Freieslebenite $AgPbSbS_3$

Crystal Data: Monoclinic. *Point Group:* $2/m$. Crystals prismatic and striated parallel to [001], to 3 cm, showing {011}, {021}, and {110}; as exsolutions in galena and inclusions in other silver minerals. *Twinning:* Twin plane {100}; lamellae seen in polished section.

Physical Properties: *Cleavage:* Imperfect on {110}. *Fracture:* Subconchoidal to uneven. Hardness = 2–2.5 VHN = n.d. D(meas.) = 6.20–6.23 D(calc.) = 6.22

Optical Properties: Opaque. *Color:* Pale steel-gray to silver-white or lead-gray. *Streak:* Pale steel-gray to silver-white or lead-gray. *Luster:* Metallic. *Pleochroism:* Very weak. *Anisotropism:* Just noticeable.

R_1–R_2: (400) 38.2–42.5, (420) 38.0–42.1, (440) 37.8–41.7, (460) 37.4–41.3, (480) 37.0–40.9, (500) 36.6–40.5, (520) 36.2–40.1, (540) 35.7–39.7, (560) 35.4–39.3, (580) 35.0–38.9, (600) 34.6–38.5, (620) 34.2–38.1, (640) 33.9–37.7, (660) 33.4–37.2, (680) 33.0–36.7, (700) 32.5–36.1

Cell Data: *Space Group:* $P2_1/a$. $a = 7.518(1)$ $b = 12.809(4)$ $c = 5.940(1)$ $\beta = 92.25(1)^\circ$ $Z = 4$

X-ray Powder Pattern: Hiendelaencina, Spain. [ck??this for precisions of d's??< ICDD??] 2.83 (100), 3.48 (80), 2.98 (70), 1.784 (50), 2.08 (40), 3.25 (30), 2.01 (30)

Chemistry:

	(1)	(2)	(3)
Ag	22.45	23.08	20.24
Pb	31.90	30.77	38.87
Fe		0.63	
Sb	26.83	27.11	22.84
S	17.60	18.41	18.05
Total	98.78	100.00	100.00

(1) Hiendelaencina, Spain; corresponds to $Ag_{1.14}Pb_{0.84}Sb_{1.20}S_{3.00}$. (2) Příbram, Czech Republic; corresponds to $Ag_{1.12}Pb_{0.78}Fe_{0.06}Sb_{1.16}S_{3.00}$. (3) $AgPbSbS_3$.

Occurrence: Of hydrothermal origin.

Association: Acanthite, pyrargyrite, silver, andorite, galena, siderite.

Distribution: In Germany, in Saxony, from the Himmelsfürst mine, Erbisdorf [TL] and Braünsdorf, both near Freiberg, and at Marienberg. From Příbram, Czech Republic. As fine crystals from Hiendelaencina, Guadalajara Province, Spain. In the Les Farges mine, near Ussel, Corrèze; Pontgibaud, Puy-de-Dôme; and Vialas, Lozère, France. From Dossena, Lombardy, Italy. At Hällefors, Bergslagen metallic province, Sweden. In the USA, from the Eagle mine, Gilman district, Eagle Co., Colorado, and the Castle Dome Mountains, Yuma Co., Arizona. In Canada, at Cobalt, Ontario, and at the Weber prospect of Mount Nansen Mines, Yukon Territory. From Oruro, Bolivia.

Name: Honoring Johann Karl Freiesleben (1774–1846), Mining Commissioner of Saxony, Germany, who first described the mineral.

References: (1) Palache, C., H. Berman, and C. Frondel (1944) Dana's system of mineralogy, (7th edition), v. I, 416–418. (2) Hellner, E. (1957) Über komplex zusammengesetzte sulfidische Erze. II. Struktur des Freieslebenits, $PbAgSbS_3$. Zeits. Krist., 109, 4 (in German with English abs.). (3) Ito, T. and W. Nowacki (1974) The crystal structure of freieslebenite, $PbAgSbS_3$. Zeits. Krist., 139, 85–102. (4) Berry, L.G. and R.M. Thompson (1962) X-ray powder data for the ore minerals. Geol. Soc. Amer. Mem. 85, 137. (5) Criddle, A.J. and C.J. Stanley, Eds. (1993) Quantitative data file for ore minerals, 3rd ed. Chapman & Hall, London, 178.