Umohoite $(UO_2)Mo^{6+}O_4 \cdot 2H_2O$

Crystal Data: Triclinic, pseudorhombohedral. *Point Group:* $\overline{1}$ or 1. Tabular plates, to 0.5 mm, in rosettes; also massive, in thin veinlets, and disseminated.

Physical Properties: *Cleavage:* On {001}, perfect. Hardness = n.d. D(meas.) = 4.53–4.66 D(calc.) = 4.523–4.457 Radioactive.

Optical Properties: Semitransparent to opaque. *Color:* Blue-black with dark green patches. *Luster:* Vitreous.
Optical Class: Biaxial (–). *Pleochroism:* X = dark blue; Y = pale blue; Z = olive-green. *Orientation:* $Y = b$; $X \wedge c \simeq 9°05'$; $Z \simeq a$. *Dispersion:* $r > v$. $\alpha = [1.66(1)]$ $\beta = 1.831(5)$ $\gamma = 1.915(5)$ 2V(meas.) = 65(2)°

Cell Data: *Space Group:* $P\overline{1}$, with $a = 6.3748(4)$ $b = 7.5287(5)$ $c = 14.628(1)$ $\alpha = 82.64(1)°$ $\beta = 85.95(1)°$ $\gamma = 89.91(1)°$ Z = 4, or *Space Group:* $P1$, with $a = 6.372(3)$ $b = 7.535(4)$ $c = 14.69(3)$ $\alpha = 97.1°$ $\beta = 85.9°$ $\gamma = 90.07°$ Z = 4

X-ray Powder Pattern: Marysvale, Utah, USA; after heating to 50°C overnight, as the pattern changes with humidity and temperature, grinding, or X-ray bombardment.
4.13 (10), 3.20 (5), 3.15 (4), 12.2 (3), 6.18 (3), 2.07 (3), 3.11 (2)

Chemistry:

	(1)	(2)	(3)
MoO_3	28.23	34.80	30.89
UO_3	57.65	55.35	61.38
As_2O_3	1.		

	(1)	(2)	(3)
MgO		1.00	
H_2O	14.	[8.85]	7.73
Total		[100.00]	100.00

(1) Marysvale, Utah, USA. (2) Shinkolobwe, Congo; by electron microprobe, average of two analyses; H_2O by difference. (3) $(UO_2)MoO_4 \cdot 2H_2O$, determined from crystal-structure analysis.

Occurrence: A rare secondary mineral, typically in sediment-hosted uranium-bearing deposits, formed in the oxidation zone above the water table.

Association: Uraninite, ilsemannite, jordisite, iriginite, schoepite, uranophane, rutherfordine, calcurmolite, fluorite, pyrite, gypsum, quartz.

Distribution: From the USA, from the Freedom No. 2 mine, Marysvale, Ohio district, Piute Co., Utah; at the Lucky Mc mine, Gas Hills, Fremont Co., Wyoming; and in the Alyce Tolino mine, Cameron district, Coconino Co., Arizona. At Shinkolobwe, Katanga Province, Congo (Shaba Province, Zaire). From the Rabéjac and Mas-d'Alary uranium deposits, south of Lodève, Hérault, France. At the Kyzylsai Mo–U deposit, Chu-Ili Mountains, southwestern Balkhash region, Kazakhstan. From unspecified localities in the former Soviet Union.

Name: For Uranium, MOlybdenum, Hydrogen, and Oxygen in the composition.

Type Material: n.d.

References: (1) Brophy, G.P. and P.F. Kerr (1953) Hydrous uranium molybdate in Marysvale ore, a preliminary report; in: Annual Report for June 30, 1952 to April 1, 1953, U.S. Atomic Energy Comm. RME-3046, 45–51. (2) Frondel, C. (1958) Systematic mineralogy of uranium and thorium. U.S. Geol. Sur. Bull. 1064, 148–149. (3) Coleman, R.G. and D.E. Appleman (1957) Umohoite from the Lucky Mc mine, Wyoming. Amer. Mineral., 42, 657–660. (4) Kamhi, S.R. (1959) An X-ray study of umohoite. Amer. Mineral., 44, 920–925. (5) Hamilton, P.-K. and P.F. Kerr (1959) Umohoite from Cameron, Arizona. Amer. Mineral., 44, 1248–1260. (6) Krivovichev, S.Y. and P.C. Burns (2000) Crystal chemistry of uranyl molybdates. I. The structure and formula of umohoite. Can. Mineral., 38, 717–726. (7) Rastsvetaeva, R.K., A.V. Barinova, G.A. Sidorenko, and D.Y. Pushcharovskiy (2000) Crystal structure of triclinic umohoite $[UMoO_6H_2O] \cdot H_2O$. Doklady Acad. Nauk SSSR, 373, 202–205.