

**Lumsdenite** **$\text{NaCa}_3\text{Mg}_2(\text{As}^{3+}\text{V}^{4+}_2\text{V}^{5+}_{10}\text{As}^{5+}_6\text{O}_{51})\cdot 45\text{H}_2\text{O}$** 

**Crystal Data:** Triclinic. *Point Group:*  $\bar{1}$ . As blades to 0.2 mm elongated along [100] and flattened perpendicular to [010], commonly in sprays.

**Physical Properties:** *Cleavage:* None. *Tenacity:* Brittle. *Fracture:* Irregular, curved. Hardness = ~2 D(meas.) = 2.35(2) D(calc.) = 2.359 Nonfluorescent.

**Optical Properties:** Translucent. *Color:* Dark green-blue. *Streak:* Green-blue. *Luster:* Vitreous. *Optical Class:* Biaxial (-).  $\alpha = 1.617(2)$   $\beta = 1.651(5)$   $\gamma = 1.675(5)$   $2V(\text{meas.}) = 78.4(5)^\circ$   $2V(\text{calc.}) = 78.6^\circ$  *Pleochroism:*  $X = \text{greenish yellow}$ ,  $Y = \text{dark greenish blue}$ ,  $Z = \text{greenish blue}$ . *Absorption:*  $X \ll Z < Y$ . Optic plane is at a small angle to the plane of flattening of the blades.

**Cell Data:** *Space Group:*  $P\bar{1}$ .  $a = 10.3490(5)$   $b = 17.6263(9)$   $c = 23.256(2)$   $\alpha = 82.208(6)^\circ$   $\beta = 88.351(6)^\circ$   $\gamma = 81.702(6)^\circ$   $Z = 2$

**X-Ray Diffraction Pattern:** Packrat mine, Lumsden Canyon, Mesa Co., Colorado, USA. 9.35 (100), 14.86 (80), 17.30 (44), 10.22 (32), 8.34 (32), 13.04 (25), 2.809 (23)

Chemistry:	(1)	(2)
K <sub>2</sub> O	0.06	
Na <sub>2</sub> O	0.47	1.05
CaO	6.30	5.69
MgO	2.60	2.73
FeO	0.05	
VO <sub>2</sub>	[5.38]	5.61
V <sub>2</sub> O <sub>5</sub>	[32.09]	30.78
As <sub>2</sub> O <sub>3</sub>	[3.36]	3.35
As <sub>2</sub> O <sub>5</sub>	[22.19]	23.34
H <sub>2</sub> O	[27.51]	24.44
Total	100.01	100.00

(1) Packrat mine, Lumsden Canyon, Mesa Co., Colorado, USA; normalized average electron microprobe analysis; H<sub>2</sub>O calculated, As and V apportioned from structure; corresponds to  $(\text{Ca}_{3.31}\text{Mg}_{1.90}\text{Na}_{0.45}\text{K}_{0.04}\text{Fe}^{2+}_{0.02})_{\Sigma=5.72}(\text{As}^{3+}_{1.00}\text{V}^{4+}_{1.91}\text{V}^{5+}_{10.40}\text{As}^{5+}_{5.69}\text{O}_{51})\cdot 45\text{H}_2\text{O}$ .

(2)  $\text{NaCa}_3\text{Mg}_2(\text{As}^{3+}\text{V}^{4+}_2\text{V}^{5+}_{10}\text{As}^{5+}_6\text{O}_{51})\cdot 45\text{H}_2\text{O}$ .

**Mineral Group:** Vanarsite mineral family.

**Occurrence:** Post-mining, secondary on asphaltum associated with montroseite- and corvusite-bearing sandstone. Deposited where U<sup>6+</sup>- and V<sup>4+</sup>/V<sup>5+</sup>-bearing solutions encountered local, strongly reducing conditions caused by the presence of organic matter.

**Association:** Gypsum, huemulite, rosslerite.

**Distribution:** From the Packrat mine, Lumsden Canyon, near Gateway, Mesa Co., Colorado, USA.

**Name:** For the location of the Packrat mine at the head of *Lumsden* Canyon.

**Type Material:** Natural History Museum of Los Angeles County, Los Angeles, California, USA (66787).

**References:** (1) Kampf, A.R., J.M. Hughes, B.P. Nash, J. Marty, and T.P. Rose (2020) Lumsdenite,  $\text{NaCa}_3\text{Mg}_2(\text{As}^{3+}\text{V}^{4+}_2\text{V}^{5+}_{10}\text{As}^{5+}_6\text{O}_{51})\cdot 45\text{H}_2\text{O}$ , a new polyoxometalate mineral from the Packrat mine, Mesa County, Colorado, USA. *Can. Mineral.*, 58, 137-151.