Mineral Groups

Adelite Group

Orthorhombic arsenates and vanadates of general formula $AB^{2+}(XO_4)(OH)$, A = Ca, Pb; B^{2+} = Co, Cu, Fe, Mg, Ni, Zn; X = As^{5+}, V^{5+}.

Adelite	$CaMg(AsO_4)(OH)$
Austinite	$CaZn(AsO_4)(OH)$
Calciovolborthite	$CaCu(VO_4)(OH)$ (needs study)
Cobaltaustinite	$Ca(Co,Cu^{2+})(AsO_4)(OH)$
Conichalcite	$CaCu^{2+}(AsO_4)(OH)$
Duftite	$PbCu(AsO_4)(OH)$
Gabrielsonite	$PbFe^{2+}(AsO_4)(OH)$
Nickelaustinite	$Ca(Ni,Zn)(AsO_4)(OH)$
Tangeite	$CaCuVO_4(OH)$

Aenigmatite Group

Triclinic silicates with general formula $A_2B_6X_6O_{20}$, A = Ca, Na; B = Al, Cr^{3+}, Fe^{2+}, Fe^{3+}, Mg, Sb^{5+}, Ti; X = Al, B, Be, Si.

Aenigmatite	$Na_2Fe_5^{2+}TiSi_6O_{20}$
Dorrite	$Ca_2Mg_2Fe_4^{3+}Al_4Si_2O_{20}$
H_gtuvaite	$(Ca,Na)_2(Fe^{2+},Fe^{3+},Ti,Mg,Mn,Sn)_6(Si,Be,Al)_6O_{20}$
Krinovite	$Na_2Mg_4Cr_2Si_6O_{20}$
Makarochkinite	$(Ca,Na)_2(Fe^{2+},Fe^{3+},Ti,Mg)_6(Si,Al,Be)_6O_{20}$
Rh_nite	$Ca_2(Mg,Fe^{2+},Fe^{3+},Ti)_6(Si,Al)_6O_{20}$
Serendibite	$Ca_2(Mg,Al)_6(Si,Al,B)_6O_{20}$
Welshite	$Ca_2Sb^{5+}Mg_4Fe^{3+}Si_4Be_2O_{20}$
Wilkinsonite	$Na_2Fe_4^{2+}Fe_2^{3+}Si_6O_{20}$

Alluaudite Group

Monoclinic phosphates and arsenates of general formula $NaACD_2(XO_4)_3$, A = Ca, Mg, Pb; C = Ca, Fe^{2+}, Mn^{2+}; D = Mn^{2+}, Fe^{2+}, Fe^{3+}, Mg; X = P, As.

Alluaudite	$NaCaFe^{2+}(Mn^{2+},Fe^{2+},Fe^{3+},Mg)_2(PO_4)_3$
Arseniopleite	$NaCaMn^{2+}(Mn^{2+},Mg)_2(AsO_4)_3$
Caryinite	$Na(Ca,Pb)(Ca,Mn)(Mn,Mg)_2(AsO_4)_3$
Ferro-alluaudite	$NaCaFe^{2+}(Fe^{2+},Mn^{2+},Fe^{3+})_2(PO_4)_3$
Hagendorfite	$NaCaMn^{2+}(Fe^{2+},Fe^{3+},Mg)_2(PO_4)_3$
Maghagendorfite	$NaMn^{2+}Mg(Fe^{2+},Fe^{3+})_2(PO_4)_3$
Varulite	$(Na,Ca)Mn^{2+}(Mn^{2+},Fe^{2+},Fe^{3+})_2(PO_4)_3$

Alunite Group

Trigonal sulfates of general formula $AB_6(SO_4)_4(OH)_{12}$, A = Ag_2^{1+}, Ca, $(H_3O)_2$, K_2, Na_2, $(NH_4)_2$, Tl^{1+}, Pb; B = Al, Cu^{2+}, Fe^{3+}.

Alunite	$K_2Al_6(SO_4)_4(OH)_{12}$
Ammonioalunite	$(NH_4)_2Al_6(SO_4)_4(OH)_{12}$
Ammoniojarosite	$(NH_4)_2Fe_6^{3+}(SO_4)_4(OH)_{12}$
Argentojarosite	$Ag_2Fe_6^{3+}(SO_4)_4(OH)_{12}$

Beaverite	$Pb(Cu^{2+},Fe^{3+},Al)_6(SO_4)_4(OH)_{12}$
Dorallcharite	$(Tl,K)Fe_3^{3+}(SO_4)_2(OH)_6$
Huangite	$CaAl_6(SO_4)_4(OH)_{12}$
Hydronium jarosite	$(H_3O^{1+})_2Fe_6^{3+}(SO_4)_4(OH)_{12}$
Jarosite	$K_2Fe_6^{3+}(SO_4)_4(OH)_{12}$
Kintoreite	$PbFe_3^{3+}(PO_4)_2(OH,H_2O)_6$
Minamiite	$(Na,Ca,K)_2Al_6(SO_4)_4(OH)_{12}$
Natroalunite	$Na_2Al_6(SO_4)_4(OH)_{12}$
Natrojarosite	$Na_2Fe_6^{3+}(SO_4)_4(OH)_{12}$
Osarizawaite	$Pb_2Cu_2^{2+}Al_4(SO_4)_4(OH)_{12}$
Plumbojarosite	$PbFe_6^{3+}(SO_4)_4(OH)_{12}$
Walthierite	$BaAl_6(SO_4)_4(OH)_{12}$

Amblygonite Group

Triclinic phosphates of general formula $AB(PO_4)X$, A = Li, Na; B = Al, Fe^{3+}; X = (OH), F.

Amblygonite	$(Li,Na)Al(PO_4)(F,OH)$
Montebrasite	$LiAl(PO_4)(OH,F)$
Natromontebrasite	$(Na,Li)Al(PO_4)(OH,F)$
Tavorite	$LiFe^{3+}(PO_4)(OH)$

Amphibole Group

A major revision of the classification and nomenclature of the Amphibole Group by Leake *et al.* (1997) has been published in several mineralogical journals. For example, it has appeared in the *Canadian Mineralogist* **35**, 219–246 (1997), *Mineralogical Magazine* **61**, 295–321 (1997), the *European Journal of Mineralogy* **9**, 623–651 (1997), and the *American Mineralogist* **82**, 1019–1037 (1997). Mandarino (1998) summarized the report in the *Mineralogical Record* **29**, 169–174 (1998) as *The Second List of Additions and Corrections to the Glossary of Mineral Species 7th Edition (1995)*. Readers interested in this complex group of minerals should refer to that article and to the original paper by Leake *et al.* (1997). Since the publication of the papers noted above, several new amphibole species have been described; these are included in this book.

The standard amphibole formula is $AB_2^{VI}C_5^{IV}T_8O_{22}X_2$. The components *A, B, C, T,* and *X* of the formula correspond to the following crystallographic sites:

A one site per formula unit;
B two *M*4 sites per formula unit;
C a composite of five octahedral sites made up of 2 *M*1, 2 *M*2, and 1 *M*3 sites per formula unit;
T eight tetrahedral sites in two sets of four per formula unit;
X two sites per formula unit.

The ions considered *normally* to occupy these sites are:

□ (empty site) and K at *A* only
Na at *A* or *B*
Ca at *B* only
L-type ions: Mg, Fe^{2+}, Mn^{2+}, Li, and rarer ions of similar size such as Zn, Ni, Co at *C* or *B*
M-type ions: Al at *C* or *T*

Fe^{3+}, and, more rarely, Mn^{3+}, Cr^{3+} at *C* only
High-valency ions: Ti^{4+} at *C* or *T*
Zr^{4+} at *C* only
Si at *T* only
Anions: OH, F, Cl, O at *X*

The amphibole group is divided into four subgroups: magnesium-iron-manganese-lithium (i.e., Mg-Fe-Mn-Li), calcic, sodic-calcic, and sodic. The second column of the following species list indicates the subgroup to which the species belong; MFML = Mg-Fe-Mn-Li, C = calcic, SC = sodic-calcic, and S = sodic.

Species names not in bold indicate compositions that may not have been found in nature yet.

Actinolite	C	$\square Ca_2(Mg,Fe^{2+})_5Si_8O_{22}(OH)_2$
Aluminobarroisite	SC	$\square(CaNa)Mg_3Al_2Si_7AlO_{22}(OH)_2$
Alumino-ferrobarroisite	SC	$\square(CaNa)Fe_3^{2+}Al_2Si_7AlO_{22}(OH)_2$
Alumino-ferrotschermakite	C	$\square Ca_2(Fe_3^{2+}Al_2)Si_6Al_2O_{22}(OH)_2$
Alumino-magnesiotaramite	SC	$Na(CaNa)Mg_3Al_2Si_6Al_2O_{22}(OH)_2$
Aluminotaramite	SC	$Na(CaNa)Fe_3^{2+}Al_2Si_6Al_2O_{22}(OH)_2$
Aluminotschermakite	C	$\square Ca_2(Mg_3Al_2)Si_6Al_2O_{22}(OH)_2$
Anthophyllite	MFML	$\square Mg_7Si_8O_{22}(OH)_2$
Arfvedsonite	S	$NaNa_2(Fe_4^{2+}Fe^{3+})Si_8O_{22}(OH)_2$
Barroisite	SC	$\square(CaNa)Mg_3AlFe^{3+}Si_7AlO_{22}(OH)_2$
Cannilloite	C	$CaCa_2(Mg_4Al)Si_5Al_3O_{22}(OH)_2$
Clinoferroholmquistite	MFML	$\square(Li_2Fe_3^{2+}Al_2)Si_8O_{22}(OH)_2$
Clinoholmquistite	MFML	$\square(Li_2Mg_3Al_2)Si_8O_{22}(OH)_2$
Cummingtonite	MFML	$\square Mg_7Si_8O_{22}(OH)_2$
Eckermannite	S	$NaNa_2(Mg_4Al)Si_8O_{22}(OH)_2$
Edenite	C	$NaCa_2Mg_5Si_7AlO_{22}(OH)_2$
Ferribarroisite	SC	$\square(CaNa)Mg_3Fe_2^{3+}Si_7AlO_{22}(OH)_2$
Ferric-ferronyb_ite	S	$NaNa_2(Fe_3^{2+}Fe_2^{3+})Si_7AlO_{22}(OH)_2$
Ferri-clinoferroholmquistite	MFML	$\square(Li_2Fe_3^{2+}Fe_2^{3+})Si_8O_{22}(OH)_2$
Ferri-clinoholmquistite	MFML	$\square(Li_2Mg_3Fe_2^{3+})Si_8O_{22}(OH)_2$
Ferric-nyb_ite	S	$NaNa_2(Mg_3Fe_2^{3+})Si_7AlO_{22}(OH)_2$
Ferri-ferrobarroisite	SC	$\square(CaNa)Fe_3^{2+}Fe_2^{3+}Si_7AlO_{22}(OH)_2$
Ferri-ferrotschermakite	C	$\square Ca_2(Fe_3^{2+}Fe_2^{3+})Si_6Al_2O_{22}(OH)_2$
Ferri-magnesiotaramite	SC	$Na(CaNa)Mg_3Fe_2^{3+}Si_6Al_2O_{22}(OH)_2$
Ferritaramite	SC	$Na(CaNa)Fe_3^{2+}Fe_2^{3+}Si_6Al_2O_{22}(OH)_2$
Ferritschermakite	C	$\square Ca_2(Mg_3Fe_2^{3+})Si_6Al_2O_{22}(OH)_2$
Ferro-actinolite	C	$\square Ca_2Fe_5^{2+}Si_8O_{22}(OH)_2$
Ferro-anthophyllite	MFML	$\square Fe_7^{2+}Si_8O_{22}(OH)_2$
Ferrobarroisite	SC	$\square(CaNa)Fe_3^{2+}AlFe^{3+}Si_7AlO_{22}(OH)_2$
Ferro-eckermannite	S	$NaNa_2(Fe_4^{2+}Al)Si_8O_{22}(OH)_2$
Ferro-edenite	C	$NaCa_2Fe_5^{2+}Si_7AlO_{22}(OH)_2$
Ferrogedrite	MFML	$\square Fe_5^{2+}Al_2Si_6Al_2O_{22}(OH)_2$
Ferroglaucophane	S	$\square Na_2(Fe_3^{2+}Al_2)Si_8O_{22}(OH)_2$
Ferroholmquistite	MFML	$\square(Li_2Fe_3^{2+}Al_2)Si_8O_{22}(OH)_2$
Ferrohornblende	C	$\square Ca_2[Fe_4^{2+}(Al,Fe^{3+})]Si_7AlO_{22}(OH)_2$
Ferrokaersutite	C	$NaCa_2(Fe_4^{2+}Ti)Si_6Al_2O_{23}(OH)$

Ferroleakeite	SNa$Na_2(Fe_2^{2+}Fe_2^{3+}Li)Si_8O_{22}(OH)_2$	
Ferronyb_ite	SNa$Na_2(Fe_3^{2+}Al_2)Si_7AlO_{22}(OH)_2$	
Ferropargasite	C	$NaCa_2(Fe_4^{2+}Al)Si_6Al_2O_{22}(OH)_2$
Ferrorichterite	SC	$Na(CaNa)Fe_5^{2+}Si_8O_{22}(OH)_2$
Ferrotschermakite	C	$\square Ca_2(Fe_3^{2+}AlFe^{3+})Si_6Al_2O_{22}(OH)_2$
Ferrowinchite	SC	$\square(CaNa)Fe_4^{2+}(Al,Fe^{3+})Si_8O_{22}(OH)_2$
Fluorocannilloite	C	$CaCa_2(Mg_4Al)Si_5Al_3O_{22}F_2$
Fluoro-ferroleakeite	SNa$Na_2(Fe_2^{2+}Fe_2^{3+}Li)Si_8O_{22}F_2$	
Fluororichterite	SC	$Na(CaNa)Mg_5Si_8O_{22}F_2$
Gedrite	MFML	$\square Mg_5Al_2Si_6Al_2O_{22}(OH)_2$
Glaucophane	S$\square Na_2(Mg_3Al_2)Si_8O_{22}(OH)_2$	
Grunerite	MFML	$\square Fe_7^{2+}Si_8O_{22}(OH)_2$
Hastingsite	C	$NaCa_2(Fe_4^{2+}Fe^{3+})Si_6Al_2O_{22}(OH)_2$
Holmquistite	MFML	$\square(Li_2Mg_3Al_2)Si_8O_{22}(OH)_2$
Kaersutite	C	$NaCa_2(Mg_4Ti)Si_6Al_2O_{23}(OH)$
Katophorite	SC	$Na(CaNa)Fe_4^{2+}(Al,Fe^{3+})Si_7AlO_{22}(OH)_2$
Kornite	S(Na,K)$Na_2(Mg_2Mn_2^{3+}Li)Si_8O_{22}(OH)_2$	
Kozulite	SNa$Na_2Mn_4^{2+}(Fe^{3+},Al)Si_8O_{22}(OH)_2$	
Leakeite	SNa$Na_2(Mg_2Fe_2^{3+}Li)Si_8O_{22}(OH)_2$	
Magnesio-arfvedsonite	SNa$Na_2(Mg_4Fe^{3+})Si_8O_{22}(OH)_2$	
Magnesiohastingsite	C	$NaCa_2(Mg_4Fe^{3+})Si_6Al_2O_{22}(OH)_2$
Magnesiohornblende	C	$\square Ca_2[Mg_4(Al,Fe^{3+})]Si_7AlO_{22}(OH)_2$
Magnesiokatophorite	SC	$Na(CaNa)Mg_4(Al,Fe^{3+})Si_7AlO_{22}(OH)_2$
Magnesioriebeckite	S$\square Na_2(Mg_3Fe_2^{3+})Si_8O_{22}(OH)_2$	
Magnesiosadanagaite	C	$NaCa_2[Mg_3(Al,Fe^{3+})_2]Si_5Al_3O_{22}(OH)_2$
Magnesiotaramite	SC	$Na(CaNa)Mg_3AlFe^{3+}Si_6Al_2O_{22}(OH)_2$
Manganocummingtonite	MFML	$\square Mn_2Mg_5Si_8O_{22}(OH)_2$
Manganogrunerite	MFML	$\square Mn_2Fe_5^{2+}Si_8O_{22}(OH)_2$
Nyb_ite	SNa$Na_2(Mg_3Al_2)Si_7AlO_{22}(OH)_2$	
Pargasite	C	$NaCa_2(Mg_4Al)Si_6Al_2O_{22}(OH)_2$
Permanganogrunerite	MFML	$\square Mn_4Fe_3^{2+}Si_8O_{22}(OH)_2$
Potassic-fluororichterite	SC	$(K,Na)(CaNa)Mg_5Si_8O_{22}F_2$
Potassic-magnesiosadanagaite	C	$(K,Na)Ca_2[Mg_3(Al,Fe^{3+})_2]$-$Si_5Al_3O_{22}(OH)_2$
Potassicpargasite	C	$(K,Na)Ca_2(Mg,Fe,Al)_5$-$(Si,Al)_8O_{22}(OH,F)_2$
Potassicsadanagaite	C	$(K,Na)Ca_2[Fe_3^{2+}(Al,Fe^{3+})_2]$-$Si_5Al_3O_{22}(OH)_2$
Protoferro-anthophyllite	MFML	$(Fe^{2+},Mn^{2+})_2(Fe^{2+},Mg)_5(Si_4O_{11})_2(OH)_2$
Protomangano-ferro-anthophyllite	MFML	$(Mn^{2+},Fe^{2+})_2(Fe^{2+},Mg)_5(Si_4O_{11})_2(OH)_2$
Richterite	SC	$Na(CaNa)Mg_5Si_8O_{22}(OH)_2$
Riebeckite	S$\square Na_2(Fe_3^{2+}Fe_2^{3+})Si_8O_{22}(OH)_2$	
Sadanagaite	C	$NaCa_2[Fe_3^{2+}(Al,Fe^{3+})_2]Si_5Al_3O_{22}(OH)_2$
Sodicanthophyllite	MFML	$NaMg_7Si_8O_{22}(OH)_2$

Sodic-ferri-clinoferroholmquistite		
	MFML	$Li_2(Fe^{2+},Mg)_3Fe_2^{3+}Si_8O_{22}(OH)_2$
Sodic-ferro-anthophyllite	MFML	$NaFe_7^{2+}Si_8O_{22}(OH)_2$
Sodic-ferrogedrite	MFML	$NaFe_6^{2+}AlSi_6Al_2O_{22}(OH)_2$
Sodicgedrite	MFML	$NaMg_6AlSi_6Al_2O_{22}(OH)_2$
Taramite	SC	$Na(CaNa)Fe_3^{2+}AlFe^{3+}Si_6Al_2O_{22}(OH)_2$
Tremolite	C	$\square Ca_2Mg_5Si_8O_{22}(OH)_2$
Tschermakite	C	$\square Ca_2(Mg_3AlFe^{3+})Si_6Al_2O_{22}(OH)_2$
Ungarettiite		$SNaNa_2(Mn_2^{2+}Mn_3^{3+})Si_8O_{22}O_2$
Winchite	SC	$\square(CaNa)Mg_4(Al,Fe^{3+})Si_8O_{22}(OH)_2$

Joesmithite is a related mineral.

