

Vanalite

NaAl₉V₁₂O₄₂(OH)₄•33H₂O

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Crystal Data: Monoclinic. *Point Group:* 2/m or 2. In poorly-formed flattened and ragged crystals, may have diamond-shaped outlines, to 0.02 mm.

Physical Properties: *Cleavage:* {010}, perfect; {100}, less so. Hardness = n.d.
D(meas.) = 2.3–2.4 D(calc.) = 2.15

Optical Properties: Semitransparent. *Color:* Bright yellow to yellow-orange. *Luster:* Waxy to vitreous.

Optical Class: Biaxial. *Pleochroism:* Slight; in shades of yellow. *Orientation:* Extinction parallel; elongation negative. $\alpha = 1.710(6)$ $\beta = \text{n.d.}$ $\gamma = 1.735(6)$ 2V(meas.) = n.d.

Cell Data: *Space Group:* P2₁/m or P2₁. $a = 12.470$ $b = 21.40$ $c = 10.825$ $\beta = 97^\circ$
Z = 2

X-ray Powder Pattern: Kurumsak River valley, Kazakhstan.
10.70 (100), 2.938 (100), 8.52 (42), 7.90 (37), 6.33 (30), 5.34 (30), 3.308 (30)

Chemistry:	(1)	(2)
V ₂ O ₅	47.10	49.34
V ₂ O ₄	1.80	
SiO ₂	trace	
Al ₂ O ₃	21.00	20.75
Fe ₂ O ₃	0.20	
MgO	trace	
CaO	trace	
Na ₂ O	1.40	1.40
H ₂ O ⁺	23.30	
H ₂ O ⁻	7.80	
H ₂ O		28.51
Total	[102.60]	100.00

(1) Kurumsak River valley, Kazakhstan; original total given as 99.40%; corresponds to Na_{0.90}(Al_{8.18}Fe_{0.05}³⁺)_{Σ=8.23}(V_{10.29}⁵⁺V_{0.43}⁴⁺)_{Σ=10.72}[O₃₇(OH)_{4.76}]_{Σ=41.76}•30H₂O.

(2) NaAl₉V₁₂O₄₂(OH)₄•33H₂O.

Occurrence: Incrusting joints and cavities in weathered shales.

Association: Steigerite, hewettite, delvauxite, satpaevite, gypsum, halloysite, montmorillonite, other clay minerals.

Distribution: From a prospect in the Kurumsak River valley, northwestern Kara-Tau Mountains, south Kazakhstan.

Name: For VANadium and ALuminum in the composition.

Type Material: Mining Institute, St. Petersburg, 1271/1; A.E. Fersman Mineralogical Museum, Academy of Sciences, Moscow, Russia, 85613.

References: (1) Ankinovich, E.A. (1962) A new vanadium mineral, vanalite. Zap. Vses. Mineral. Obshch., 91, 307–314 (in Russian). (2) (1963) Amer. Mineral., 48, 1180 (abs. ref. 1). (3) Ankinovich, E.A., F.A. Kurmakaeva, and I.S. Zazubina (1987) Steigerite and vanalite from carbonaceous-siliceous vanadium-bearing formations of northwestern Karatau (southern Kazakhstan). Zap. Vses. Mineral. Obshch., 116, 100–113 (in Russian with English abs.).