

Field Spar

Feldspars are the most common mineral group in the crust. The name has German roots meaning essentially "coarse mineral in field stone." This suggests how common feldspars are, turning up in most of the stones of the field, common as weeds.

It is hard to find crustal rocks that don't have some feldspar in them. Most igneous rocks, such as granite, rhyolite, gabbro and basalt have lots of feldspar, and are often named based on the kind and proportion of feldspar in them. Metamorphic rocks such as schist and gneiss have substantial feldspar. Some sedimentary sandstones, such as the arkoses have significant feldspar. Feldspars, though, are less common in sediments, as weathering breaks them down to clays. Much clay in soil likely started out as feldspar.

Feldspars are really a family of minerals that are related structurally and chemically. There are some properties they all have in common. They are all non-metallic in luster. They all usually form blocky grains breaking along two directions of cleavage that intersect at close to 90 degrees. They are 6 on the Mohs Hardness Scale, unless they've been softened as a result of weathering to clay minerals. They can have many colors, but are most often white, gray, tan or pink.

The feldspar group has two major subdivisions: potassium feldspar and plagioclase feldspar.

Potassium feldspar, also known as K feldspar or K-spar, can take on several crystalline structures, forming the minerals orthoclase, sanidine and microcline. Adularia is a low-temperature form of orthoclase. These minerals differ primarily in the distribution of aluminum and silicon in their atomic lattices. They are very common in granitic rocks. Wisconsin's red granite is dominated by K-spar stained red by tiny inclusions of hematite. The pale pink grains in the St. Cloud, MN granites are also K-spar. But beware of using color to I.D. minerals! Much K-spar is white, and some are more exotic colors. Blue green amazonite, for example, is a K-spar. Some may show pretty plays of color (schiller), forming moonstone and larvikite. The identification of K-spar as microcline, orthoclase or sanidine can't be done reliably without X-Ray diffraction analysis, so most geologists simply refer to them as K-spar when seen in hand specimen.

Plagioclase feldspars are a group of calcium and sodium minerals. They are distinguished by the proportion of calcium to sodium in them. Anorthite, albite, labradorite and bytownite are all types of plagioclase feldspar.

Clevelandite is a type of highly sodic plagioclase (albite) found as platy crystals in pegmatites. These are usually white, gray, or greenish, but may be other colors, including red and black. Some show beautiful plays of color known as labradorescence. The calcium to sodium ratio in a plagioclase can only be determined by chemical or optical analysis, so it is best to I.D. these in the field solely as "plagioclase" without trying to be too specific.

For field I.D., then, one only has to decide if the feldspar is K-spar or plagioclase. How is plagioclase distinguished from Kspar? It's a bit tricky. The best way is to look for striations. Striations are ruler-straight grooves (similar to the grooves on phonograph records for you old-timers who remember phonograph records) found on about 1/2 of the cleavage surfaces. Plagioclase has striations; K feldspar does not. The striations can be seen best using a magnifier on a freshly-broken surface. Keep tilting the sample to get the light to hit off the cleavage face, and you should see them if they are there. Remember they show up only half the surface. They are also destroyed by weathering. Even handling the sample obliterates them by filling the grooves in with oils from your fingers (I call this "student weathering"). Get used to what they look like by looking at labeled samples. Be persistent. Students HATE looking for these.

Another word to the wise. Minerals other than plagioclase (i.e calcite and tourmaline) have striations, so remember to apply the test on minerals that you know to be a feldspar of some sort.

Not sure about striations? Can't tell if its plagioclase or K-spar? Just call it feldspar, and be glad you aren't in my mineralogy class.

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