Apatite Group

Hexagonal, or monoclinic, pseudohexagonal arsenates, phosphates, and vanadates of general formula $A_5(XO_4)_3(F,CL,CH)$; A = Ba, Ca, Ce, K, Na, Pb, Sr, Y; X = As^{5+}, P^{5+}, Si^{4+}, V^{5+}; (CO_3) may partially replace (PO_4).

Alforsite	$Ba_5(PO_4)_3Cl$
Belovite-(Ce)	$Sr_3Na(Ce,La)(PO_4)_3(F,OH)$
Belovite-(La)	$Sr_3Na(La,Ce)(PO_4)_3(F,OH)$
Carbonate-fluorapatite	$Ca_5(PO_4,CO_3)_3F$
Carbonate-hydroxylapatite	$Ca_5(PO_4,CO_3)_3(OH)$
Chlorapatite	$Ca_5(PO_4)_3Cl$
Clinomimetite	$Pb_5(AsO_4)_3Cl$
Fermorite	$(Ca,Sr)_5(AsO_4,PO_4)_3(OH)$
Fluorapatite	$Ca_5(PO_4)_3F$
Hedyphane	$Pb_3Ca_2(AsO_4)_3Cl$
Hydroxylapatite	$Ca_5(PO_4)_3(OH)$
Johnbaumite	$Ca_5(AsO_4)_3(OH)$
Mimetite	$Pb_5(AsO_4)_3Cl$
Morelandite	$(Ba,Ca,Pb)_5(AsO_4,PO_4)_3Cl$
Pyromorphite	$Pb_5(PO_4)_3Cl$
Strontium-apatite	$(Sr,Ca)_5(PO_4)_3(OH,F)$
Svabite	$Ca_5(AsO_4)_3F$
Turneaureite	$Ca_5[(As,P)O_4]_3Cl$
Vanadinite	$Pb_5(VO_4)_3Cl$

Britholite-(Ce), Britholite-(Y), Fluorbritholite-(Ce), Chlorellestadite, Fluorellestadite, Hydroxylellestadite, and Mattheddleite are silicates that are isostructural with members of the Apatite group; so is the sulfate Cesanite.

Aragonite Group

Orthorhombic carbonates of general formula ACO_3, A = Ba, Ca, Pb, Sr; compare the Calcite group.

Aragonite	$CaCO_3$
Cerussite	$PbCO_3$
Strontianite	$SrCO_3$
Witherite	$BaCO_3$

Arsenic Group

Trigonal semi-metals (As, Bi, Sb).

Antimony	Sb
Arsenic	As
Bismuth	Bi
Stibarsen	SbAs

Arsenopyrite Group

Sulfides of general formula ABS, mon. or orth., A = Co, Fe, Os, Ru; B = As, Sb.

Arsenopyrite	FeAsS
Glaucodot	(Co,Fe)AsS
Gudmundite	FeSbS
Osarsite	(Os,Ru)AsS
Ruarsite	RuAsS

Arthurite Group

Monoclinic arsenates and phosphates of general formula $A^{2+}Fe_2^{3+}(XO_4)_2(O,OH)_2{\cdot}4H_2O$; A^{2+}; A^{2+} = Cu, Fe, Mn, Zn; X = As, P, S.

Arthurite	$Cu^{2+}Fe_2^{3+}(AsO_4,PO_4,SO_4)_2(O,OH)_2{\cdot}4H_2O$
Earlshannonite	$(Mn^{2+},Fe^{2+})Fe_2^{3+}(PO_4)_2(OH)_2{\cdot}4H_2O$
Ojuelaite	$ZnFe_2^{3+}(AsO_4)_2(OH)_2{\cdot}4H_2O$
Whitmoreite	$Fe^{2+}Fe_2^{3+}(PO_4)_2(OH)_2{\cdot}4H_2O$

Astrophyllite Group

Triclinic silicates of general formula $A_3B_7C_2Si_8O_{24}(O,OH)_7$, A = Ca, Cs, (H_3O), K, Na; B = Fe^{2+}, Mg, Mn^{2+}; C = Nb, Ti, Zr.

Astrophyllite	$(K,Na)_3(Fe^{2+},Mn)_7Ti_2Si_8O_{24}(O,OH)_7$
Cesium-kupletskite	$(Cs,K,Na)_3(Mn,Fe^{2+})_7(Ti,Nb)_2Si_8O_{24}(O,OH,F)_7$
Hydroastrophyllite	$(H_3O,K,Ca)_3(Fe^{2+},Mn)_{5-6}Ti_2Si_8(O,OH)_{31}$
Kupletskite	$(K,Na)_3(Mn,Fe^{2+})_7(Ti,Nb)_2Si_8O_{24}(O,OH)_7$
Magnesium astrophyllite	$(Na,K)_4Mg_2(Fe^{2+},Fe^{3+},Mn)_5Ti_2Si_8O_{24}(O,OH,F)_7$
Niobophyllite	$(K,Na)_3(Fe^{2+},Mn^{2+})_6(Nb,Ti)_2Si_8(O,OH,F)_{31}$
Zircophyllite	$(K,Na,Ca)_3(Mn,Fe^{2+})_7(Zr,Nb)_2Si_8O_{27}(OH,F)_4$

Autunite Group

Tetragonal uranyl arsenate, phosphates, and vanadates of general formula $A(UO_2)_2(XO_4)_2{\cdot}8\text{–}12H_2O$; A = Ba, Ca, Cu, Fe^{2+}, 1/2(HAl), Mg, Mn^{2+}, $Na_3(UO_2)$; X = As, P, V.

Autunite	$Ca(UO_2)_2(PO_4)_2{\cdot}10\text{–}12H_2O$
Fritzscheite	$Mn^{2+}(UO_2)_2[(P,V)O_4]_2{\cdot}10H_2O$ (?)
Heinrichite	$Ba(UO_2)_2(AsO_4)_2{\cdot}10\text{–}12H_2O$
Kahlerite	$Fe^{2+}(UO_2)_2(AsO_4)_2{\cdot}10\text{–}12H_2O$
Nov__ekite	$Mg(UO_2)_2(AsO_4)_2{\cdot}12H_2O$
Sabugalite	$H_{0.5}Al_{0.5}(UO_2)_2(PO_4)_2{\cdot}8H_2O$

Sal_eite	$Mg(UO_2)_2(PO_4)_2 \cdot 10H_2O$
Sodium autunite	$Na_2(UO_2)_2(PO_4)_2 \cdot 8H_2O$
Torbernite	$Cu^{2+}(UO_2)_2(PO_4)_2 \cdot 8–12H_2O$
Tr_gerite	$(UO_2)_3(AsO_4)_2 \cdot 12H_2O$ (?)
Uranocircite	$Ba(UO_2)_2(PO_4)_2 \cdot 12H_2O$
Uranospinite	$Ca(UO_2)_2(AsO_4)_2 \cdot 10H_2O$
Zeunerite	$Cu^{2+}(UO_2)_2(AsO_4)_2 \cdot 10–16H_2O$

Axinite Group

Triclinic borosilicates of general formula $A_3Al_2BSi_4O_{15}(OH)$, A = Ca, Fe^{2+}, Mg, Mn^{2+}.

Ferro-axinite	$Ca_2Fe^{2+}Al_2BSi_4O_{15}(OH)$
Magnesio-axinite	$Ca_2MgAl_2BSi_4O_{15}(OH)$
Manganaxinite	$Ca_2Mn^{2+}Al_2BSi_4O_{15}(OH)$
Tinzenite	$(Ca,Mn^{2+},Fe^{2+})_3Al_2BSi_4O_{15}(OH)$

Barite Group

Orthorhombic sulfates and chromate of general formula AXO_4, A = Ba, Pb, Sr; X = Cr^{6+}, S^{6+}.

Anglesite	$PbSO_4$
Barite	$BaSO_4$
Celestine	$SrSO_4$
Hashemite	$Ba(Cr,S)O_4$

Beudantite Group

Trigonal sulfate-arsenates and sulfate-phosphates of general formula $AB_3(XO_4)(SO_4)(OH)_6$, A = Ba, Ca, Ce, Pb, Sr, (H_3); B = Al, Fe^{3+}, Ga;
X = As^{5+}, P^{5+}.

Beudantite	$PbFe_3^{3+}(AsO_4)(SO_4)(OH)_6$
Corkite	$PbFe_3^{3+}(PO_4)(SO_4)(OH)_6$
Gallobeudantite	$PbGa_3[(AsO_4),(SO_4)]_2(OH)_6$
Hidalgoite	$PbAl_3(AsO_4)(SO_4)(OH)_6$
Hinsdalite	$(Pb,Sr)Al_3(PO_4)(SO_4)(OH)_6$
Kemmlitzite	$(Sr,Ce)Al_3(AsO_4)(SO_4)(OH)_6$
Schlossmacherite	$(H_3O,Ca)Al_3(AsO_4,SO_4)_2(OH)_6$
Svanbergite	$SrAl_3(PO_4)(SO_4)(OH)_6$
Woodhouseite	$CaAl_3(PO_4)(SO_4)(OH)_6$

Bjarebyite Group

Monoclinic and triclinic phosphates of general formula $AB_2C_2(PO_4)_3(OH)_3$,
A = Ba, Sr; B = Fe^{2+}, Mg, Mn^{2+}; C = Al, Fe^{3+}.

Bjarebyite	$(Ba,Sr)(Mn^{2+},Fe^{2+},Mg)_2Al_2(PO_4)_3(OH)_3$
Kulanite	$Ba(Fe^{2+},Mn,Mg)_2Al_2(PO_4)_3(OH)_3$
Penikisite	$Ba(Mg,Fe^{2+})_2Al_2(PO_4)_3(OH)_3$
Perloffite	$Ba(Mn^{2+},Fe^{2+})_2Fe_2^{3+}(PO_4)_3(OH)_3$

Brackebuschite Group

Monoclinic arsenates, phosphates, and vanadates of general formula $A_2B(XO_4)_2(OH,H_2O)$, A = Ba, Ca, Pb, Sr; B = Al, Cu^{2+}, Fe^{2+}, Fe^{3+}, Mn^{2+}, Mn^{3+}, Zn; XO_4 = AsO_4, PO_4, SO_4, VO_4.

Arsenbrackebuschite	$Pb_2(Fe^{2+},Zn)(AsO_4)_2 \cdot H_2O$
Arsentsumebite	$Pb_2Cu^{2+}(AsO_4)(SO_4)(OH)$
Bearthite	$Ca_2Al(PO_4)_2(OH)$
Brackebuschite	$Pb_2(Mn^{3+},Fe^{3+})(VO_4)_2(OH)$
Feinglosite	$Pb_2(Zn,Fe)[(As,S)O_4]_2 \cdot H_2O$
Gamagarite	$Ba_2(Fe^{3+},Mn^{3+})(VO_4)_2(OH)$
Goedkenite	$(Sr,Ca)_2Al(PO_4)_2(OH)$
Tsumebite	$Pb_2Cu(PO_4)(SO_4)(OH)$

Fornacite and Vauquelinite are structurally related to the members of this group.

Brucite Group

Trigonal hydroxides of general formula $M^{2+}(OH)_2$, M^{2+} = Fe, Mg, Mn, Ni.

Amakinite	$(Fe^{2+},Mg)(OH)_2$
Brucite	$Mg(OH)_2$
Pyrochroite	$Mn^{2+}(OH)_2$
Theophrastite	$Ni(OH)_2$

Calcite Group

Trigonal carbonates of general formula $A^{2+}(CO_3)$, A^{2+} = Ca, Cd, Co, Fe, Mg, Mn, Ni, Zn; compare the Aragonite group.

Calcite	$CaCO_3$
Gasp_ite	$(Ni,Mg,Fe^{2+})CO_3$
Magnesite	$MgCO_3$
Otavite	$CdCO_3$
Rhodochrosite	$Mn^{2+}CO_3$
Siderite	$Fe^{2+}CO_3$
Smithsonite	$ZnCO_3$
Sphaerocobaltite	$CoCO_3$

Cancrinite Group

Hexagonal silicates of general formula $A_{6-9}(Si,Al)_{12}O_{24}[(SO_4),(CO_3),Cl_2,(OH)]_{2-4} \cdot nH_2O$. A = Na, Ca, K.

Afghanite	$(Na,Ca,K)_8(Si,Al)_{12}O_{24}(SO_4,Cl,CO_3)_3 \cdot H_2O$
Bystrite	$Ca(Na,K)_7Si_6Al_6O_{24}(S^{2-})_{1.5} \cdot H_2O$
Cancrinite	$Na_6Ca_2Al_6Si_6O_{24}(CO_3)_2$
Cancrisilite	$Na_7Al_5Si_7O_{24}(CO_3) \cdot 3H_2O$
Davyne	$(Na,Ca,K)_8Al_6Si_6O_{24}(Cl,SO_4,CO_3)_{2-3}$
Franzinite	$(Na,Ca)_7(Si,Al)_{12}O_{24}(SO_4,CO_3,OH,Cl)_3 \cdot H_2O$
Giuseppettite	$(Na,K,Ca)_{7-8}(Si,Al)_{12}O_{24}(SO_4Cl)_{1-2}$
Hydroxycancrinite	$Na_8Al_6Si_6O_{24}(OH)_2 \cdot 2H_2O$

Liottite	$(Ca,Na,K)_8(Si,Al)_{12}O_{24}[(SO_4),(CO_3),Cl,OH]_4 \cdot H_2O$
Microsommite	$(Na,Ca,K)_{7–8}(Si,Al)_{12}O_{24}(Cl,SO_4,CO_3)_{2–3}$
Pitaglianoite	$K_2Na_6Si_6Al_6O_{24}(SO_4) \cdot 2H_2O$
Quadridavyne	$[(Na,K)_6Cl_2](Ca_2Cl_2)(Si_6Al_6O_{24})$
Sacrofanite	$(Na,Ca,K)_9(Si,Al)_{12}O_{24}[(OH)_2,(SO_4),(CO_3),Cl_2]_3 \cdot nH_2O$
Tounkite	$(Na,Ca,K)_8(Al_6Si_6O_{24})(SO_4)_2Cl \cdot H_2O$
Vishnevite	$(Na,Ca,K)_6(Si,Al)_{12}O_{24}[(SO_4),(CO_3),Cl_2]_{2–4} \cdot nH_2O$
Wenkite (?)	$Ba_4Ca_6(Si,Al)_{20}O_{39}(OH)_2(SO_4)_3 \cdot nH_2O$ (?)

Chalcanthite Group

Triclinic sulfates of general formula $A^{2+}(SO_4) \cdot 5H_2O$, A^{2+} = Cu, Fe, Mg, Mn.

Chalcanthite	$Cu^{2+}SO_4 \cdot 5H_2O$
Jokokuite	$Mn^{2+}SO_4 \cdot 5H_2O$
Pentahydrite	$MgSO_4 \cdot 5H_2O$
Siderotil	$Fe^{2+}SO_4 \cdot 5H_2O$

Chalcopyrite Group

Tetragonal sulfides of general formula $CuBX_2$, B = Fe, Ga, In; X = S, Se.

