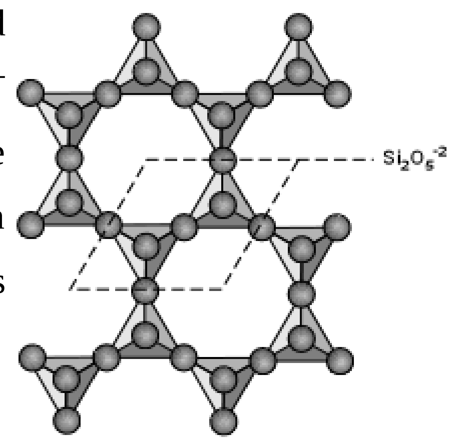
Sub Class: Phyllosilicates (Sheet Silicates)

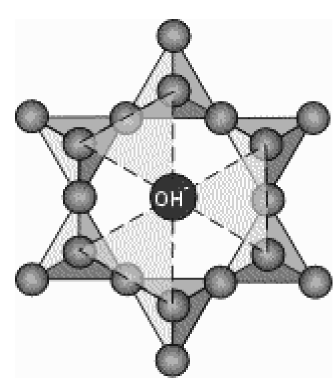
As the derivation of the name of this important group implies (Greek : Phyllon, leaf). When three of the oxygen of tetrahedron are shared with adjacent tetrahedral infinity flat sheets silicate are formed this called phyllosilicate.

The phyllosilicates, or sheet silicates, are an important group of minerals that includes the micas, chlorite, serpentine, talc, and the clay minerals. Because of the special importance of the clay minerals as one of the primary products of chemical weathering and one of the more abundant constituents of sedimentary rocks.

The basic structure of the phyllosilicates is based on interconnected six member rings of SiO_4^{-4} tetrahedra that extend outward in infinite sheets. Three out of the 4 oxygens from each tetrahedra are shared with other tetrahedra. This leads to a basic structural unit of $Si_2O_5^{-2}$.



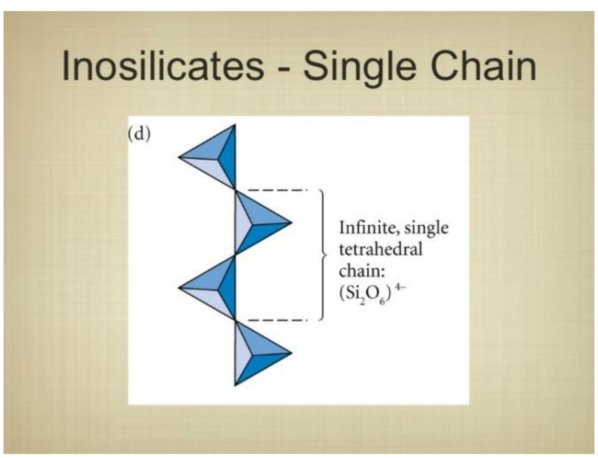
Most phyllosilicates contain hydroxyl ion, OH-, with the OH located at the center of the 6 membered rings, as shown here. Thus, the group becomes $Si_2O_5(OH)^{-3}$. When other cations are bonded to the SiO_4 sheets, they share the apical oxygens and the (OH) ions which bond to the other cations in octahedral coordination. This forms a layer of cations, usually Fe^{+2}, Mg^{+2}, or Al^{+3}, that occur in octahedral coordination with the O and OH ions of the tetrahedral layer. As shown, here, the triangles become the faces of the octahedral groups that can bind to the tetrahedral layers.

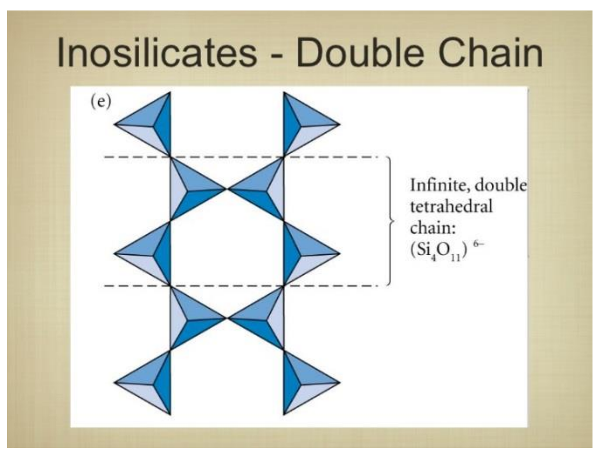


Silicate Class / Phylosilicates sub-class	
Name	**Chemical Composition**
Serpentine	$Mg_6\,Si_4O_{10}\,(OH)_2$
Talc	$Mg_3\,Si_4O_{10}\,(OH)_2$
Muscovite	$KAl_3Si_3O_{10}\,(OH)_2$
Phlogopite	$KMg_3\,AlSi_3O_{10}\,(OH)_2$
Biotite	$K(Mg,Fe)_3\,AlSi_3O_{10}\,(OH)_2$
Glauconite	$K(Fe,Mg,Al)_3\,Si_4O_{10}\,(OH)_2$
Lepidotite	$K(Li,Al,Rb)_2(Al,Si)_4O_{10}\,(F.\ OH)_2$

Sub Class: Inosilicates

This class is characterized by its one-dimensional chains and bands created by the linkage of SiO_4 tetrahedrons. Single chains may be formed by the sharing of two oxygen atoms from each tetrahedron, resulting in a structure with an Si:O ratio of 1:3. Two such chains that are aligned side by side with alternate tetrahedrons sharing an additional oxygen atom form bands of double chains (see Figure 14). These structures have an Si:O ratio of 4:11. There are a number of silicate minerals, pyroxenoids, which have a similar Si:O ratio as pyroxene, but with structures that are not identical as the chains of silicon tetrahedra do not infinitely repeat. Two significant rock-forming mineral families display these structure types: the single-chain pyroxenes and the double-chain amphiboles.





Silicate Class / Inosilicates sub-class	
Name	**Chemical Composition**
Tremolite	$Ca_2(Mg,Fe)_5\ Si_8O_{22}(OH)_2$
Actinolite	$Ca_2(Mg,Fe)_5\ Si_8O_{22}(OH)_2$
Hornblende	$NaCa_2(\ Mg,Fe,\ Al)_5(Al,\ Si)_8\ O_{22}(OH)_2$
Enstatite	$MgSiO_3$
Hypersthenes	$(Mg,\ Fe)SiO_3$
Diopside	$CaMgSi_2O_6$
Hedenbergite	$CaFeSi_2O_6$
Augite	$Ca(Mg,\ Fe,\ Al)(Al,\ Si)_2O_6$
Wollastonite	$CaSiO_3$
Rhodonite	$MnSiO_3$