

Crystal Data: Tetragonal. *Point Group:* $4/m\ 2/m\ 2/m$. As very tiny grains, to 1 μm , and in aggregates.

Physical Properties: *Cleavage:* Imperfect. *Tenacity:* Brittle. Hardness = Soft. VHN = 92-123, 109 average (10 g load). $D(\text{meas.}) = \text{n.d.}$ $D(\text{calc.}) = [3.86]$

Optical Properties: Opaque. *Color:* Copper-red to pinchbeck-brown, iridescent; grayish orange-cream in reflected light; a fresh surface oxidizes to a sooty black film. *Luster:* Metallic. *Anisotropism:* Moderate, gray to brownish gray with a bluish tint. R: (400) —, (420) —, (440) 15.0, (460) 15.6, (480) 16.6, (500) 17.4, (520) 18.2, (540) 19.2, (560) 20.0, (580) 21.0, (600) 21.8, (620) 22.6, (640) 23.3, (660) 24.0, (680) 24.6, (700) 25.4

Cell Data: Space Group: $I4/mmm$. $a = 3.8460(10)$ $c = 13.308(3)$ $Z = 1$

X-ray Powder Pattern: Murun massif, Russia. 6.52 (10), 2.53 (8), 2.90 (6), 1.940 (5), 1.715 (4), 2.10 (3), 3.29 (2)

| Chemistry: | (1) | (2) |
|------------|--------------|--------------|
| K | 14.57 | 17.27 |
| Cu | 44.38 | 42.09 |
| Fe | 12.07 | 12.33 |
| <u>S</u> | <u>28.14</u> | <u>28.31</u> |
| Total | 99.16 | 100.00 |

- (1) Murun massif, Russia; by electron microprobe, corresponding to $K_{1.72}Cu_{3.23}Fe_{1.09}S_{4.05}$.
 (2) $K_2Cu_3FeS_4$.

Polymorphism & Series: Forms a series with thalcusite.

Occurrence: In rocks that have undergone intensive potassium metasomatism.

Association: Charoite, acmite, potassium feldspar.

Distribution: From the Murun alkalic massif, near Olekminsk, Sakha and Mt. Koashva, Khibiny massif, Kola Peninsula, Russia.

Name: For the locality in the *Murun* massif, Russia.

Type Material: A.E. Fersman Mineralogical Museum, Academy of Sciences, Moscow, Russia (81604).

References: (1) Dobrovolskaya, M.G., A.I. Tsepin, T.L. Evstigneeva, L.N. Vyal'sov, and A.O. Zaozerina (1981) Murunskite, $K_2Cu_3FeS_4$, a new sulfide of potassium, copper, and iron. *Zap. Vses. Mineral. Obshch.*, 110, 468-473 (in Russian). (2) (1982) *Amer. Mineral.*, 67, 624 (abs. ref. 1). (3) Pekov, I.V., N.V. Zubkova, D.V. Lisitsyn, and D.Y. Pushcharovsky (2009) Crystal structure of murunskite. *Dokl. Akad. Nauk*, 424, 385-387 (in Russian), *Dokl. Earth Sci.*, 424, 139-141 (in English). (4) (2010) *Amer. Mineral.*, 95(10), 1600 (abs. ref. 3).