Chenite $Pb_4Cu(SO_4)_2(OH)_6$

Crystal Data: Triclinic. *Point Group:* $\overline{1}$. As complex prismatic crystals elongated along [032], to 1.5 mm. Of the 20 pinacoids identified, {$\overline{1}$32}, {$\overline{22}$1} {100} and {$\overline{1}$10} are dominant, yielding a bricklike shape. *Twinning:* Uncommon by an unresolved twin law.

Physical Properties: *Cleavage:* On {100}, good; traces of a second one on {001}.
Hardness = ∼2.5 D(meas.) = 5.98(2) D(calc.) = 6.044

Optical Properties: Transparent to translucent. *Color:* Sky-blue. *Streak:* Pale blue.
Luster: Vitreous to resinous.
Optical Class: Biaxial (–). *Pleochroism:* Weak. *Dispersion:* $r \gg v$, very strong. $\alpha = 1.871(5)$
$\beta = 1.909(5)$ $\gamma = 1.927(5)$ 2V(meas.) = 67(1)° 2V(calc.) = 68°

Cell Data: *Space Group:* $P\overline{1}$. $a = 5.791(1)$ $b = 7.940(1)$ $c = 7.976(1)$ $\alpha = 112.02(1)°$
$\beta = 97.73(1)°$ $\gamma = 100.45(1)°$ Z = 1

X-ray Powder Pattern: Susanna mine, Scotland.
3.60 (10), 3.41 (9), 5.55 (7), 2.80 (7), 4.32 (6), 2.07 (6), 3.30 (5)

Chemistry:

	(1)	(2)
SO_3	13.3	13.50
PbO	74.5	75.25
CuO	7.8	6.70
H_2O	[4.4]	4.55
Total	[100.0]	100.00

(1) Susanna mine, Scotland; by electron microprobe, H_2O by difference, presence of $(SO_4)^{2-}$ and $(OH)^{1-}$ and absence of H_2O confirmed by IR, corresponds to $Pb_{3.98}Cu_{1.17}(SO_4)_{1.98}(OH)_{6.08}$.
(2) $Pb_4Cu(SO_4)_2(OH)_6$.

Occurrence: Of rare occurrence in the oxidized portions of some Pb–Cu sulfide deposits.

Association: Caledonite, linarite, leadhillite, susannite, elyite, lanarkite, galena, chalcopyrite.

Distribution: From the Susanna mine, Leadhills, Lanarkshire, Scotland. At the Llechwedd Helyg mine, Tir-y-Mynach, Dyfed, Wales. In the Driggith mine, Caldbeck Fells, Cumbria, England. From the Virneberg mine, near Rheinbreitbach, Rhineland-Palatinate, and at Ramsbeck, North Rhine-Westphalia, Germany.

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References: (1) Paar, W.H., K. Mereiter, R.S.W. Braithwaite, P. Keller, and P.J. Dunn (1986) Chenite, $Pb_4Cu(SO_4)_2(OH)_6$, a new mineral from Leadhills, Scotland. Mineral. Mag., 50, 129–135. (2) (1987) Amer. Mineral., 72, 222 (abs. ref. 1). (3) Hess, H., P. Keller, and H. Riffel (1988) The crystal structure of chenite, $Pb_4Cu(OH)_6(SO_4)_2$. Neues Jahrb. Mineral., Monatsh., 259–264.