

## Luddenite

## Pb<sub>2</sub>Cu<sub>2</sub>Si<sub>5</sub>O<sub>14</sub>•14H<sub>2</sub>O

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**Crystal Data:** Monoclinic. *Point Group:* n.d. Rare crystals tend to a platy habit with wedge-shaped terminations; microcrystalline, with individual grains to 0.01 mm, forming rosettes and fan-shaped aggregates.

**Physical Properties:** *Cleavage:* Parallel and normal to the plane of flattening of the microcrystals. Hardness = 4 D(meas.) = 4.45 D(calc.) = [4.98]

**Optical Properties:** Semitransparent. *Color:* Nickel-green. *Streak:* Slightly paler nickel green.

*Optical Class:* Biaxial. *Pleochroism:* X = Y = yellow-green; Z = rich emerald-green.  $\alpha = 1.852$   $\beta = \text{n.d.}$   $\gamma = 1.867$   $2V(\text{meas.}) = \sim 40^\circ$

**Cell Data:** *Space Group:* n.d.  $a = 7.85$   $b = 20.06$   $c = 14.72$   $\beta = 90.78^\circ$   $Z = [6]$

**X-ray Powder Pattern:** Artillery Peaks area, Arizona, USA.

7.361 (10), 3.173 (10), 2.918 (8), 5.218 (7), 4.226 (5), 3.515 (5), 3.411 (5)

**Chemistry:**

	(1)	(2)	(3)
SiO <sub>2</sub>	25.7	27.2	25.94
TiO <sub>2</sub>	4.7		
CuO	13.2	14.0	13.74
PbO	35.1	37.1	38.54
H <sub>2</sub> O	20.5	21.7	21.78
Total	99.2	[100.0]	100.00

(1) Artillery Peaks area, Arizona, USA; microchemical analysis, H<sub>2</sub>O by Penfield method; some H<sub>2</sub>O may be nonessential. (2) Recalculated to 100.0% after removal of TiO<sub>2</sub> impurity.

(3) Pb<sub>2</sub>Cu<sub>2</sub>Si<sub>5</sub>O<sub>14</sub>•14H<sub>2</sub>O.

**Occurrence:** In thoroughly oxidized Pb–Cu sulfide ores.

**Association:** Galena, chalcopyrite, fluorite, quartz, alamosite, melanotekite, cerussite, chalcocite, shattuckite, chrysocolla, wickenburgite, altered Fe–Ti oxides.

**Distribution:** On the dumps of a Pb–Ag–Cu prospect in the Artillery Peaks area, Mohave Co., Arizona, USA.

**Name:** For Raymond W. Ludden, Chief Geologist for Western Exploration, Phelps Dodge Corporation.

**Type Material:** The Natural History Museum, London, England, 1984,473–474.

**References:** (1) Williams, S.A. (1982) Luddenite, a new copper-lead silicate from Arizona. *Mineral. Mag.*, 46, 363–364. (2) (1983) *Amer. Mineral.*, 68, 643 (abs. ref. 1).