

Crystal Data: Triclinic. *Point Group:* $\bar{1}$. As lamellar, tabular, flattened prismatic or hoper crystals to 50 μm , epitaxially overgrown on koksharovite. As spongy aggregates of irregularly shaped grains to 0.15 mm.

Physical Properties: *Cleavage:* None. *Fracture:* Uneven. *Tenacity:* Brittle. Hardness = ~4.5 VHN = 379-495, 426 average (20 g load). D(meas.) = n.d. D(calc.) = 3.448

Optical Properties: Translucent. *Color:* Yellowish brown; light gray with intense deep yellow internal reflections in reflected light. *Streak:* Yellow. *Luster:* Adamantine.

Optical Class: n.d. *Bireflectance:* Weak.

R₁-R₂: (470) 16.3-17.7, (546) 14.1-15.7, (589) 13.8-15.1, (650) 13.6-14.7

Cell Data: Space Group: $P\bar{1}$. $a = 8.012(4)$ $b = 9.345(5)$ $c = 6.678(3)$ $\alpha = 106.992(10)^\circ$
 $\beta = 101.547(8)^\circ$ $\gamma = 96.594(11)^\circ$ $Z = 1$

X-ray Powder Pattern: Bezmyannyi volcano, Kamchatka, Russia.

3.209 (100), 3.539 (86), 3.270 (67), 1.665 (24), 3.090 (20), 3.041 (18), 3.751 (17)

Chemistry:	(1)	(2)
MgO	2.20	
CaO	0.01	
Al ₂ O ₃	7.81	
Fe ₂ O ₃	27.18	46.75
TiO ₂	4.50	
SiO ₂	0.26	
P ₂ O ₅	0.09	
<u>V₂O₅</u>	<u>57.01</u>	<u>53.25</u>
Total	99.06	100.00

(1) Bezmyannyi volcano, Kamchatka, Russia; average of 5 electron microprobe analyses Fe³⁺ confirmed by structure refinement; corresponds to (Fe³⁺_{3.29}Al_{1.48}Ti_{0.54}Mg_{0.53}) $\Sigma=5.84$ (V_{6.05}Si_{0.04}P_{0.01}) $\Sigma=6.10$ O₂₄. (2) Fe³⁺VO₄.

Mineral Group: Howardevansite group.

Occurrence: As fumarole sublimates on volcanic scoria.

Association: Koksharovite, bannermanite, quartz, biotite, Ti-V-bearing magnetite.

Distribution: At Bezmyannyi volcano, Kamchatka, Far-Eastern Region, Russia.

Name: For the *Zimina* volcano, located 12 km south of the Bezmyannyi volcano, Russia.

Type Material: A.E. Fersman Mineralogical Museum, Russian Academy of Sciences, Moscow, Russia (4603/1).

References: (1) Pekov, I.V., O.I. Siidra, V.O. Yapaskurt, Y.S. Polekhovskiy, and P.M. Kartashov (2018) Ziminaite, Fe³⁺VO₄, a new howardevansite-group mineral from the Bezmyannyi volcano, Kamchatka, Russia. *Mineral. Petrol.*, 112(3), 371-379. (2) (2019) *Amer. Mineral.*, 104(5), 784 (abs. ref 1).