Belloite Cu(OH)Cl

Crystal Data: Monoclinic. *Point Group*: 2/*m*. As grains to 100 μm in incrustations and masses.

Physical Properties: *Cleavage*: n.d. *Fracture*: n.d. *Tenacity*: n.d. Hardness = Soft. D(meas.) = n.d. D(calc.) = 3.79 Nonfluorescent. Unstable in non-desert conditions; converts in water to botallackite and atacamite.

Optical Properties: Transparent to translucent. *Color*: Yellowish green to olive-green. *Streak*: Yellowish green. *Luster*: Vitreous. *Optical Class*: Biaxial. *n*(calc.) = 1.85 *Pleochroism*: Weak, yellowish green to pale yellowish green.

Cell Data: *Space Group*: $P2_1/a$. $a = 5.552(3)$ $b = 6.668(2)$ $c = 6.124(2)$ $\beta = 115.00(3)°$ Z = 4

X-ray Powder Pattern: Sierra Gorda, Antofagasta, Atacama Desert, Chile. 5.553 (100), 2.758 (52), 2.241 (27), 1.851 (21), 2.516 (18), 1.769 (16), 1.607 (15)

Chemistry:

	(1)
CuO	68.84
Cl	26.35
H_2O	7.47
-O = Cl	5.96
Total	96.70

(1) Sierra Gorda, Antofagasta, Atacama Desert, Chile; average electron microprobe and CHN analyses; corresponding to $Cu_{1.05}(OH)_{1.00}O_{0.10}Cl_{0.90}$.

Occurrence: In a desert at abandoned copper mines (Chile). An alteration product of fumarolic sublimates (Russia). In a desert guano deposit (Chile).

Association: Nitratine, montmorillonite, paratacamite, atacamite, gunningite, alunite, natrojarosite; intermediate members of the aubertite-magnesioaubertite solid-solution series, eriochalcite, alunite, kaolinite, halloysite, riotintoite, anatacamite, vendidaite (La Vendida mine); bojarite, halite (Pabellón de Pica Mountain).

Distribution: From the La Vendida and an unnamed abandoned mine [TL], near Sierra Gorda, Antofagasta, Atacama Desert, Chile. At Pabellón de Pica Mountain, 1.5 km south of the Chanabaya village, Iquique Province, Tarapacá Region, Chile. At fumaroles, Second scoria cone, Tolbachik volcano, Kamchatka, Russia.

Name: Honors Andrés *Bello* (1780-1865), founder and first rector of the University of Chile.

Type Material: Mineralogical Museum, University of Hamburg, Germany.

References: (1) Schlüter, J., K.-H. Klaska, and G. Gebhard (2000) Belloite, Cu(OH)Cl, a new mineral from Sierra Gorda, Antofagasta, Chile. Neues Jahrb. Mineral. Mon., 67-73. (2) (2000) Amer. Mineral., 85, 1843 (abs. ref. 1). (3) Effenberger, H. (1984) Verfeinerung der Kristallstruktur von Kupfer(II)-hydroxichlorid, Cu(OH)Cl. Monatshefte für Chemie, 115, 725-730. (4) Chukanov, N.V., G. Möhn, N.V. Zubkova, D.A. Ksenofontov, I.V. Pekov, A.A. Agakhanov, S.N. Britvin, and J. Desor (2020) Bojarite, $Cu_3(N_3C_2H_2)_3(OH)Cl_2 \cdot 6H_2O$, a new mineral species with a microporous metal-organic framework from the guano deposit at Pabellón de Pica, Iquique Province, Chile. Mineral. Mag., 84, 921-927.