

Bernardite

Tl(As, Sb)₅S₈

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Crystal Data: Monoclinic. *Point Group:* $2/m$. Crystals are thick tabular, partly corroded and striated, with prominent {100}, {012}, {210}, and {201}, $\{\bar{2}01\}$, {010}, to 4 mm.

Physical Properties: *Fracture:* Subconchoidal to uneven. Hardness = ~ 2 D(meas.) = 4.5(1) D(calc.) = 4.105

Optical Properties: Semitransparent. *Color:* Black. *Streak:* Red. *Luster:* Dull.

Optical Class: Biaxial.

R_1 – R_2 : (400) 29.6–32.3, (420) 28.9–31.8, (440) 28.1–31.3, (460) 27.4–30.6, (480) 26.8–29.9, (500) 26.0–28.9, (520) 25.4–27.8, (540) 25.0–26.7, (560) 24.5–25.8, (580) 24.0–25.1, (600) 23.6–24.4, (620) 23.3–23.9, (640) 23.1–23.4, (660) 22.9–23.0, (680) 22.8–22.8, (700) 22.8–22.5

Cell Data: *Space Group:* $P2_1/c$. $a = 15.647(4)$ $b = 8.038(3)$ $c = 10.750(3)$
 $\beta = 91.27(3)^\circ$ $Z = 4$

X-ray Powder Pattern: Alšar, Macedonia (calculated).

3.06 (100), 4.28 (74), 4.46 (65), 3.07 (65), 3.68 (63), 2.68 (59), 3.72 (55)

Chemistry:

	(1)	(2)	(3)
Tl	23.3	22.7	24.46
As	43.7	35.2	44.84
Sb	0.1	10.4	
S	31.5	29.8	30.70
Total	98.6	98.1	100.00

(1) Alšar, Macedonia; by electron microprobe, corresponding to $\text{Tl}_{0.93}(\text{As}_{4.75}\text{Sb}_{0.01})_{\Sigma=4.76}\text{S}_{8.00}$.
(2) Do.; by electron microprobe, corresponding to $\text{Tl}_{0.96}(\text{As}_{4.04}\text{Sb}_{0.74})_{\Sigma=4.78}\text{S}_{8.00}$. (3) TlAs_5S_8 .

Occurrence: In a hydrothermal deposit with other As–Tl sulfide minerals.

Association: Realgar, orpiment, hutchinsonite, wallisite, hatchite, lorandite, edenharterite, erniggliite, stalderite (Binntal, Switzerland).

Distribution: From Alšar (Allchar), near Rošden, Macedonia [TL]. At the Lengenbach quarry, Binntal, Valais, Switzerland.

Name: In honor of Dr. Jan H. Bernard, mineralogist, Geological Survey of Czechoslovakia, who first noted the mineral.

Type Material: Národní Museum, Prague, Czech Republic; Natural History Museum, Vienna; Institute for Mineralogy and Crystallography, University of Vienna, Austria.

References: (1) Pašava, J., F. Pertlik, E.F. Stumpfl, and J. Zemmann (1989) Bernardite, a new thallium arsenic sulphosalt from Allchar, Macedonia, with a determination of the crystal structure. *Mineral. Mag.*, 53, 531–538. (2) (1990) *Amer. Mineral.*, 75, 1209 (abs. ref. 1).