Redcanyonite $(NH_4)_2Mn[(UO_2)_4O_4(SO_4)_2](H_2O)_4$

Crystal Data: Monoclinic. *Point Group*: 2/*m*. In radial aggregates, to 1 mm, composed of needles and blades, to 0.2 mm, flattened on {010}, elongated on [100], and that exhibit {001}, {010}, {101}, and $\{10\bar{1}\}$. *Twinning*: By 180° rotation on [100].

Physical Properties: *Cleavage*: Perfect on {010}. *Fracture*: Uneven. *Tenacity*: Brittle. Hardness = ~2 D(meas.) = n.d. D(calc.) = 4.633-4.688 Soluble in dilute HCl.

Optical Properties: Translucent. *Color*: Red-orange. *Streak*: Pale orange. *Luster*: Vitreous. *Optical Class*: Biaxial (+). α = 1.725(3) β = 1.755(3) γ = 1.850(5) 2V(meas.) = 60(2)° 2V(calc.) = 61.3° *Orientation*: $X = b$, $Y \approx c^*$, $Z \approx a$. *Dispersion*: Very strong, $r < v$. *Pleochroism*: X = orange, Y = yellow, Z = orange. *Absorption*: $Y << X < Z$.

Cell Data: Space Group: *C*2/*m*. a = 8.6572(17) b = 14.155(3) c = 8.8430(19) β = 104.117(18)° Z = 2

X-ray Powder Pattern: Blue Lizard mine, Red Canyon, San Juan County, Utah, USA.
7.19 (100), 3.112 (72), 3.453 (56), 3.600 (33), 2.657 (23), 8.55 (21), 2.491 (21)

Chemistry:

	(1)	(2)
$(NH_4)_2O$	3.41	3.48
P_2O_5	0.10	
SO_3	10.28	10.68
MnO	2.26	4.73
CuO	0.46	
ZnO	0.34	
UO_3	74.27	76.30
H_2O	[5.10]	4.81
Total	96.22	100.00

(1) Blue Lizard mine, Red Canyon, San Juan County, Utah, USA; average of 5 electron microprobe analyses supplemented by Raman and FTIR spectroscopy, H_2O calculated from structure; corresponds to $(NH_4)_{2.02}(Mn_{0.49}Cu_{0.09}Zn_{0.06})_{\Sigma=0.64}H^+_{0.72}[(UO_2)_4O_4(S_{0.99}P_{0.01}O_4)_2](H_2O)_4$.
(2) $(NH_4)_2Mn[(UO_2)_4O_4(SO_4)_2](H_2O)_4$.

Mineral Group: Zippeite group.

Occurrence: A secondary uranium mineral localized within organic-rich beds that are laced with uraninite and sulfides. NH^{4+} inferred to be from decomposition of organic material.

Association: Ammoniozippeite, bobcookite, brochantite, devilline, gypsum, johannite, posnjakite, natrozippeite, pentahydrate, pickeringite.

Distribution: From the Blue Lizard mine, on the northern edge of Red Canyon, White Canyon district, San Juan County, Utah, USA.

Name: For the locality, Red Canyon in southeast Utah and in allusion to the red and orange hues of iron-stained sandstones within the canyon, which are also the striking color of the new mineral.

Type Material: Natural History Museum of Los Angeles County, Los Angeles, California, USA (66293, 66294, 66295, 66296, 66297, and 66298).

References: (1) Olds, T.A., J. Plášil, A.R. Kampf, P.C. Burns, B.P. Nash, J. Marty, T.P. Rose, and S.M. Carlson (2018) Redcanyonite, $(NH_4)_2Mn[(UO_2)_4O_4(SO_4)_2](H_2O)_4$, a new zippeite-group mineral from the Blue Lizard mine, San Juan County, Utah, USA. Mineral. Mag., 82(6), 1261-1275. (2) (2019) Amer. Mineral., 104(12), 1869-1870 (abs. ref. 1).