

Section 1 The Rock Cycle

- A. Rock—mixture of minerals, volcanic glass, organic matter, or other material
- B. Rock cycle—model showing processes that create and change rock
1. Sedimentary rock can be changed by heat and pressure into metamorphic rock.
 2. Metamorphic rock can melt and cool to form igneous rock.
 3. Igneous rock can be broken into fragments that may later form sedimentary rock.
- C. Conservation of matter—rock cycle never destroys elements of rocks but merely redistributes them
- D. James Hutton recognized the rock cycle in 1788 by observing Siccar Point, Scotland.

Discussion Question

What primary processes are involved in the rock cycle? Pressure, temperature, and fragmentation

END

Underlined words and phrases are to be filled in by students on the Note-taking Worksheet.

Section 2 Igneous Rock

- A. **Igneous rocks** form from magma found deep under Earth's surface.
1. Magma reaching the surface flows from a volcano as **lava**.
 2. Magma trapped below the surface forms large-grained **intrusive** igneous rock when it cools.
 3. Magma cooling at or near Earth's surface forms small-grained **extrusive** igneous rock.
 4. **Basaltic** igneous rocks are dark-colored and dense.
 - a. Contain **iron** and **magnesium** but very little silica
 - b. Basaltic lava flows **freely** from a volcano.
 5. **Granitic** igneous rocks are lower density and lighter color.
 - a. Contain more **silica** and less iron and magnesium
 - b. Granitic magma is **thick** and **stiff**.
 6. **Andesitic** rocks have a more balanced composition of minerals and density than basaltic or granitic rocks.
 7. Crystal **size**, large or small, can help identify an igneous rock as intrusive or extrusive.
 8. Volcanic glass rocks **cool** so quickly that few crystals form.
 9. Some rocks have **holes** formed around once-trapped air and other gases.
- B. Igneous rocks are **classified** in two ways.
1. Where they formed—**intrusive** (under the Earth's surface) or **extrusive** (at or near the Earth's surface)
 2. **Magma** type—basaltic, granitic, or andesitic

Discussion Question

What does mineral crystal size tell about how rock formed? Large crystals—magma cooled slowly; tiny crystals—magma cooled more rapidly; very few crystals—magma cooled very quickly

END

Section 3 Metamorphic Rocks

- A. **Metamorphic rocks**—changed by temperature, pressure, and hot fluids
1. Heat and pressure result from one layer of rock on top of another layer.
 - a. Sometimes temperature and pressure are great enough to melt rock, forming magma.
 - b. Sometimes pressure flattens mineral grains in rocks without melting them.
 - c. As pressure and temperature continue to increase over time, one type of rock can change into several different metamorphic rocks.
 2. Hot, water-rich fluids can move through rock, chemically changing it.
- B. Classification of metamorphic rocks—by composition and texture
1. **Foliated** texture—mineral grains flatten and line up in parallel layers or bands
 2. **Nonfoliated** texture—mineral grains grow and rearrange but do not form layers

Discussion Question

What are three factors that can change rocks? Heat, pressure, and hot, water-rich liquids



Section 4 Sedimentary Rocks

- A. **Sedimentary rocks**—mostly found on the exposed surface of Earth
1. Rock fragments, mineral grains, and bits of plants and animal remains moved by wind, water, ice or gravity are called sediments.
 2. Sedimentary rocks form in layers.
- B. Sedimentary rocks—classified by what they were made of and how they were formed
- C. **Detrital** sedimentary rocks—made from broken fragments of other rocks
1. When layers of small sediments stick together because of pressure, compaction occurs.
 2. When water and other minerals move through open spaces between larger sediments, gluing them together, cementation occurs.
 3. Detrital rocks often have a granular texture.
 4. Rocks are named according to size and shape of sediments.
 - a. Sediment size can be large like gravel or small like clay.
 - b. Sediments can be well-rounded or have sharp angles.
- D. Chemical sedimentary rocks—non-clastic rocks formed when dissolved minerals came out of solution
1. Limestone forms from calcite, which was calcium carbonate in solution.
 2. Rock salt forms from halite, which was salt in solution.
- E. Organic sedimentary rocks—made from remains of once-living plants or animals
1. Chalk—made of microscopic calcite-shell remains of animals
 2. Coal—made of plant remains, chemically changed by microorganisms and compacted over millions of years
- F. Rock cycle—a continuous and dynamic process

Discussion Question

How do detrital, chemical, and organic sedimentary rocks differ? Detrital is formed from sediment fragments compacted or cemented together; chemical is formed from formerly dissolved minerals; organic is formed from once-living things.

END