Chalcopyrite	$CuFeS_2$
Eskebornite	$CuFeSe_2$
Gallite	$CuGaS_2$
Roquesite	$CuInS_2$

Lenaite is a related mineral.

Chlorite Group

Monoclinic or triclinic silicates of general formula $A_{4–6}Z_4O_{10}(OH,O)_8$, A = Al, Fe^{2+}, Fe^{2+}, Li, Mg, Mn^{2+}, Ni, Zn; Z = Al, B, Fe^{3+}, Si. Their nomenclature is discussed by Hey, *Min. Mag.* **30**, 277–292 (1954) and by Bayliss, *Can. Min.* **13**, 178–180 (1975).

Baileychlore	$(Zn,Fe^{2+},Al,Mg)_6(Si,Al)_4O_{10}(OH)_8$
Chamosite	$(Fe^{2+},Mg,Fe^{3+})_5Al(Si_3Al)O_{10}(OH,O)_8$
Clinochlore	$(Mg,Fe^{2+})_5Al(Si_3Al)O_{10}(OH)_8$
Cookeite	$LiAl_4(Si_3Al)O_{10}(OH)_8$
Gonyerite	$(Mn^{2+},Mg)_5Fe^{3+}(Si_3Fe^{3+})O_{10}(OH)_8$
Nimite	$(Ni,Mg,Fe^{2+})_5Al(Si_3Al)O_{10}(OH)_8$
Orthochamosite	$(Fe^{2+},Mg,Fe^{3+})_5Al(Si_3Al)O_{10}(OH,O)_8$
Pennantite	$Mn_5^{2+}Al(Si_3Al)O_{10}(OH)_8$
Sudoite	$Mg_2(Al,Fe^{3+})_3Si_3AlO_{10}(OH)_8$

Compare Franklinfurnaceite.

Cobaltite Group

Sulfides, cubic or pseudo-cubic, of general formula ABS, A = Co, In, Ir, Ni, Pd, Pt, Rh, Ru; B = As, Sb, Bi.

Cobaltite	CoAsS
Gersdorffite	NiAsS
Hollingworthite	(Rh,Pt,Pd)AsS

Irarsite	(Ir,Ru,Rh,Pt)AsS
Jolliffeite	NiAsSe
Padmaite	PdBiSe
Platarsite	(Pt,Rh,Ru)AsS
Tolovkite	IrSbS
Ullmannite	NiSbS
Willyamite	(Co,Ni)SbS

Colusite Group

Cubic sulfides with general formula $Cu_{26}A_2B_6S_{32}$ or $Cu_{26}A_4B_4S_{32}$ where A = V, Fe and B = As, Sn, Sb, Ge.

Colusite	$Cu_{26}V_2(As,Sn,Sb)_6S_{32}$
Germanite	$Cu_{26}Fe_4Ge_4S_{32}$
Germanocolusite	$Cu_{26}V_2(Ge,As)_6S_{32}$
Nekrasovite	$Cu_{26}V_2(Sn,As,Sb)_6S_{32}$
Stibiocolusite	$Cu_{26}V_2(Sb,Sn,As)_6S_{32}$

Copiapite Group

Triclinic sulfates of formula either $A^{2+}Fe_4^{3+}(SO_4)_6(OH)_2{\cdot}18–20H_2O$, or $B^{3}+_{2/3}Fe_4^{3+}(SO_4)_6(OH)_2{\cdot}20H_2O$; A^{2+} = Ca, Cu, Fe, Mg, Zn; B^{3+} = Al, Fe.

Aluminocopiapite	$Al_{2/3}Fe_4^{3+}(SO_4)_6(OH)_2{\cdot}20H_2O$
Calciocopiapite	$CaFe_4^{3+}(SO_4)_6(OH)_2{\cdot}19H_2O$
Copiapite	$Fe^{2+}Fe_4^{3+}(SO_4)_6(OH)_2{\cdot}20H_2O$
Cuprocopiapite	$Cu^{2+}Fe_4^{3+}(SO_4)_6(OH)_2{\cdot}20H_2O$
Ferricopiapite	$Fe^{3}+_{2/3}Fe_4^{3+}(SO_4)_6(OH)_2{\cdot}20H_2O$
Magnesiocopiapite	$MgFe_4^{3+}(SO_4)_6(OH)_2{\cdot}20H_2O$
Zincocopiapite	$ZnFe_4^{3+}(SO_4)_6(OH)_2{\cdot}18H_2O$

Crandallite Group

Trigonal phosphates and arsenates of general formula $AB_3(XO_4)_2(OH,F)_5$, or $AB_3(XO_4)_2(OH,F)_6$; A = Ba, Bi, Ca, Ce, La, Nd, Pb, Sr, Th; B = Al, Fe^{3+}; X = As, P, Si.

Arsenocrandallite	$(Ca,Sr)Al_3[(As,P)O_4]_2(OH)_5{\cdot}H_2O$
Arsenoflorencite-(Ce)	$(Ce,La)Al_3(AsO_4,PO_4)_2(OH)_6$
Arsenogorceixite	$HBaAl_3(AsO_4)_2(OH)_6$
Arsenogoyazite	$(Sr,Ca,Ba)Al_3(AsO_4,PO_4)_2(OH,F)_5{\cdot}H_2O$
Benauite	$HSrFe_3^{3+}(PO_4)_2(OH)_6$
Crandallite	$CaAl_3(PO_4)_2(OH)_5{\cdot}H_2O$
Dussertite	$BaFe_3^{3+}(AsO_4)_2(OH)_5$
Eylettersite	$(Th,Pb)_{1-x}Al_3(PO_4,SiO_4)_2(OH)_6$ (?)
Florencite-(Ce)	$CeAl_3(PO_4)_2(OH)_6$
Florencite-(La)	$(La,Ce)Al_3(PO_4)_2(OH)_6$
Florencite-(Nd)	$(Nd,Ce)Al_3(PO_4)_2(OH)_6$
Gorceixite	$BaAl_3(PO_4)(PO_3OH)(OH)_6$
Goyazite	$SrAl_3(PO_4)_2(OH)_5{\cdot}H_2O$
Philipsbornite	$PbAl_3(AsO_4)_2(OH)_5{\cdot}H_2O$

Plumbogummite	$PbAl_3(PO_4)_2(OH)_5 \cdot H_2O$
Waylandite	$(Bi,Ca)Al_3(PO_4,SiO_4)_2(OH)_6$
Zairite	$Bi(Fe^{3+},Al)_3(PO_4)_2(OH)_6$

Crichtonite Group

Trigonal, or monoclinic, pseudotrigonal oxides of general formula $AB_{21}(O,OH)_{38}$; A = Ba, Ca, Ce, K, La, Na, Pb, Sr, Y; B = Cr^{3+}, Fe^{2+}, Fe^{3+}, Mg, Mn^{2+}, Ti, U, V^{3+}, Zn, Zr.

Crichtonite	$(Sr,La,Ce,Y)(Ti,Fe^{3+},Mn)_{21}O_{38}$
Davidite-(Ce)	$(Ce,La)(Y,U,Fe^{2+})(Ti,Fe^{3+})_{20}(O,OH)_{38}$
Davidite-(La)	$(La,Ce)(Y,U,Fe^{2+})(Ti,Fe^{3+})_{20}(O,OH)_{38}$
Dessauite	$(Sr,Pb)(Y,U)(Ti,Fe^{3+})_{20}O_{38}$
Landauite	$NaMn^{2+}Zn_2(Ti,Fe^{3+})_6Ti_{12}O_{38}$
Lindsleyite	$(Ba,Sr)(Ti,Cr,Fe,Mg,Zr)_{21}O_{38}$
Loveringite	$(Ca,Ce)(Ti,Fe^{3+},Cr,Mg)_{21}O_{38}$
Mathiasite	$(K,Ca,Sr)(Ti,Cr,Fe,Mg)_{21}O_{38}$
Senaite	$Pb(Ti,Fe,Mn)_{21}O_{38}$

Cryptomelane Group

Complex oxides, tetragonal or monoclinic, pseudo-tetragonal, of general formula AB_8O_{16}, A = Ba, K, Mn^{4+}, Na, Pb, Sr; B = Cr^{3+}, Fe^{3+}, Mg, Mn^{2+}, Ti, V^{3+}, Zn, Zr.

Ankangite	$Ba(Ti,V^{3+},Cr^{3+})_8O_{16}$
Coronadite	$Pb(Mn^{4+},Mn^{2+})_8O_{16}$
Cryptomelane	$K(Mn^{4+},Mn^{2+})_8O_{16}$
Hollandite	$Ba(Mn^{4+},Mn^{2+})_8O_{16}$
Manjiroite	$(Na,K)(Mn^{4+},Mn^{2+})_8O_{16} \cdot nH_2O$
Mannardite	$Ba(Ti_6V_2^{3+})O_{16}$
Priderite	$(K,Ba)(Ti,Fe^{3+})_8O_{16}$
Redledgeite	$BaTi_6Cr_2^{3+}O_{16} \cdot H_2O$

Cuspidine Group

Monoclinic and triclinic silicates of general formula $X_{16}(Si_2O_7)_4(O,OH,F)_8$, where X is: Na, Ca, Zr, Ti, Nb, Mn^{2+}, Fe^{2+}, Y, and REE. On structural grounds, this group can be split into four subgroups with the following species: (a) Cuspidine, L_venite, Normandite, Niocalite, Hiortdahlite II, and Janhaugite; (b) W_hlerite; (c) Baghdadite and Burpalite; (d) Hiortdahlite I. The Cuspidine Group is closely related to the G_tzenite Group. For details see the paper by Merlino & Perchiazzi in *Can. Min.* **26**, 933–943 (1988).

Baghdadite	$Ca_{12}(Zr,Ti)_4(Si_2O_7)_4(O,F)_8$, mon.
Burpalite	$Na_8Ca_4Zr_4(Si_2O_7)_4F_8$, mon.
Cuspidine	$Ca_{16}(Si_2O_7)_4(F,OH)_8$, mon.
Hiortdahlite I	$(Na_3Ca)Ca_8Zr_2M_2(Si_2O_7)_4(O_3F_5)$, tric. (M has an average charge of 3+)
Hiortdahlite II	$(Na,Ca)_4Ca_8Zr_2(Y,Zr,REE,Na)_2(Si_2O_7)_4(O_3F_5)$, tric.
Janhaugite	$Na_6Mn_6^{2+}Ti_4(Si_2O_7)_4[O_2(OH,F,O)_6]$, mon.
L_venite	$(Na,Ca)_8(Mn^{2+},Fe^{2+})_4)(Zr,Ti)_4(Si_2O_7)_4(O,OH,F)_8$, mon.
Niocalite	$Ca_{14}Nb_2(Si_2O_7)_4(O_6F_2)$, mon.
Normandite	$Na_4Ca_4(Mn^{2+},Fe^{2+})_4(Zr,Ti)_4(Si_2O_7)_4(O_4F_4)$, mon.

W_hlerite	$Na_4Ca_8(Zr,Nb)_4(Si_2O_7)_4(O,OH,F)_8$, mon.

Datolite Group

See Gadolinite group.

Descloizite Group

Orthorhombic arsenates and vanadates of general formula $PbM(XO_4)(OH)$, $M = Cu^{2+}$ Fe^{2+} Mn^{2+} Zn; $X = As^{5+}$, V^{5+}

Arsendescloizite	$PbZn(AsO_4)(OH)$
_echite	$Pb(Fe^{2+},Mn)(VO_4)(OH)$
Descloizite	$PbZn(VO_4)(OH)$
Mottramite	$PbCu^{2+}(VO_4)(OH)$
Pyrobelonite	$PbMn^{2+}(VO_4)(OH)$

Dolomite Group

Trigonal carbonates of general formula $AB(CO_3)_2$, A = Ba, Ca; B = Fe^{2+}, Mg, Mn^{2+}, Zn.

Ankerite	$Ca(Fe^{2+},Mg,Mn)(CO_3)_2$
Dolomite	$CaMg(CO_3)_2$
Kutnohorite	$Ca(Mn^{2+},Mg,Fe^{2+})(CO_3)_2$
Minrecordite	$CaZn(CO_3)_2$
Norsethite	$BaMg(CO_3)_2$

Isostructural with the borates Nordenski_ldine and Tusionite.

Epidote Group

Monoclinic and orthorhombic silicates of general formula $A_2B_3(SiO_4)_3(OH)$, or $A_2B_3Si_3O_{11}(OH,F)_2$, A = Ca, Ce, Pb, Sr, Y; B = Al, Fe^{3+}, Mg, Mn^{3+}, V^{3+}.

Allanite-(Ce)	$(Ce,Ca,Y)_2(Al,Fe^{2+},Fe^{3+})_3(SiO_4)_3(OH)$
Allanite-(Y)	$(Y,Ce,Ca)_2(Al,Fe^{3+})_3(SiO_4)_3(OH)$
Androsite-(La)	$(Mn,Ca)(La,Ce,Ca,Nd)AlMn^{3+}Mn^{2+}(SiO_4)(Si_2O_7)O(OH)$
Clinozoisite	$Ca_2Al_3(SiO_4)_3(OH)$
Dissakisite-(Ce)	$Ca(Ce,La)MgAl_2(SiO_4)_3(OH)$
Dollaseite-(Ce)	$CaCeMg_2AlSi_3O_{11}(F,OH)_2$
Epidote	$Ca_2(Fe^{3+},Al)_3(SiO_4)_3(OH)$
Hancockite	$(Pb,Ca,Sr)_2(Al,Fe^{3+})_3(SiO_4)_3(OH)$
Khristovite-(Ce)	$(Ca,REE)REE(Mg,Fe^{2+})AlMn^{2+}Si_3O_{11}(OH)(F,O)$
Mukhinite	$Ca_2Al_2V^{3+}(SiO_4)_3(OH)$
Piemontite	$Ca_2(Al,Mn^{3+},Fe^{3+})_3(SiO_4)_3(OH)$
Strontiopiemontite	$CaSr(Al,Mn^{3+},Fe^{3+})_3Si_3O_{11}O(OH)$
Zoisite	$Ca_2Al_3(SiO_4)_3(OH)$

Ettringite Group

Hexagonal sulfates of general formula $Ca_6X_2Y(O,OH)_{12}\cdot 24–26H_2O$, X = Al, Cr^{3+} Fe^{3+}, Mn^{2+}, Mn^{4+}, Si; Y = $(SO_4,CO_3)_3$ or $(SO_4)_2B(OH)_4$.

Bentorite	$Ca_6(Cr,Al)_2(SO_4)_3(OH)_{12}\cdot 26H_2O$
Charlesite	$Ca_6(Al,Si)_2(SO_4)_2B(OH)_4(OH,O)_{12}\cdot 26H_2O$

Ettringite	$Ca_6Al_2(SO_4)_3(OH)_{12}\cdot 26H_2O$
Jouravskite	$Ca_6Mn_2^{4+}(SO_4,CO_3)_4(OH)_{12}\cdot 26H_2O$
Sturmanite	$Ca_6(Fe^{3+},Al,Mn^{2+})_2(SO_4)_2[B(OH)_4](OH)_{12}\cdot 25H_2O$
Thaumasite	$Ca_6Si_2(CO_3)_2(SO_4)_2(OH)_{12}\cdot 24H_2O$

Fairfieldite Group

Triclinic arsenates and phosphates of general formula $Ca_2B(XO_4)_2\cdot 2H_2O$, B = Co, Fe^{2+}, Mg, Mn^{2+}, Ni, Zn; X = As, P.

Cassidyite	$Ca_2(Ni,Mg)(PO_4)_2\cdot 2H_2O$
Collinsite	$Ca_2(Mg,Fe^{2+})(PO_4)_2\cdot 2H_2O$
Fairfieldite	$Ca_2(Mn^{2+},Fe^{2+})(PO_4)_2\cdot 2H_2O$
Gaitite	$Ca_2Zn(AsO_4)_2\cdot 2H_2O$
Messelite	$Ca_2(Fe^{2+},Mn^{2+})(PO_4)_2\cdot 2H_2O$
Parabrandtite	$Ca_2Mn^{2+}(AsO_4)_2\cdot 2H_2O$
Roselite-beta	$Ca_2Co(AsO_4)_2\cdot 2H_2O$
Talmessite	$Ca_2Mg(AsO_4)_2\cdot 2H_2O$

Feldspar Group

Silicates of general formula XZ_4O_8, monoclinic, triclinic, orthorhombic, X = Ba, Ca, K, Na, NH_4, Sr; Z = Al, B, Si.

