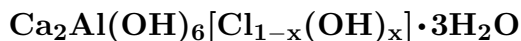


## Hydrocalumite



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**Crystal Data:** Monoclinic, pseudo-hexagonal. *Point Group:*  $2/m$ . Pseudo-hexagonal crystals, tabular on {001}, bounded by {120}, {120}, and {101}, to 1 cm; massive. *Twinning:* Common on {322} as contact twins.

**Physical Properties:** *Cleavage:* {001}, perfect; another inclined at  $\sim 60^\circ$  to {100}, poor. Hardness = 3  $D(\text{meas.}) = 2.09\text{--}2.15$   $D(\text{calc.}) = 2.09\text{--}2.15$  Strongly pyroelectric.

**Optical Properties:** Transparent. *Color:* Colorless to light green; colorless in thin section. *Luster:* Vitreous, pearly on cleavages.

*Optical Class:* Biaxial (-). *Orientation:*  $Y = b$ ;  $X \wedge c = 3^\circ$ .  $\alpha = 1.528\text{--}1.535$   $\beta = 1.552\text{--}1.553$   $\gamma = 1.556\text{--}1.557$   $2V(\text{meas.}) = 24^\circ\text{--}40^\circ$

**Cell Data:** *Space Group:*  $P2_1/c$ .  $a = 9.953\text{--}10.047$   $b = 11.466\text{--}11.523$   $c = 16.271\text{--}16.292$   $\beta = 104.20^\circ\text{--}104.46^\circ$   $Z = 8$

**X-ray Powder Pattern:** Scawt Hill, Ireland.

7.92 (vvs), 3.99 (vs), 2.87 (s), 2.46 (s), 1.657 (ms), 2.70 (m), 2.24 (m)

Chemistry:	(1)	(2)	(3)
Al <sub>2</sub> O <sub>3</sub>	18.1	18.8	18.6
MgO			1.0
CaO	40.0	41.5	38.3
Na <sub>2</sub> O			0.1
Cl			6.2
H <sub>2</sub> O + CO <sub>2</sub>	40.3		
H <sub>2</sub> O		38.5	34.1
CO <sub>2</sub>		1.8	1.0
Total	98.4	100.6	99.3

(1–2) Scawt Hill, Ireland. (3) Boisséjour, France; corresponding to  $(\text{Ca}_{1.92}\text{Mg}_{0.07}\text{Na}_{0.01})_{\Sigma=2.00}\text{Al}(\text{OH})_6[\text{Cl}_{0.48}(\text{OH})_{0.37}(\text{CO}_3)_{0.06}]_{\Sigma=0.91} \cdot 4\text{H}_2\text{O}$ .

**Occurrence:** A rare late-stage hydrothermal mineral in skarns formed from contact metamorphism of limestone or in xenoliths in lava.

**Association:** Afwillite, portlandite, ettringite, larnite, plombièreite, hydrogrossular, calcite.

**Distribution:** At Scawt Hill, near Larne, Co. Antrim, Ireland. From Boisséjour, near Ceyrat, Puy-de-Dôme, France. At Campomorto, Montalto di Castro, Lazio, Italy. From the Bellerberg, Rothenberg, and Emmelberg volcanos, near Mayen, Eifel district, Germany. At Kopeysk, Chelyabinsk coal basin, Southern Ural Mountains, Russia. In the Daba marbles, Jordan.

**Name:** For a HYDROus mineral containing CALcium and ALUMinum.

**Type Material:** n.d.

**References:** (1) Palache, C., H. Berman, and C. Frondel (1944) Dana's system of mineralogy, (7th edition), v. I, 667–668. (2) Buttler, F.G., L.S. Dent Glasser and H.F.W. Taylor (1959) Studies on  $4\text{CaO} \cdot \text{Al}_2\text{O}_3 \cdot 13\text{H}_2\text{O}$  and the related natural mineral hydrocalumite. *J. Amer. Ceramic Soc.*, 42, 121–126. (3) Grünhagen, H. and J. Mergoil (1963) Découverte d'hydrocalumite et afwillite associées à l'ettringite dans les porcelanites de Boisséjour près Ceyrat (Puy-de-Dôme). *Bull. Soc. fr. Minéral.*, 86, 149–157 (in French). (4) Fischer, R., H.-J. Kuzel, and H. Schellhorn (1980) Hydrocalumit: Mischkristalle von "Friedelschem Salz"  $\text{CaO} \cdot \text{Al}_2\text{O}_3 \cdot \text{CaCl}_2 \cdot 10\text{H}_2\text{O}$  und Tetracalciumaluminat-hydrat  $\text{CaO} \cdot \text{Al}_2\text{O}_3 \cdot \text{Ca}(\text{OH})_2 \cdot 12\text{H}_2\text{O}$ ? *Neues Jahrb. Mineral., Monatsh.*, 322–334 (in German with English abs.). (5) E. Passaglia and M. Sacerdoti (1988) Hydrocalumite from Montalto di Castro, Viterbo, Italy. *Neues Jahrb. Mineral., Monatsh.*, 454–461. (6) Sacerdoti, M. and E. Passaglia (1988) Hydrocalumite from Latium, Italy; its crystal structure and relationship with related synthetic phases. *Neues Jahrb. Mineral., Monatsh.*, 462–475.

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