



PHOENICIA UNIVERSITY

Types of Rocks

An Introduction to Geology

How rocks form, how they differ, and how the rock cycle connects them

1 What Is a Rock?

A rock is a naturally occurring solid made of one or more minerals (or, occasionally, mineral-like matter such as volcanic glass). What makes a rock is not its chemistry alone, but how it formed — and that history is what geologists use to classify it.

Mineral

A naturally occurring, inorganic solid with a defined chemical composition and crystal structure.

Rock

A naturally occurring solid mass made of one or more minerals, grouped by how it formed.

Rock cycle

The continuous process by which rocks change from one type to another over geologic time.

2

The Three Rock Families

Igneous

“From fire”

Forms as molten rock (magma or lava) cools and solidifies.

Sedimentary

“From settling”

Forms as sediment is deposited, compacted, and cemented over time.

Metamorphic

“From change”

Forms when existing rock is transformed by heat and/or pressure.

Every rock on Earth belongs to one of these three families, based on its formation process.

3 Igneous Rocks

Intrusive (Plutonic)

Cools slowly beneath the surface, allowing large, visible crystals to form.

Granite · Diorite · Gabbro

Extrusive (Volcanic)

Cools rapidly at or above the surface, producing small or no visible crystals.

Basalt · Obsidian · Pumice

Grain size is the key visual clue: the slower the cooling, the larger the crystals.

4 Sedimentary Rocks

Sedimentary rocks form as rock and mineral fragments are weathered, transported, deposited in layers, and compacted and cemented together over time — often preserving fossils and clues about past environments.

Sandstone

Cemented sand-sized grains.

Limestone

Often formed from shell and coral debris.

Shale

Compacted, fine clay and mud particles.

Conglomerate

Rounded pebbles cemented together.

Sedimentary rocks are the only type that commonly contains fossils.

5 Metamorphic Rocks

Heat, pressure, or both transform existing rock — igneous, sedimentary, or even other metamorphic rock — without fully melting it, changing its texture and mineral structure.

Foliated

Minerals align into visible bands or layers under directed pressure.

Slate · Schist · Gneiss

Non-Foliated

Minerals recrystallize without banding, often under even pressure.

Marble · Quartzite

6 The Rock Cycle



The rock cycle has no fixed starting point — any rock type can, in theory, transform into any other.

7 Identifying Rocks in the Field

- Texture: is the rock crystalline, grainy, layered, or glassy?
- Grain size: are individual mineral grains visible to the eye, or too fine to see?
- Color and banding: does the rock show streaks, bands, or uniform color?
- Hardness: can it be scratched with a fingernail, a coin, or only steel?
- Reaction to acid: does it fizz with dilute acid — a sign of carbonate minerals like limestone?

Key Takeaways

- All rocks belong to one of three families — igneous, sedimentary, or metamorphic — defined by how they formed.
- Igneous rocks form from cooling magma or lava; grain size reveals how quickly they cooled.
- Sedimentary rocks form from compacted, cemented sediment and are the only type that commonly holds fossils.
- Metamorphic rocks form when heat and pressure transform existing rock without melting it.
- The rock cycle connects all three families in a continuous, ongoing process.