Sartorite $PbAs_2S_4$

Crystal Data: Monoclinic, pseudo-orthorhombic. *Point Group:* $2/m$. Prismatic, deeply striated ‖ [010] with rounded cavernous crystal terminations, to 10 cm; parallel and subparallel groupings common due in part to twinning. *Twinning:* Commonly repeated on {100} to produce lamination of crystals; lamellae seen in polished section may be bent.

Physical Properties: *Cleavage:* Fair on {100}. *Fracture:* Conchoidal. *Tenacity:* Extremely brittle. Hardness = 3 VHN = 196 D(meas.) = 5.10 D(calc.) = [5.13]

Optical Properties: Opaque. *Color:* Dark lead-gray; in polished section, pure white, rarely with deep red internal reflections. *Streak:* Chocolate-brown. *Luster:* Metallic. *Pleochroism:* Rarely visible, only in oil. *Anisotropism:* Weak.
R_1–R_2: (400) 37.5–40.4, (420) 37.1–40.0, (440) 36.7–39.6, (460) 36.1–39.2, (480) 35.7–38.8, (500) 35.1–38.3, (520) 34.5–37.8, (540) 33.9–37.2, (560) 33.3–36.6, (580) 32.6–35.9, (600) 31.9–35.2, (620) 31.1–34.4, (640) 30.4–33.4, (660) 29.8–32.6, (680) 29.1–32.0, (700) 28.6–31.5

Cell Data: *Space Group:* $P2_1/n$ (pseudocell; supercells exist). $a = 19.62$ $b = 7.89$ $c = 4.19$ $\beta = 90°$ Z = 4

X-ray Powder Pattern: Binntal, Switzerland.
3.49 (100), 2.76 (90), 2.96 (80), 2.33 (60), 3.87 (50), 2.64 (50), 4.15 (40)

Chemistry:

	(1)	(2)
Pb	43.63	42.70
As	30.46	30.87
S	25.51	26.43
Total	99.60	100.00

(1) Binntal, Switzerland; average of three analyses. (2) $PbAs_2S_4$.

Occurrence: In a hydrothermal deposit in dolostone (Binntal, Switzerland).

Association: Tennantite, pyrite, dufrénoysite, rathite, realgar (Binntal, Switzerland).

Distribution: From the Lengenbach quarry, Binntal, Valais, Switzerland [TL]. In the Pitone marble quarry, near Seravezza, Tuscany, Italy. At the Zuni mine, San Juan Co., Colorado, USA. From the Julcani district, Peru.

Name: Honors Professor Wolfgang Sartorius von Waltershausen (1809–1876), University of Göttingen, Göttingen, Germany, who first announced the species.

Type Material: n.d.

References: (1) Palache, C., H. Berman, and C. Frondel (1944) Dana's system of mineralogy, (7th edition), v. I, 478–481. (2) Pring, A., T. Williams, and R. Withers (1993) Structural modulation in sartorite: an electron microscope study. Amer. Mineral., 78, 619–626. (3) Pring, A. (2001) The crystal chemistry of the sartorite group minerals from Lengenbach, Binntal, Switzerland – a HRTEM study. Schweiz. Mineral. Petrog. Mitt., 81, 69–87. (4) Berlepsch, P., T. Armbruster, E. Makovicky, and D. Topa (2003) Another step toward understanding the true nature of sartorite: determination and refinement of a ninefold superstructure. Amer. Mineral., 88, 450–461. (5) Berry, L.G. and R.M. Thompson (1962) X-ray powder data for the ore minerals. Geol. Soc. Amer. Mem. 85, 166–167. (6) Criddle, A.J. and C.J. Stanley, Eds. (1993) Quantitative data file for ore minerals, 3rd ed. Chapman & Hall, London, 499.