Ammoniolasalite $[(NH_4)_2Mg_2(H_2O)_{20}][V_{10}O_{28}]$

Crystal Data: Monoclinic. *Point Group*: 2/*m*. As short prismatic (elongated along $[10\bar{1}]$) to equant crystals, often with stepped or skeletal faces and in parallel orientation.

Observed crystal forms are {001}, {110}, $\{10\bar{1}\}$, {111}, $\{11\bar{1}\}$, {201}, and $\{31\bar{1}\}$.

Physical Properties: *Cleavage*: None. *Fracture*: Conchoidal. *Tenacity*: Brittle. Hardness = ~1 D(meas.) = 2.82(2) D(calc.) = 2.278 Slowly soluble in water and rapidly in dilute HCl.

Optical Properties: Transparent. *Color*: Bright orange to orange-yellow. S*treak*: Light orange. *Luster*: Vitreous.
Optical Class: Biaxial (-). $\alpha = 1.740(3)$ $\beta = 1.769(3)$ $\gamma = 1.771(3)$ 2V(meas.) = 31(1)° 2V(calc.) = 29.1° *Orientation*: $Y = b$, $Z \wedge a = 38°$ in β obtuse. *Dispersion*: Very strong, $r > v$. *Pleochroism*: X = yellow, Y = yellow orange, Z = orange. *Absorption*: $X < Y < Z$.

Cell Data: Space Group: *C*2/*c*. $a = 24.471(9)$ $b = 10.935(9)$ $c = 17.456(9)$ $\beta = 119.051(14)°$ Z = 4

X-ray Powder Pattern: Burro mine, Slick Rock district, San Miguel County, Colorado, USA. 9.43(100), 6.80 (32), 7.62 (26), 10.64 (24), 2.725 (23), 8.57 (21), 2.891 (13)

Chemistry:

	(1)	(2)
K_2O	0.81	
MgO	5.56	5.75
V_2O_5	64.88	64.85
$(NH_4)_2O$	[3.26]	3.71
H_2O	[25.70]	25.69
Total	100.01	100.00

(1) Burro mine, Slick Rock district, San Miguel County, Colorado, USA; normalized average of 4 electron microprobe analyses supplemented by CHN analysis and FTIR spectroscopy, $(NH_4)_2O$ and H_2O calculated from structure; corresponds to $[(NH_4)_{1.76}K_{0.24}]_{\Sigma=2.00}Mg_{1.94}[V^{5+}{}_{10}O_{28}]\cdot 20H_2O$.
(2) $[(NH_4)_2Mg_2(H_2O)_{20}][V_{10}O_{28}]$.

Occurrence: Product of postmining oxidation of primary montroseite-corvusite assemblages at ambient temperatures. The ammonium derived from organic matter. In a bedded or roll-front U and V deposit in sandstone containing carbonaceous plant material.

Association: Ammoniozippeite, schindlerite, wernerbaurite.

Distribution: From the Burro mine, Slick Rock district, San Miguel County, Colorado, USA.

Name: *Ammonio* for the composition as the NH_4-dominant (over Na) analogue of *lasalite*.

Type Material: Natural History Museum of Los Angeles County, Los Angeles, California, USA (67477, 67478, 67479, 67480, and 67481).

References: (1) Kampf, A.R., B.P. Nash, P.M. Adams, J. Marthy, and J.M. Hughes (2018) Ammoniolasalite, $[(NH_4)_2Mg_2(H_2O)_{20}][V_{10}O_{28}]$, a new decavanadate species from the Burro Mine, Slick Rock District, Colorado. Can. Mineral., 56(6), 859-869. (2) (2020) Amer. Mineral., 105(10), 1598-1599 (abs. ref. 1).