## Hummerite $KMgV^{5+}_5O_{14}\cdot 8H_2O$

**Crystal Data**: Triclinic. *Point Group*: $\bar{1}$. Massive, in veins and efflorescences.

**Physical Properties**: Hardness = n.d. D(meas.) = n.d. D(calc.) = [2.53] Soluble in $H_2O$, from which it may be recrystallized.

**Optical Properties**: Translucent. *Color*: Bright orange.
*Optical Class*: Biaxial (–) (recrystallized). $\alpha$ = n.d. $\beta$ = 1.81 $\gamma$ = n.d. 2V(meas.) = n.d.
*Dispersion*: Strong.

**Cell Data**: *Space Group*: $P\bar{1}$. $a$ = 8.8178(4) $b$ = 10.7236(5) $c$ = 11.0707(5) $\alpha$ = 65.798(1)° $\beta$ = 74.057(1)° $\gamma$ = 71.853(1)° Z = [2]

**X-ray Powder Pattern**: Hummer mine, Colorado, USA.
8.2 (10), 7.4 (7), 2.73 (6), 7.0 (5), 3.31 (4), 3.13 (4), 2.11 (4)

**Chemistry**: Qualitative energy-dispersion analysis showed only K, Mg, V, and O; originally characterized by correspondence of properties with synthetic material.

**Occurrence**: Leached from vanadium oxide ores and deposited in veins in clay and as efflorescences on bedded or roll-front U-V deposits in sandstone.

**Association**: Huemulite, rossite, thenardite, gypsum, epsomite (Malargüe district, Argentina); gypsum, huemulite, metamunirite, munirite, bluestreakite (Blue Streak mine, USA).

**Distribution**: In the USA, in the Hummer mine, Blue Streak mine, Jo Dandy group, and the North Star mine, Paradox Valley, Uravan district, Montrose Co., Colorado; in the Mesa No. 1 mine, Lukachukai Mountains, Apache Co., Arizona; from the Grants district, McKinley Co., New Mexico; in the Corvusite mine, Beaver Mesa, La Sal Mountains, Grand Co., Utah; and in the Gold Quarry mine, near Carlin, Maggie Creek district, Eureka Co., Nevada. From the Malargüe district, Mendoza Province, Argentina. At the Ronneburg deposit, Thuringia, Germany.

**Name**: For the *Hummer* mine, Colorado, USA, where it occurs.

**Type Material**: Harvard University, Cambridge, Massachusetts, 102345; National Museum of Natural History, Washington, D.C., USA, 106899.

**References**: (1) Weeks, A.D., E.A. Cisney, and A.M. Sherwood (1951) Hummerite and montroseite, two vanadium minerals from Montrose County, Colorado. Proceedings of the 31st Annual Meeting. Amer. Mineral., 36, 326-327 (abs.). (2) Evans, H.T., Jr., M.E. Mrose, and R. Marvin (1955) Constitution of the natural and artificial decavanadates. Proceedings of the 35th Annual Meeting. Amer. Mineral., 40, 314-315 (abs.). (3) Griffen, D.T. (1990) The crystal structure of hummerite, with comments on the crystallochemical stability of the decavanadate isopolyanion. Brigham Young Univ., Geology Studies, 36, 1-14. (4) Traill, R.J. and A.P. Sabina (1960) Catalogue of X-ray diffraction patterns and specimen mounts on file at the Geological Survey of Canada. Geol. Sur. Canada, Paper 60-4, 50. (5) Hughes, J.M., M. Schindler, J. Rakovan, and F.E. Cureton (2002) The crystal structure of hummerite, $KMg(V_5O_{14})$ $8H_2O$: bonding between the $[V_{10}O_{28}]^{6-}$ structural unit and the $\{K_2Mg_2(H_2O)_{16}\}^{6+}$ interstitial complex. Can. Mineral., 40, 1429-1435. (6) (2003) Amer. Mineral., 88, 1179 (abs. ref. 5).