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Mica



Figure 1 - Mica

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Continuing on with the theme of rock forming minerals, this week we'll look at mica. Mica is a general term for a number of minerals with similar characteristics. The term [mica](#) was first recorded in 1706 as *smicka*, which seems to have been taken from the Latin word *micare* - to twinkle, flash or glisten - an allusion to the pearly lustre of the separated sheets.

General Characteristics

All micas are sheet silicates and form [monoclinic](#) crystals that cleave along parallel planes. The sheets that form along the [cleavage](#) planes show a vitreous, silky or pearly [lustre](#). The hardness of micas generally vary from 2½ to 6 on [Moh's Hardness Scale](#). With mica, the hardness of the flat sheets along the cleavage planes is lower, i.e. 2 - 3 while the hardness of the crystal edges is in the higher range.

The main varieties of mica are: [muscovite](#), [paragonite](#), [glauconite](#), [lepidolite](#), [phlogopite](#), [biotite](#), [zinnwaldite](#), [margarite](#), and [clintonite](#). The full list of minerals in the mica group are found [here](#).

Figure 2 shows the general molecular structure of one variety of mica, muscovite. Variations on this general structure are characteristic of mica minerals.

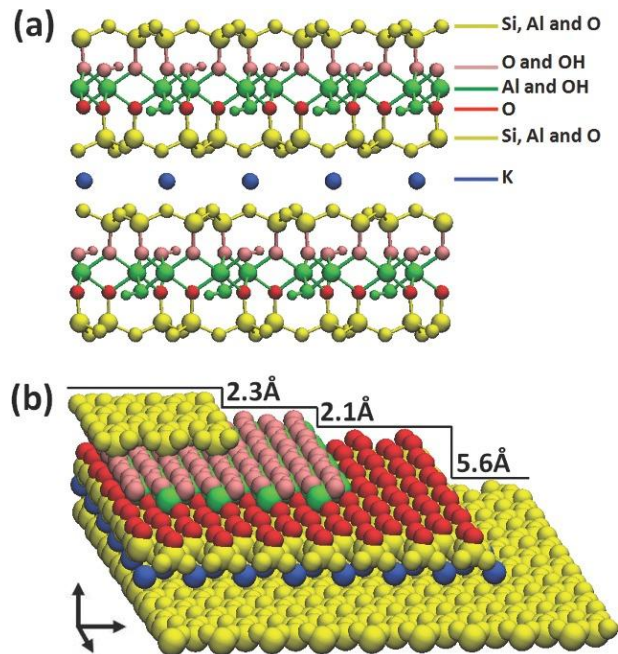


Figure 2 - Muscovite Mica Structure

[Credit: Zhifeng Shao, Researchgate](#)

Main Types of Mica

[Muscovite](#)

With a chemical formula of $KAl_2(AlSi_3O_{10})(OH)_2$, muscovite is generally white to colorless and has a vitreous, silky, pearly lustre. It is found in a wide variety of geological environments, but especially in pegmatite. It has been used as an [electrical insulator](#), a heat resistant transparent "glass" on wood fired stoves or lamps, and as a "glitter" additive to paint. Large crystals in pegmatite rock found in Russia, i.e. ancient Muscovy, used to be called [Muscovy Glass](#).

[Paragonite](#)

Paragonite has a crystal formula of $NaAl_2(AlSi_3O_{10})(OH)_2$ and is generally colourless to pale yellow. It occurs in schists and phyllites, in muscovite-biotite gneisses, quartz veins, in fine-grained sediments, and [glaucophane](#) bearing rocks.

[Glauconite](#)

Also called greensand, glauconite has a chemical formula of $(K,Na)(Fe^{3+},Al,Mg)_2(Si,Al)_4O_{10}(OH)_2$. As the alternate name suggests, glauconite is generally green in colour, ranging from blue green to yellow green. Glauconite is a common additive to fertilizer for its potassium content. It is found in marine sediments.

Lepidolite

With a chemical formula of $KLi_2Al(Si_4O_{10})(F,OH)_2$ to $K(Li_{1.5}Al_{1.5})(AlSi_3O_{10})(F,OH)_2$, lepidolite is generally pink, light purple or light rose red. It is a minor ore of lithium and is sometimes used in jewelry. Lepidolite is found in granite pegmatite rocks.

Phlogopite

Phlogopite ranges in colour and can be brown, gray, green, yellow, or reddish brown. The chemical formula for phlogopite is $KMg_3(AlSi_3O_{10})(OH)_2$. Phlogopite is generally found in metamorphosed limestone and [ultrabasic](#) rocks.

Biotite

A very common dark coloured iron rich mica, biotite has the general chemical formula of $K(Mg,Fe)_3AlSi_3O_{10}(OH)_2$. Biotite was named after the French physicist and mineralogist, Jean-Baptiste Biot [April 21, 1774 - February 3, 1862], who studied the optical properties of mica. It is found in a variety of geological environments ranging from igneous to metamorphic and is one of the most common kind of mica you are likely to find in the field.

Zinnwaldite

Named after Zinnwald, on the border between Germany and the Czech Republic, zinnwaldite is a brown mica found associated with the tin deposits in its [type locality](#). It has a chemical formula of $KFe_2^+Al(Al_2Si_2O_{10})(OH)_2$ to $KLi_2Al(Si_4O_{10})(F,OH)_2$.

Margarite

Considered a brittle mica, margarite, $CaAl_2(Al_2Si_2O_{10})(OH)_2$, is grayish, pale pink, or yellow, green. Its hardness 3 ½ to 4½ on [Moh's Hardness Scale](#). It is found in deposits of emery ([corundite](#)) and in [chlorite](#)-mica schists.

Clintonite

Also called xanthophyllite, clintonite is another brittle mica. It is brown, golden brown, reddish brown, yellow green, or dark green in colour and has the chemical formula:

$CaAlMg_2(SiAl_3O_{10})(OH)_2$. Clintonite's hardness ranges from three to six and it is found in chlorite schists. The [type locality](#) for clintonite is in [Amity, Town of Warwick, Orange Co., New](#)

[York, USA](#). The mineral is named after a former Governor of New York State and surveyor of the Erie Canal, [DeWitt Clinton](#).

Field Notes

If you do any field geology in places with igneous and/or metamorphic rocks, you will see lots of mica as an accessory mineral. The best way to identify which kind of mica you are seeing is by association, that is, by what other kinds of minerals are found with the mica and by what kind of rock you are looking at.

Standard Caveat

The purpose of my weblog postings is to spark people's curiosity in geology. Don't entirely believe me until you've done your own research and checked the evidence. If I have sparked your curiosity in the subject of this posting, follow up with some of the links provided here. If you want to, go out into the field and examine some rocks on your own with the help of a good field guide. Follow the evidence and make up your own mind.

In science, the only authority is the evidence.