Mallestigite $Pb_3Sb(SO_4)(AsO_4)(OH)_6 \cdot 3H_2O$

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Crystal Data: Monoclinic. *Point Group:* $2/m$. Crystals are tabular or prismatic, elongated along [001], showing {010}, {110}, {001}, to 1 mm, commonly in parallel to radial aggregates.

Physical Properties: *Cleavage:* On {010}, distinct. *Fracture:* Even. *Tenacity:* Very brittle. Hardness = ∼3 D(meas.) = > 4.2 D(calc.) = 5.21

Optical Properties: Transparent. *Color:* Cerulean blue, blue-green, pale blue. *Streak:* Pale blue. *Luster:* Vitreous.
Optical Class: Biaxial (+). *Pleochroism:* Moderate; in pale blues. *Absorption:* $X \geq Y > Z$.
$\alpha = 1.868$ $\beta = 1.892$ $\gamma = 1.928$ 2V(meas.) = 80°

Cell Data: *Space Group:* $C2/m$. $a = 18.93(3)$ $b = 7.3(1)$ $c = 11.35(2)$ $\beta = 112.44(10)°$
Z = 2

X-ray Powder Pattern: Tiger, Arizona, USA.
2.896 (100), 6.67 (90), 3.05 (90), 4.72 (80), 10.43 (60), 6.08 (60), 5.24 (30)

Chemistry:

	(1)	(2)
SO_3	7.7	7.01
Sb_2O_5		7.08
Sb_2O_3	6.1	
Al_2O_3	2.3	2.23
CuO	14.9	13.93
PbO	57.6	58.63
Cl	5.7	6.21
H_2O	[7.0]	6.31
$-O = Cl_2$	1.3	1.40
Total	[100.0]	100.00

(1) Tiger, Arizona, USA; by electron microprobe, H_2O by difference; corresponds to $Pb_{5.81}Cu_{4.22}Al_{1.02}Sb_{0.94}O_2(S_{1.07}O_4)_2Cl_{3.62}(OH)_{15.58}$. (2)$Pb_6Cu_4AlSbO_2(SO_4)_2Cl_4(OH)_{16}$.

Occurrence: A rare secondary mineral in the oxidized zone of a hydrothermal polymetallic base-metal deposit (Tiger, Arizona, USA); in metallic slag, formed by reaction with ocean water (Laurium, Greece).

Association: Anglesite, leadhillite, caledonite, phosgenite, diaboleite, wulfenite (Tiger, Arizona, USA); cerussite, matlockite, laurionite, paralaurionite, phosgenite, fiedlerite, penfieldite, boleite, diaboleite (Laurium, Greece).

Distribution: From the Mammoth-St. Anthony mine, Tiger, Pinal Co., Arizona, USA. At Laurium, Greece, in slag.

Name: For the Mammoth vein at Tiger, Arizona, from where the mineral was first noted, and the town of Mammoth, Arizona, USA, named for the mine.

Type Material: Victor Goldschmidt University, Göttingen, Germany, M5632; National Museum of Natural History, Washington, D.C., USA, 141368, 161200.

References: (1) Peacor, D.R., P.J. Dunn, G. Schnorrer-Köhler, and R.A. Bideaux (1985) Mammothite , a new mineral from Tiger, Arizona and Laurium, Greece. Mineral. Record, 16, 117–120. (2) (1986) Amer. Mineral., 71, 229–230 (abs. ref. 1). (3) Effenberger, H. (1985) The crystal structure of mammothite, $Pb_6Cu_4AlSbO_2(OH)_{16}Cl_4(SO_4)_2$. Tschermaks Mineral. Petrog. Mitt., 34, 279–288.

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