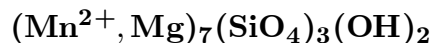


# Manganhumite



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**Crystal Data:** Orthorhombic. *Point Group:*  $2/m\ 2/m\ 2/m$ . Anedral 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)

<b>Chemistry:</b>	(1)	(2)	(1)	(2)
SiO <sub>2</sub>	29.8	26.21	CaO	0.34
TiO <sub>2</sub>		0.17	F	1.46
Al <sub>2</sub> O <sub>3</sub>	trace	0.00	H <sub>2</sub> O	[1.89]
FeO	0.98	0.94	P <sub>2</sub> O <sub>5</sub>	trace
MnO	57.1	69.47	-O = F <sub>2</sub>	[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  $(\text{Mn}_{4.76}^{2+}\text{Mg}_{2.10}\text{Fe}_{0.07}\text{Ca}_{0.07})_{\Sigma=7.00}(\text{SiO}_4)_3(\text{OH})_2$ . (2) Bald Knob, North Carolina, USA; by electron microprobe, H<sub>2</sub>O calculated from stoichiometry; corresponds to  $(\text{Mn}_{6.76}^{2+}\text{Mg}_{0.12}\text{Fe}_{0.09}\text{Ca}_{0.02})_{\Sigma=6.99}\text{Si}_{3.01}\text{O}_{12}[(\text{OH})_{1.45}\text{F}_{0.53}]_{\Sigma=1.98}$ .

**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. All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise without the prior written permission of Mineral Data Publishing.