

**Crystal Data:** Triclinic. *Point Group:*  $\bar{1}$ . As blades flattened on {110} and striated and elongated along [001] to 1 mm; and as subparallel or divergent aggregates or botryoidal.

**Physical Properties:** *Cleavage:* Fair on {001}, {110} and  $\{\bar{1}\bar{1}0\}$ . *Tenacity:* Brittle.  
*Fracture:* Curved. Hardness = ~ 2 D(meas.) = 2.36(2) D(calc.) = 2.351  
 Dissolves in dilute HCl.

**Optical Properties:** Transparent. *Color:* Very dark greenish blue; pearly green (aggregates); dark blue in transmitted light. *Streak:* Grayish blue. *Luster:* Vitreous.  
*Optical Class:* Biaxial (-).  $\alpha(\text{calc.}) = 1.625$   $\beta = 1.628(2)$   $\gamma = 1.629(2)$   $2V(\text{meas.}) = 60.7(4)^\circ$   
 $2V(\text{calc.}) = \text{n.d.}$  *Orientation:*  $X \approx \perp \{110\}$ ,  $Z \wedge c \approx 20^\circ$ . *Pleochroism:* None.  
*Dispersion:* Moderate,  $r < v$ .

**Cell Data:** Space Group:  $P\bar{1}$ .  $a = 18.0572(4)$   $b = 19.4126(4)$   $c = 24.0586(17)$   
 $\alpha = 87.364(6)^\circ$   $\beta = 86.266(6)^\circ$   $\gamma = 79.267(6)^\circ$   $Z = 2$

**X-ray Powder Pattern:** Packrat mine, Gateway district, Mesa County, Colorado, USA.  
 10.5 (100), 14.5 (49), 12.1 (49), 2.939 (22), 2.732 (22), 7.45 (20), 2.846 (19)

Chemistry:	(1)	(2)
Na <sub>2</sub> O	0.30	0.27
CaO	11.29	10.27
As <sub>2</sub> O <sub>3</sub>		[3.38]
As <sub>2</sub> O <sub>5</sub>	31.28	[24.49]
VO <sub>2</sub>		[5.57]
V <sub>2</sub> O <sub>5</sub>	40.23	[30.46]
<u>H<sub>2</sub>O</u>		<u>[25.56]</u>
Total	83.22	100.00

- (1) Packrat mine, Gateway district, Colorado, USA; average of 4 electron microprobe analyses.  
 (2) Analysis 1 normalized, H<sub>2</sub>O calculated from structure, As and V apportioned for charge balance and structural criteria; corresponds to  $(\text{Ca}_{10.72}\text{Na}_{0.51})_{\Sigma=11.23}(\text{As}^{3+}\text{V}^{4+}_{1.97}\text{V}^{5+}_{9.80}\text{As}^{5+}_{6.23}\text{O}_{51})_2 \cdot 83\text{H}_2\text{O}$ .

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

**Association:** Gatewayite, morrisonite, vanarsite, pharmacolite, montroseite, corvusite.

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

**Name:** For the Packrat mine.

**Type Material:** Natural History Museum of Los Angeles County, Los Angeles, California, USA (64513 and 64514).

**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  $[\text{As}^{3+}\text{V}^{4+,5+}_{12}\text{As}^{5+}_6\text{O}_{51}]$  heteropolyanion, a novel polyoxometalate cluster. *Can. Mineral.*, 54, 145-162. (2) (2017) *Amer. Mineral.*, 102, 1145-1146 (abs. ref. 1).