

Crystal Data: Monoclinic. *Point Group:* 2/m. As blades flattened on {100} and elongated along [010], and as subparallel or fan-like aggregates to 5 mm.

Physical Properties: *Cleavage:* Fair on {100}. *Tenacity:* Brittle. *Fracture:* Curved. Hardness = ~2 D(meas.) = 2.48(2) D(calc.) = 2.460 Dissolves in dilute HCl.

Optical Properties: Transparent. *Color:* Very dark blue. *Streak:* Grayish blue. *Luster:* Vitreous. *Optical Class:* Biaxial (-). $\alpha = 1.645(5)$ $\beta(\text{calc.}) = 1.677$ $\gamma(\text{calc.}) = 1.681$ $2V(\text{meas.}) = 37(2)^\circ$ $2V(\text{calc.}) = \text{n.d.}$ *Orientation:* $Y = b, X \wedge a \approx 12^\circ$ in obtuse β . *Pleochroism:* $X =$ cornflower blue, $Y =$ dark blue, $Z =$ dark blue. *Absorption:* $X \ll Z < Y$. *Dispersion:* None.

Cell Data: Space Group: $P2_1/c$. $a = 25.8815(5)$ $b = 10.9416(2)$ $c = 28.2861(6)$
 $\beta = 102.2150(10)^\circ$ $Z = 2$

X-ray Powder Pattern: Packrat mine, Gateway district, Mesa County, Colorado, USA.
13.1 (100), 10.0 (98), 9.3 (63), 7.87 (56), 4.67 (35), 4.44 (31), 3.339 (33)

Chemistry:	(1)	(2)
Na ₂ O	0.63	0.54
CaO	13.08	11.30
SrO	0.21	0.19
FeO	0.04	0.03
As ₂ O ₃		[3.41]
As ₂ O ₅	31.61	[23.34]
VO ₂		[9.55]
V ₂ O ₅	43.89	[27.44]
H ₂ O		[24.20]
Total	89.47	100.00

(1) Packrat mine, Gateway district, Colorado, USA; average of 16 electron microprobe analyses.

(2) Analysis 1 normalized, H₂O calculated from structure, As and V apportioned for charge balance and structural criteria; corresponds to (Ca_{11.70}Na_{1.01}Sr_{0.11}Fe_{0.02}) $\Sigma=12.84$ (As³⁺V⁴⁺_{3.34}V⁵⁺_{8.76}As⁵⁺_{5.90}O₅₁)₂·78H₂O.

Occurrence: A secondary mineral formed by the oxidation of montroseite-corvusite assemblages in a moist environment.

Association: Gatewayite, morrisonite, packratite, pharmacolite, montroseite, corvusite.

Distribution: From the Packrat mine, Gateway district, Mesa County, Colorado, USA.

Name: An acronym based on the composition and specifically the fact that it contains vanadate, arsenite, and arsenate groups.

Type Material: Natural History Museum of Los Angeles County, Los Angeles, California, USA (64149 and 64150).

References: (1) Kampf, A.R., J.M. Hughes, B.P. Nash, and J. Marty (2016) Vanarsite, packratite, morrisonite, and gatewayite: four new minerals containing the [As³⁺V^{4+,5+}₁₂As⁵⁺₆O₅₁] heteropolyanion, a novel polyoxometalate cluster. *Can. Mineral.*, 54, 145-162. (2) (2017) *Amer. Mineral.*, 102, 1145-1146 (abs. ref. 1).