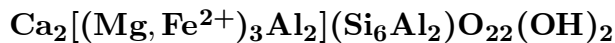


Tschermakite

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Crystal Data: Monoclinic. *Point Group:* $2/m$. [As prismatic crystals; as reaction rims on other minerals.] *Twinning:* [Simple or multiple twinning \parallel {100}.]**Physical Properties:** *Cleavage:* Perfect on {110}, intersecting at 56° and 124° ; partings on {100}, {001}. *Tenacity:* [Brittle.] *Hardness* = 5–6 *D*(meas.) = ~ 3.15 *D*(calc.) = [3.25]**Optical Properties:** Transparent to translucent. *Color:* Green. *Luster:* [Vitreous.] *Optical Class:* Biaxial (+) or (-). *Pleochroism:* Distinct in browns and greens. *Orientation:* $Y = b$. *Absorption:* $Z = Y > X$. $\alpha = 1.623\text{--}1.660$ $\beta = 1.630\text{--}1.680$ $\gamma = 1.638\text{--}1.688$ $2V$ (meas.) = $60^\circ\text{--}90^\circ$ **Cell Data:** *Space Group:* $C2/m$. $a = 9.762(6)$ $b = 17.994(12)$ $c = 5.325(6)$
 $\beta = 105.10(8)^\circ$ $Z = 2$ **X-ray Powder Pattern:** n.d.

Chemistry:	(1)	(2)
SiO ₂	41.06	41.36
TiO ₂	0.24	1.95
Al ₂ O ₃	18.52	12.49
Fe ₂ O ₃	4.67	4.25
FeO	7.81	12.36
MnO	0.25	0.11
MgO	15.31	11.45
CaO	9.92	10.85
Na ₂ O	1.24	1.68
K ₂ O	0.34	1.50
H ₂ O ⁺	0.46	1.87
H ₂ O ⁻	0.11	
Total	99.93	99.87

(1) Hurry Inlet, Greenland; corresponds to $(\text{Ca}_{1.56}\text{Na}_{0.35}\text{K}_{0.06})_{\Sigma=1.97}(\text{Mg}_{3.35}\text{Al}_{1.22}\text{Fe}_{0.96}^{2+}\text{Fe}_{0.51}^{3+}\text{Mn}_{0.03}\text{Ti}_{0.03})_{\Sigma=6.10}(\text{Si}_{6.02}\text{Al}_{1.98})_{\Sigma=8.00}\text{O}_{22}(\text{OH})_{0.45}$. (2) Central Bug region, Ukraine; corresponds to $(\text{Ca}_{1.71}\text{Na}_{0.48}\text{K}_{0.28})_{\Sigma=2.47}(\text{Mg}_{2.51}\text{Fe}_{1.52}\text{Fe}_{0.47}^{3+}\text{Al}_{0.27}\text{Ti}_{0.22}\text{Mn}_{0.01})_{\Sigma=5.00}(\text{Si}_{6.10}\text{Al}_{1.90})_{\Sigma=8.00}\text{O}_{22}(\text{OH})_2$.

Polymorphism & Series: Forms a series with ferrotschermakite.**Mineral Group:** Amphibole (calcic) group: $\text{Mg}/(\text{Mg} + \text{Fe}^{2+}) \geq 0.5$; $(\text{Na} + \text{K})_{\text{A}} < 0.5$; $\text{Na}_{\text{B}} < 0.67$; $(\text{Ca} + \text{Na})_{\text{B}} \geq 1.34$; $\text{Si} < 6.25$; $\text{Ti} < 0.5$.**Occurrence:** From eclogites and other ultramafic igneous rocks, and in medium- to high-grade metamorphic rocks, typically amphibolites.**Association:** Kyanite, garnet.**Distribution:** Probably widespread. Well-studied material from: Hurry Inlet, Fiskensæset, Greenland. At Glenelg and Knockormal, Ayrshire, Scotland. From Lake Kutemajärvi, Orivesi, and Perniö, Finland. In France, from Le Viala du Tarn, Aveyron. From the central Bug region, Ukraine.**Name:** To honor Professor Gustav Tschermak von Seysenegg (1836–1927), Austrian mineralogist, University of Vienna, Vienna, Austria.**Type Material:** n.d.**References:** (1) Winchell, A.N. (1945) Variations in composition and properties of the calciferous amphiboles. *Amer. Mineral.*, 30, 27–50. (2) Deer, W.A., R.A. Howie, and J. Zussman (1963) *Rock-forming minerals*, v. 2, chain silicates, 263–314. (3) Hawthorne, F.C. (1983) The crystal chemistry of the amphiboles. *Can. Mineral.*, 21, 173–480, esp. 368, 386.

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