Rock Cycle

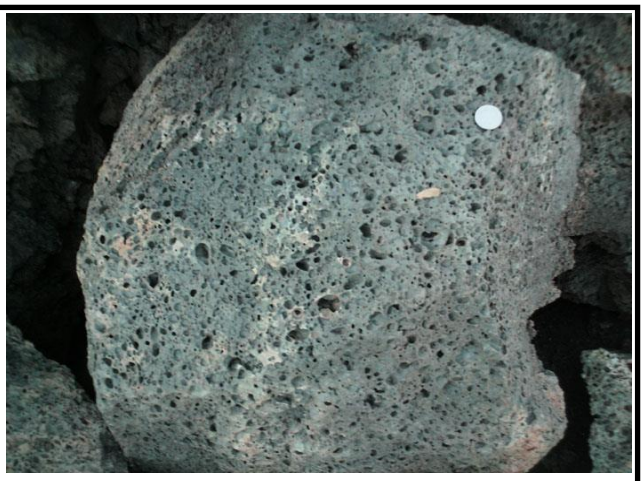
Rock or **stone** is a natural substance, a solid aggregate of one or more minerals. For example, **granite.** The Earth's outer solid layer, the lithosphere, is made of rock.

Rock has been used by mankind throughout history. The minerals and metals found in rocks have been essential to human civilization. Three major groups of rocks are defined: **igneous**, **sedimentary**, and **metamorphic**. The scientific study of rocks is called **petrology**, which is an essential component of geology.

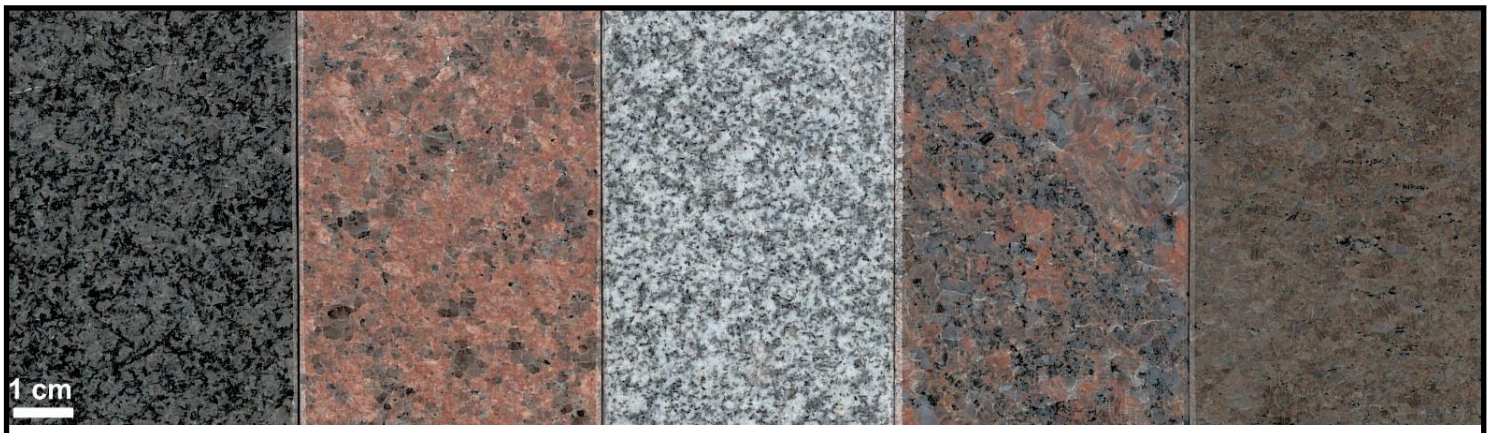
- **Igneous rock**

Igneous rock forms through the cooling and solidification of magma or lava. igneous rocks are divided into two main categories: **plutonic rock** and **volcanic**. Plutonic or intrusive rocks result when magma cools and crystallizes slowly within the Earth's crust. A common example of this type is **granite**. Volcanic or extrusive rocks result from magma reaching the surface either as lava or fragmental ejecta, a common example of this type is **basalt**.