Albite	$NaAlSi_3O_8$
Anorthite	$CaAl_2Si_2O_8$
Anorthoclase	$(Na,K)AlSi_3O_8$
Banalsite	$BaNa_2Al_4Si_4O_{16}$
Buddingtonite	$(NH_4)AlSi_3O_8$
Celsian	$BaAl_2Si_2O_8$
Dmisteinbergite	$CaAl_2Si_2O_8$
Hyalophane	$(K,Ba)Al(Si,Al)_3O_8$
Microcline	$KAlSi_3O_8$
Orthoclase	$KAlSi_3O_8$
Paracelsian	$BaAl_2Si_2O_8$
Reedmergnerite	$NaBSi_3O_8$
Sanidine	a mon. K-Na feldspar
Slawsonite	$(Sr,Ca)Al_2Si_2O_8$
Stronalsite	$SrNa_2Al_4Si_4O_{16}$
Svyatoslavite	$CaAl_2Si_2O_8$

Ferrotapiolite Group

Tetragonal oxides of general formula $A^{2+}B_2^{5+}O_6$, A^{2+} = Fe, Mg, Mn, Zn; B^{5+} = Nb, Sb, Ta.

Bystr_mite	$MgSb_2^{5+}O_6$
Ferrotapiolite	$(Fe^{2+},Mn^{2+})(Ta,Nb)_2O_6$
Manganotapiolite	$(Mn^{2+},Fe^{2+})(Ta,Nb)_2O_6$
Ordo_ezite	$ZnSb_2^{5+}O_6$
Tripuhyite	$Fe^{2+}Sb_2^{5+}O_6$

Gadolinite Group

Monoclinic silicates of general formula $W_{2-3}X(B,Be)_2(Si,B)_2(O,OH)_{10}$, W = Ca, Ce, Y, Yb; X = Y, Fe^{2+}, Mg.

Bakerite	$Ca_4B_4(BO_4)(SiO_4)_3(OH)_3 \cdot H_2O$
Datolite	$Ca_2B_2Si_2O_8(OH)_2$
Gadolinite-(Ce)	$(Ce,La,Nd,Y)_2Fe^{2+}Be_2Si_2O_{10}$
Gadolinite-(Y)	$Y_2Fe^{2+}Be_2Si_2O_{10}$
Hingganite-(Yb)	$(Yb,Y)_2Be_2Si_2O_8(OH)_2$
Homilite	$Ca_2(Fe^{2+},Mg)B_2Si_2O_{10}$
Minasgeraisite-(Y)	$CaY_2Be_2Si_2O_{10}$

The phosphates Drugmanite, Herderite and Hydroxylherderite and the arsenate Bergslagite are structurally related to the silicates of this group.

Garnet Group

Cubic silicates of general formula $A_3B_2(SiO_4)_3$; (for Hibschite and Katoite, $A_3B_2(SiO_4)_{3-x}(OH)_{4x}$), A = Ca, Fe^{2+}, Mg, Mn^{2+}; B = Al, Cr^{3+}, Fe^{3+}, Mn^{3+}. Si, Ti, V^{3+}, Zr; Si is partly replaced by Al, Fe^{3+}.

Almandine	$Fe_3^{2+}Al_2(SiO_4)_3$
Andradite	$Ca_3Fe_2^{3+}(SiO_4)_3$
Calderite	$(Mn^{2+},Ca)_3(Fe^{3+},Al)_2(SiO_4)_3$
Goldmanite	$Ca_3(V,Al,Fe^{3+})_2(SiO_4)_3$
Grossular	$Ca_3Al_2(SiO_4)_3$
Hibschite	$Ca_3Al_2(SiO_4)_{3-x}(OH)_{4x}$
Katoite	$Ca_3Al_2(SiO_4)_{3-x}(OH)_{4x}$
Kimzeyite	$Ca_3(Zr,Ti)_2(Si,Al,Fe^{3+})_3O_{12}$
Knorringite	$Mg_3Cr_2(SiO_4)_3$
Majorite	$Mg_3(Fe,Al,Si)_2(SiO_4)_3$
Morimotoite	$Ca_3TiFe^{2+}Si_3O_{12}$
Pyrope	$Mg_3Al_2(SiO_4)_3$
Schorlomite	$Ca_3Ti_2^{4+}(Fe_2^{3+}Si)O_{12}$
Spessartine	$Mn_3^{2+}Al_2(SiO_4)_3$
Uvarovite	$Ca_3Cr_2(SiO_4)_3$

The tellurate Yafsoanite, the arsenates Berzeliite and Manganberzeliite, the vanadate Palenzonaite, and the halide Cryolithionite are isostructural with the minerals of the Garnet group. Henritermierite is a related mineral.

G_tzenite Group

Monoclinic and triclinic silicates of general formula $X_{16}(Si_2O_7)_4(O,OH,F)_8$, where X is: Na, Ca, Zr, Ti, Mn. The G_tzenite Group is closely related to the Cuspidine Group. For details see the paper by Merlino & Perchiazzi in *Can. Min.* **26**, 933–943 (1988).

G_tzenite	$Na_4Ca_{10}Ti_2(Si_2O_7)_4F_8$, tric.
Hainite	$Na_4Ca_{10}Ti_2(Si_2O_7)_4(O,OH)_4F_4$, tric.
Rosenbuschite	$(Ca,Na)_{12}(Zr,Ti)_4(Si_2O_7)_4(O_4F_4)$, tric.
Seidozerite	$(Na,Ca)_8(Zr,Ti,Mn)_8(Si_2O_7)_4(O,F)_8$, mon.

Halotrichite Group

Monoclinic sulfates of general formula $AB_2(SO_4)_4 \cdot 22H_2O$, A = Fe^{2+}, Mg, Mn^{2+}, Ni, Zn; B = Al, Cr^{3+}, Fe^{3+}.

Apjohnite	$Mn^{2+}Al_2(SO_4)_4 \cdot 22H_2O$
Bilinite	$Fe^{2+}Fe_2^{3+}(SO_4)_4 \cdot 22H_2O$
Dietrichite	$(Zn,Fe^{2+},Mn^{2+})Al_2(SO_4)_4 \cdot 22H_2O$
Halotrichite	$Fe^{2+}Al_2(SO_4)_4 \cdot 22H_2O$
Pickeringite	$MgAl_2(SO_4)_4 \cdot 22H_2O$
Redingtonite	$(Fe^{2+},Mg,Ni)(Cr,Al)_2(SO_4)_4 \cdot 22H_2O$
Wupatkiite	$(Co,Mg,Ni)Al_2(SO_4)_4 \cdot 22H_2O$

Hauchecornite Group

Tetragonal sulfosalts of general formula A_9BCS_8, A = Co, Ni; B = As, Bi, Sb; C = Bi, Sb, Te.

Arsenohauchecornite	Ni_9BiAsS_8
Bismutohauchecornite	$Ni_9Bi_2S_8$
Hauchecornite	$Ni_9Bi(Sb,Bi)S_8$
Tellurohauchecornite	Ni_9BiTeS_8
Tu_ekite	$Ni_4Sb_2S_8$

Hematite Group

Trigonal oxides of general formula R_2O_3, R = Al, Cr^{3+}, Fe^{3+}, V^{3+}.

Corundum	Al_2O_3
Eskolaite	Cr_2O_3
Hematite	$a\text{-}Fe_2O_3$
Karelianite	V_2O_3

Hexahydrite Group

Monoclinic sulfates of general formula $M^{2+}SO_4 \cdot 6H_2O$, M^{2+} = Co, Fe, Mg, Mn, Ni, Zn.

Bianchite	$(Zn,Fe^{2+})(SO_4) \cdot 6H_2O$
Chvaleticeite	$(Mn^{2+},Mg)SO_4 \cdot 6H_2O$
Ferrohexahydrite	$Fe^{2+}SO_4 \cdot 6H_2O$
Hexahydrite	$MgSO_4 \cdot 6H_2O$
Moorhouseite	$(Co,Ni,Mn^{2+})SO_4 \cdot 6H_2O$
Nickelhexahydrite	$(Ni,Mg,Fe^{2+})(SO_4) \cdot 6H_2O$

Humite Group

Silicates, orthorhombic or monoclinic, that form a morphotropic series with Olivine, with compositions A_2SiO_4, $A_2SiO_4 \cdot A(OH)_2$, $2A_2SiO_4 \cdot A(OH)_2$, $3A_2SiO_4 \cdot A(OH)_2$, $4A_2SiO_4 \cdot A(OH)_2$; A = Fe^{2+}, Mg, Mn^{2+}; (OH) is partially replaced by F.

Alleghanyite	$Mn_5^{2+}(SiO_4)_2(OH)_2$
Chondrodite	$(Mg,Fe^{2+})_5(SiO_4)_2(F,OH)_2$
Clinohumite	$(Mg,Fe^{2+})_9(SiO_4)_4(F,OH)_2$
Humite	$(Mg,Fe^{2+})_7(SiO_4)_3(F,OH)_2$

Jerrygibbsite	$Mn_9^{2+}(SiO_4)_4(OH)_2$
Leucophoenicite	$Mn_7^{2+}(SiO_4)_3(OH)_2$
Manganhumite	$(Mn^{2+},Mg)_7(SiO_4)_3(OH)_2$
Norbergite	$Mg_3(SiO_4)(F,OH)_2$
Ribbeite	$(Mn^{2+},Mg)_5(SiO_4)_2(OH)_2$
Sonolite	$Mn_9^{2+}(SiO_4)_4(OH,F)_2$

Hydrotalcite Group

Trigonal carbonates of general formula $A_6B_2(CO_3)(OH)_{16}\cdot 4H_2O$, A = Mg, Ni; B = Al, Cr^{3+}, Fe^{3+}, Mn^{2+}, Co^{3+}. Compare the Manasseite group; see also **75**, 242–243 (1990).

Comblainite	$(Ni_6^{2+}Co_2^{3+}(CO_3)(OH)_{16}\cdot 4H_2O$
Desautelsite	$Mg_6Mn_2^{3+}(CO_3)(OH)_{16}\cdot 4H_2O$
Hydrotalcite	$Mg_6Al_2(CO_3)(OH)_{16}\cdot 4H_2O$
Iowaite	$Mg_6Fe_2^{3+}(OH)_{16}Cl_2\cdot 4H_2O$
Pyroaurite	$Mg_6Fe_2^{3+}(CO_3)(OH)_{16}\cdot 4H_2O$
Reevesite	$Ni_6Fe_2^{3+}(CO_3)(OH)_{16}\cdot 4H_2O$
Stichtite	$Mg_6Cr_2(CO_3)(OH)_{16}\cdot 4H_2O$
Takovite	$Ni_6Al_2(OH)_{16}(CO_3,OH)\cdot 4H_2O$

Meixnerite, the sulfates Honessite and Wermlandite, and the carbonates Caresite, Charmarite and Quintinite are structurally related to the minerals of this group.

Ilmenite Group

Trigonal oxides of general formula $M^{2+}TiO_3$, M^{2+} = Fe, Mg, Mn, Zn.

Ecandrewsite	$(Zn,Fe^{2+},Mn^{2+})TiO_3$
Geikielite	$MgTiO_3$
Ilmenite	$Fe^{2+}TiO_3$
Pyrophanite	$Mn^{2+}TiO_3$

Joaquinite Group

Orthorhombic and monoclinic titanosilicates of general formula $A_6(Ti,Nb)_2Si_8(O,OH)_{26}\cdot H_2O$; A = Ba, Ce, Fe^{2+}, Mn^{2+}, Na, Sr.

Bario-orthojoaquinite	$(Ba,Sr)_4Fe_2^{2+}Ti_2Si_8O_{26}\cdot H_2O$
Byelorussite-(Ce)	$NaMn^{2+}Ba_2Ce_2Ti_2Si_8O_{26}(F,OH)\cdot H_2O$
Joaquinite-(Ce)	$Ba_2NaCe_2Fe^{2+}(Ti,Nb)_2Si_8O_{26}(OH,F)\cdot H_2O$
Orthojoaquinite-(Ce)	$Ba_2NaCe_2Fe^{2+}Ti_2Si_8O_{26}(O,OH)\cdot H_2O$
Strontiojoaquinite	$Sr_2Ba_2(Na,Fe^{2+})_2Ti_2Si_8O_{24}(O,OH)_2\cdot H_2O$
Strontio-orthojoaquinite	$Sr_2Ba_2(Na,Fe^{2+})_2Ti_2Si_8O_{24}(O,OH)_2\cdot H_2O$

Kaolinite-Serpentine Group

Silicates, triclinic, monolinic, orthorhombic, trigonal, hexagonal, of general formula $M_{2-3}Z_2O_5(OH)_4\cdot nH_2O$, M = Al, Fe^{3+}, Fe^{2+}, Mg, Mn^{2+}, Ni, Zn; Z = Al, Fe^{2+}, Si.

Amesite	$Mg_2Al(SiAl)O_5(OH)_4$
Antigorite	$(Mg,Fe^{2+})_3Si_2O_5(OH)_4$
Berthierine	$(Fe^{2+},Fe^{3+},Mg)_{2-3}(Si,Al)_2O_5(OH)_4$

Brindleyite	$(Ni,Mg,Fe^{2+})_2Al(SiAl)O_5(OH)_4$
Clinochrysotile	$Mg_3Si_2O_5(OH)_4$
Cronstedtite	$Fe_2^{2+}Fe^{3+}(SiFe^{3+})O_5(OH)_4$
Dickite	$Al_2Si_2O_5(OH)_4$
Fraipontite	$(Zn,Al)_3(Si,Al)_2O_5(OH)_4$
Greenalite	$(Fe^{2+},Fe^{3+})_{2-3}Si_2O_5(OH)_4$
Halloysite	$Al_2Si_2O_5(OH)_4$
Kaolinite	$Al_2Si_2O_5(OH)_4$
Kellyite	$(Mn^{2+},Mg,Al)_3(Si,Al)_2O_5(OH)_4$
Lizardite	$Mg_3Si_2O_5(OH)_4$
Manandonite	$LiAl_2(SiAl_{0.5}B_{0.5})O_5(OH)_4$
Nacrite	$Al_2Si_2O_5(OH)_4$
N_pouite	$Ni_3Si_2O_5(OH)_4$
Odinite	$(Fe^{3+},Mg,Al,Fe^{2+})_{2.5}(Si,Al)_2O_5(OH)_4$
Orthochrysotile	$Mg_3Si_2O_5(OH)_4$
Parachrysotile	$Mg_3Si_2O_5(OH)_4$
Pecoraite	$Ni_3Si_2O_5(OH)_4$

Kieserite Group

Monoclinic sulfates of general formula $M^{2+}SO_4 \cdot H_2O$, M^{2+} = Cu, Fe, Mg, Mn, Ni, Zn.

Dwornikite	$(Ni,Fe^{2+})SO_4 \cdot H_2O$
Gunningite	$(Zn,Mn^{2+})SO_4 \cdot H_2O$
Kieserite	$MgSO_4 \cdot H_2O$
Szmikite	$Mn^{2+}(SO_4) \cdot H_2O$
Szomolnokite	$Fe^{2+}SO_4 \cdot H_2O$

Lazulite Group

Monoclinic phosphates of general formula $A^{2+}B_2^{3+}(PO_4)_2(OH)_2$; A^{2+} = Cu, Fe, Mg; B^{3+} = Al, Fe.

Barbosalite	$Fe^{2+}Fe_2^{3+}(PO_4)_2(OH)_2$
Hentschelite	$Cu^{2+}Fe_2^{3+}(PO_4)_2(OH)_2$
Lazulite	$MgAl_2(PO_4)_2(OH)_2$
Scorzalite	$(Fe^{2+},Mg)Al_2(PO_4)_2(OH)_2$

Linnaeite Group

Cubic sulfides of general formula $A^{2+}B_2^{3+}X_4$, A^{2+} = Co, Cu, Fe, Ni, Zn; B^{3+} = Co, Cr, Fe, In, Ni, Sb; X = S, Se. Compare the oxides of Spinel group.

Bornhardtite	$Co^{2+}Co_2^{3+}Se_4$
Carrollite	$Cu(Co,Ni)_2S_4$
Daubr_elite	$Fe^{2+}Cr_2S_4$
Fletcherite	$Cu(Ni,Co)_2S_4$
Florensovite	$(Cu,Zn)(Cr,Sb)_2S_4$
Greigite	$Fe^{2+}Fe_2^{3+}S_4$
Indite	$Fe^{2+}In_2S_4$
Kalininite	$ZnCr_2S_4$

Linnaeite	$Co^{2+}Co_2^{3+}S_4$
Polydymite	$NiNi_2S_4$
Siegenite	$(Ni,Co)_3S_4$
Tr_stedtite	Ni_3Se_4
Tyrrellite	$(Cu,Co,Ni)_3Se_4$
Violarite	$Fe^{2+}Ni_2^{3+}S_4$

L_llingite Group

Orthorhombic arsenides and antimonides of general formula AB_2, A = Co, Fe, Ni; B = As, S, Sb.

Costibite	CoSbS
L_llingite	$FeAs_2$
Nisbite	$NiSb_2$
Rammelsbergite	$NiAs_2$
Safflorite	$(Co,Fe)As_2$
Sein_jokite	$(Fe,Ni)(Sb,As)_2$

Lovozerite Group

Trigonal and orthorhombic silicates of general formula $A_6B_{2-x}C_{1-y}Si_6(O,OH)_{18}$, A = Na, H; B = Ca, Mn, Fe; C = Ti, Zr.

