

Amphibole Fact Sheet

Calcic Clinoamphiboles, Tremolite-Actinolite-Ferroactinolite $\text{Ca}_2\text{Mg}_5\text{Si}_8\text{O}_{22}(\text{OH})_2$ - $\text{Ca}_2\text{Fe}_5\text{Si}_8\text{O}_{22}(\text{OH})_2$ Monoclinic, $C2/m$

Figure 1. The main structural feature of amphibole is a double chain of Si-O tetrahedra extended along the crystallographic c-axis, shown in blue and labeled T1 and T2 after the atomic site designation. The metal sites for Mg^{2+} and Fe^{2+} lie in a strip of octahedral sites, shown in brown and labeled M1, M2, M3. These sites differ slightly in size and shape. The larger site, M4, is coordinated by 8 oxygens and contains larger cations such as Ca^{2+} and Na^+ . The crystallographic axes, a, b and c and the unit cell are indicated.

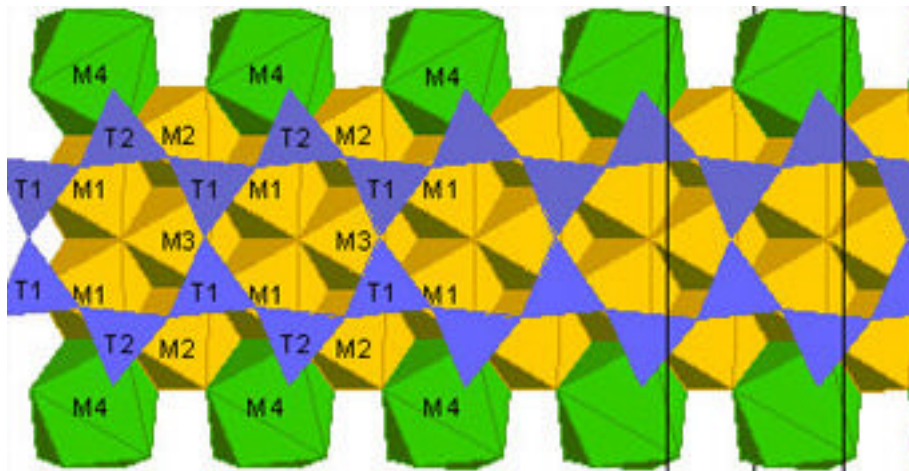
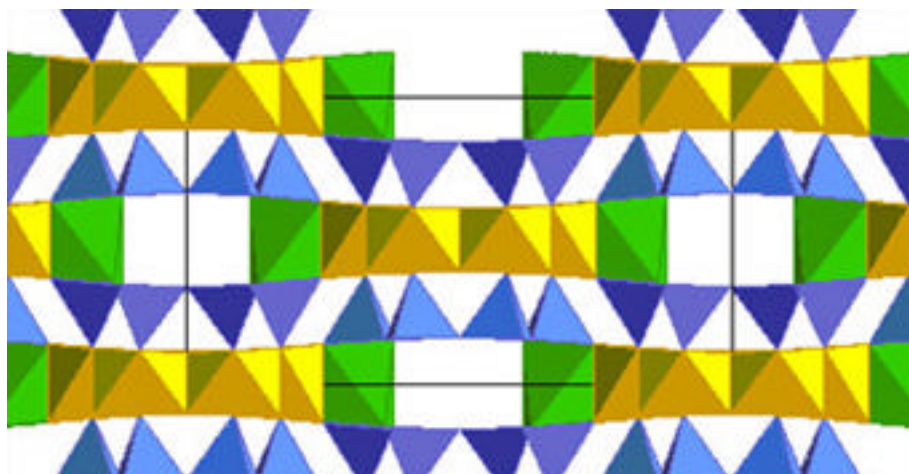


Figure 2. This view down the c-axis shows that the brown octahedral strips are sandwiched between blue double-chain tetrahedral strips with green M4 sites at the edges of the octahedral strips. The combination of the two tetrahedral strips and intervening octahedral strip has been called an I-beam. The I-beams are joined together in a stair step fashion to generate the three dimensional clinoamphibole structure. The large rectangular void between the strips is the site for large cations such as K^+ .



Low Calcium Clinoamphiboles, Cummingtonite-Grunerite $Mg_7Si_8O_{22}(OH)_2$ - $Fe_7Si_8O_{22}(OH)_2$ Monoclinic, $C2/m$

Figure 3. The main structural feature of amphibole is a double chain of Si-O tetrahedra extended along the crystallographic c-axis, shown in blue and labeled T1 and T2 after the atomic site designation. The metal sites for Mg^{2+} and Fe^{2+} lie in a strip of octahedral sites, shown in brown and labeled M1, M2, M3. These sites differ slightly in size and shape. The larger site, shown in dark brown and labeled M4, is coordinated by 8 oxygens and contains larger cations such as Fe^{2+} and Na^+ . In the case of Grunerite Fe^{2+} is preferentially ordered into the M4 site. The crystallographic axes, a, b and c and the unit cell are indicated.

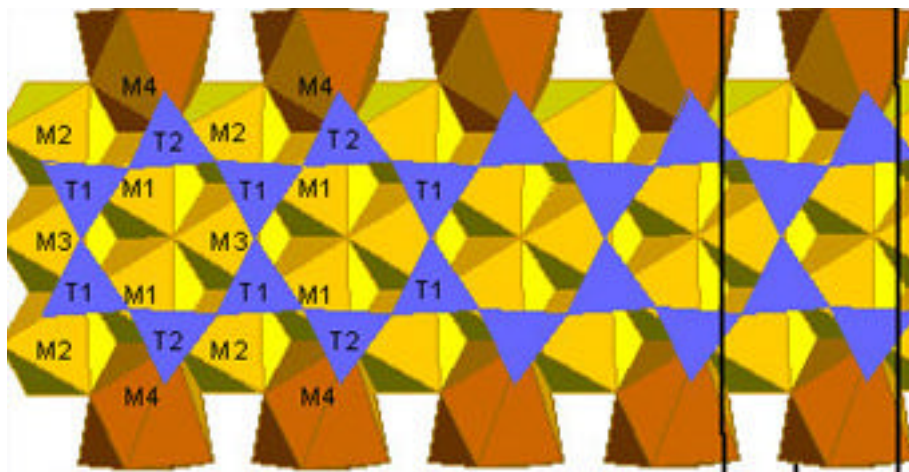


Figure 4. This view down the c-axis shows that the brown octahedral strips are sandwiched between blue double-chain tetrahedral strips with darker brown M4 sites at the edges of the octahedral strips. The combination of the two tetrahedral strips and intervening octahedral strip has been called an I-beam. The I-beams are joined together in a stair step fashion to generate the three dimensional clinoamphibole structure. The large rectangular void between the strips is the site for large cations such as K^+ .

