

Crystal Data: Orthorhombic, pseudocubic. *Point Group:* 222. Granular massive; rarely as pseudocubes and plates, to 1 cm.

Physical Properties: *Fracture:* Hackly, poor. *Tenacity:* Somewhat sectile. Hardness = 2.5 VHN = 33–84 (25 g load). D(meas.) = 7.0–8.0 D(calc.) = 8.24

Optical Properties: Opaque. *Color:* Grayish iron-black, tarnishes to iridescent brownish. *Streak:* Black. *Luster:* Metallic. *Anisotropism:* Distinct but weak, pale gray to dark gray. R₁–R₂: (400) 37.2–41.8, (420) 37.0–41.2, (440) 37.4–40.5, (460) 38.0–39.9, (480) 38.2–39.3, (500) 37.9–38.5, (520) 37.1–37.6, (540) 35.9–36.7, (560) 34.8–36.0, (580) 33.9–35.5, (600) 33.2–35.2, (620) 32.8–34.9, (640) 32.4–34.5, (660) 32.0–34.1, (680) 31.6–33.7, (700) 31.2–33.3

Cell Data: *Space Group:* P2₁2₁2₁. *a* = 4.333 *b* = 7.062 *c* = 7.764 *Z* = 4

X-ray Powder Pattern: Tilkerode, Germany. 2.67 (100), 2.57 (100), 2.24 (60), 2.006 (40), 4.15 (20), 2.42 (20), 2.11 (20)

Chemistry:	(1)	(2)	(3)
Ag	72.3	74.8	73.21
Cu	0.1		
Se	28.0	25.0	26.79
Te	0.3		
S		1.3	
Total	100.7	101.1	100.00

(1) Tilkerode, Germany; by electron microprobe, corresponds to (Ag_{1.95}Cu_{0.01})_{Σ=1.96}(Se_{1.03}Te_{0.01})_{Σ=1.04}. (2) Silver City, Idaho, USA; corresponds to Ag_{1.98}(Se_{0.90}S_{0.12})_{Σ=1.02}. (3) Ag₂Se.

Occurrence: In hydrothermal veins deficient in sulfur, associated with other selenides, quartz, and carbonates.

Association: Clausthalite, aguilarite, acanthite, tiemannite, umangite, eucairite, argentian tetrahedrite, argentian gold, pyrite, chalcopyrite.

Distribution: In Germany, in the Harz Mountains, at Tilkerode [TL] and St. Andreasberg. From Săcărîmb (Nagyág), Romania. In the Předbořice deposit, Czech Republic. At Kongsberg, Norway. In the USA, from Republic, Ferry Co., and in the L-D mine, Wenatchee, Chelan Co., Washington; at the De Lamar mine, Silver City district, Owyhee Co., and from the 4th of July mine, Yankee Fork, Custer Co., Idaho; in Nevada, large crystals in the Ken Snyder mine, Gold Circle district, Elko Co., and at the Rex Grande deposit, Midas, Elko Co. From the Betty claim group, north of Divide Lake, British Columbia; and in the Kidd Creek mine, near Timmins, Ontario, Canada. At Guanaajuato, Mexico. From the Pacajake mine, Hiaco, 24 km east-northeast of Colquechaca, Potosí, Bolivia. At Tuminico, Sierra de Cacho, La Rioja Province, Argentina. From the Wolumia goldfield, New South Wales, Australia. In the Emperor mine, Vatukoula, and the Tuvatu Au–Ag–Te deposit, Viti Levu, Fiji Islands. From the Hishikari and Kushikino Au–Ag deposits, Kagoshima Prefecture, and in the Sanru mine, Hokkaido, Japan. At the Axi gold deposit, Ili, Xinjiang Uygur Autonomous Region, China. A number of additional minor occurrences are known.

Name: For German mineralogist and crystallographer Carl Friedrich Naumann (1797–1873).

References: (1) Palache, C., H. Berman, and C. Frondel (1944) Dana's system of mineralogy, (7th edition), v. I, 179–180. (2) Wieggers, G.A. (1971) The crystal structure of the low temperature form of silver selenide. *Amer. Mineral.*, 56, 1882–1888. (3) Petruk, W., D.R. Owens, J.M. Stewart, and E.J. Murray (1974) Observations on acanthite, aguilarite and naumannite. *Can. Mineral.*, 12, 365–369. (4) Berry, L.G. and R.M. Thompson (1962) X-ray powder data for the ore minerals. *Geol. Soc. Amer. Mem.* 85, 34–35. (5) Ramdohr, P. (1969) The ore minerals and their intergrowths, (3rd edition), 474–475. (6) Criddle, A.J. and C.J. Stanley, Eds. (1993) Quantitative data file for ore minerals, 3rd ed. Chapman & Hall, London, 389.

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