

# FELDSPARS

Spelled either with, or without the 'd' these make up to 60% of the Earth's surface, and are the most important of the Silicate minerals. They are double Silicates of Aluminium with, usually, Potassium, Sodium, or Calcium. Often neglected by collectors, probably because they are of complex and varied composition, they and their decomposition products are responsible for much of the landscape as we know it. A typical igneous rock, like Granite, consists of Quartz, Feldspars, and subsidiary minerals, Micas, etc. In the case of Granite, the Feldspar is mainly Orthoclase, a Potassium, Aluminium Silicate, and this is the component which breaks down first by weathering. With time, when the Granite has been eroded away its component parts will settle at the bottom of lakes and seas, and will consolidate into resultant sedimentary rocks, comprising sandstones (containing the Silica and clays), and into shales, and mudstones, (containing the Feldspars and their breakdown products).

**The common Feldspars are built up from the following compounds.**

ALKALI [ Orthoclase (Or),  $KAlSi_3O_8$   
 FELSPARS [ Albite (Ab),  $NaAlSi_3O_8$  ] PLAGIOCLASE  
 Anorthite (An),  $CaAl_2Si_2O_8$  ] FELDSPARS

There is a temptation to give up at this stage, before getting bogged down in chemical formulae. However, for many non-chemists, the compositions can be visualised more clearly if the formulae are expressed in terms of the Oxides: Silica  $SiO_2$ , Alumina  $Al_2O_3$ , Lime  $CaO$ , Soda  $Na_2O$ , and Potash  $K_2O$ , as follows.

		<i>Usual</i>	<i>As Oxides</i>
ORTHOCLASE	Or	$KAlSi_3O_8$	$6SiO_2Al_3O_3K_2O$
ALBITE	Ab	$NaAlSi_3O_8$	$6SiO_2Al_2O_3Na_2O$
ANORTHITE	An	$CaAl_2Si_2O_8$	$2SiO_2Al_2O_3CaO$

Soda and Potash are to some extent interchangeable in the crystal lattice in the 'Alkali Feldspars'. Thus Orthoclase commonly contains a proportion of Albite. Similarly, Albite and Anorthite are perfectly interchangeable (isomorphous) giving rise to a continuous series of minerals, known collectively as Plagioclase. If Albite is the predominant mineral, it is known as 'Soda' Plagioclase, and if Anorthite, as 'Lime' Plagioclase, (Otherwise 'Sodic' and 'Calcic') The Plagioclase series is arbitrarily subdivided according to the proportions of Albite component present, as follows.

'ALBITE'	100% -- 90%	] <u>ALBITE</u>
OLIGOCLASE	90% -- 70%	
ANDESINE	70% -- 50%	
LABRADORITE	50% -- 30%	
BYTOWNITE	30% -- 10%	
ANORTHITE	10% -- 0%	

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*Orthoclase, as it generally occurs, is a white or flesh coloured milky mineral, with perfect 90° cleavage ( Ortho = 90° -- clase from Greek clastos = breaking ) Plagioclase also has two planes of cleavage, in this case not exactly at 90°, hence plagioclase, ( from Greek plagios = oblique ). Feldspars break down with water and CO<sub>2</sub> into several minerals of economic importance.*

*Kaolonite occurs in china clay, interestingly so called after the hill in China called Kaoling, where it was originally mined, and from which it was imported. It's characteristic is that it remains white after firing, and together with Feldspars, Silica, and other Silicates, is the basis of the ceramic and pottery industries.*

*Zeolites comprise a myriad of hydrated compounds of Silica, Alumia, and Alkaline. Alkaline earth bases are used as filter media, and for water softening. They have an important function in soils by retaining, in a form usable by plants, Potash, released by the breakdown of Feldspars.*

*Bauxite, in tropical conditions,--- All the Silica can be removed, and only pure hydrated Aluminium Oxides left. This is the only workable ore for Aluminium. Minerals such as Kaolonite, Disordered Kaolonite, Feldspars, Soda, Potash, and Lime, are all important constituents of clays and soils.*

## FELDSPARS FOR LAPIDARY By Jim Nicholls January 1999

*As well as being useful, Feldspars can be very beautiful, and gem varieties are highly prized, covering a wide range of colours and effects. Naturally they are often used in jewellery. Many people admire the floating eye of light (iridescence) found in the moonstones, ( A variety of Albite called Andularia ), and although the classic gem is considered to be the blue-white, many other colours are found, such as pink, grey, and black, both transparent and translucent; ( the latter are the finest of them all, in my opinion ). Microcline sounds more technical than beautiful, but in fact provides us with 'Amazonite', with lovely light- blues and green-blues: the best material has a floating eye. Amazonite also gives us the chance to see clearly the typical repeated twinning shown by many Feldspars. Oligoclase, ( what a mouthful ) gives us the exiting 'Sunstones' with their minute platelets of Haematite, all exactly in alignment in a transparent material, but as anyone who has cut the stone will tell you, it is not as easy as it looks to get that glorious flashing effect. Another Feldspar often cut is 'Labradorite', which often shows a blue flash of reflected light, or more rarely, a gold flash, which is the most impressive. The finest material comes from Finland, and is called 'Spectrolite'. Some gem varieties of Feldspar, such as Anorthite, Peristerite, Perthite, etc. occasionally provide us with transparent material, suitable for faceting, but are seldom used in jewellery: Because of rarity, most are cut as collectors items.*