

Minerals – Patterns in Nature, Building blocks of rocks

Definition – A naturally occurring inorganic homogeneous solid with a specific chemical composition and atomic structure

Mineral formation

1. Precipitation
2. Solidification
3. Solid-state diffusion (metamorphism)
4. Biomineralization
5. Fumerolic mineralization (vapor)

Mineral classes (with a few examples) –

1. Silicates -
 - A. Silicon-Oxygen tetrahedron
 - B. Represents 95% of Earth's Crust
 - C. Even the Earth's mafic rich rocks contain some silicaExamples = Quartz (SiO_2) and Feldspars (e.g. [KAISi₃O₈](#))
2. Oxides –
 - A. Metal cations bound to oxygen anions
 - B. Important source for ore (metals)Example = Hematite (Fe_2O_3)
3. Sulfides -
 - A. Metal cations bound to sulfide anions
 - B. Important source for ore (metals)Example: Galena (PbS)
4. Sulfates -
 - A. Metal cations bound to sulfates (SO_4 anions)
 - B. Commonly form as precipitatesExample = Gypsum ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$)
5. Halides -
 - A. A halogen anion (F, Cl, Br, I, etc.) bound to a cation
 - B. Example = Halite (NaCl)
6. Carbonates -
 - A. Contains a CO_3 molecule
 - B. Reacts to acid (e.g. HCL or vinegar)Examples – Calcite (CaCO_3) and Dolomite ($\text{CaMg}(\text{CO}_3)_2$)
7. Native metals -
 - A. A pure mass of a single metal possessing metallic bondsExamples = Gold (Au) and Copper (Cu)