## Manasseite $Mg_6Al_2(CO_3)(OH)_{16}\cdot 4H_2O$



**Crystal Data:** Hexagonal. *Point Group:* n.d. Hexagonal crystals, to 2 cm, prismatic with hexagonal dipyramidal forms, terminated by {0001}; commonly foliated massive, intermixed with hydrotalcite. *Twinning:* On {0001}, and on a pyramid at about 30° to [0001].

**Physical Properties:** *Cleavage:* {0001}, perfect. Hardness = 2 D(meas.) = 2.05(5) D(calc.) = 2.00

**Optical Properties:** Transparent. *Color:* White, pale blue to sky-blue, pale gray, pale yellow, pale brown, pale orange to deep red-orange, may be zoned; colorless in transmitted light. *Luster:* Waxy to pearly on the cleavage.
*Optical Class:* Uniaxial (–); may be biaxial due to strain. $\omega = 1.524(3)$ $\epsilon = 1.510(3)$ 2V(meas.) = Small.

**Cell Data:** *Space Group:* n.d. $a = 6.12$ $c = 15.34$ $Z = 1$

**X-ray Powder Pattern:** Dypingdal quarry, Snarum, Norway. (ICDD 14-525).
7.67 (100), 1.84 (60), 2.60 (50), 2.34 (40), 2.17 (40), 2.00 (40), 1.52 (30)

**Chemistry:**

| | (1) | (2) |
|---|---|---|
| $Al_2O_3$ | 16.59 | 16.88 |
| $Fe_2O_3$ | 0.21 | |
| MgO | 39.38 | 40.04 |
| $H_2O$ | 36.34 | 35.79 |
| $CO_2$ | 7.48 | 7.29 |
| Total | 100.00 | 100.00 |

(1) Snarum, Norway; estimated gibbsite 6.38%. (2) $Mg_6Al_2(CO_3)(OH)_{16}\cdot 4H_2O$.

**Polymorphism & Series:** Dimorphous with hydrotalcite.

**Mineral Group:** Manasseite group.

**Occurrence:** A secondary mineral in ultramafic rocks.

**Association:** Hydrotalcite, serpentine, dolomite.

**Distribution:** From Snarum, Norway. In Russia, found near Kusinsk, Southern Ural Mountains, at Asbest, Ural Mountains; on the Kola Peninsula, large crystals from the Kovdor massif, and at the Vuoriyarvi carbonatite complex. At Amity, Orange Co., New York, USA. From Mont St. Hilaire, Quebec, Canada. Fine crystals from the Jacupiranga mine, São Paulo, Brazil.

**Name:** Honors Ernesto Manasse (1875–1922), Italian chemist and mineralogist, Professor of Mineralogy, University of Florence, Florence, Italy, for work on pyroaurite-related minerals.

**Type Material:** Harvard University, Cambridge, Massachusetts, USA, 87211.

**References:** (1) Palache, C., H. Berman, and C. Frondel (1944) Dana's system of mineralogy, (7th edition), v. I, 658–659. (2) Kapustin, Y.L. (1971) Mineralogy of carbonatites. Nauka Publishers, Moscow, 165 (in English). (3) Taylor, H.W.F. (1973) Crystal structures of some double hydroxide minerals. Mineral. Mag., 39, 377–389.