Imandrite	$Na_6Ca_{1.5}Fe^{3+}Si_6O_{18}$
Kazakovite	$Na_6(Mn^{2+},H_2)TiSi_6O_{18}$
Koashvite	$Na_6(Ca,Mn)(Ti,Fe)Si_6O_{18}\cdot H_2O$
Lovozerite	$Na_2Ca(Zr,Ti)Si_6(O,OH)_{18}$
Petarasite	$Na_5Zr_2Si_6O_{18}(Cl,OH)\cdot 2H_2O$
Tisinalite	$Na_3H_3(Mn^{2+},Ca,Fe)TiSi_6(O,OH)_{18}\cdot 2H_2O$
Zirsinalite	$Na_6(Ca,Mn,Fe^{2+})ZrSi_6O_{18}$

Ludwigite Group

Orthorhombic borates of general formula $X_2Y(BO_5)$, X = Fe^{2+}, Mg, Ni; Y = Al, Fe^{3+}, Mg, Mn^{3+}, Sb, Ti.

Azoproite	$(Mg,Fe^{2+})_2(Fe^{3+},Ti,Mg)BO_5$
Bonaccordite	$Ni_2Fe^{3+}BO_5$
Chestermanite	$Mg_2(Fe^{3+},Mg,Al,Sb^{5+})(BO_3)O_2$
Fredrikssonite	$Mg_2(Mn^{3+},Fe^{3+})BO_5$
Ludwigite	$Mg_2Fe^{3+}BO_5$
Vonsenite	$Fe_2^{2+}Fe^{3+}BO_5$

Compare Hulsite, Orthopinakiolite, Pinakiolite and Takeuchiite.

Magnetoplumbite Group

Hexagonal oxides of general formula $AB_{12}O_{19}$, A = Ba, Ca, Ce, K, Pb; B = Al, Cr^{3+}, Fe^{2+}, Fe^{2+}, Mg, Mn^{3+}, Ti.

Hawthorneite	$Ba(Ti_3Cr_4Fe_2^{2+}Fe_2^{3+}Mg)O_{19}$
Hibonite	$(Ca,Ce)(Al,Ti,Mg)_{12}O_{19}$
Magnetoplumbite	$Pb(Fe^{3+},Mn^{3+})_{12}O_{19}$
Ne_ilovite	$PbZn_2(Mn^{4+},Ti^{4+})_2Fe_8^{3+}O_{19}$

Yimengite	$K(Cr^{3+},Ti,Fe^{3+},Mg)_{12}O_{19}$

Manasseite Group

Hexagonal carbonates of general formula $Mg_6B_2(CO_3)(OH)_{16}\cdot 4H_2O$, B = Al, Cr^{3+}, Fe^{3+}. Compare the Hydrotalcite group; see also **75**, 242–243 (1990).

Barbertonite	$Mg_6Cr_2(CO_3)(OH)_{16}\cdot 4H_2O$
Chlormagaluminite	$(Mg,Fe^{2+})_4Al_2(OH)_{12}(Cl_2,CO_3)\cdot 2H_2O$
Manasseite	$Mg_6Al_2(CO_3)(OH)_{16}\cdot 4H_2O$
Sj_grenite	$Mg_6Fe_2^{3+}(CO_3)(OH)_{16}\cdot 4H_2O$

Marcasite Group

Orthorhombic sulfides, selenides, and tellurides of general formula AX_2, A = Co, Fe, Ni; X = S, Se, Te. Compare the Pyrite group.

Ferroselite	$FeSe_2$
Frohbergite	$FeTe_2$
Hastite	$CoSe_2$
Kullerudite	$NiSe_2$
Marcasite	FeS_2
Mattagamite	$CoTe_2$

Melanterite Group

Monoclinic sulfates of general formula $A^{2+}SO_4\cdot 7H_2O$, A^{2+} = Co, Cu, Fe, Mn, Zn.

Bieberite	$CoSO_4\cdot 7H_2O$
Boothite	$CuSO_4\cdot 7H_2O$
Mallardite	$Mn^{2+}SO_4\cdot 7H_2O$
Melanterite	$Fe^{2+}SO_4\cdot 7H_2O$
Zinc-melanterite	$(Zn,Cu^{2+},Fe^{2+})SO_4\cdot 7H_2O$

Melilite Group

Tetragonal silicates of general formula A_2BZSiO_7, A = Na, Ca; B = Al, Be, Mg, Zn; Z = Al, Si.

_kermanite	$Ca_2MgSi_2O_7$
Gehlenite	$Ca_2Al(AlSi)O_7$
Gugiaite	$Ca_2BeSi_2O_7$
Hardystonite	$Ca_2ZnSi_2O_7$
Melilite	$(Ca,Na)_2(Al,Mg)(Si,Al)_2O_7$

Jeffreyite, Leucophanite and Meliphanite are silicates structurally related to the minerals of this group.

Melonite Group

Trigonal sulfides and tellurides of general formula AB_2, A = Ni, Pd, Pt, Sn; B = Bi, S, Se, Te.

Berndtite	SnS_2
Kitkaite	NiTeSe

Melonite	$NiTe_2$
Merenskyite	$(Pd,Pt)(Te,Bi)_2$
Moncheite	$(Pt,Pd)(Te,Bi)_2$

Meta-autunite Group

Tetragonal or orthorhombic uranyl phosphates and arsenates of general formula $A(UO_2)_2(XO_4)_2{\cdot}nH_2O$; A = Ba, Ca, Co, Cu^{2+}, Fe^{2+}, $(H_3O)_2$, K_2, Mg, $(NH_4)_2$, Zn; X = As^{5+}, P^{5+}.

Abernathyite	$K_2(UO_2)_2(AsO_4)_2{\cdot}8H_2O$
Bassetite	$Fe^{2+}(UO_2)_2(PO_4)_2{\cdot}8H_2O$
Chernikovite	$(H_3O)_2(UO_2)_2(PO_4)_2{\cdot}6H_2O$
Meta-ankoleite	$K_2(UO_2)_2(PO_4)_2{\cdot}6H_2O$
Meta-autunite	$Ca(UO_2)_2(PO_4)_2{\cdot}2–6H_2O$
Metaheinrichite	$Ba(UO_2)_2(AsO_4)_2{\cdot}8H_2O$
Metakahlerite	$Fe^{2+}(UO_2)_2(AsO_4)_2{\cdot}8H_2O$
Metakirchheimerite	$Co(UO_2)_2(AsO_4)_2{\cdot}8H_2O$
Metalodevite	$Zn(UO_2)_2(AsO_4)_2{\cdot}10H_2O$
Metanov__ekite	$Mg(UO_2)_2(AsO_4)_2{\cdot}4–8H_2O$
Metatorbernite	$Cu^{2+}(UO_2)_2(PO_4)_2{\cdot}8H_2O$
Meta-uranocircite	$Ba(UO_2)_2(PO_4)_2{\cdot}8H_2O$
Meta-uranospinite	$Ca(UO_2)_2(AsO_4)_2{\cdot}8H_2O$
Metazeunerite	$Cu^{2+}(UO_2)_2(AsO_4)_2{\cdot}8H_2O$
Sodium uranospinite	$(Na_2,Ca)(UO_2)_2(AsO_4)_2{\cdot}5H_2O$
Uramphite	$(NH_4)_2(UO_2)_2(PO_4)_2{\cdot}6H_2O$

Mica Group

The nomenclature of this group was revised by a subcommittee of the Commission on New Minerals and Mineral Names of the International Mineralogical Association. The report of this subcommittee by Rieder *et al.* (1998) has been published in many major mineralogical journals; for example, *Canadian Mineralogist* **36**, 905–912 (1998). Readers interested in more details of the mica group minerals should consult this report.

The mica group minerals are pseudohexagonal, monoclinic layer silicates. The general simplified formula can be written as: $IM_{2–3}h_{1–0}T_4O_{10}A_2$, where *I* is commonly K, Na, Ca, Cs, NH_4, Rb, Ba; *M* is commonly Li, Fe^{2+}, Fe^{3+}, Mg, Al, Ti, Mn^{2+}, Mn^{3+}, Zn, Cr, V; h represents a vacancy; *T* is commonly Al, Fe^{3+}, Si, Be, B; and *A* is commonly F, OH, Cl, O (oxy-micas), S. The most frequently encountered elements are set in bold face; note that other substitutions are possible. The following tabulation gives the ideal formulae for end member species except where noted. Mica group minerals are classified into three different types: normal micas (either dioctahedral or trioctahedral), brittle micas (either dioctahedral or trioctahedral) and interlayer-deficient micas (either dioctahedral or trioctahedral). The following abbreviations are used below:

di. = dioctahedral micas br. = brittle micas

tr. = trioctahedral micas in. = interlayer-deficient micas

Aluminoceladonite (di.) $KAl(Mg,Fe^{2+})hSi_4O_{10}(OH)_2$
Anandite (tr.) (br.) $BaFe_3^{2+}Fe^{3+}Si_3O_{10}S(OH)$
Annite (tr.) $KFe_3^{2+}AlSi_3O_{10}(OH)_2$
Aspidolite (tr.) $NaMg_3AlSi_3O_{10}(OH)_2$
Biotite (tr.) (a series name) compositions on, or close to, the Annite-Phlogopite and Siderophyllite-Eastonite joins; dark micas without lithium
Bityite (tr.) (br.) $CaLiAl_2BeAlSi_2O_{10}(OH)_2$
Boromuscovite (di.) $KAl_2hBSi_3O_{10}(OH)_2$
Brammallite (di.) (in.) (a series name) $Na_{0.65}Al_{2.0}hAl_{0.65}Si_{3.35}O_{10}(OH)_2$
Celadonite (di.) $KFe^{3+}(Mg,Fe^{2+})hSi_4O_{10}(OH)_2$
Chernykhite (di.) (br.) $BaV_2hAl_2Si_2O_{10}(OH)_2$
Chromphyllite (di.) $KCr_2hAlSi_3O_{10}(OH)_2$
Clintonite (tr.) (br.) $CaMg_2AlAl_3SiO_{10}(OH)_2$
Eastonite (tr.) $KMg_2AlAl_2Si_2O_{10}(OH)_2$
Ephesite (tr.) $NaLiAl_2Al_2Si_2O_{10}(OH)_2$
Ferro-aluminoceladonite (di.) $KAl(Fe^{2+},Mg)hSi_4O_{10}(OH)_2$
Ferroceladonite (di.) $KFe^{3+}(Fe^{2+},Mg)hSi_4O_{10}(OH)_2$
Glauconite (di.) (in.) (a series name) $K_{0.8}R^3+_{1.33}R^2+_{0.67}hAl_{0.13}Si_{3.87}O_{10}(OH)_2$
Hendricksite (tr.) $KZn_3AlSi_3O_{10}(OH)_2$
Illite (di.) (in.) (a series name) $K_{0.65}Al_{2.0}hAl_{0.65}Si_{3.35}O_{10}(OH)_2$
Kinoshitalite (tr.) (br.) $BaMg_3Al_2Si_2O_{10}(OH)_2$
Lepidolite (tr.) (a series name) compositions on, or close to, the Trilithionite-Polylithionite join; light micas with substantial lithium
Margarite (di.) (br.) $CaAl_2hAl_2Si_2O_{10}(OH)_2$
Masutomilite (tr.) $KLiAlMn^{2+}AlSi_3O_{10}F_2$
Montdorite (tr.) (not an end member) $KFe^2+_{1.5}Mn^2+_{0.5}Mg_{0.5}h_{0.5}Si_4O_{10}F_2$
Muscovite (di.) $KAl_2hAlSi_3O_{10}(OH)_2$
Nanpingite (di.) $CsAl_2hAlSi_3O_{10}(OH)_2$
Norrishite (tr.) $KLiMn_2^{3+}Si_4O_{12}$
Paragonite (di.) $NaAl_2hAlSi_3O_{10}(OH)_2$
Phengite (di.) (a series name) potassic compositions between, or close to, the joins Muscovite-Aluminoceladonite and Muscovite-Celadonite
Phlogopite (tr.) $KMg_3AlSi_3O_{10}(OH)_2$
Polylithionite (tr.) $KLi_2AlSi_4O_{10}F_2$
Preiswerkite (tr.) $NaMg_2AlAl_2Si_2O_{10}(OH)_2$
Roscoelite (di.) $KV_2hAlSi_3O_{10}(OH)_2$
Siderophyllite (tr.) $KFe_2^{2+}AlAl_2Si_2O_{10}(OH)_2$
Tainiolite (tr.) $KLiMg_2Si_4O_{10}F_2$
Tetra-ferri-annite (tr.) $KFe_3^{2+}Fe^{3+}Si_3O_{10}(OH)_2$
Tetra-ferriphlogopite (tr.) $KMg_3Fe^{3+}Si_3O_{10}(OH)_2$
Tobelite (di.) $(NH_4)Al_2hAlSi_3O_{10}(OH)_2$
Trilithionite (tr.) (not an end member) $KLi_{1.5}Al_{1.5}AlSi_3O_{10}F_2$
Wonesite (tr.) (in.) (not an end member) $Na_{0.5}h_{0.5}Mg_{2.5}Al_{0.5}AlSi_3O_{10}(OH)_2$
Zinnwaldite trioctahedral micas on, or close to, the Siderophyllite-Polylithionite join; dark micas containing lithium

Mixite Group

Hexagonal arsenates and phosphates of general formula $ACu_6(XO_4)_3(OH)_6 \cdot 3H_2O$, A = Al, Bi, Ca, Ce, La, Nd, Y; X = As, P.

Agardite-(La)	$(La,Ca)Cu_6(AsO_4)_3(OH)_6 \cdot 3H_2O$
Agardite-(Y)	$(Y,Ca)Cu_6(AsO_4)_3(OH)_6 \cdot 3H_2O$
Goudeyite	$(Al,Y)Cu_6^{2+}(AsO_4)_3(OH)_6 \cdot 3H_2O$
Mixite	$BiCu_6^{2+}(AsO_4)_3(OH)_6 \cdot 3H_2O$
Petersite-(Y)	$(Y,Ce,Nd,Ca)Cu_6^{2+}(PO_4)_3(OH)_6 \cdot 3H_2O$

Monazite Group

Monoclinic arsenates, phosphates, silicates, of general formula ABO_4, A = Bi, Ca, Ce, La, Nd, Th; B = As^{5+}, P^{5+}, Si^{4+}.

Brabantite	$Ca_{0.5}Th_{0.5}(PO_4)$
Cheralite-(Ce)	$(Ce,Ca,Th)(P,Si)O_4$
Gasparite-(Ce)	$(Ce,La,Nd)AsO_4$
Huttonite	$ThSiO_4$
Monazite-(Ce)	$(Ce,La,Nd,Th)PO_4$
Monazite-(La)	$(La,Ce,Nd)PO_4$
Monazite-(Nd)	$(Nd,La,Ce)PO_4$
Rooseveltite	$BiAsO_4$

Montgomeryite Group

Monoclinic phosphates of general formula $Ca_4A^{2+}B_4^{3+}(PO_4)_6(OH)_4 \cdot 12H_2O$, A^{2+} = Fe, Mg, Mn; B^{3+} = Al, Fe.

Calcioferrite	$Ca_4Fe^{2+}(Fe^{3+},Al)_4(PO_4)_6(OH)_4 \cdot 13H_2O$
Kingsmountite	$(Ca,Mn^{2+})_4(Fe^{2+},Mn^{2+})Al_4(PO_4)_6(OH)_4 \cdot 12H_2O$
Montgomeryite	$Ca_4MgAl_4(PO_4)_6(OH)_4 \cdot 12H_2O$
Zodacite	$Ca_4Mn^{2+}Fe_4^{3+}(PO_4)_6(OH)_4 \cdot 12H_2O$

Montmorillonite Group

See Smectite group.

Nickeline Group

Hexagonal antimonides, arsenides, bismuthides, selenides, stannides, and tellurides of general formula AX, A = Co, Ni, Pd, Pt; X = As, Bi, Sb, Se, Sn, Te.

Breithauptite	NiSb
Freboldite	CoSe
Imgreite	NiTe (?)
Langisite	(Co,Ni)As
Nickeline	NiAs
Niggliite	PtSn
Sederholmite	b-NiSe
Sobolevskite	PdBi
Stumpflite	Pt(Sb,Bi)
Sudburyite	(Pd,Ni)Sb

Nordite Group

Orthorhombic silicates of general formula $Na_3Sr(REE)BSi_6O_{17}$, where REE = Ce or La, B = Fe^{2+}, Mn^{2+}, or Zn.

Ferronordite-(Ce)	$Na_3SrCeFe^{2+}Si_6O_{17}$
Manganonordite-(Ce)	$Na_3SrCeMn^{2+}Si_6O_{17}$
Nordite-(Ce)	$Na_3SrCeZnSi_6O_{17}$
Nordite-(La)	$Na_3SrLaZnSi_6O_{17}$

Olivine Group

Orthorhombic silicates of general formula $A_2^{2+}SiO_4$, A^{2+} = Fe, Mg, Mn, Ni.

