

**Crystal Data:** Quasicrystal. *Point Group:* n.d. As anhedral to subhedral grains to 100  $\mu\text{m}$ .

**Physical Properties:** *Cleavage:* None. *Fracture:* Uneven. *Tenacity:* Brittle. Hardness = n.d. D(meas.) = n.d. D(calc.) = n.d.

**Optical Properties:** Opaque. *Color:* Dark gray-black. *Streak:* Gray. *Luster:* Metallic. *Optical Class:* Isotropic.

R: (471.1) 62.3, (548.3) 60.6, (586.6) 58.1, (652.3) 56.0

**Cell Data:** *Space Group:*  $Fm\bar{3}5$ .  $a_{6D} = 12.64$  (six-dimensional notation)

**X-ray Powder Pattern:** Khatyrka meteorite.

2.006 (100), 2.108 (90), 1.238 (30), 3.41 (25), 3.75 (20), 3.24 (20), 1.452 (15)

Chemistry:	(1)	(2)
Al	43.07	43.02
Cu	38.62	38.60
Fe	18.07	18.38
Si	0.02	
Cr	0.02	
Co	0.01	
Ca	0.01	
Zn	0.01	
Cl	0.01	
Total	99.84	100.00

(1) Khatyrka meteorite; average of 34 electron microprobe analyses; corresponds to Al<sub>63.11</sub>Cu<sub>24.02</sub>Fe<sub>12.78</sub>Si<sub>0.03</sub>Cr<sub>0.02</sub>Co<sub>0.01</sub>Ca<sub>0.01</sub>Zn<sub>0.01</sub>Cl<sub>0.01</sub>. (2) Al<sub>63</sub>Cu<sub>24</sub>Fe<sub>13</sub>.

**Occurrence:** Likely formed by impact-induced shock in the Khatyrka meteorite, a CV3 carbonaceous chondrite.

**Association:** Spinel, diopside, forsterite, nepheline, sodalite, corundum, stishovite, khatyrkite, cupalite, an unnamed AlCuFe compound.

**Distribution:** From the Khatyrka meteorite.

**Name:** For the *icosahedral* symmetry of its atomic structure, as observed in its diffraction pattern.

**Type Material:** Natural History Museum, University of Florence, Italy (46407/G).

**References:** (1) Bindi, L., P.J. Steinhardt, N. Yao, and P.J. Lu (2011) Icosahedrite, Al<sub>63</sub>Cu<sub>24</sub>Fe<sub>13</sub>, the first natural quasicrystal. *Amer. Mineral.*, 96, 928-931. (2) Stagno, V., L. Bindi, C. Park, S. Tkachev, V.B. Prakapenka, H.-K. Mao, R.J. Hemley, P.J. Steinhardt, and Y. Fei (2015) Quasicrystals at extreme conditions: The role of pressure in stabilizing icosahedral Al<sub>63</sub>Cu<sub>24</sub>Fe<sub>13</sub> at high temperature *Amer. Mineral.*, 100, 2412-2418.