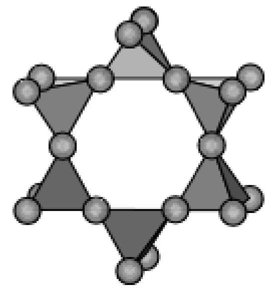
Sub Class: Cyclosilicates

Cyclosilicate, compound with a structure in which silicate tetrahedrons (a central silicon atom surrounded by four oxygen atoms at the corners of a tetrahedron) are arranged in rings. Each tetrahedron shares two of its oxygen atoms with other tetrahedrons; the rings formed may have three (e.g., benitoite), four (e.g., axinite), or six members (e.g., beryl). The cyclosilicates have chemical formulas that contain multiples of SiO_3.

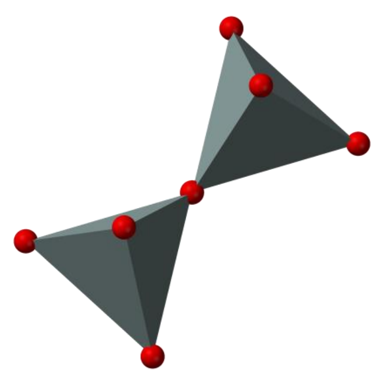


Silicate Class / Cyclosilicates sub-class	
Name	**Chemical Composition**
Axinite	$Ca_3Al_2(BO_3)\,Si_4O_{12}\,(OH)_2$
Beryl	$Be_3\,Al_2Si_6O_{18}$
Cordierite	$(Mg, Fe)_2Al_4Si_5O_{18}$
Tourmaline	

Sub Class: Sorosilicates

These minerals contain sets of two SiO_4 tetrahedrons joined by one shared apical oxygen (see Figure 14). A silicon-to-oxygen ratio of 2:7 is consequently present in their structures. More than 70 minerals belong to the sorosilicate group, although most are rare. Only the members of the epidote group and vesuvianite are common. Both independent $(SiO_4)^{4-}$ and double $(Si_2O_7)^{6-}$ groups are incorporated into the epidote structure, as is reflected in its formula: $Ca_2(Al, Fe)Al_2O(SiO_4)(Si_2O_7)(OH)$.

Silicate Class / Sorosilicates sub-class	
Name	**Chemical Composition**
Zoisite	$Ca_2Al_3\,Si_3O_{12}\,(OH)$
Clinozoisite	$Ca_2Al_3\,Si_3O_{12}\,(OH)$
Epidote	$Ca_2(Al, Fe)_3\,Si_3O_{12}\,(OH)$



Sub Class: Nesosilicates

The silicon-oxygen tetrahedrons of the nesosilicates are not polymerized; they are linked to one another only by ionic bonds of the interstitial cations. As a result of the isolation of the tetrahedral groups, the crystal habits of these minerals are typically equidimensional so that prominent cleavage directions are not present. The size and charge of the interstitial cations largely determine the structural form of the nesosilicates. The relatively high specific gravity and hardness that are characteristic of this group arise from the dense packing of the atoms within the structure. Substitution of aluminum for silicon is normally quite low. Examples of common nesosilicates are given in the table below:

Silicate Class / Nenosilicates sub-class	
Name	**Chemical Composition**
Olivine	$Mg_6 Si_4O_{10} (OH)_2$
Andalusite	Al_2SiO_5
Sillimanite	Al_2SiO_5
Kyanite	Al_2SiO_5
Staurolite	$Al_4 FeSi_2O_{10} (OH)_2$
Topaz	$Al_2 SiO_4 (OH, F)_2$
Almandite	$Fe_3 Al_2 (SiO_4)_3$
Spessarite	$Mn_3 Al_2 (SiO_4)_3$
Grossularite	$Ca_3 Al_2 (SiO_4)_3$
Zircon	$ZrSiO_4$