Fayalite	$Fe_2^{2+}SiO_4$
Forsterite	Mg_2SiO_4
Liebenbergite	$(Ni,Mg)_2SiO_4$
Tephroite	$Mn_2^{2+}SiO_4$

Osumilite Group

Hexagonal and orthorhombic silicates of general formula $A_{1-2}B_{2-3}C_3Z_{12}O_{30}\cdot nH_2O$, A = Ba, Ca, K, Na; B = Fe^{2+}, Li, Mg, Mn^{2+}, Na, Sn, Ti, Y, Zn, Zr; C = Al, B, Be, Fe^{2+}, Fe^{3+}, Li, Mg, Zn; Z = Al, Si.

Armenite (?)	$BaCa_2Al_6Si_9O_{30}\cdot 2H_2O$
Berezanskite	$KLi_3Ti_2Si_{12}O_{30}$
Brannockite	$KLi_3Sn_2Si_{12}O_{30}$
Chayesite	$K(Mg,Fe^{2+})_4Fe^{3+}Si_{12}O_{30}$
Darapiosite	$KNa_2Li(Mn,Zn)_2ZrSi_{12}O_{30}$
Dusmatovite	$K(K,Na,h)(Mn^{2+},Y,Zr)_2(Zn,Li)_3Si_{12}O_{30}$
Eifelite	$KNa_3Mg_4Si_{12}O_{30}$
Emeleusite	$Na_4Li_2Fe_2^{3+}Si_{12}O_{30}$
Merrihueite	$(K,Na)_2(Fe^{2+},Mg)_5Si_{12}O_{30}$
Milarite	$KCa_2AlBe_2Si_{12}O_{30}\cdot 0.5H_2O$
Osumilite	$(K,Na)(Fe^{2+},Mg)_2(Al,Fe^{3+})_3(Si,Al)_{12}O_{30}$
Osumilite-(Mg)	$(K,Na)(Mg,Fe^{2+})_2(Al,Fe^{3+})_3(Si,Al)_{12}O_{30}$
Poudretteite	$KNa_2B_3Si_{12}O_{30}$
Roedderite	$(Na,K)_2(Mg,Fe^{2+})_5Si_{12}O_{30}$
Sogdianite	$(K,Na)_2(Li,Fe^{2+})_3(Zr,Ti,Fe^{3+})Si_{12}O_{30}$
Sugilite	$KNa_2(Fe^{2+},Mn^{2+},Al)_2Li_3Si_{12}O_{30}$
Yagiite	$(Na,K)_{1.5}Mg_2(Al,Mg)_3(Si,Al)_{12}O_{30}$

Overite Group

Orthorhombic phosphates of general formula $ABC(PO_4)_2(OH)\cdot 2–4H_2O$, A = Ca, Mn, Zn; B = Mg, Fe^{2+}, Mn^{2+}; C = Al, Fe^{3+}.

Lun'okite	$(Mn^{2+},Ca)(Mg,Fe^{2+},Mn^{2+})Al(PO_4)_2(OH)\cdot 4H_2O$
Manganosegelerite	$(Mn^{2+},Ca)(Mn^{2+},Fe^{2+},Mg)Fe^{3+}(PO_4)_2(OH)\cdot 4H_2O$
Overite	$CaMgAl(PO_4)_2(OH)\cdot 4H_2O$
Segelerite	$CaMgFe^{3+}(PO_4)_2(OH)\cdot 4H_2O$

Wilhelmvierlingite	$CaMn^{2+}Fe^{3+}(PO_4)_2(OH)\cdot 2H_2O$

Paravauxite Group

Triclinic phosphates of general formula $AB_2(PO_4)_2(OH)_2\cdot 8H_2O$ or $AB_2(PO_4)_2(OH)_3\cdot 7–8H_2O$, A = Mg, Fe^{2+}, Mn^{2+}, Fe^{3+}; B = Al, Fe^{3+}, Cr^{3+}.

Gordonite	$MgAl_2(PO_4)_2(OH)_2\cdot 8H_2O$
Laueite	$Mn^{2+}Fe_2^{3+}(PO_4)_2(OH)_2\cdot 8H_2O$
Paravauxite	$Fe^{2+}Al_2(PO_4)_2(OH)_2\cdot 8H_2O$
Sigloite	$Fe^{3+}Al_2(PO_4)_2(OH)_3\cdot 7H_2O$
Ushkovite	$MgFe_2^{3+}(PO_4)_2(OH)_2\cdot 8H_2O$

Pentlandite Group

Cubic sulfides of general formula AB_8X_8, A = Ag, Cd, Co, Fe, Mn, Ni, Pb; B = Co, Cu, Fe, Ni; X = S, Se.

Argentopentlandite	$Ag(Fe,Ni)_8S_8$
Cobalt pentlandite	Co_9S_8
Geffroyite	$(Ag,Cu,Fe)_9(Se,S)_8$
Manganese-shadlunite	$(Mn,Pb,Cd)(Cu,Fe)_8S_8$
Pentlandite	$(Fe,Ni)_9S_8$
Shadlunite	$(Pb,Cd)(Fe,Cu)_8S_8$

Periclase Group

Cubic oxides of general formula $M^{2+}O$, M^{2+} = Cd, Fe, Mg, Mn, Ni.

Bunsenite	NiO
Manganosite	$Mn^{2+}O$
Monteponite	CdO
Periclase	MgO
W_stite	$Fe^{2+}O$

Perovskite Group

Pseudocubic oxides, orthorhombic, or monoclinic, of general formula ABO_3, A = Ca, Ce, Na, Sr; B = Nb, Ti, Fe.

Latrappite	$(Ca,Na)(Nb,Ti,Fe)O_3$
Loparite-(Ce)	$(Ce,Na,Ca)(Ti,Nb)O_3$
Lueshite	$NaNbO_3$
Perovskite	$CaTiO_3$
Tausonite	$SrTiO_3$

Picromerite Group

Monoclinic sulfates of general formula $A_2B^{2+}(SO_4)_2\cdot 6H_2O$, A = K, (NH_4); B^{2+} = Cu, Fe, Mg, Ni.

Boussingaultite	$(NH_4)_2Mg(SO_4)_2\cdot 6H_2O$
Cyanochroite	$K_2Cu^{2+}(SO_4)_2\cdot 6H_2O$
Mohrite	$(NH_4)_2Fe^{2+}(SO_4)_2\cdot 6H_2O$
Nickel-boussingaultite	$(NH_4)_2(Ni,Mg)(SO_4)_2\cdot 6H_2O$

Picromerite	$K_2Mg(SO_4)_2 \cdot 6H_2O$

Plumbogummite Group = Crandallite Group.

Pumpellyite Group

Monoclinic silicates of general formula $Ca_2XY_2(SiO_4)(Si_2O_7)(OH)_2 \cdot H_2O$, X = Al, Fe^{2+}, Fe^{3+}, Mg, Mn^{2+}; Y = Al, Fe^{3+}, Cr^{3+}, Mn^{3+}. See *Can. Min.* **12**, 219–223 (1973).

Julgoldite-(Fe^{2+})	$Ca_2Fe^{2+}(Fe^{3+},Al)_2(SiO_4)(Si_2O_7)(OH)_2 \cdot H_2O$
Okhotskite	$Ca_2(Mn^{2+},Mg)(Mn^{3+},Al,Fe^{3+})_2Si_3O_{10}(OH)_4$
Pumpellyite-(Fe^{2+})	$Ca_2Fe^{2+}Al_2(SiO_4)(Si_2O_7)(OH)_2 \cdot H_2O$
Pumpellyite-(Fe^{3+})	$Ca_2(Fe^{3+},Mg,Fe^{2+})(Al,Fe^{3+})_2(SiO_4)(Si_2O_7)(OH)_2 \cdot H_2O$
Pumpellyite-(Mg)	$Ca_2MgAl_2(SiO_4)(Si_2O_7)(OH)_2 \cdot H_2O$
Pumpellyite-(Mn^{2+})	$Ca_2(Mn^{2+},Mg)(Al,Mn^{3+},Fe)_2(SiO_4)(Si_2O_7)(OH)_2 \cdot H_2O$
Shuiskite	$Ca_2(Mg,Al)(Cr,Al)_2(SiO_4)(Si_2O_7)(OH)_2 \cdot H_2O$

Pyrite Group

Cubic sulfides, arsenides, etc., of general formula AXY or AX_2, A = Au, Co, Cu, Fe, Mn, Ni, Os, Pd, Pt, Ru; X and Y = As, Bi, S, Sb, Se, Te. Compare the Marcasite group.

Aurostibite	$AuSb_2$
Cattierite	CoS_2
Dzharkenite	$FeSe_2$
Erlichmanite	OsS_2
Fukuchilite	$(Cu,Fe)S_2$
Geversite	$Pt(Sb,Bi)_2$
Hauerite	MnS_2
Insizwaite	$Pt(Bi,Sb)_2$
Kru_aite	$CuSe_2$
Laurite	RuS_2
Maslovite	$(Pt,Pd)(Bi,Te)_2$
Michenerite	PdBiTe
Penroseite	$(Ni,Co,Cu)Se_2$
Pyrite	FeS_2
Sperrylite	$PtAs_2$
Testibiopalladite	Pd(Sb,Te)Te
Trogtalite	$CoSe_2$
Vaesite	NiS_2
Villaman_nite	$(Cu,Ni,Co,Fe)S_2$

Pyrochlore Group

Cubic complex oxides of general formula $A_{1-2}B_2O_6(O,OH,F) \cdot nH_2O$; A = Ba, Bi, Ca, Ce, Cs, K, Na, Pb, Sb^{3+}, Sn, Sr, Th, U, Y, Zr; B = Fe, Nb, Sn, Ta, Ti, W. Pyrochlore subgroup has Nb > Ta, (Nb + Ta) > 2Ti; Microlite subgroup has Ta > Nb, (Ta + Nb) > 2Ti; Betafite subgroup has 2Ti > (Nb + Ta). Compare the closely related Stibiconite group.

Bariomicrolite	$Ba_2(Ta,Nb)_2(O,OH)_7$
Bariopyrochlore	$(Ba,Sr)_2(Nb,Ti)_2(O,OH)_7$

Betafite	$(Ca,Na,U)_2(Ti,Nb,Ta)_2O_6(OH)$
Bismutomicrolite	$(Bi,Ca)(Ta,Nb)_2O_6(OH)$
Calciobetafite	$Ca_2(Ti,Nb)_2(O,OH)_7$
Ceriopyrochlore-(Ce)	$(Ce,Ca,Y)_2(Nb,Ta)_2O_6(OH,F)$
Cesstibtantite	$(Cs,Na)Sb^{3+}Ta_4O_{12}$
Kalipyrochlore	$(K,Sr)_{2-x}Nb_2O_6(O,OH)\cdot nH_2O$
Microlite	$(Ca,Na)_2Ta_2O_6(O,OH,F)$
Natrobistantite	$(Na,Cs)Bi(Ta,Nb,Sb)_4O_{12}$
Plumbobetafite	$(Pb,U,Ca)(Ti,Nb)_2O_6(OH,F)$
Plumbomicrolite	$(Pb,Ca,U)_2Ta_2O_6(OH)$
Plumbopyrochlore	$(Pb,Y,U,Ca)_{2-x}Nb_2O_6(OH)$
Pyrochlore	$(Ca,Na)_2Nb_2O_6(OH,F)$
Stannomicrolite	$(Sn^{2+},Fe^{2+},Mn^{2+})_2(Ta,Nb,Sn^{4+})_2(O,OH)_7$
Stibiobetafite	$(Sb^{3+},Ca)_2(Ti,Nb,Ta)_2(O,OH)_7$
Stibiomicrolite	$(Sb,Ca,Na)_2(Ta,Nb)_2O_7$
Strontiopyrochlore	$Sr_2Nb_2(O,OH)_7$
Uranmicrolite	$(U,Ca,Ce)_2(Ta,Nb)_2O_6(OH,F)$
Uranpyrochlore	$(U,Ca,Ce)_2(Nb,Ta)_2O_6(OH,F)$
Yttrobetafite-(Y)	$(Y,U,Ce)_2(Ti,Nb,Ta)_2O_6(OH)$
Yttropyrochlore-(Y)	$(Y,Na,Ca,U)_{1-2}(Nb,Ta,Ti)_2(O,OH)_7$

Ferritungstite (cub.), Jixianite (cub.) and Zirkelite (mon.) are structurally related oxides; Ralstonite is an isostructural halide. The nomenclature of the group, with recommendations by the I.M.A. Commission on New Minerals and Mineral Names are given in **62**, 403–410 (1977).

Pyroxene Group

Orthorhombic or monoclinic silicates of general formula ABZ_2O_6, A = Ca, Fe^{2+}, Li, Mg, Mn^{2+}, Na, Zn; B = Al, Cr^{3+}, Fe^{2+}, Fe^{3+}, Mg, Mn^{2+}, Sc, Ti, V^{3+}; Z = Al, Si.

Aegirine	$NaFe^{3+}Si_2O_6$
Aegirine-augite	
Augite	$(Ca,Na)(Mg,Fe,Al,Ti)(Si,Al)_2O_6$
Clinoenstatite	$Mg_2Si_2O_6$
Clinoferrosilite	$(Fe^{2+},Mg)_2Si_2O_6$
Diopside	$CaMgSi_2O_6$
Donpeacorite	$(Mn^{2+},Mg)MgSi_2O_6$
Enstatite	$Mg_2Si_2O_6$
Esseneite	$CaFe^{3+}AlSiO_6$
Ferrosilite	$(Fe^{2+},Mg)_2Si_2O_6$
Hedenbergite	$CaFe^{2+}Si_2O_6$
Jadeite	$Na(Al,Fe^{3+})Si_2O_6$
Jervisite	$(Na,Ca,Fe^{2+})(Sc,Mg,Fe^{2+})Si_2O_6$
Johannsenite	$CaMn^{2+}Si_2O_6$
Kanoite	$(Mn^{2+},Mg)_2Si_2O_6$
Kosmochlor	$NaCr^{3+}Si_2O_6$
Namansilite	$NaMn^{3+}Si_2O_6$
Natalyite	$Na(V^{3+},Cr^{3+})Si_2O_6$

Omphacite	a clinopyroxene
Petedunnite	$Ca(Zn,Mn^{2+},Fe^{2+},Mg)Si_2O_6$
Pigeonite	$(Mg,Fe^{2+},Ca)(Mg,Fe^{2+})Si_2O_6$
Spodumene	$LiAlSi_2O_6$

Nchwaningite is structurally related. The nomenclature of the group is in accord with the recommendations of the I.M.A. Commission on New Minerals and Mineral Names, **73**, 1123–1133 (1988).

Rhabdophane Group

Hexagonal or pseudo-hexagonal phosphates, with general formula $XZO_4 \cdot 1–2H_2O$, X = Ca, Ce, Fe^{3+}. La, Pb, Th; Z = P, S.

Brockite	$(Ca,Th,Ce)(PO_4)\cdot H_2O$
Grayite	$(Th,Pb,Ca)PO_4\cdot H_2O$
Ningyoite	$(U,Ca,Ce)_2(PO_4)_2\cdot 1–2H_2O$
Rhabdophane-(Ce)	$(Ce,La)PO_4\cdot H_2O$
Rhabdophane-(La)	$(La,Ce)PO_4\cdot H_2O$
Rhabdophane-(Nd)	$(Nd,Ce,La)PO_4\cdot H_2O$
Tristramite	$(Ca,U^{4+},Fe^{3+})(PO_4,SO_4)\cdot 2H_2O$

Rosasite Group

Monoclinic or triclinic carbonates of general formula $A_2(CO_3)(OH)_2$ or $AB(CO_3)(OH)_2$, A and B = Co, Cu, Mg, Ni, Zn.

Glaukosphaerite	$(Cu,Ni)_2(CO_3)(OH)_2$
Kolwezite	$(Cu^{2+},Co)_2(CO_3)(OH)_2$
Mcguinnessite	$(Mg,Cu^{2+})_2(CO_3)(OH)_2$
Nullaginite	$Ni_2(CO_3)(OH)_2$
Rosasite	$(Cu^{2+},Zn)_2(CO_3)(OH)_2$
Zincrosasite	$(Zn,Cu^{2+})_2(CO_3)(OH)_2$

Pokrovskite is a related mineral.

Roselite Group

Monoclinic arsenates of general formula $Ca_2M^{2+}(AsO_4)_2\cdot 2H_2O$, M^{2+} = Co, Mg, Mn, Zn.

Brandtite	$Ca_2(Mn^{2+},Mg)(AsO_4)_2\cdot 2H_2O$
Roselite	$Ca_2(Co^{2+},Mg)(AsO_4)_2\cdot 2H_2O$
Wendwilsonite	$Ca_2(Mg,Co)(AsO_4)_2\cdot 2H_2O$
Zincroselite	$Ca_2Zn(AsO_4)_2\cdot 2H_2O$

Rozenite Group

Monoclinic sulfates of general formula $A^{2+}SO_4\cdot 4H_2O$, A^{2+} = Co, Fe, Mg, Mn, Ni, Zn.

