Calumetite $Cu(OH,Cl)_2 \cdot 2H_2O$

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Crystal Data: Orthorhombic. *Point Group:* n.d. As spherules and sheaves of scaly crystals, subparallel on {001}, with {001} and {110}.

Physical Properties: *Cleavage:* {001}, good. *Tenacity:* Brittle. Hardness = 2
D(meas.) = n.d. D(calc.) = n.d.

Optical Properties: Semitransparent. *Color:* Brilliant azure to powder blue; bluish white on the cleavage. *Luster:* Pearly on the cleavage.
Optical Class: Biaxial (–). *Pleochroism:* Feeble; in blues. *Orientation:* $X = c$; $Y = a$; $Z = b$. *Absorption:* $Z \geq Y > X$. $\alpha = 1.666$ $\beta = 1.690$ $\gamma = 1.690$ 2V(meas.) = 2°

Cell Data: *Space Group:* n.d. Z = n.d.

X-ray Powder Pattern: Centennial mine, Michigan, USA.
7.50 (10), 2.481 (8), 3.02 (6), 3.76 (5), 3.42 (3), 3.30 (3), 2.341 (3)

Chemistry:

	(1)
AgCl	0.17
Cu	44.1
Cl	5.3
$H_2O^+ + OH$	33.5
H_2O^+	16.9
Total	99.97

(1) Centennial mine, Michigan, USA; Cu by electrolysis, H_2O:OH from charge balance; corresponding to $Cu_{0.99}[(OH)_{1.78}Cl_{0.22}]_{\Sigma=2.00} \cdot 2.35H_2O$.

Occurrence: In cavities and fractures in basalt, formed by the action of chlorine-bearing connate waters on copper, cuprite being regarded as an intermediate product in the alteration (Centennial mine, Michigan, USA).

Association: Tremolite, quartz, epidote, monazite, copper, cuprite, atacamite, buttgenbachite, malachite, paratacamite, anthonyite (Centennial mine, Michigan, USA).

Distribution: In the USA, from the Centennial and other nearby mines, near Calumet, Houghton Co., Michigan. From Laurium, Greece, in slag. In Germany, from Niederfischbach, Siegerland, and at Richelsdorf, Hesse, in slag.

Name: For the town of Calumet, Michigan, USA, near which it was first discovered.

Type Material: National Museum of Natural History, Washington, D.C., USA, 115870.

References: (1) Williams, S.A. (1963) Anthonyite and calumetite, two new minerals from the Michigan copper district. Amer. Mineral., 48, 614–619.

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