

Crystal Data: Orthorhombic. *Point Group:* $2/m\ 2/m\ 2/m$. Aggregates of acicular crystals, to 1 mm.

Physical Properties: *Cleavage:* {001}, good. *Fracture:* Conchoidal. *Tenacity:* Brittle. Hardness = 3.7–4.2 VHN = 150–212 (50 g load). D(meas.) = 6.47 D(calc.) = 6.505

Optical Properties: Opaque. *Color:* Lead-gray. *Streak:* Gray-black. *Luster:* Metallic. *Pleochroism:* From pale greenish white to darker greenish white or gray. *Anisotropism:* Distinct, from greenish gray to dark gray to brownish gray.
 R_1 – R_2 : (400) 44.6–48.5, (420) 44.1–48.4, (440) 43.5–48.0, (460) 42.5–47.4, (480) 42.2–46.9, (500) 41.6–46.2, (520) 41.0–45.7, (540) 40.6–45.2, (560) 40.1–44.8, (580) 39.8–44.4, (600) 39.6–44.1, (620) 39.3–43.8, (640) 39.1–43.5, (660) 38.8–43.2, (680) 38.5–42.9, (700) 38.2–42.5

Cell Data: *Space Group:* $Pn\bar{m}$. $a = 33.88(2)$ $b = 38.02(2)$ $c = 4.070(2)$ $Z = 1$

X-ray Powder Pattern: Izok Lake, Canada.

3.398 (100), 2.149 (60), 3.305 (40), 2.038 (40b), 2.878 (40), 1.745 (40), 3.159 (30)

Chemistry:	(1)	(2)	(1)	(2)
Pb	46.6	50.01	Sb	13.3
Cu	1.0	0.88	Bi	20.5
Fe	0.2	0.19	S	17.0
Ag	2.0	0.59		
			Total	100.6
				99.45

(1) Izok Lake, Canada; by electron microprobe, average of three analyses; corresponds to $\text{Pb}_{22.96}\text{Ag}_{1.89}(\text{Cu}_{1.61}\text{Fe}_{0.37})_{\Sigma=1.98}(\text{Sb}_{11.15}\text{Bi}_{10.02})_{\Sigma=21.17}\text{S}_{54.13}$. (2) Vena mines, Sweden; by electron microprobe, average of 19 analyses; corresponds to $\text{Pb}_{25.64}\text{Ag}_{0.58}(\text{Cu}_{1.47}\text{Fe}_{0.36})_{\Sigma=1.83}(\text{Sb}_{10.18}\text{Bi}_{9.76})_{\Sigma=19.94}\text{S}_{56.02}$.

Polymorphism & Series: Forms a series with giessenite.

Occurrence: In a massive Zn–Cu–Pb sulfide deposit (Izok Lake, Canada); from a Cu–Co sulfide deposit in skarn (Vena mines, Sweden).

Association: Galena, pyrrhotite, pyrite, jaskólskiite (Izok Lake, Canada); galena, jaskólskiite, pyrrhotite, bismuth, antimony, antimonian bismuthinite, kobellite (Vena mines, Sweden).

Distribution: From Izok Lake, Northwest Territories, Canada [TL]. At the Vena mines, near Askersund, Örebro, Sweden. From near Lake Zervreila, Vals, Graubünden, Switzerland. At Bazoges, Vendée, and in the Chalanches mine, near Allemont, Isère, France. In the Toroiaga mine, Baia Boră district, Romania. From the Srednegolgotaiskoe gold deposit, eastern Transbaikalia, Siberia, Russia. At the Otome mine, Yamanashi Prefecture, Japan. From Mangchang, Guangxi Autonomous Region, China.

Name: For the locality at Izok Lake, Canada.

Type Material: The Natural History Museum, London, England, 1983,75; Canadian Geological Survey, Ottawa; Royal Ontario Museum, Toronto, Canada; National Museum of Natural History, Washington, D.C., USA, 165272.

References: (1) Harris, D.C., A.C. Roberts, and A.J. Criddle (1986) Izoklakeite, a new mineral species from Izok Lake, Northwest Territories. *Can. Mineral.*, 24, 1–5. (2) (1987) *Amer. Mineral.*, 72, 222 (abs. ref. 1). (3) Zakrzewski, M.A. and E. Makovicky (1986) Izoklakeite from Vena, Sweden, and the kobellite homologous series. *Can. Mineral.*, 24, 7–18. (4) Makovicky, E. and W.G. Mumme (1986) The crystal structure of izoklakeite, $\text{Pb}_{51.3}\text{Sb}_{20.4}\text{Bi}_{19.5}\text{Ag}_{1.2}\text{Cu}_{2.9}\text{Fe}_{0.7}\text{S}_{114}$. The kobellite homologous series and its derivatives. *Neues Jahrb. Mineral., Abh.*, 153, 121–145. (5) Armbruster, T. and W. Hummel (1987) (Sb,Bi,Pb) ordering in sulfosalts: crystal-structure refinement of a Bi-rich izoklakeite. *Amer. Mineral.*, 72, 821–831. (6) Moëlo, Y., G. Roger, D. Maurel-Palacin, E. Marcoux, and A. Loroussi (1995) Chemistry of some Pb-(Cu,Fe)-(Sb,Bi) sulfosalts from France and Portugal. Implications for the crystal chemistry of lead sulfosalts in the Cu-poor part of the Pb_2S_2 – Cu_2 – Sb_2S_3 – Bi_2S_3 system. *Mineral. Petrol.*, 53, 229–250.

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