

Minerals and Rocks

The Rock Cycle

.....**Read to Learn**.....

What is the rock cycle?

Do you have a recycling program at school? Or do you recycle at home? When materials such as paper or metal are recycled they are used over again, but not always for the same things. The metal from the beverage can you recycled yesterday might end up in a baseball bat.

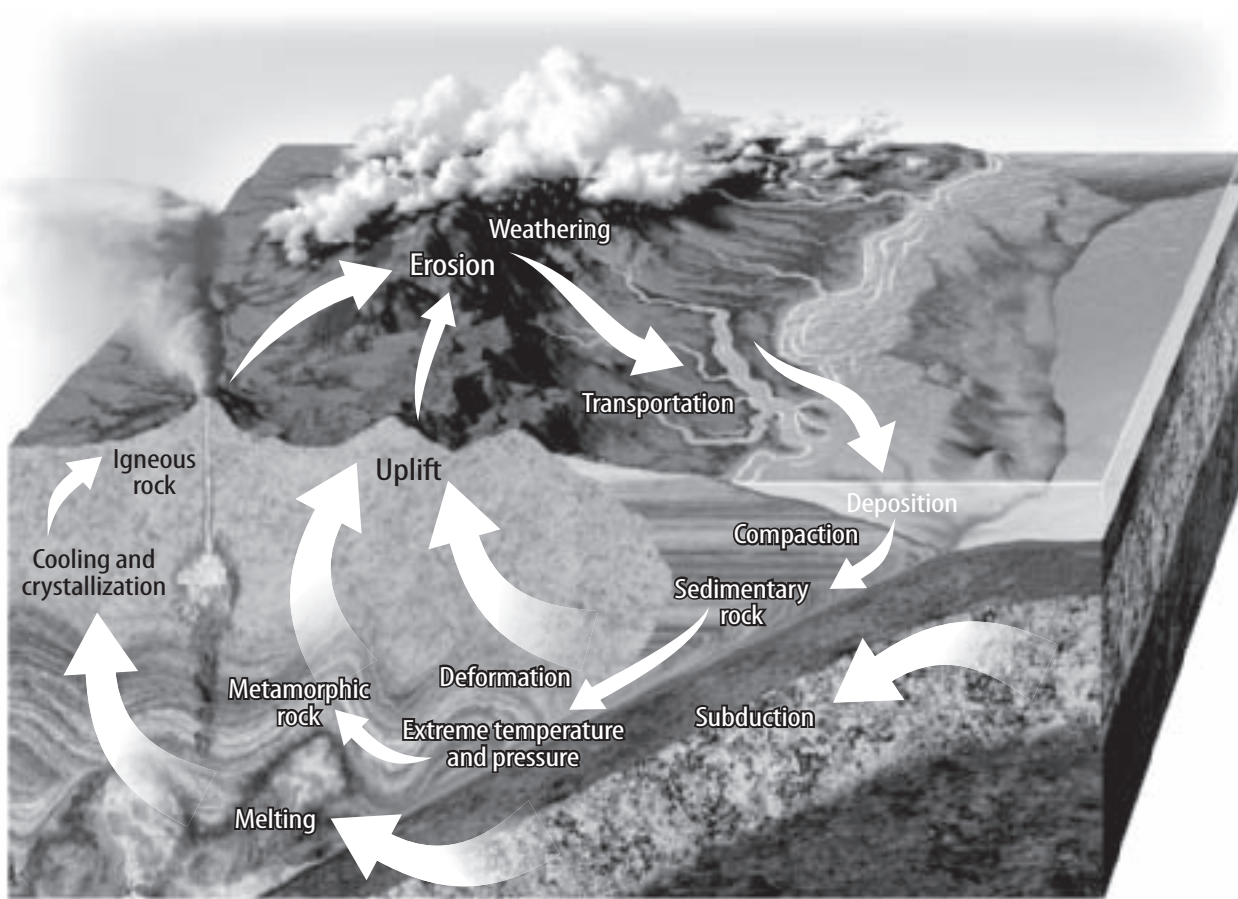
Recycling also occurs naturally on Earth. The rock material that formed Earth 4.6 billion years ago is still here. However, much of it has changed many times throughout Earth's history. *The series of processes that continually change one rock type into another is called the **rock cycle**.*

As materials move through the rock cycle, they can take the form of igneous rocks, sedimentary rocks, or metamorphic rocks. At times, the material might not be rock at all. It might be sediment, magma, or lava. As Earth materials move through the rock cycle, both their form and their location on Earth change.

Processes of the Rock Cycle

Mineral and rock formation are important processes in the rock cycle. The rock cycle is continuous. It has no beginning or end. Some processes take place on Earth's surface. Others take place deep beneath Earth's surface.

The Rock Cycle



Cooling and Crystallization

The figure above shows the processes in the rock cycle. Rocks continually transform from one type to another as they move slowly through the cycle. Melted rock is present both on and below Earth's surface. *When lava erupts and cools and crystallizes on Earth's surface, the igneous rock that forms is called **extrusive rock**. When magma cools and crystallizes inside Earth, the igneous rock that forms is called **intrusive rock**.*

Uplift

If intrusive rocks form deep within Earth, how are they ever exposed at the surface? **Uplift** is the process that moves large amounts of rock up to Earth's surface and to higher elevations. Earth's tectonic activity drives uplift. Uplift is often part of mountain building.

Weathering and Erosion

Uplift brings rocks to Earth's surface. There they are exposed to the environment. Glaciers, wind, and rain, along with the activities of some organisms, break down exposed rocks. The same glaciers, wind, and rain also carry sediment to low-lying areas, called basins, by the process of erosion.

Deposition

Eventually, glaciers, wind, and water slow down enough that they can no longer transport the sediment. *The process of laying down sediment in a new location is called **deposition**.*

Deposition forms layers of sediment. As time passes, more and more layers are deposited.

Compaction and Cementation

The weight of top layers of sediment pushes the grains of the bottom layers closer together. This process is called compaction. Sedimentary rocks have tiny spaces, called pores, between the grains. Pores sometimes contain water and dissolved minerals. When these minerals crystallize, they cement the grains together. The rock cycle figure on the previous page shows the path of sediment from weathering and erosion to compaction and cementation.

Temperature and Pressure

Rocks subjected to high temperatures and pressure far below Earth's surface undergo metamorphism. For example, as temperature and pressure increase, the sedimentary rock called shale changes to the metamorphic rock called slate. As temperature and pressure continue to increase, slate changes to phyllite, then to schist, and finally to gneiss. If the temperature is high enough, the rock melts and becomes magma. Igneous rocks form as the magma cools, and the material continues through the rock cycle.

Rocks and Plate Tectonics

The theory of plate tectonics states that Earth's surface is broken into rigid plates. The plates move as a result of Earth's internal thermal energy and convection in the mantle. The theory explains the movement of continents. It also explains earthquakes, volcanoes, and the formation of new crust. These events occur at plate boundaries where plates interact.

Igneous rock forms where volcanoes occur and where plates move apart. Where plates collide, rocks are subjected to intense pressure and can undergo metamorphism. Colliding plates can also uplift rock or push rock deep below Earth's surface, where it melts and forms magma. At Earth's surface, uplifted rocks are exposed and weathered. Weathered rock forms sediment, which eventually can form sedimentary rock.

Processes within Earth that move tectonic plates also drive part of the rock cycle. The rock cycle also includes surface processes. As long as these processes exist, the rock cycle will continue.