## **Tennantite-(Cu)**

**Crystal Data**: Cubic. *Point Group*:  $\overline{4}$  3*m*. As anhedral grains, to 0.1 mm; often as ameboid oriented patches to 80  $\mu$ m, sometimes replacing enargite.

**Physical Properties**: *Cleavage*: Indistinct. *Tenacity*: Brittle. *Fracture*: Conchoidal. Hardness = [3.5-4] (by analogy within the group). D(meas.) = n.d. D(calc.) = 4.656

**Optical Properties**: Opaque. *Color*: Black, gray with a bluish tint in reflected light. *Streak*: Black. *Luster*: Metallic. *Optical Class*: Isotropic. R: (470) 29.1, (546) 28.4, (589) 27.4, (650) 25.0

**Cell Data**: Space Group:  $I\bar{4}$  3m. a = 10.171(1) Z = 2

## X-Ray Diffraction Pattern: Calculated pattern.

2.936 (100), 1.798 (43), 1.533 (21), 2.543 (18), 1.857 (8), 4.152 (4), 1.995 (4)

Chemistry:		(1)	(2)
	Cu	49.32	51.56
	Fe	2.20	
	Zn	0.09	
	Sn	0.03	
	As	9.45	20.26
	Sb	1.94	
	Те	0.02	
	S	27.75	28.18
	Total	100.80	100.00

(1) Layo deposit, Castilla Province, Arequipa Department, Peru; average electron microprobe analysis; corresponding to  $(Cu_{11.27}Fe_{0.57}Zn_{0.02})_{\Sigma=11.86}(As_{3.77}Sb_{0.23})_{\Sigma=4.00}S_{12.57}$  or structurally  ${}^{M(2)}Cu_{6.00}{}^{M(1)}(Cu_{5.40}Fe_{0.58}Zn_{0.02})^{X(3)}(As_{0.95}Sb_{0.05})_{4}S_{13}$ . (2)  $Cu_{6}^{+}(Cu_{4}^{+}Cu_{2}^{+})_{2}As_{4}S_{13}$ .

Polymorphism & Series: At least partial series with tennantite-(Fe) and tennantite-(Zn).

**Mineral Group**: Tetrahedrite group.  ${}^{M(2)}A_6{}^{M(1)}(B_4C_2){}^{X(3)}D_4{}^{S(1)}Y_{12}{}^{S(2)}Z$ 

**Occurrence**: In an epithermal hydrothermal vein deposit by replacement of enargite under decreasing  $f_{S2}$ .

Association: Enargite, chalcopyrite, vinciennite, pyrite.

Distribution: From the Layo deposit, Castilla Province, Arequipa Department, Peru.

**Name**: Honors the English chemist Smithson *Tennant* (1761-1815) with a suffix for the dominant divalent cation in the C site.

**Type Material**: Department of Mineralogy and Petrology, National Museum, Prague, Czech Republic (P1P 74/2020), the Natural History Museum, University of Pisa, Italy (19925), and the Mineralogical Museum (MINES ParisTech), School of Mines, Paris, France (ENSMP 83990).

**References**: (1) Biagioni, B., J. Sejkora, Y. Moëlo, E. Marcoux, D. Mauro, and Z. Dolníček (2022) Tennantite-(Cu), Cu<sub>12</sub>As<sub>4</sub>S<sub>13</sub>, from Layo, Arequipa Department, Peru: a new addition to the tetrahedrite-group minerals. Mineral. Mag., 86, 331-339. (2) Biagioni, C., L.L. George, N.J. Cook, E. Makovicky, Y. Moëlo, M. Pasero, J. Sejkora, C.J. Stanley, W.D. Welch, and F. Bosi (2020) The tetrahedrite group: Nomenclature and classification. Amer. Mineral., 105, 109-122.