Humite $(Mg, Fe^{2+})_7(SiO_4)_3(F, OH)_2$

Crystal Data: Orthorhombic. *Point Group:* $2/m\ 2/m\ 2/m$. Crystals typically highly modified, to 1 cm; granular.

Physical Properties: *Cleavage:* {100}, poor. *Fracture:* Uneven to subconchoidal. *Tenacity:* Brittle. Hardness = 6 D(meas.) = 3.20–3.32 D(calc.) = 3.201

Optical Properties: Transparent to translucent. *Color:* White, yellow, dark orange, brown; colorless to yellow-brown in thin section. *Luster:* Vitreous.
Optical Class: Biaxial (+). *Pleochroism:* X = very pale yellow to dark yellow; $Y = Z$ = colorless, pale yellow. *Orientation:* $X = a$; $Y = c$; $Z = b$. *Dispersion:* $r > v$. $\alpha = 1.607$–1.643 $\beta = 1.619$–1.655 $\gamma = 1.639$–1.675 2V(meas.) = 65°–84°

Cell Data: *Space Group: Pmcn.* $a = 20.8526(4)$ $b = 4.7408(1)$ $c = 10.2580(2)$ $Z = 4$

X-ray Powder Pattern: Synthetic $Mg_7(SiO_4)_3F$.
2.256 (100), 2.438 (70), 1.4786 (70), 1.7387 (65), 3.64 (50), 2.691 (50), 2.572 (40)

Chemistry:

	(1)	(2)
SiO_2	35.79	36.43
TiO_2	2.00	0.10
Al_2O_3	0.79	
Fe_2O_3	0.33	
FeO	3.31	5.03
MnO	0.84	0.65
MgO	54.51	53.84
CaO	0.00	0.01
F	2.77	4.07
H_2O^+	0.91	[1.69]
H_2O^-	0.00	
$-O = F_2$	1.17	[1.71]
Total	100.08	[100.11]

(1) Lohja, Finland; corresponds to $(Mg_{6.75}Fe^{2+}_{0.23}Ti_{0.12}Al_{0.08}Mn_{0.06}Fe^{3+}_{0.02})_{\Sigma=7.26}(Si_{0.99}O_4)_3[F_{0.73}(OH)_{0.50}]_{\Sigma=1.23}$. (2) Sillböle, Finland; by electron microprobe, H_2O calculated from stoichiometry; corresponds to $(Mg_{6.60}Fe_{0.35}Mn_{0.04})_{\Sigma=6.99}(SiO_4)_3[F_{1.06}(OH)_{0.93}O_{0.01}]_{\Sigma=2.00}$.

Mineral Group: Humite group.

Occurrence: Typically in contact metamorphic zones in limestones and dolostones associated with felsic, or more rarely, alkalic plutonic rocks, especially where metasomatism has introduced Fe, B, and F.

Association: Grossular, wollastonite, forsterite, monticellite, cuspidine, fluoborite, ludwigite, spinel, brucite, calcite, dolomite, serpentine, diopside, corundum, phlogopite, pyrrhotite.

Distribution: At Monte Somma and Vesuvius, Campania, Italy. At Lohja, Sillböle, and Hermala, Finland. In the Norberg area, and at the Ladu mine, Persberg, Värmland, Sweden. From Sorfinnset, Glomfjord, Norway. In the Tilly Foster mine, Brewster, Putnam Co., New York, and at Franklin, Sussex Co., New Jersey, USA. From Llanos de Juanar, Málaga Province, Spain. At Anzahamazonono, Madagascar.

Name: After Sir Abraham Hume (1749–1838), English connoisseur and collector of works of art, gems, and minerals.

Type Material: Natural History Museum, Paris, France.

References: (1) Dana, E.S. (1892) Dana's system of mineralogy, (6th edition), 535–536. (2) Deer, W.A., R.A. Howie, and J. Zussman (1982) Rock-forming minerals, (2nd edition), v. 1A, orthosilicates, 380–417. (3) Ribbe, P.H. and G.V. Gibbs (1971) Crystal structures of the humite minerals: III. Mg/Fe ordering in humite and its relation to other ferromagnesian silicates. Amer. Mineral., 56, 1155–1173. (4) (1962) NBS Mono. 25, 1, 30.