

Phyllosilicates – Sheets

Phyllosilicates, or sheet silicates, form parallel sheets of silicate tetrahedra with Si_2O_5 or a 2:5 ratio. All phyllosilicate minerals are hydrated with either water or hydroxyl (OH) groups attached. Bonds within the sheets are strong, but bonds between them are quite weak.

Fe, Mg
↓

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

Color - _____
Crystal Habit - _____
Crystal System - _____
Cleavage - _____
Hardness - _____
Luster/Streak _____/_____
Use (if any) - _____
Other _____



Al
↓

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

Color - _____
Crystal Habit - _____
Crystal System - _____
Cleavage - _____
Hardness - _____
Luster/Streak _____/_____
Use (if any) - _____
Other _____



Phyllosilicates – Sheets (cont.)

Biotite, muscovite, and lepidolite are sheet silicates from a group of minerals called the MICA group.

↙ Li (lithium)

Lepidolite - $K(\text{Li},\text{Al})_{2-3}(\text{AlSi}_3)\text{O}_{10}(\text{OH})_2$

Color - _____
Crystal Habit - _____
Crystal System - _____
Cleavage - _____
Hardness - _____
Luster/Streak _____ / _____
Use (if any) - _____
Other _____



Most clay minerals are also phyllosilicates typically with microscopic clay sized crystals (less than 0.02 mm). You are responsible for only one aluminum rich variety.

Kaolinite - $\text{Al}_2\text{Si}_2\text{O}_5(\text{OH})_4$

Color - _____
Crystal Habit - _____
Crystal System - _____
Cleavage - _____
Hardness - _____
Luster/Streak _____ / _____
Use (if any) - _____
Other _____



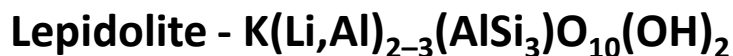
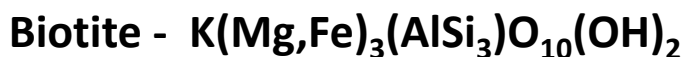
Phyllosilicates – Sheets (cont.)



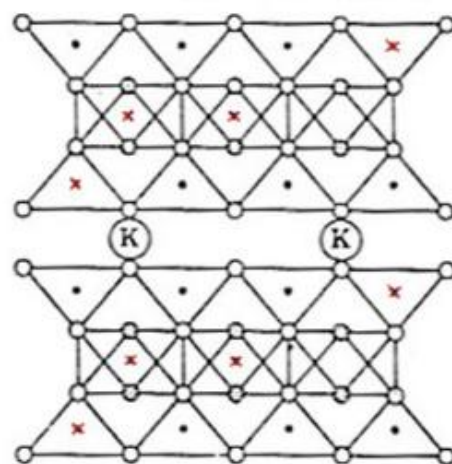
Color - _____
 Crystal Habit - _____
 Crystal System - _____
 Cleavage - _____
 Hardness - _____
 Luster/Streak _____ / _____
 Use (if any) - _____
 Other _____



Phyllosilicates



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



○ = Oxygen
 ○ = Hydroxyl
 • = Silicon
 x = Aluminum
 ● = Magnesium

Framework silicates – Feldspars and more

In a framework silicate, or tectosilicate, each tetrahedron shares all 4 oxygen atoms with its neighbours, forming a 3D-4D structure. Feldspars carry a Si-O ratio of 3-8 except where Al substitutes for some Si. **Feldspars** make up as much as 60% of the earth's crust.

There are two main groups of feldspar

- 1) Plagioclase Group (with Na, Ca) --- you have 2 to learn
- 2) Microcline-Orthoclase Group (with K) -- you have 2 to learn

Albite - $\text{NaAlSi}_3\text{O}_8$

Color - _____
Crystal Habit - _____
Crystal System - _____
Cleavage - _____
Hardness - _____
Luster/Streak _____ / _____
Use (if any) - _____
Other -- **look up labradorite**



Note
lamellar
twinning



beryl
albite

Microcline - KAlSi_3O_8 variety - Amazonite

Color - _____
Crystal Habit - _____
Crystal System - _____
Cleavage - _____
Hardness - _____
Luster/Streak _____ / _____
Use (if any) - _____
Other _____



Framework silicates – (cont.)

Orthoclase - KAlSi_3O_8

Color - _____
Crystal Habit - _____
Crystal System - _____
Cleavage - _____
Hardness - _____
Luster/Streak _____ / _____
Use (if any) - _____
Other _____

Pink color in granite
is due to orthoclase



Sodalite - $\text{Na}_8(\text{Al}_6\text{Si}_6\text{O}_{24})\text{Cl}_2$

Color - _____
Crystal Habit - _____
Crystal System - _____
Cleavage - _____
Hardness - _____
Luster/Streak _____ / _____
Use (if any) - _____
Other _____

