

Minerals

Mineral Identification

Hardness (Mohs Scale)	Resistance to scratching. Scale ranges from 1 (Talc) to 10 (Diamond).
Streak	Color of the mineral in powdered form obtained by scratching it on a streak plate.
Luster	How light is reflected from a mineral's surface (e.g., metallic, glassy, dull).
Cleavage/Fracture	How a mineral breaks. Cleavage is breaking along smooth planes, fracture is irregular breakage.
Color	Visual color of the mineral, but can be unreliable due to impurities.
Specific Gravity	Density of the mineral relative to water.

Common Mineral Groups

Silicates	Most abundant group; contains silicon and oxygen (e.g., quartz, feldspar).
Carbonates	Contains carbon and oxygen (e.g., calcite, dolomite).
Oxides	Contains oxygen and a metal (e.g., hematite, magnetite).
Sulfides	Contains sulfur and a metal (e.g., pyrite, galena).
Halides	Contains halogen elements (e.g., halite, fluorite).
Native Elements	Minerals made of a single element (e.g., gold, silver, copper).

Rocks

Igneous Rocks

Intrusive (Plutonic)	Cool slowly beneath the surface; large crystals (e.g., granite, diorite).
Extrusive (Volcanic)	Cool quickly on the surface; small or no crystals (e.g., basalt, rhyolite).
Felsic	High silica content; light-colored (e.g., granite, rhyolite).
Mafic	Low silica content; dark-colored (e.g., basalt, gabbro).
Intermediate	Between felsic and mafic (e.g., diorite, andesite).
Ultramafic	Very low silica content; very dark-colored (e.g., peridotite).

Sedimentary Rocks

Clastic	Formed from fragments of other rocks (e.g., sandstone, shale, conglomerate).
Chemical	Formed from precipitation of minerals from solution (e.g., limestone, rock salt).
Organic	Formed from the accumulation of plant or animal remains (e.g., coal, coquina).
Breccia	Clastic sedimentary rock with large, angular fragments.
Sandstone	Clastic sedimentary rock composed mainly of sand-sized minerals or rock grains.
Shale	Fine-grained, clastic sedimentary rock composed of mud that is a mix of flakes of clay minerals and tiny fragments of other minerals, especially quartz and calcite.

Metamorphic Rocks

Foliated	Minerals are aligned in layers due to directed pressure (e.g., schist, gneiss).
Non-Foliated	No layered texture (e.g., marble, quartzite).
Regional Metamorphism	Occurs over large areas due to tectonic forces.
Contact Metamorphism	Occurs locally due to heat from magma intrusion.
Slate	Foliated metamorphic rock created through alteration of shale or mudstone by low-grade regional metamorphism.
Marble	Non-foliated metamorphic rock resulting from the metamorphism of limestone or dolomite.

Geological Processes

Weathering

Physical Weathering	Breakdown of rocks without changing their chemical composition (e.g., frost wedging, abrasion).
Chemical Weathering	Breakdown of rocks by altering their chemical composition (e.g., oxidation, dissolution).
Erosion	The process by which soil and rock are removed from the Earth's surface by wind, water, ice, or gravity.
Abrasion	The mechanical scraping of a rock surface by friction between rocks and moving particles during their transport by wind, glacier, waves, gravity, running water or erosion.
Oxidation	A type of chemical weathering that occurs when oxygen reacts with minerals in rocks, especially those containing iron.
Dissolution	A process where minerals in a rock are dissolved by water, especially if the water is acidic.

Plate Tectonics

Divergent Boundaries	Plates move apart; new crust is created (e.g., mid-ocean ridges).
Convergent Boundaries	Plates collide; crust is destroyed (e.g., subduction zones, mountain ranges).
Transform Boundaries	Plates slide past each other horizontally; crust is neither created nor destroyed (e.g., San Andreas Fault).
Subduction	One tectonic plate slides beneath another, often resulting in volcanic activity and earthquakes.
Faulting	Fractures in the Earth's crust where movement has occurred, leading to earthquakes.
Folding	Bending of rock layers due to compressional forces, creating anticlines (upfolds) and synclines (downfolds).

Mass Wasting

Creep	Slow, gradual downslope movement of soil and rock.
Landslide	Sudden downslope movement of a mass of soil and rock.
Mudflow	Rapid flow of a mixture of soil, rock, and water.
Rockfall	Free fall of detached rocks from a cliff or steep slope.
Slump	A type of landslide where a mass of soil or rock moves downslope along a curved surface.
Debris Flow	A type of fast-moving flow of sediment and water with a high concentration of coarse material.

Geological Dating

Relative Dating

Law of Superposition	In undisturbed rock sequences, the oldest layers are at the bottom, and the youngest are at the top.
Principle of Original Horizontality	Sedimentary layers are initially deposited horizontally.
Principle of Cross-Cutting Relationships	A geological feature that cuts across another is younger than the feature it cuts.
Unconformities	Gaps in the geological record due to erosion or non-deposition.
Fossil Succession	Fossil organisms succeed one another in a definite and determinable order, and any time period can be recognized by its fossil content.
Index Fossils	Fossils that are widely distributed, lived for a short period, and are useful for dating rocks.

Absolute Dating (Radiometric Dating)

Half-Life	The time it takes for half of the parent isotopes to decay into daughter isotopes.
Carbon-14 Dating	Used to date organic materials up to ~50,000 years old (half-life: 5,730 years).
Potassium-Argon Dating	Used to date rocks millions of years old (half-life: 1.3 billion years).
Uranium-Lead Dating	Used to date very old rocks and minerals (half-life: 4.5 billion years for U-238).
Rubidium-Strontium Dating	Another method for dating old rocks, particularly useful for dating metamorphic rocks.
Assumptions	Constant decay rate, closed system (no addition or loss of parent or daughter isotopes).