

# Khatyrkite

# (Cu, Zn)Al<sub>2</sub>

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**Crystal Data:** Tetragonal. *Point Group:*  $4/m\ 2/m\ 2/m$ . As prismatic crystals, to 400  $\mu\text{m}$ , and intimately intergrown with cupalite in small grains.

**Physical Properties:** *Cleavage:* {100}, distinct. *Tenacity:* Malleable. Hardness = 5.5 VHN = 511–568 (100 g load). D(meas.) = n.d. D(calc.) = 4.42

**Optical Properties:** Opaque. *Color:* Steel-gray yellow; in reflected light, isotropic sections are pale blue, anisotropic sections are blue to creamy pink. *Luster:* Metallic. *Anisotropism:* Distinct, grayish yellow to brownish red.

R<sub>1</sub>–R<sub>2</sub>: (400) —, (420) —, (440) 70.1–75.8, (460) 70.3–75.6, (480) 71.5–75.9, (500) 73.0–76.5, (520) 74.5–76.4, (540) 76.1–76.1, (560) 77.4–75.3, (580) 78.4–74.3, (600) 79.2–73.2, (620) 79.7–72.0, (640) 79.8–70.7, (660) 79.9–69.5, (680) 79.8–68.5 (700) 79.5–67.5

**Cell Data:** *Space Group:*  $I4/mcm$ .  $a = 6.07(1)$   $c = 4.89(1)$   $Z = 4$

**X-ray Powder Pattern:** Listvenitovyi Stream, Russia. 4.27 (10), 2.119 (8), 2.372 (7), 1.920 (7), 3.04 (5), 1.894 (4), 2.156 (2)

|                   |        |
|-------------------|--------|
| <b>Chemistry:</b> | (1)    |
| Cu                | 53.93  |
| Zn                | 1.28   |
| Al                | 45.11  |
| Total             | 100.32 |

(1) Listvenitovii Stream, Russia; by electron microprobe, average of analyses on nine grains; corresponding to  $(\text{Cu}_{1.02}\text{Zn}_{0.02})_{\Sigma=1.04}\text{Al}_{2.00}$ .

**Occurrence:** In black slick washed from greenish gray cover weathering from serpentine.

**Association:** Cupalite, two unnamed zinc aluminides.

**Distribution:** From near the Listvenitovyi Stream, Khatyrka ultramafic zone of the Koryak–Kamchata fold area, Koryak Mountains, Magadan district, Russia [TL].

**Name:** For the occurrence in the Khatyrka ultramafic zone, Russia.

**Type Material:** Mining Institute, St. Petersburg, Russia, 1687/1.

**References:** (1) Razin, L.V., N.S. Rudashevskii, and L.N. Vyal'sov (1985) New natural intermetallic compounds of aluminum, copper and zinc – khatyrkite  $\text{CuAl}_2$ , cupalite  $\text{CuAl}$  and zinc aluminides – from hyperbasites of dunite–harzburgite formation. *Zap. Vses. Mineral. Obshch.*, 114, 90–100 (in Russian). (2) (1986) *Amer. Mineral.*, 71, 1278 (abs. ref. 1). (3) Friauf, J.B. (1927) The crystal structures of two intermetallic compounds [ $\text{Cu}_2\text{Mg}$  and  $\text{CuAl}_2$ ]. *J. Amer. Chem. Soc.*, 49(2), 3107–3114. (4) Havinga, E.E., H. Damsma, and P. Hokkeling (1972) Compounds and pseudo-binary alloys with the  $\text{CuAl}_2$ (C16)–type structure. I. Preparation and X-ray results. *J. Less-Common Metals*, 27, 169–186.