

Kostylevite

$\text{K}_2\text{ZrSi}_3\text{O}_9 \cdot \text{H}_2\text{O}$

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Crystal Data: Monoclinic. *Point Group:* $2/m$. As crystals elongated $\parallel$ $[001]$, showing $\{001\}$, $\{010\}$, $\{100\}$, and $\{011\}$. *Twinning:* On $\{100\}$.

Physical Properties: *Cleavage:* $\{110\}$, perfect. Hardness = ~ 5 VHN = 428–435
D(meas.) = 2.74 D(calc.) = 2.79

Optical Properties: Transparent. *Color:* Colorless. *Luster:* Vitreous.
Optical Class: Biaxial (+). *Orientation:* $X = b$; $Y \wedge c = 45^\circ$. *Dispersion:* $r < v$, weak.
 $\alpha = 1.595(2)$ $\beta = 1.598(2)$ $\gamma = 1.610(2)$ $2V(\text{meas.}) = 48^\circ$

Cell Data: *Space Group:* $P2_1/a$. $a = 13.171(4)$ $b = 11.717(4)$ $c = 6.565(2)$ $\beta = 105.26^\circ$
 $Z = 2$

X-ray Powder Pattern: Khibiny massif, Russia.
3.087 (100), 5.60 (60), 3.336 (53), 2.802 (53), 6.42 (47), 5.86 (31), 5.24 (31)

Chemistry:	(1)	(2)
SiO ₂	42.01	43.37
TiO ₂	2.06	
ZrO ₂	23.90	29.64
HfO ₂	0.61	
Fe ₂ O ₃	0.02	
CaO	0.00	
Na ₂ O	0.00	
K ₂ O	22.14	22.66
H ₂ O		4.33
Total	90.74	100.00

(1) Khibiny massif, Russia; by electron microprobe. Presence of H₂O is shown by strong IR absorption bands; if 1.00 H₂O is assumed to satisfy structural requirements and measured density, note the analysis will then sum to only $\sim 95\%$ however. (2) $\text{K}_2\text{ZrSi}_3\text{O}_9 \cdot \text{H}_2\text{O}$.

Polymorphism & Series: Dimorphous with umbite.

Occurrence: In alkalic pegmatite in a differentiated alkalic massif.

Association: Umbite, wadeite, eudialyte, potassian feldspar, aegirine.

Distribution: In the valley of the Vuonnemiok River, Khibiny massif, Kola Peninsula, Russia.

Name: For Ekaterina Evtikhiyevna Kostyleva-Labuntsova (1894–1974), Russian mineralogist, Institute of Geology of Ore Deposits, Petrology, Mineralogy, and Geochemistry, Moscow, Russia.

Type Material: Geology Museum, Kola Branch, Academy of Sciences, Apatity; Mining Institute, St. Petersburg, 1634/1; A.E. Fersman Mineralogical Museum, Academy of Sciences, Moscow, Russia, 82757.

References: (1) Khomyakov, A.P., A.A. Voronkov, L.I. Polezhaeva, and N.N. Smol'yaninova (1983) Kostylevite, $\text{K}_4\text{Zr}_2\text{Si}_6\text{O}_{18} \cdot 2\text{H}_2\text{O}$, a new mineral. Zap. Vses. Mineral. Obshch., 112, 469–474 (in Russian). (2) Ilyushin, G.D., A.P. Khomyakov, N.V. Shumyatskaya, A.A. Voronkov, N.N. Nevskii, V.V. Ilyukhin, and N.V. Belov (1981) Crystal structure of a new natural zirconosilicate, $\text{K}_4\text{Zr}_2\text{Si}_6\text{O}_{18} \cdot 2\text{H}_2\text{O}$. Doklady Acad. Nauk SSSR, 256, 860–863 (in Russian). (3) (1984) Amer. Mineral., 69, 812 (abs. refs. 1 and 2).