Aplowite	$(Co,Mn^{2+},Ni)SO_4\cdot 4H_2O$
Boyleite	$(Zn,Mg)SO_4\cdot 4H_2O$
Ilesite	$(Mn^{2+},Zn,Fe^{2+})SO_4\cdot 4H_2O$
Rozenite	$Fe^{2+}SO_4\cdot 4H_2O$
Starkeyite	$MgSO_4\cdot 4H_2O$

Rutile Group

Tetragonal oxides of general formula $M^{4+}O_2$, M^{4+} = Ge, Mn, Pb, Si, Sn, Te, Ti.

Argutite	GeO_2
Cassiterite	SnO_2
Paratellurite	TeO_2
Plattnerite	PbO_2
Pyrolusite	$Mn^{4+}O_2$
Rutile	TiO_2
Squawcreekite	$(Fe^{3+},Sb^{5+},Sn^{2+})O_2$
Stishovite	SiO_2

Sellaite is structurally related to the Rutile group.

Scapolite Group

The tetragonal silicate series $Na_4Al_3Si_9O_{24}Cl$—$Ca_4Al_6Si_6O_{24}(CO_3,SO_4)$.

Marialite	$3NaAlSi_3O_8{\cdot}NaCl$
Meionite	$3CaAl_2Si_2O_8{\cdot}CaCO_3$

Schoenfliesite Group

Cubic hydroxides of general formula $M^{2+}Sn^{4+}(OH)_6$, M^{2+} = Ca, Cu, Fe, Mg, Mn, Zn.

Burtite	$CaSn(OH)_6$
Mushistonite	$(Cu^{2+},Zn,Fe^{2+})Sn^{4+}(OH)_6$
Natanite	$Fe^{2+}Sn^{4+}(OH)_6$
Schoenfliesite	$MgSn^{4+}(OH)_6$
Vismirnovite	$ZnSn^{4+}(OH)_6$
Wickmanite	$Mn^{2+}Sn^{4+}(OH)_6$

Compare the Stottite group.

Smectite Group

Monoclinic silicates of general formula $X_{0.3}Y_{2-3}Z_4O_{10}(OH)_2{\cdot}nH_2O$, X (exchangeable ions) = Ca/2, Li, Na; Y = Al, Cr^{3+}, Cu^{2+}, Fe^{2+}, Fe^{3+}, Li, Mg, Ni, Zn; Z = Al, Si.

Aliettite	a clay mineral
Beidellite	$(Na,Ca_{0.5})_{0.3}Al_2(Si,Al)_4O_{10}(OH)_2{\cdot}nH_2O$
Hectorite	$Na_{0.3}(Mg,Li)_3Si_4O_{10}(F,OH)_2$
Montmorillonite	$(Na,Ca)_{0.3}(Al,Mg)_2Si_4O_{10}(OH)_2{\cdot}nH_2O$
Nontronite	$Na_{0.3}Fe_2^{3+}(Si,Al)_4O_{10}(OH)_2{\cdot}nH_2O$
Saponite	$(Ca/2,Na)_{0.3}(Mg,Fe^{2+})_3(Si,Al)_4O_{10}(OH)_2{\cdot}4H_2O$
Sauconite	$Na_{0.3}Zn_3(Si,Al)_4O_{10}(OH)_2{\cdot}4H_2O$
Stevensite	$(Ca/2)_{0.3}Mg_3Si_4O_{10}(OH)_2$
Swinefordite	$(Ca,Na)_{0.3}(Li,Mg)_2(Si,Al)_4O_{10}(OH,F)_2{\cdot}2H_2O$
Volkonskoite	$Ca_{0.3}(Cr^{3+},Mg,Fe^{3+})_2(Si,Al)_4O_{10}(OH)_2{\cdot}4H_2O$
Yakhontovite	$(Ca,Na)_{0.5}(Cu^{2+},Fe^{2+},Mg)_2Si_4O_{10}(OH)_2{\cdot}3H_2O$

Compare Brammallite, Illite and Rectorite.

Sodalite Group

Cubic silicates of general formula $(Na,Ca)_{4–8}Al_6Si_6(O,S)_{24}(SO_4,Cl,(OH),S)_{1–2}\cdot nH_2O$.

Ha_yne	$(Na,Ca)_{4–8}Al_6Si_6(O,S)_{24}(SO_4,Cl)_{1–2}$
Lazurite	$(Na,Ca)_{7–8}(Al,Si)_{12}(O,S)_{24}[(SO_4),Cl_2,(OH)_2]$
Nosean	$Na_8Al_6Si_6O_{24}(SO_4)\cdot H_2O$
Sodalite	$Na_8Al_6Si_6O_{24}Cl_2$

Sphalerite Group

Cubic sulfides, selenides, and tellurides of general formula AX, A = Cd, Fe, Hg, Zn; X = S, Se, Te.

Coloradoite	HgTe
Hawleyite	CdS
Metacinnabar	HgS
Sphalerite	(Zn,Fe)S
Stilleite	ZnSe
Tiemannite	HgSe

Spinel Group

Cubic oxides of general formula AB_2O_4, A = Co, Cu, Fe^{2+}, Ge, Mg, Mn^{2+}, Ni, Ti, Zn; B = Al, Cr^{3+}, Fe^{2+}, Fe^{3+}, Mg, Mn^{3+}, Ti, V^{3+}.

Brunogeierite	$(Ge^{2+},Fe^{2+})Fe_2^{3+}O_4$
Chromite	$Fe^{2+}Cr_2O_4$
Cochromite	$(Co,Ni,Fe^{2+})(Cr,Al)_2O_4$
Coulsonite	$Fe^{2+}V_2^{3+}O_4$
Cuprospinel	$(Cu^{2+},Mg)Fe_2^{3+}O_4$
Franklinite	$(Zn,Mn^{2+},Fe^{2+})(Fe^{3+},Mn^{3+})_2O_4$
Gahnite	$ZnAl_2O_4$
Galaxite	$(Mn^{2+},Fe^{2+},Mg)(Al,Fe^{3+})_2O_4$
Hercynite	$Fe^{2+}Al_2O_4$
Jacobsite	$(Mn^{2+},Fe^{2+},Mg)(Fe^{3+},Mn^{3+})_2O_4$
Magnesiochromite	$MgCr_2O_4$
Magnesiocoulsonite	MgV_2O_4
Magnesioferrite	$MgFe_2^{3+}O_4$
Magnetite	$Fe^{2+}Fe_2^{3+}O_4$
Manganochromite	$(Mn^{2+},Fe^{2+})(Cr^{3+},V^{3+})_2O_4$
Nichromite	$(Ni,Co,Fe^{2+})(Cr^{3+},Fe^{3+},Al)_2O_4$
Qandilite	$(Mg,Fe^{2+})_2(Ti,Fe^{2+},Al)O_4$
Spinel	$MgAl_2O_4$
Trevorite	$NiFe_2^{3+}O_4$
Ulv_spinel	$TiFe_2^{2+}O_4$
Vuorelainenite	$(Mn^{2+},Fe^{2+})(V^{3+},Cr^{3+})_2O_4$
Zincochromite	$ZnCr_2^{3+}O_4$

Ringwoodite is an isostructural silicate. Compare the sulfides of the Linnaeite group.

Stannite Group

Tetragonal sulfides and selenides of general formula A_3BX_4, A = Ag, Cd, Cu, Fe, Hg, Zn; B = As, Ge, In, Sb, Sn; X = S, Se.

Briartite	$Cu_2(Zn,Fe)GeS_4$
_erny;ite	Cu_2CdSnS_4
Famatinite	Cu_3SbS_4
Hocartite	Ag_2FeSnS_4
Kuramite	Cu_3SnS_4
Luzonite	Cu_3AsS_4
Permingeatite	Cu_3SbSe_4
Pirquitasite	Ag_2ZnSnS_4
Stannite	Cu_2FeSnS_4
Velikite	Cu_2HgSnS_4

K_sterite and Ferrok_sterite are structurally related minerals.

Stibiconite Group

Cubic oxides of general formula $A_{1-2}B_2O_6(O,OH,F)$, A = Ag, Bi, Ca, Cu, Fe^{2+}, Fe^{3+}, K, Mn^{2+}, Na, Pb, Sb^{3+}; B = Fe^{3+}, Sb^{5+}, Ti. Compare with the Pyrochlore group.

Bindheimite	$Pb_2Sb_2O_6(O,OH)$
Bismutostibiconite	$Bi(Sb^{5+},Fe^{3+})_2O_7$
Partzite	$Cu_2^{2+}Sb^{2+}(O,OH)_7$ (?)
Rom_ite	$(Ca,Fe^{2+},Mn^{2+},Na)_2(Sb,Ti)_2O_6(O,OH,F)$
Stetefeldtite	$Ag_2Sb_2(O,OH)_7$ (?)
Stibiconite	$Sb^{3+}Sb_2^{5+}O_6(OH)$

Jixianite is a structurally related lead tungsten oxide.

Stottite Group

Tetragonal hydroxides of general formula $AB(OH)_6$, A = Fe^{2+}, Fe^{3+}, Mn^{2+}, Na; B = Ge^{4+}, Sn^{4+}, Sb^{5+}.

Jeanbandyite	$(Fe^{3+},Mn^{2+})Sn^{4+}(OH)_6$
Mopungite	$NaSb^{5+}(OH)_6$
Stottite	$Fe^{2+}Ge^{4+}(OH)_6$
Tetrawickmanite	$Mn^{2+}Sn^{4+}(OH)_6$

Compare the cubic minerals of the Schoenfliesite group.

Tapiolite Group

See Ferrotapiolite group.

Tetradymite Group

Trigonal selenides and tellurides of general formula A_2X_3, A = Bi, Sb; X = S, Se, Te.

Kawazulite	$Bi_2(Te,Se,S)_3$
Paraguanajuatite	$Bi_2(Se,S)_3$
Skippenite	Bi_2Se_2Te
Tellurantimony	Sb_2Te_3
Tellurobismuthite	Bi_2Te_3
Tetradymite	Bi_2Te_2S

Tetrahedrite Group

Cubic sulfides, selenides, and tellurides of general formula $A_{12}B_4X_{13}$, A = Ag, Cu, Fe, Hg,

Zn; B = As, Sb, Te; X = S, Se, Te.

Argentotennantite	$(Ag,Cu)_{10}(Zn,Fe)_2(As,Sb)_4S_{13}$
Freibergite	$(Ag,Cu,Fe)_{12}(Sb,As)_4S_{13}$
Giraudite	$(Cu,Zn,Ag)_{12}(As,Sb)_4(Se,S)_{13}$
Goldfieldite	$Cu_{12}(Te,Sb,As)_4S_{13}$
Hakite	$(Cu,Hg)_{12}Sb_4(Se,S)_{13}$
Tennantite	$(Cu,Ag,Fe,Zn)_{12}As_4S_{13}$
Tetrahedrite	$(Cu,Fe,Ag,Zn)_{12}Sb_4S_{13}$

Tourmaline Group

Trigonal borosilicates of general formula $WX_3Y_6(BO_3)_3Si_6O_{18}(O,OH,F)_4$, W = Ca, K, Na; X = Al, Fe^{2+}, Fe^{3+}, Li, Mg, Mn^{2+}; Y = Al, Cr^{3+}, Fe^{+3}, V^{3+}.

Buergerite	$NaFe_3^{3+}Al_6(BO_3)_3Si_6O_{18}(O,F)_4$
Chromdravite	$NaMg_3(Cr,Fe^{3+})_6(BO_3)_3Si_6O_{18}(OH)_4$
Dravite	$NaMg_3Al_6(BO_3)_3Si_6O_{18}(OH)_4$
Elbaite	$Na(Li,Al)_3Al_6(BO_3)_3Si_6O_{18}(OH)_4$
Feruvite	$Ca(Fe^{2+},Mg)_3(Al,Mg)_6(BO_3)_3Si_6O_{18}(OH)_4$
Foitite	$h[Fe_2^{2+}(Al,Fe^{3+})]Al_6Si_6O_{18}(BO_3)_3(OH)_4$
Liddicoatite	$Ca(Li,Al)_3Al_6(BO_3)_3Si_6O_{18}(O,OH,F)_4$
Olenite	$NaAl_3Al_6(BO_3)_3Si_6O_{18}(O,OH)_4$
Povondraite	$NaFe_3^{3+}Fe_6^{3+}(BO_3)_3(Si_6O_{18})(OH,O)_4$
Schorl	$NaFe_3^{2+}Al_6(BO_3)_3Si_6O_{18}(OH)_4$
Uvite	$(Ca,Na)(Mg,Fe^{2+})_3Al_5Mg(BO_3)_3Si_6O_{18}(OH,F)_4$

Tsumcorite Group

Monoclinic and triclinic arsenates, phosphates, vanadates, and sulfates with the general formula: $(M1)(M2)_2(XO_4)_2(OH,H_2O)_2$, where M1 is Pb, Ca, or Na; M2 is Cu, Zn, Fe^{3+}, Co, Mn^{3+}, and X is As, P, V, and S.

Ferrilotharmeyerite	$Ca(Fe^{3+},Zn)_2(AsO_4)_2(OH,H_2O)_2$	mon.
Gartrellite	$Pb[(Cu,Zn)(Fe^{3+},Zn,Cu)](AsO_4)_2(OH,H_2O)_2$	tric.
Helmutwinklerite	$Pb(Zn,Cu)_2(AsO_4)_2{\cdot}2H_2O$	tric.
Lotharmeyerite	$Ca(Mn^{3+},Zn)_2(AsO_4)_2(OH,H_2O)_2$	mon.
Mawbyite	$Pb(Fe^{3+},Zn)_2(AsO_4)_2(OH,H_2O)_2$	mon.
Mounanaite	$PbFe_2^{3+}(VO_4)_2(OH)_2$	mon.
Natrochalcite	$NaCu_2(SO_4)_2(OH,H_2O)_2$	mon.
Phosphogartrellite	$PbCuFe^{3+}(PO_4)_2(OH,H_2O)_2$	tric.
Thometzekite	$Pb(Cu^{2+},Zn)_2(AsO_4)_2{\cdot}2H_2O$	tric.(?)
Tsumcorite	$Pb(Zn,Fe^{3+})_2(AsO_4)_2(OH,H_2O)_2$	mon.

Turquoise Group

Triclinic phosphates of general formula $AB_6(PO_4)_xPO_3(OH)_{2-x}(OH)_8{\cdot}4H_2O$, A = Ca, Cu^{2+}, Fe^{2+}, Zn; B = Al, Fe^{3+}, Cr^{2+}.

Aheylite	$(Fe^{2+},Zn)Al_6(PO_4)_4(OH)_8{\cdot}4H_2O$

Chalcosiderite	$Cu^{2+}Fe_6^{3+}(PO_4)_4(OH)_8 \cdot 4H_2O$
Coeruleolactite	$(Ca,Cu^{2+})Al_6(PO_4)_4(OH)_8 \cdot 4–5H_2O$
Faustite	$(Zn,Cu^{2+})Al_6(PO_4)_4(OH)_8 \cdot 4H_2O$
Planerite	$Al_6(PO_4)_2(PO_3OH)_2(OH)_8 \cdot 4H_2O$
Turquoise	$Cu^{2+}Al_6(PO_4)_4(OH)_8 \cdot 4H_2O$

Variscite Group

Orthorhombic arsenates and phosphates of general formula $AXO_4 \cdot 2H_2O$, $A = Al, Fe^{3+}, Cr^{3+}, In^{3+}$; X = As, P.

Mansfieldite	$AlAsO_4 \cdot 2H_2O$
Scorodite	$Fe^{3+}AsO_4 \cdot 2H_2O$
Strengite	$Fe^{3+}PO_4 \cdot 2H_2O$
Variscite	$AlPO_4 \cdot 2H_2O$
Yanomamite	$InAsO_4 \cdot 2H_2O$

Vivianite Group

Monoclinic arsenates and phosphates of general formula $A_3^{2+}(XO_4)_2 \cdot 8H_2O$, A^{2+} = Co, Fe, Mg, Mn, Ni, Zn; X = As, P.

Annabergite	$Ni_3(AsO_4)_2 \cdot 8H_2O$
Arupite	$Ni_3(PO_4)_2 \cdot 8H_2O$
Bari_ite	$(Mg,Fe^{2+})_3(PO_4)_2 \cdot 8H_2O$
Erythrite	$Co_3(AsO_4)_2 \cdot 8H_2O$
H_rnesite	$Mg_3(AsO_4)_2 \cdot 8H_2O$
K_ttigite	$Zn_3(AsO_4)_2 \cdot 8H_2O$
Parasymplesite	$Fe_3^{2+}(AsO_4)_2 \cdot 8H_2O$
Vivianite	$Fe_3^{2+}(PO_4)_2 \cdot 8H_2O$

Bobierrite and Manganese-h_rnesite are related minerals, with b-axes twice those of minerals of this group.

Whiteite Group

Monoclinic phosphates of general formula $AB^{2+}CX_2(PO_4)_4(OH)_2 \cdot 8H_2O$, $A = Ca, Mn^{2+}$; B^{2+} = Mg, Mn, Fe, Zn; $C = Mg, Fe^{2+}$; X = Al, Fe^{3+}.

