Christelite $Zn_3Cu_2(SO_4)_2(OH)_6 \cdot 4H_2O$

Crystal Data: Triclinic. *Point Group:* $\overline{1}$. As thin bladed crystals, flattened on {001}, to 13 mm.

Physical Properties: *Cleavage:* On {001}, perfect. Hardness = n.d. D(meas.) = 3.14 D(calc.) = 3.20

Optical Properties: Transparent. *Color:* Greenish blue. *Streak:* Bright greenish blue. *Luster:* Vitreous.
Optical Class: Biaxial (–). *Pleochroism:* X = pale blue; $Y = Z$ = blue. $\alpha = 1.598$ $\beta = 1.626$ $\gamma = 1.635$ 2V(meas.) = 59.4° 2V(calc.) = 59°

Cell Data: *Space Group:* $P\overline{1}$. $a = 5.4143(8)$ $b = 6.336(1)$ $c = 10.470(3)$ $\alpha = 94.32(3)°$ $\beta = 90.06(2)°$ $\gamma = 90.27(2)°$ Z = 2

X-ray Powder Pattern: San Francisco mine, Chile.
5.230 (100), 10.459 (82), 3.486 (54), 1.743 (12), 2.493 (10), 2.355 (10), 3.157 (8)

Chemistry:

	(1)	(2)
SO_3	23.53	23.22
CuO	18.62	23.08
ZnO	36.25	35.41
H_2O	23.05	18.29
Total	101.45	100.00

(1) San Francisco mine, Chile; by electron microprobe, H by CHN analyzer, H_2O and $(OH)^{1-}$ then proportioned by crystal-structure analysis; corresponds to $Zn_{2.82}Cu_{1.48}(SO_4)_{1.86}(OH)_{4.88} \cdot 5.66H_2O$. (2) $Zn_3Cu_2(SO_4)_2(OH)_6 \cdot 4H_2O$.

Occurrence: A secondary mineral in the oxidized portions of a Cu–Zn sulfide deposit.

Association: Zincian paratacamite, anglesite, hemimorphite, gordaite, quartz.

Distribution: From the San Francisco mine, two km west of the Sierra Gorda railway station, Sierra Gorda district, Antofagasta, Chile.

Name: Honors Christel Gebhard-Giesen (1950–), German mineral collector.

Type Material: University of Hamburg, Hamburg, Germany.

References: (1) Schlüter, J., K.-H. Klaska, G. Adiwidjaja, and G. Gebhard (1996) Christelite, $Zn_3Cu_2(SO_4)_2(OH)_6 \cdot 4H_2O$, a new mineral from the San Francisco mine, Antofagasta, Chile. Neues Jahrb. Mineral., Monatsh., 188–192. (2) (1997) Amer. Mineral., 82, 207–210 (abs. ref. 1). (3) Adiwidjaja, G., K. Friese, K.-H. Klaska, and J. Schlüter (1996) The crystal structure of christelite $Zn_3Cu_2(SO_4)_2(OH)_6 \cdot 4H_2O$. Zeits. Krist., 211, 518–521.