

Feldspar Encyclopedia Article

Feldspar

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Feldspar

Feldspar is the most common mineral on Earth, constituting approximately 60% of the **crust**. It forms directly from cooling **magma** and is a major component of **granite** and most other **igneous rocks**.

The term feldspar actually covers a whole family of **minerals**, all of which consist of a framework of **aluminum**, **oxygen**, and **silicon** atoms plus an additive, usually potassium, sodium, or calcium. Feldspars vary in color from pink to gray, and are categorized by the additives they contain. Pure potassium feldspar is orthoclase (KAlSi_3O_8), pure sodium feldspar is albite ($\text{NaAlSi}_3\text{O}_8$), and pure calcium feldspar is anorthite ($\text{CaAl}_2\text{Si}_2\text{O}_8$). A feldspar may contain both sodium and calcium or sodium and potassium. The sodium–calcium feldspars form a continuum from albite to anorthite, the **plagioclase** feldspar series, which corresponds to the continuous branch of **Bowen's reaction series**. The sodium–potassium feldspars form a continuum from albite to orthoclase that is termed the orthoclase or alkali feldspar series. Feldspars containing significant quantities of both calcium and potassium are not found, as such mixtures are not chemically stable in cooling magma and react to form other minerals.

Orthoclase feldspars cleave along two planes that are at right angles, and plagioclase feldspars cleave along two planes that are not quite at right angles. Feldspar nomenclature is based on these mechanical properties: *ortho*, *plagio*, and *clase* are the Greek for right, slanted, and breaking, respectively.

Feldspar is less chemically stable when exposed to **water** than **quartz**, the other major ingredient of granite. Granite exposed to **weather** therefore becomes crumbly as its feldspar decays, and mechanical forces (e.g., **wind**, running water) break the granite up into **sand**. Rough, rapid fragmentation liberates some feldspar before it has had time to decay chemically, so a sand's ratio of feldspar to quartz records the rate at which its source granite was fragmented. This information is used by geologists to deduce ancient patterns of mountain-building and **erosion**.

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