Jahnsite-(CaMnFe)	$CaMn^{2+}Fe_2^{3+}Fe_2^{3+}(PO_4)_4(OH)_2 \cdot 8H_2O$
Jahnsite-(CaMnMg)	$CaMn^{2+}(Mg,Fe^{2+})_2Fe_2^{2+}(PO_4)_4(OH)_2 \cdot 8H_2O$
Jahnsite-(CaMnMn)	$CaMn^{2+}Mn_2^{2+}Fe_2^{3+}(PO_4)_4(OH)_2 \cdot 8H_2O$
Keckite	$Ca(Mn^{2+},Zn)_2Fe_3^{3+}(PO_4)_4(OH)_3 \cdot 2H_2O$
Rittmanite	$(Mn^{2+},Ca)Mn^{2+}(Fe^{2+},Mn^{2+})_2(Al,Fe^{3+})_2(PO_4)_4(OH)_2 \cdot 8H_2O$
Whiteite-(CaFeMg)	$Ca(Fe^{2+},Mn^{2+})Mg_2Al_2(PO_4)_4(OH)_2 \cdot 8H_2O$
Whiteite-(CaMnMg)	$CaMn^{2+}Mg_2Al_2(PO_4)_4(OH)_2 \cdot 8H_2O$
Whiteite-(MnFeMg)	$(Mn^{2+},Ca)(Fe^{2+},Mn^{2+})Mg_2Al_2(PO_4)_4(OH)_2 \cdot 8H_2O$

Zeolite Group

This group has been the subject of a major review by a subcommittee of the Commission on New Minerals and Mineral Names of the International Mineralogical Association. The

subcommittee, headed by Dr. Douglas S. Coombs, has published its report in several journals; for example, Coombs *et al.* (1997) *Canadian Mineralogist* **35**, 1571–1606 where detailed references are given for all of the species. The report is discussed in a summary article by Mandarino (1999) in the *Mineralogical Record* **30**, 5–6. We recommend that readers interested in more details about this group of minerals read the report and the article.

Zeolite minerals are defined as silicates having framework structures which contain open cavities in the form of channels and cages. These are usually occupied by H_2O molecules and extra-framework cations that are commonly exchangeable. In many zeolites, not only do the extra-framework cations vary widely, but so also does the Al:Si ratio. This in turn changes the total extra-framework cation charge and commonly the number of extra-framework cations. The number of H_2O molecules is also variable; as the number of extra-framework cations increases, H_2O tends to decrease. The formulae given are therefore to be regarded as no more than simplified representative formulae. The crystallography varies greatly within the zeolite group and species fall into all of the crystal systems. The report establishes *series* which are comprised of two or more species based on the dominant extra-framework cation present. All members of a series have the same root name but are distinguished by a suffix consisting of a hyphen and the chemical symbol of the extra-framework cation. Note that this zeolite suffix differs from the Levinson-type suffix in that the latter consists of a hyphen followed by a chemical symbol (or symbols) enclosed in parentheses (i.e., brackets). Species are listed in bold face and series names are given in ordinary type. Note that two of the species, pahasapaite and weinebeneite, are beryllophosphates rather than silicates.

Amicite	$K_4Na_4[Al_8Si_8O_{32}]\cdot 10H_2O$, mon.
Ammonioleucite	$(NH_4)[AlSi_2O_6]$, tet.
Analcime	$Na[AlSi_2O_6]\cdot H_2O$, cub., tet., trig., orth., mon., and tric.
Barrerite	$Na_2[Al_2Si_7O_{18}]\cdot 6H_2O$, orth.
Bellbergite	$(K,Ba,Sr)_2Sr_2Ca_2(Ca,Na)_4[Al_{18}Si_{18}O_{72}]\cdot 30H_2O$, hex.
Bikitaite	$Li[AlSi_2O_6]\cdot H_2O$, mon. and tric.
Boggsite	$Ca_8Na_3[Al_{19}Si_{77}O_{192}]\cdot 70H_2O$, orth.
Brewsterite (series)	$(Sr,Ba)_2[Al_4Si_{12}O_{32}]\cdot 10H_2O$, mon.
Brewsterite-Ba	$(Ba,Sr)_2[Al_4Si_{12}O_{32}]\cdot 10H_2O$, mon.
Brewsterite-Sr	$(Sr,Ba)_2[Al_4Si_{12}O_{32}]\cdot 10H_2O$, mon.
Chabazite (series)	$(Ca_{0.5},Na,K)_4[Al_4Si_8O_{24}]\cdot 12H_2O$, trig. and tric.
Chabazite-Ca	$(Ca_{0.5},K,Na)_4[Al_4Si_8O_{24}]\cdot 12H_2O$, trig
Chabazite-K	$(K,Na,Ca_{0.5})_4[Al_4Si_8O_{24}]\cdot 12H_2O$, trig
Chabazite-Na	$(Na,K,Ca_{0.5})_4[Al_4Si_8O_{24}]\cdot 12H_2O$, trig
Chiavennite	$CaMn[Be_2Si_5O_{13}(OH)_2]\cdot 2H_2O$, orth.
Clinoptilolite (series)	$(Na,K,Ca_{0.5},Sr_{0.5},Ba_{0.5},Mg_{0.5})_6[Al_6Si_{30}O_{72}]\cdot \sim 20H_2O$, mon.
Clinoptilolite-Ca	$(Ca_{0.5},Na,K)_6[Al_6Si_{30}O_{72}]\cdot \sim 20H_2O$, mon.
Clinoptilolite-K	$(K,Na)_6[Al_6Si_{30}O_{72}]\cdot \sim 20H_2O$, mon.
Clinoptilolite-Na	$(Na,K,Ca_{0.5})_6[Al_6Si_{30}O_{72}]\cdot \sim 20H_2O$, mon.
Cowlesite	$Ca[Al_2Si_3O_{10}]\cdot 5.3H_2O$, orth.
Dachiardite (series)	$(Ca_{0.5},Na,K)_{4-5}[Al_{4-5}Si_{20-19}O_{48}]\cdot \sim 13H_2O$, mon.
Dachiardite-Ca	$(Ca_{0.5},K,Na)_{4-5}[Al_{4-5}Si_{20-19}O_{48}]\cdot \sim 13H_2O$, mon.
Dachiardite-Na	$(Na,K,Ca_{0.5})_{4-5}[Al_{4-5}Si_{20-19}O_{48}]\cdot \sim 13H_2O$, mon.

Edingtonite $Ba[Al_2Si_3O_{10}]\cdot 4H_2O$, orth. and tet.
Epistilbite $(Ca,Na_2)[Al_2Si_4O_{12}]\cdot 4H_2O$, mon. and tric.
Erionite (series) $(K,Na,Ca_{0.5})_{10}[Al_{10}Si_{26}O_{72}]\cdot \sim 30H_2O$, hex.
Erionite-Ca $(Ca_{0.5},K,Na)_{10}[Al_{10}Si_{26}O_{72}]\cdot \sim 30H_2O$, hex.
Erionite-K $(K,Na,Ca_{0.5})_{10}[Al_{10}Si_{26}O_{72}]\cdot \sim 30H_2O$, hex.
Erionite-Na $(Na,K,Ca_{0.5})_{10}[Al_{10}Si_{26}O_{72}]\cdot \sim 30H_2O$, hex.
Faujasite (series) $(Na,Ca_{0.5},Mg_{0.5},K)_{3-4}[Al_{3-4}Si_{9-8}O_{24}]\cdot 16H_2O$, cub.
Faujasite-Ca $(Ca_{0.5},Na,Mg_{0.5},K)_{3-4}[Al_{3-4}Si_{9-8}O_{24}]\cdot 16H_2O$, cub.
Faujasite-Mg $(Mg_{0.5},Ca_{0.5},Na,K)_{3-4}[Al_{3-4}Si_{9-8}O_{24}]\cdot 16H_2O$, cub.
Faujasite-Na $(Na,Ca_{0.5},Mg_{0.5},K)_{3-4}[Al_{3-4}Si_{9-8}O_{24}]\cdot 16H_2O$, cub.
Ferrierite (series) $(K,Na,Mg_{0.5},Ca_{0.5})_6[Al_6Si_{30}O_{72}]\cdot 18H_2O$, orth. and mon.
Ferrierite-K $(K,Na,Mg_{0.5},Ca_{0.5})_6[Al_6Si_{30}O_{72}]\cdot 18H_2O$, orth.
Ferrierite-Mg $(Mg_{0.5},K,Na,Ca_{0.5})_6[Al_6Si_{30}O_{72}]\cdot 18H_2O$, orth.
Ferrierite-Na $(Na,K,Mg_{0.5},Ca_{0.5})_6[Al_6Si_{30}O_{72}]\cdot 18H_2O$, mon.
Garronite $NaCa_{2.5}[Al_6Si_{10}]O_{32}\cdot 14H_2O$, tet. and orth.
Gaultite $Na_4[Zn_2Si_7O_{18}]\cdot 5H_2O$, orth.
Gismondine $Ca[Al_2Si_2O_8]\cdot 4.5H_2O$, mon.
Gmelinite (series) $(Na,Ca_{0.5},K,Sr_{0.5})_8[Al_8Si_{16}O_{48}]\cdot 22H_2O$, hex.
Gmelinite-Ca $(Ca_{0.5},Sr_{0.5},Na,K)_4[Al_8Si_{16}O_{48}]\cdot 22H_2O$, hex.
Gmelinite-K $(K,Ca_{0.5},Sr_{0.5},Na)_4[Al_8Si_{16}O_{48}]\cdot 22H_2O$, hex.
Gmelinite-Na $(Na,K,Ca_{0.5})_4[Al_8Si_{16}O_{48}]\cdot 22H_2O$, hex.
Gobbinsite $Na_5[Al_5Si_{11}O_{32}]\cdot 12H_2O$, orth.
Gonnardite $(Na,Ca)_{6-8}[(Al,Si)_{20}O_{40}]\cdot 12H_2O$, tet.
Goosecreekite $Ca[Al_2Si_6O_{16}]\cdot 5H_2O$, mon.
Gottardiite $Na_3Mg_3Ca_5[Al_{19}Si_{117}O_{272}]\cdot 93H_2O$, orth.
Harmotome $(Ba_{0.5},Ca_{0.5},K,Na)_5[Al_5Si_{11}O_{32}]\cdot 12H_2O$, mon.
Heulandite (series) $(Ca_{0.5},Sr_{0.5},Ba_{0.5},Mg_{0.5},Na,K,)_9[Al_9Si_{27}O_{72}]\cdot \sim 24H_2O$, mon.
Heulandite-Ca $(Ca_{0.5},Na,K)_9[Al_9Si_{27}O_{72}]\cdot \sim 24H_2O$, mon.
Heulandite-K $(K,Ca_{0.5},Na,Mg_{0.5},Sr_{0.5})_9[Al_9Si_{27}O_{72}]\cdot \sim 24H_2O$, mon.
Heulandite-Na $(Na,Ca_{0.5},K)_9[Al_9Si_{27}O_{72}]\cdot \sim 24H_2O$, mon.
Heulandite-Sr $(Sr_{0.5},Ca_{0.5},Na,K)_9[Al_9Si_{27}O_{72}]\cdot \sim 24H_2O$, mon.
Hsianghualite $Li_2Ca_3[Be_3Si_3O_{12}]F_2$, cub.
Kalborsite $K_6[Al_4Si_6O_{20}]B(OH)_4Cl$, tet.
Laumontite $Ca_4[Al_8Si_{16}O_{48}]\cdot 18H_2O$, mon.
Leucite $K[AlSi_2O6]$, tet.
Levyne (series) $(Ca_{0.5},Na,K)_6[Al_6Si_{12}O_{36}]\cdot \sim 17H_2O$, trig
Levyne-Ca $(Ca_{0.5},Na,K)_6[Al_6Si_{12}O_{36}]\cdot \sim 17H_2O$, trig
Levyne-Na $(Na,Ca_{0.5},K)_6[Al_6Si_{12}O_{36}]\cdot \sim 17H_2O$, trig
Lovdarite $K_4Na_{12}[Be_8Si_{28}O_{72}]\cdot 18H_2O$, orth.
Maricopaite $(Pb_7Ca_2)[Al_{12}Si_{36}(O,OH)_{100}]\cdot n(H_2O,OH)$, n , 32, orth.
Mazzite $(Mg_{2.5}K_2Ca_{1.5})[Al_{10}Si_{26}O_{72}]\cdot 30H_2O$, hex.
Merlinoite $K_5Ca_2[Al_9Si_{23}O_{64}]\cdot 22H_2O$, orth.
Mesolite $Na_{16}Ca_{16}[Al_{48}Si_{72}O_{240}]\cdot 64H_2O$, orth.

Montesommaite	$K_9[Al_9Si_{23}O_{64}]\cdot 10H_2O$, orth.
Mordenite	$(Na_2,Ca,K_2)_4[Al_8Si_{40}O_{96}]\cdot 28H_2O$, orth.
Mutinaite	$Na_3Ca_4[Al_{11}Si_{85}O_{192}]\cdot 60H_2O$, orth.
Natrolite	$Na_2[Al_2Si_3O_{10}]\cdot 2H_2O$, orth.
Offr_tite	$CaKMg[Al_5Si_{13}O_{36}]\cdot 16H_2O$, hex.
Pahasapaite	$(Ca_{5.5}Li_{3.6}K_{1.2}Na_{0.2}h_{13.5})Li_8[Be_{24}P_{24}O_{96}]\cdot 38H_2O$, cub.
Parth_ite	$Ca_2[Al_4Si_4O_{15}(OH)_2]\cdot 4H_2O$, mon.
Paulingite (series)	$(K,Ca_{0.5},Na,Ba_{0.5})_{10}[Al_{10}Si_{32}O_{84}]\cdot 27–44H_2O$, cub.
Paulingite-Ca	$(Ca_{0.5},K,Na)_{10}[Al_{10}Si_{32}O_{84}]\cdot 27–44H_2O$, cub.
Paulingite-K	$(K,Ca_{0.5},Na)_{10}[Al_{10}Si_{32}O_{84}]\cdot 27–44H_2O$, cub.
Perlialite	$K_9Na(Ca,Sr)[Al_{12}Si_{24}O_{72}]\cdot 15H_2O$, hex.
Phillipsite (series)	$(K,Na,Ca_{0.5},Ba_{0.5})_{4–7}[Al_{4–7}Si_{12–9}O_{32}]\cdot 12H_2O$, mon.
Phillipsite-Ca	$(Ca_{0.5},K,Na,Ba_{0.5})_{4–7}[Al_{4–7}Si_{12–9}O_{32}]\cdot 12H_2O$, mon.
Phillipsite-K	$(K,Na,Ca_{0.5},Ba_{0.5})_{4–7}[Al_{4–7}Si_{12–9}O_{32}]\cdot 12H_2O$, mon.
Phillipsite-Na	$(Na,K,Ca_{0.5},Ba_{0.5})_{4–7}[Al_{4–7}Si_{12–9}O_{32}]\cdot 12H_2O$, mon.
Pollucite	$(Cs,Na)[AlSi_2O_6]\cdot nH_2O$, where (Cs + n) = 1, cub.
Roggianite	$Ca_2[Be(OH)_2Al_2Si_4O_{13}]\cdot <2.5H_2O$, tet.
Scolecite	$Ca[Al_2Si_3O_{10}]\cdot 3H_2O$, mon.
Stellerite	$Ca[Al_2Si_7O_{18}]\cdot 7H_2O$, orth.
Stilbite (series)	$(Ca_{0.5},Na,K)_9[Al_9Si_{27}O_{72}]\cdot 28H_2O$, mon.
Stilbite-Ca	$(Ca_{0.5},Na,K)_9[Al_9Si_{27}O_{72}]\cdot 28H_2O$, mon.
Stilbite-Na	$(Na,Ca_{0.5},K)_9[Al_9Si_{27}O_{72}]\cdot 28H_2O$, mon.
Terranovaite	$NaCa[Al_3Si_{17}O_{40}]\cdot >7H_2O$, orth.
Thomsonite	$Ca_2Na[Al_5Si_5O_{20}]\cdot 6H_20$, orth.
Tschernichite	$Ca[Al_2Si_6O_{16}]\cdot \sim 8H_2O$, tet.
Tsch_rtnerite	$Ca_4(K,Ca,Sr,Ba)_3Cu_3(OH)_8[Al_{12}Si_{12}O_{48}]\cdot nH_2O$, n ~ 20, cub.
Wairakite	$Ca[Al_2Si_4O_{12}]\cdot 2H_2O$, mon. and tet.
Weinebeneite	$Ca[Be_3(PO_4)_2(OH)_2]\cdot 4H_2O$, mon.
Willhendersonite	$K_{0–1}Ca_{1.5–1.0}[Al_3Si_3O_{12}]\cdot 5H_2O$, tric.
Yugawaralite	$Ca[Al_2Si_6O_{16}]\cdot 4H_2O$, mon. and tric.

Tvedalite may be structurally related to Chiavennite, but a structural study is required. Paranatrolite is considered a doubtful species and requires further study.