Ramdohrite $Ag_3Pb_6Sb_{11}S_{24}$

Crystal Data: Monoclinic. *Point Group:* 2/*m.* Crystals are long prismatic or thick lance-shaped, from 0.5-1 cm. *Twinning:* Lamellar twinning on (010).

Physical Properties: Fracture: Uneven. *Tenacity:* Brittle. Hardness = 2
VHN = 206 (20 g load). D(meas.) = 5.43 D(calc.) = 5.543

Optical Properties: Opaque. *Color:* Gray-black; in polished section, white. *Streak:* Gray-black. *Luster:* Metallic. *Pleochroism:* Very weak. *Anisotropism:* Moderate.
R_1-R_2: (400) 39.3-43.1, (420) 38.8-42.8, (440) 38.3-42.5, (460) 37.8-42.2, (480) 37.4-42.0, (500) 36.9-41.6, (520) 36.5-41.2, (540) 36.0-40.9, (560) 35.7-40.5, (580) 35.3-40.2, (600) 34.8-39.7, (620) 34.4-39.2, (640) 34.0-38.7, (660) 33.4-38.0, (680) 32.8-37.3, (700) 32.0-36.4

Cell Data: *Space Group: P*$2_1/n$. a = 19.3117(6) b = 13.0543(4) c = 8.7348(3)
β = 90.179(2)° Z = 4

X-ray Powder Pattern: Chocaya mine, Bolivia.
3.32 (100), 2.94 (60), 2.78 (50), 2.21 (50), 3.48 (30), 3.04 (30), 3.82 (20)

Chemistry:	(1)	(2)	(3)
Ag	8.96	8.79	8.80
Pb	33.84	34.46	33.82
Fe		0.21	
Cd		0.60	
In		0.20	
Sb	34.91	34.40	36.44
S	21.14	20.41	20.94
Total	98.85	99.07	100.00

(1) Chocaya mine, Bolivia; by electron microprobe. (2) Chocaya mine, Bolivia; by electron microprobe; corresponds to $Ag_{2.8}Pb_{5.9}Fe_{0.1}Mn_{0.1}In_{0.1}Cd_{0.2}Sb_{10.8}S_{24}$. (3) $Ag_3Pb_6Sb_{11}S_{24}$.

Occurrence: Found in fine-grained quartz in a hydrothermal vein (Chocaya mine, Bolivia).

Association: Pyrite, stannite, andorite, jamesonite, sphalerite, quartz (Chocaya mine, Bolivia); andorite (Bear Basin, Washington, USA).

Distribution: In Bolivia, from the Colorado Ag-Sn vein, Chocaya mine, Potosi, and from Tatasi. In the USA, at the Round Valley tungsten mine, Bishop Creek area, Inyo Co., California and at Bear Basin, King Co., Washington.

Name: Honors Professor Paul Ramdohr (1890-1985), German mineralogist.

Type Material: National Museum of Natural History, Washington, D.C., USA (R6595).

References: (1) Palache, C., H. Berman, and C. Frondel (1944) Dana's system of mineralogy, (7th edition), v. I**,** 450-451. (2) Donnay, J.D.H. and G. Donnay (1954) Syntaxic intergrowths in the andorite series. Amer. Mineral., 39,161-171. (3) Ramdohr, P. (1969) The ore minerals and their intergrowths, (3rd edition), 731-733. (4) Borodaev, Y.S., O.L. Sveshnikova, and N.N. Mozgova (1971) The inhomogeneity of ramdohrite. Doklady Acad. Nauk SSSR, 199, 1138-1141 (in Russian). (5) (1972) Amer. Mineral., 57, 1560 (abs. ref. 4). (6) Makovicky, E. and W.G. Mumme (1983) The crystal structure of ramdohrite, $Pb_6Sb_{ll}Ag_3S_{24}$, and its implications for the andorite group and zinckenite. Neues Jahrb. Mineral., Abh., 147,58-79. (7) Moelo, Y., E. Makovicky, and S. Karup-Møller (1984) New data on the minerals of the andorite series. Neues Jahrb. Mineral., Monatsh., 175-182. (8) (1985) Amer. Mineral., 70, 219-220 (abs. ref. 7). (9) Makovicky, E., W.G. Mumme, and R.W. Gable (2013) The crystal structure of ramdohrite, $Pb_{5.9}Fe_{0.1}Mn_{0.1}In_{0.1}Cd_{0.2}Ag_{2.8}Sb_{10.8}S_{24}$: A new refinement. Amer. Mineral., 98, 773-779.