface that represent an outcrop, and of rocks that do not represent an outcrop.
 - An outcrop is an exposure of rock at the Earth's surface such that the rock is "in place", i.e., it is still attached to bedrock and has not been moved by humans or nature.
 - You should have given an example from your experience. Rocks along the creek bed near the Art building do not represent an outcrop. Before taking a geology class, you may have often driven by outcrop at roadcuts without realizing the marvel of nature that is geology!
5. What are six major rock-forming minerals that we saw in lab and today in class?
 - quartz, potassium feldspar (orthoclase), plagioclase feldspar, amphibole (e.g., hornblende), pyroxene (didn't see in class or lab yet), biotite mica, muscovite mica, olivine, calcite
6. Explain the concept of the rock cycle in your own words.
 - All major classes of rocks (ign. mmorphic, or sed) can be transformed into all other major classes of rocks through tectonic processes and the processes listed in Question #1. There are some limitations. E.g., you can't take a quartz sandstone and metamorphose it into a marble, because marble is primarily composed of recrystallized calcite (CaCO_3), whereas sandstone is primarily composed of quartz (SiO_2).
7. Name and briefly explain the two major types of metamorphism.
 - Contact – solid state (no melting) recrystallization due primarily to high temperature. Usually occurs in a "halo" around intrusion of an igneous magma in the "country rock"
 - regional – solid state (no melting) recrystallization due both high temperature and high pressure. Due to the tremendous T and P experienced by rock due to plate collision during a mountain building (orogenic) event.
8. How do divergent and convergent plate boundaries relate to the 3 main rock types?
 - There are lots of answers here. E.g., igneous melts form at convergent boundaries when the downgoing lithospheric plate begins to partially melt, then rise and form igneous intrusions or volcanoes. Regional metamorphism occurs at convergent margins (ocean-continent and continent-continent) due to hi T and P. Mountain building at convergent margins (ocean - ocean, ocean-continent and continent- continent) causes uplift, and weathering of these mountains starts the process of sedimentary rock formation (see Question #1 above). The main process at divergent plate boundaries is the formation of basalt along mid-ocean ridges (spreading centers).