Igneous rock(Basalt)



Igneous rock(Basalt)



Various granites (cut and polished surfaces)

- **Sedimentary rock**

Sedimentary rocks are formed at the earth's surface by the accumulation and cementation of fragments of earlier rocks, minerals, and organisms or as chemical precipitates and organic growths in water (sedimentation).

About (7.9%) of the crust by volume is composed of sedimentary rocks, with (82%) of those being **shales**, while the remainder consists of **limestone** (6%), **sandstone** and **arkoses** (12%). Sedimentary rocks often contain **fossils**. Sedimentary rocks form under the influence of gravity and typically are deposited in horizontal or near horizontal layers or strata and may be referred to as **stratified rocks**.

Sedimentary rock

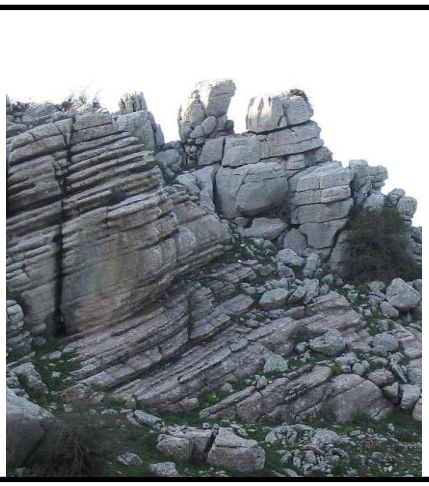
Rock type: **Shale**

Composition: Clay minerals and quartz

Sedimentary rock

Rock type: **Limestone**

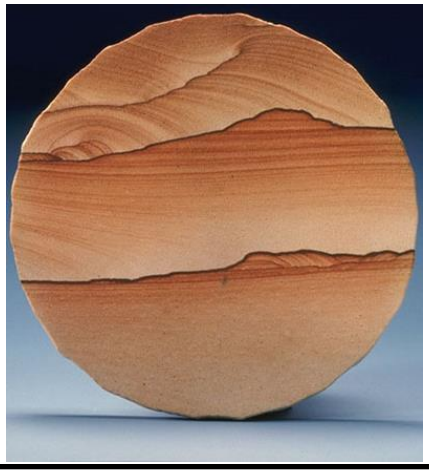
Composition: Calcium carbonate, inorganic crystalline calcite and/or organic calcareous material



Sedimentary rock

Rock type: **Sandstone**

Composition: Typically quartz and feldspar.



Sedimentary rock

Rock type: **Arkose**

Composition: >25% feldspar

Before being deposited, sediments are formed by weathering of earlier rocks by erosion in a source area and then transported to the place of deposition by water, wind, ice, mass movement or glaciers (agents of **denudation**).

- **Metamorphic rock**

Metamorphic rocks are formed by subjecting any rock type—sedimentary rock, igneous rock or another older metamorphic rock—to different **temperature** and **pressure** conditions than those in which the original rock was formed. This process is called **metamorphism**; meaning to "change in form".

The result is a profound change in **physical properties** and **chemistry** of the stone. The original rock, known as the **protolith**, transforms into other mineral types or other forms of the same minerals, by **recrystallization**. The temperatures and pressures required for this process are always higher than those found at the Earth's surface: temperatures greater than **150 to 200 °C** and pressures of **1500 bars.** Metamorphic rocks compose (**27.4%)** of the crust by volume.

Depending on the structure, metamorphic rocks are divided into two general categories. Those that possess a texture are referred to as **foliated**; the remainders are termed **non-foliated**.

Metamorphic rock

Rock type: **foliated**

Example: **Gneiss**

Metamorphic rock

Rock type: **Non-foliated**

Example: **Marble**

1. **Foliated metamorphic rocks** such as **gneiss**, **phyllite** and **schist**, have a layered or banded appearance that is produced by exposure to heat and directed pressure.
2. **Non-foliated metamorphic rocks** such as **hornfels**, **marble** and **quartzite** do not have a layered or banded appearance.