

Krutaite**(Cu, Co, Ni)Se₂**

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Crystal Data: Cubic. *Point Group:* $2/m\bar{3}$. As zoned crystals, to 1 cm, and as inclusions in clausthalite.

Physical Properties: Hardness = n.d. VHN = 248 (25 g load). D(meas.) = n.d.
D(calc.) = 6.53

Optical Properties: Opaque. *Color:* Gray. *Luster:* Metallic. *Anisotropism:* Zones rich in Co and Ni are anisotropic in yellow-brown tints.

R: (400) 33.8, (420) 34.2, (440) 34.4, (460) 34.4, (480) 34.2, (500) 33.6, (520) 33.0, (540) 32.3, (560) 31.4, (580) 30.6, (600) 29.7, (620) 29.0, (640) 28.3, (660) 28.0, (680) 28.0, (700) 28.4

R: (400) 38.1, (420) 38.5, (440) 38.8, (460) 39.2, (480) 39.3, (500) 39.3, (520) 39.2, (540) 39.0, (560) 38.7, (580) 38.4, (600) 38.0, (620) 37.7, (640) 37.3, (660) 37.0, (680) 36.7, (700) 36.5

Cell Data: *Space Group:* $Pa\bar{3}$. $a = 6.056$ $Z = 4$

X-ray Powder Pattern: Petrovice, Czech Republic.

2.712 (100), 3.023 (90), 2.477 (80), 1.827 (60), 1.678 (40), 1.166 (40), 1.618 (30)

Chemistry:	(1)	(2)	(3)	(4)
Cu	20.6	17.9	24.7	28.69
Co	4.8	2.2	2.4	
Ni	1.5	8.9	1.3	
Fe	0.6	0.1	0.2	
Hg	0.2			
Se	69.5	71.7	71.5	71.31
Total	97.2	100.8	100.1	100.00

(1) Petrovice, Czech Republic; by electron microprobe, corresponding to $(\text{Cu}_{0.74}\text{Co}_{0.18}\text{Ni}_{0.06}\text{Fe}_{0.02})_{\Sigma=1.00}\text{Se}_{2.00}$. (2) El Dragon mine, Bolivia; by electron microprobe, corresponding to $(\text{Cu}_{0.62}\text{Ni}_{0.33}\text{Ni}_{0.08})_{\Sigma=1.03}\text{Se}_{2.00}$. (3) Slavkovice, Czech Republic; by electron microprobe, corresponding to $(\text{Cu}_{0.86}\text{Co}_{0.09}\text{Ni}_{0.05}\text{Fe}_{0.01})_{\Sigma=1.01}\text{Se}_{2.00}$. (4) CuSe_2 .

Mineral Group: Pyrite group.

Occurrence: Of hydrothermal origin.

Association: Clausthalite, eskebornite, uraninite, hematite, ferroselite, bukovite, umangite, berzelianite, chalcopyrite, goethite.

Distribution: In the Czech Republic, from the Petrovice uranium deposit, near Žďár [TL] and at Slavkovice. In the El Dragón mine, Potosí, Bolivia. From Tuminico, Sierra de Cacho, and at Los Llantenes, La Rioja Province, Argentina.

Name: For Dr. Tomáš Kruťa (1906–), Director of the Mineralogy Laboratory, Moravian Museum, Brno, Czech Republic.

Type Material: National School of Mines, Paris, France.

References: (1) Johan, Z., P. Picot, R. Pierrot, and M. Kvaček (1972) La krutaite, CuSe_2 , un nouveau minéral du groupe de la pyrite. *Bull. Soc. fr. Minéral.*, 95, 475–481 (in French with English abs.). (2) (1974) *Amer. Mineral.*, 59, 210 (abs. ref. 1). (3) Grundmann, G., G. Lehrberger, and G. Schnorrer-Köhler (1990) The El Dragón mine, Potosí, Bolivia. *Mineral. Record*, 21, 133–146, esp. 137–138. (4) Yashunsky, Y.V., S.D. Rasulova, G.I. Necheljustov, E.G. Rjabeva, and S.A. Batulin (1996) New data on Krutaite, CuSe_2 . *Zap. Vses. Mineral. Obshch.*, 125.3, 60–66. (5) Criddle, A.J. and C.J. Stanley, Eds. (1993) Quantitative data file for ore minerals, 3rd ed. Chapman & Hall, London, 303, 304.

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