

## Phyllosilicates (or Sheet Silicates)

The phyllosilicates are composed of a continuous network of tetrahedral and octahedral layers arranged in various ways (see figure below). The T-O and T-O-T layers are held together by weak electrostatic forces or interlayer cations.

## Micas

The micas are composed of T-O-T layers with cations stuck between the T-O-T units. They show perfect basal cleavage and have either a hexagonal or diamond-shaped outline. The micas are found in all rock types of a range of compositions.

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For more information, see the lecture notes section.

### Identification:

Muscovite –  $\text{KAl}_2(\text{AlSi}_3\text{O}_{10})(\text{OH})_2$

Hand sample: Perfect (001) cleavage. Will flake off into thin sheets. Silvery-white in color to transparent in thin sheets. Thin Section: Plane Light: Moderate positive relief. Colorless in thin section. Cross Polars: Biaxial (-), 2V 30-47°.

Birefringence is third order with high second order colors possible. Extinction is parallel to cleavage; other orientations show undulose extinction.

Biotite-  $\text{K}_2(\text{Mg,Fe})_3\text{AlSi}_3\text{O}_{10}(\text{F,OH,O})_2$

Hand Sample: Similar to Muscovite but black in color. In thin sheets it will appear as a dusty yellow color. Thin Section: Moderate to moderately high positive relief. Brown to brownish green with strong pleochroism. Crossed Polars: Biaxial (-) 2V 0-25°.

Interference colors are high third order and up to fourth order, however, the mineral color can mask the interference colors. Radiation haloes are common in biotite.

Lepidolite-  $\text{K}(\text{Li, Al})_3(\text{Si, Al})_4\text{O}_{10}(\text{F,OH})_2$  -

Hand Sample: Similar to other micas, but pink to purple in color.

Thin Section: Resembles muscovite but will have slightly lower relief and birefringence.

Occurrence: Lepidolite is only found in granitic pegmatites and is associated with beryl, tourmaline, and spodumene.

Other micas to watch out for: (See Nesse for properties)

Stilpnomelane

Clintonite

Margarite

**Other Phyllosilicates:**

Serpentine-  $\text{Mg}_3\text{Si}_2\text{O}_5(\text{OH})_4$  –

Hand Sample: Green in color with a waxy or greasy luster when massive, silky luster when fibrous.

Thin Section: Plane Light: Low to moderately low negative or positive relief. Colorless to pale green with weak pleochroism.

Talc -  $\text{Mg}_2\text{Si}_4\text{O}_{10}(\text{OH})_2$  –

Hand Sample: Can be white, to dark green or brown with a pearly to greasy luster. Has a white streak and a hardness of 1 (can be scratched with a fingernail). Thin Section: Plane Light: Low to moderate positive relief. Colorless in thin section, no pleochroism.

Crossed Polars: Biaxial (-),  $2V$  0-30°. High birefringance, up to third order interference colors. Maybe mistaken for muscovite but has a smaller  $2V$ .