

Crystal Data: Monoclinic. *Point Group:* $2/m$, m or 2 . As crusts; crystals, poorly formed, short-prismatic to thick tabular, to 0.2 mm; with {001}, {100}.

Physical Properties: *Cleavage:* Perfect on {001}. *Fracture:* Stepped. *Tenacity:* Brittle. Hardness = 3 D(meas.) = 3.03(3) D(calc.) = 3.066

Optical Properties: Transparent. *Color:* Bright green. *Streak:* Pale green. *Luster:* Vitreous. *Optical Class:* Biaxial. $\alpha = 1.669(2)$ $\beta = 1.688(2)$ $\gamma = 1.707(5)$ $2V = 90(2)^\circ$ Orientation: $Y = c$; $X = b$ (?).

Cell Data: *Space Group:* $P2_1/m$, Pm , or $P2$. $a = 24.34(2)$ $b = 5.878(4)$ $c = 11.626(5)$ $\beta = 93.3(1)^\circ$ $Z = 4$

X-ray Powder Pattern: Tolbachik Volcano, Kamchatka Region, Russia. 11.63 (100), 5.80 (27), 5.88 (20), 2.518 (19), 5.73 (17), 2.321 (17), 3.052 (15)

Chemistry:	(1)
K ₂ O	11.94
CuO	51.43
Cl	37.07
H ₂ O	6.9
<u>-O=Cl₂</u>	<u>8.37</u>
Total	98.97

(1) Tolbachik Volcano, Kamchatka Region, Russia; average of 4 electron microprobe analyses, H₂O by Penfield method, IR confirms OH and H₂O, corresponding to $\text{K}_{1.96}\text{Cu}_{5.00}\text{Cl}_{8.09}(\text{OH})_{3.87} \cdot 1.03\text{H}_2\text{O}$.

Occurrence: A product of precipitation from fumarolic gases (Tolbachik Volcano, Russiaa); also reported as an alteration on massive sulfide ore exposed at the Earth's surface.

Association: Euchlorite, paratacamite, belloite, langbeinite, atacamite.

Distribution: Yadovitaya ("Poisonous") fumaroles, Second Cinder Cone, Northern Breach of the Tolbachik Large Fissure Eruption, Tolbachik Volcano, Kamchatka Region, Russia; also reported from the Blyava deposit, Orenburg oblast and dumps at the Degtyarka deposit, Sverdlovsk oblast, Russia.

Name: Honors Ural mineralogist Vladimir Nikolaevich Avdonin (1925–), senior scientist of the Ural Geological Museum, Ural State Mining University, Russia.

Type Material: Mineralogical Museum of the Department of Mineralogy, St. Petersburg State University, St. Petersburg, Russia (catalog no. 19175).

References: (1) Chukanov, N.V., M.N. Murashko, A.E. Zadov, and A.F. Bushmakina (2006) Avdoninite, $\text{K}_2\text{Cu}_5\text{Cl}_8(\text{OH})_4 \cdot \text{H}_2\text{O}$, a New Mineral Species from Volcanic Exhalations and the Technogenic Zone at Volcanic-Hosted Massive Sulfide Deposits. *Zap. Ross. Mineral. Obshch.*, 135(3), 38–42 (in Russian, English abstract); (2007) *Geology of Ore Deposits*, 49, 505–508 (in English). (2) (2009) *Amer. Mineral.*, 94, 1076 (abs. ref. 1).