Fedotovite $K_2Cu_3O(SO_4)_3$

Crystal Data: Monoclinic. *Point Group:* $2/m$. As crusts of imperfect pseudohexagonal crystals, flaky to platy on {100}, to 5 mm.

Physical Properties: *Cleavage:* On {100}, perfect. Hardness = 2.5 D(meas.) = 3.205(3) D(calc.) = 3.09 Unstable in air.

Optical Properties: Transparent. *Color:* Emerald-green to grass-green. *Streak:* Pale grass-green. *Luster:* Vitreous to silky.
Optical Class: Biaxial (+). *Pleochroism:* X = greenish blue; $Y = Z$ = yellow-green.
Orientation: $Z = b$; $Y \wedge c \simeq 0°$. *Absorption:* $Z > Y$. $\alpha = 1.577$ $\beta = 1.594$ $\gamma = 1.633$
2V(meas.) = n.d. 2V(calc.) = 68°

Cell Data: *Space Group:* $C2/c$. $a = 19.037(6)$ $b = 9.479(2)$ $c = 14.231(5)$
$\beta = 111.04(3)°$ Z = 8

X-ray Powder Pattern: Tolbachik volcano, Russia.
8.83 (100), 2.943 (12), 2.844 (5), 6.59 (4), 6.54 (4), 4.405 (3), 4.207 (3)

Chemistry:

	(1)	(2)
SO_3	42.00	41.92
CuO	38.93	41.65
ZnO	0.37	
PbO	0.70	
Na_2O	1.48	
K_2O	13.97	16.43
H_2O	trace	
insol.	2.80	
Total	100.25	100.00

(1) Tolbachik volcano, Russia; presence of $(SO_4)^{2-}$ and absence of $(OH)^{1-}$ and H_2O confirmed by IR; corresponds to $(K_{1.65}Na_{0.28})_{\Sigma=1.93}(Cu_{2.85}Zn_{0.02}Pb_{0.01})_{\Sigma=2.88}O_{0.80}(SO_4)_{3.05}$.
(2) $K_2Cu_3O(SO_4)_3$.

Occurrence: As sublimates around volcanic fumaroles.

Association: Dolerophanite, chalcocyanite, tolbachite, piypite, melanothallite, tenorite, vergasovaite, euchlorine, alarsite, klyuchevskite, lammerite, nabokoite, atlasovite, langbeinite, hematite.

Distribution: From the Tolbachik fissure volcano, Kamchatka Peninsula, Russia.

Name: Honors Sergei Aleksandrovich Fedotov (1931–), volcanologist and seismologist, Director of the Institute of Volcanology, Petropavlovsk-Kamchatkskii, Russia.

Type Material: Mineralogical Museum, St. Petersburg University, St. Petersburg, Russia, 1890/1.

References: (1) Vergasova, L.P., S.K. Filatov, Y.K. Serafimova, and G.L. Starova (1988) Fedotovite, $K_2Cu_3O(SO_4)_3$ – a new volcanic sublimate mineral. Doklady Acad. Nauk SSSR, 299, 961–964 (in Russian). (2) (1990) Amer. Mineral., 75, 240–241 (abs. ref. 1). (3) Starova, G.L., S.K. Filatov, V.S. Fundamensky, and L.P. Vergasova (1991) The crystal structure of fedotovite, $K_2Cu_3O(SO_4)_3$. Mineral. Mag., 55, 613–616. (4) Popova, V.I. and V.A. Popov (1996) Morphology of the fedotovite crystals from Kamchatka. Doklady Acad. Nauk SSSR, 350, 101–103 (in Russian).