

Crystal Data: Orthorhombic. *Point Group:* *mm2*. Crystals tabular, to 2 mm, in aggregates, and as incrustations.

Physical Properties: *Cleavage:* Perfect on {001}; distinct in some other directions.
Tenacity: Brittle. Hardness = n.d. VHN = 142–227 (20–30 g load), with great anisotropy.
 D(meas.) = 7.78 D(calc.) = 7.72

Optical Properties: Transparent to translucent. *Color:* Colorless, pale gray, or pale yellow; pale gray in reflected light; darkens on exposure to sunlight.

Optical Class: Biaxial (+). *Orientation:* $X = c$; $Y = b$; $Z = a$. $\alpha = 2.35$ $\beta = 2.36$ $\gamma = 2.46$
 $2V(\text{meas.}) = 35^\circ\text{--}40^\circ$ *Anisotropism:* Strong.

$R_1\text{--}R_2$: (400) 20.7–19.1, (420) 20.5–18.8, (440) 20.0–18.1, (460) 19.7–17.8, (480) 19.4–17.5, (500) 19.3–17.5, (520) 19.3–17.4, (540) 19.2–17.4, (560) 19.1–17.3, (580) 19.0–17.2, (600) 18.8–17.0, (620) 18.7–16.8, (640) 18.5–16.7, (660) 18.3–16.5, (680) 18.2–16.3, (700) 18.0–16.3

Cell Data: *Space Group:* *Cm2a*. $a = 16.447(19)$ $b = 5.513(3)$ $c = 11.579(15)$ $Z = 8$

X-ray Powder Pattern: Zod deposit, Armenia.

3.226 (100), 2.890 (60), 1.996 (30), 1.992 (28), 1.727 (27), 2.743 (24), 2.750 (23)

Chemistry:	(1)	(2)
Bi	60.9	66.81
Pb	2.3	
Sb	1.9	
Fe	0.3	
Cu	0.1	
Ag	0.1	
Te	20.7	20.40
O	12.5	12.79
Total	98.8	100.00

(1) Zod deposit, Armenia; by electron microprobe, average of four analyses; corresponding to $(\text{Bi}_{1.84}\text{Sb}_{0.10}\text{Pb}_{0.07}\text{Fe}_{0.03}\text{Cu}_{0.01}\text{Ag}_{0.01})_{\Sigma=2.06}\text{Te}_{1.02}\text{O}_{4.92}$. (2) Bi₂TeO₅.

Occurrence: A secondary mineral in tellurium-bearing hydrothermal ore deposits.

Association: Tellurobismuthite, tetradyomite, volynskite, galena, quartz.

Distribution: From the Zod gold deposit, 14 km east of Vardenis, Armenia. In the Northern Aksu gold deposit, Kazakhstan. From near Il'kovtsy, Vygorlat-Gutinsk Mountains, Transcarpathian region, western Ukraine.

Name: Honors Vladimir Ivanovich Smirnov (1910–1988), Russian investigator of ore deposits, Moscow University, Moscow, Russia.

Type Material: A.E. Fersman Mineralogical Museum, Academy of Sciences, Moscow, Russia, 82767.

References: (1) Spiridonov, E.M., L.A. Demina, V.A. Dolgikh, G.M. Antonina, A.D. Rakcheev, L.V. Bulgak, S.I. Lebedeva, and T.N. Chvileva (1984) Smirnite Bi₂TeO₅ – a new mineral. Doklady Acad. Nauk SSSR, 278, 199–202 (in Russian). (2) (1985) Amer. Mineral., 70, 876–877 (abs. ref. 1).