Manganhumite $(Mn^{2+},Mg)_7(SiO_4)_3(OH)_2$

Crystal Data: Orthorhombic. *Point Group:* $2/m\ 2/m\ 2/m$. Anhedral grains, to about 1 cm.

Physical Properties: *Cleavage:* {001}, perfect. Hardness = 4 D(meas.) = 3.83(5) D(calc.) = 3.84

Optical Properties: Transparent. *Color:* Pale to deep brownish orange; very pale orange in thin section. *Luster:* Subadamantine.
Optical Class: Biaxial (+). *Dispersion:* $r > v$, perceptible. $\alpha = 1.707(3)$ $\beta = 1.712(3)$ $\gamma = 1.723(3)$ $2V(meas.) = 37(4)^\circ$

Cell Data: *Space Group: Pbnm.* $a = 4.815(1)$ $b = 10.580(2)$ $c = 21.448(5)$ $Z = 4$

X-ray Powder Pattern: Brattfors mine, Sweden.
1.777 (10), 2.500 (7), 3.371 (6), 2.628 (6), 1.525 (6), 2.752 (5), 2.813 (5b)

Chemistry:

	(1)	(2)		(1)	(2)
SiO_2	29.8	26.21	CaO	0.34	0.13
TiO_2		0.17	F		1.46
Al_2O_3	trace	0.00	H_2O		[1.89]
FeO	0.98	0.94	P_2O_5	trace	
MnO	57.1	69.47	$-O = F_2$		[0.61]
MgO	14.2	0.73	Total	102.42	[100.39]

(1) Brattfors mine, Sweden; by electron microprobe, average of five grains; corresponds to $(Mn^{2+}_{4.76}Mg_{2.10}Fe_{0.07}Ca_{0.07})_{\Sigma=7.00}(SiO_4)_3(OH)_2$. (2) Bald Knob, North Carolina, USA; by electron microprobe, H_2O calculated from stoichiometry; corresponds to $(Mn^{2+}_{6.76}Mg_{0.12}Fe_{0.09}Ca_{0.02})_{\Sigma=6.99}Si_{3.01}O_{12}[(OH)_{1.45}F_{0.53}]_{\Sigma=1.98}$.

Mineral Group: Humite group.

Occurrence: A late-stage skarn mineral formed in recrystallized limestone banded between layers of manganese ore minerals (Brattfors mine, Sweden); in a manganese deposit metamorphosed to the amphibolite facies (Bald Knob, North Carolina, USA).

Association: Katoptrite, magnetite, manganostibite, magnussonite, tephroite, galaxite, manganosite (Brattfors mine, Sweden); sonolite, alleghanyite, rhodonite, kutnohorite, galaxite, jacobsite, kellyite, alabandite (Bald Knob, North Carolina, USA).

Distribution: In the Brattfors mine, Nordmark, and at Långban, Värmland, Sweden. In the USA, from Bald Knob, near Sparta, Alleghany Co., North Carolina, and Franklin, Sussex Co., New Jersey.

Name: For *manganese* in the composition and relation to *humite*.

Type Material: Swedish Museum of Natural History, Stockholm, Sweden; Harvard University, Cambridge, Massachusetts, 119819; National Museum of Natural History, Washington, D.C., USA, 137016, 162626.

References: (1) Moore, P.B. (1978) Manganhumite, a new species. Mineral. Mag., 42, 133–136. (2) (1979) Amer. Mineral., 64, 243 (abs. ref. 1). (3) Francis, C.A. and P.H. Ribbe (1978) Crystal structure of the humite minerals: V. Magnesian manganhumite. Amer. Mineral., 63, 874–877. (4) Winter, G.A., E.J. Essene, and D.R. Peacor (1983) Mn-humites from Bald Knob, North Carolina: mineralogy and phase equilibria. Amer. Mineral., 68, 951–959. (5) Dunn, P.J. (1985) Manganese humites and leucophoenicites from Franklin and Sterling Hill, New Jersey: parageneses, compositions, and implications for solid solution limits. Amer. Mineral., 70, 379–387.