

# Alumohydrocalcite

# CaAl<sub>2</sub>(CO<sub>3</sub>)<sub>2</sub>(OH)<sub>4</sub>•3H<sub>2</sub>O

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**Crystal Data:** Triclinic. *Point Group:*  $\bar{1}$  or 1. As fibers and needles, to 2.5 mm; commonly in radial aggregates and spherulites, feltlike crystal linings, and powdery to chalky masses.

**Physical Properties:** *Cleavage:* {100} perfect; {010} imperfect. *Tenacity:* Brittle. Hardness = 2.5 D(meas.) = 2.21–2.24 D(calc.) = 2.213 Decomposes in boiling H<sub>2</sub>O to calcite and hydrous aluminum oxide.

**Optical Properties:** Transparent to opaque. *Color:* Chalky white to pale blue, pale yellow, cream, gray; pale rose or brownish pink to dark violet in chromian varieties; colorless in transmitted light. *Luster:* Vitreous to pearly, earthy.

*Optical Class:* Biaxial (–). *Orientation:*  $X = b$ ; extinction inclined 6°–10°.  $\alpha = 1.485$ –1.502  $\beta = 1.553$ –1.563  $\gamma = 1.570$ –1.585 2V(meas.) = 64° 2V(calc.) = 50°–55°

**Cell Data:** *Space Group:*  $P\bar{1}$  or  $P1$  (chromian).  $a = 6.498(3)$   $b = 14.457(4)$   $c = 5.678(3)$   $\alpha = 95.83(5)^\circ$   $\beta = 93.23(3)^\circ$   $\gamma = 82.24(3)^\circ$   $Z = 2$

**X-ray Powder Pattern:** Bergisch-Gladbach, Germany.

6.25 (100), 6.50 (70), 3.23 (60), 2.039 (50), 2.519 (40), 7.21 (30), 2.860 (30)

Chemistry:	(1)	(2)	(3)		(1)	(2)	(3)
CO <sub>2</sub>	24.2	26.4	26.19	CaO	17.8	16.5	16.68
Al <sub>2</sub> O <sub>3</sub>	31.3	22.0	30.33	H <sub>2</sub> O	26.7	26.6	26.80
Cr <sub>2</sub> O <sub>3</sub>		8.3		Total	100.0	99.8	100.00

(1) Bergisch-Gladbach, Germany; (CO<sub>3</sub>)<sup>2–</sup>, (OH)<sup>1–</sup>, and H<sub>2</sub>O confirmed by IR. (2) Mount Hamilton area, California, USA; chromian, CO<sub>2</sub> by Leco carbon analyzer, H<sub>2</sub>O by CEC moisture analyzer; corresponds to Ca<sub>1.00</sub>(Al<sub>1.57</sub>Cr<sub>0.43</sub>)<sub>Σ=2.00</sub>(CO<sub>3</sub>)<sub>2</sub>(OH)<sub>4</sub>•3H<sub>2</sub>O.

(3) CaAl<sub>2</sub>(CO<sub>3</sub>)<sub>2</sub>(OH)<sub>4</sub>•3H<sub>2</sub>O.

**Occurrence:** Formed at low temperature by the action of carbonated waters on allophane or dickite in dolomites and limestones; chromian varieties are typically formed near altering chromite from serpentinites.

**Association:** Allophane, dickite, gibbsite, gypsum, aragonite, barite, Fe–Mn oxides.

**Distribution:** From a Cu–V orebody near Potekhina village, 40 km northeast of Sorsk, Khakassia district, Siberia, Russia. In Germany, in a dolomite quarry near Bergisch-Gladbach, from the Kalem quarry, near Birresborn, Eifel, and at Ramsbeck, North Rhine-Westphalia. Near Ladomirov, Slovakia. From Bicske-Csordakút, Hungary. In England, at Scarborough, North Yorkshire; Weston Favell, Northamptonshire; and in the Woodleaze quarry, Tytherington, Avon. At Montcada, Barcelona Province, Spain. From Chitral, North-West Frontier Province, Pakistan. Chromian varieties occur at: the Ruben mine, Kohlendorf, Nowa Ruda (Neurode), Silesia, Poland. In the Akenobe mine, Hyogo Prefecture, Japan. From east of Mount Hamilton, Santa Clara Co., California, USA. Several other poorly defined localities are known.

**Name:** From *aluminum*; water, *hydro*; and calcium carbonate, *calcite*, in the composition.

**Type Material:** A.E. Fersman Mineralogical Museum, Academy of Sciences, Moscow, Russia, 77088.

**References:** (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 280–281. (2) Kautz, K. (1968) Ein Vorkommen von Alumohydrocalcit und Allophan bei Bergisch-Gladbach. Neues Jahrb. Mineral., Monatsh., 350–358 (in German with English abs.). (3) Kautz, K. (1969) Elektronenbeugung und Infrarot-Untersuchungen an Alumohydrocalcit. Neues Jahrb. Mineral., Monatsh., 130–137 (in German with English abs.). (4) Paar, W. (1979) Ein Vorkommen von Alumohydrocalcit von Chitral, Westpakistan, und neue Beobachtungen an chromhaltigem Alumohydrocalcit von Nowej Rudy, Polen (= Neurode, Schlesien). Aufschluss, 28, 269–272 (in German). (5) Roberts, A.C. and M. Bonardi (1983) The X-ray crystallography of a chromian alumohydrocalcite from the Akenobe mine, Hyogo Prefecture, Japan. Geol. Surv. Can. Paper 83-1A, 477–479. (6) Pekov, I.V. (1998) Minerals first discovered on the territory of the former Soviet Union. Ocean Pictures, Moscow, 25.

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