Rowleyite $[Na(NH_4,K)_9Cl_4][V_2^{5+,4+}(P,As)O_8]_6 \cdot n[H_2O,Na,NH_4,K,Cl]$

Crystal Data: Cubic. *Point Group*: $4/m\ \bar{3}\ 2/m$. As truncated octahedra to ~ 50 μm exhibiting {100} and {111}.

Physical Properties: *Cleavage*: None. *Tenacity*: Brittle. *Fracture*: Irregular. Hardness = ~ 2 D(meas.) = 2.23(2) D(calc.) = 2.28 (for 32 H_2O pfu) Dissolves slowly in dilute HCl.

Optical Properties: Transparent on thin edges. *Color*: Dark brownish green (appearing black); red-brown with olive-green rims in transmitted light. *Streak*: Brownish green. *Luster*: Vitreous. *Optical Class*: Isotropic. n = 1.715(5)

Cell Data: Space Group: $Fd\bar{3}\ m$. a = 31.704(14) Z = 16

X-ray Powder Pattern: Rowley mine, Maricopa County, Arizona, USA.
2.811 (100), 11.3 (70), 3.216 (65), 7.97 (63), 2.1112 (34), 1.9319 (34), 9.6 (31)

Chemistry:	(1)	(2)	(3)
$(NH_4)_2O$	9.47	9.37	8.38
Na_2O	4.53	4.48	4.01
K_2O	5.00	4.96	4.44
P_2O_5	19.28	15.30	13.69
V_2O_5	42.23	34.75	31.09
VO_2		8.94	8.00
As_2O_5	4.07	3.38	3.02
Cl	8.32	9.11	8.15
H_2O		11.77	21.06
$-O = Cl_2$		2.06	1.84
Total	92.90	100.00	100.00

(1) Rowley mine, Maricopa County, Arizona, USA.; average of 5 electron microprobe analyses, low analytical total ascribed to damage under electron beam. (2) Rowley mine, Maricopa County, Arizona, USA.; electron microprobe and structural analyses, 16 H_2O pfu in channels; corresponds to $[(NH_4)_{8.81}Na_{3.54}K_{2.58})_{\Sigma=14.93}Cl_{6.29}(H_2O)_{16}][(V^{5+}_{9.36}V^{4+}_{2.64})_{\Sigma=12}(P_{5.28}As^{5+}_{0.72})_{\Sigma=6}O_{48}]$. (3) Rowley mine, Maricopa County, Arizona, USA.; electron microprobe and structural analyses, 32 H_2O pfu in channels; corresponds to $[(NH_4)_{8.81}Na_{3.54}K_{2.58})_{\Sigma=14.93}Cl_{6.29}(H_2O)_{32}][(V^{5+}_{9.36}V^{4+}_{2.64})_{\Sigma=12}(P_{5.28}As^{5+}_{0.72})_{\Sigma=6}O_{48}]$.

Occurrence: A low-temperature, post-mining secondary mineral in a hot humid tunnel encrusted nearby with bat guano.

Association: Antipinite, fluorite, mimetite, mottramite, quartz, salammoniac, struvite, vanadinite, willemite, wulfenite.

Distribution: From the Rowley mine, near Theba, Painted Rock district, Maricopa County, Arizona, USA.

Name: For the mine that produced the first specimens.

Type Material: Natural History Museum of Los Angeles County, Los Angeles, California, USA (66268-66272).

References: (1) Kampf, A.R., M.A. Cooper, B.P. Nash, T.E. Cerling, J. Marty, D.R. Hummer, A.J. Celestian, T.P. Rose, and T.J. Trebisky (2017) Rowleyite, $[Na(NH_4,K)_9Cl_4][V_2^{5+,4+}(P,As)O_8]_6 \cdot n[H_2O,Na,NH_4,K,Cl]$, a new mineral with a microporous framework structure. Amer. Mineral., 102, 1037-1044.