

Crystal Data: Hexagonal. *Point Group:* 6/m 2/m 2/m. As euhedral crystals, pyramidal, tabular, or rhombohedral, striated || (00*1) or less commonly, || [00*1], to 4 cm. Rarely in radiating aggregates or granular. *Twining:* Penetration twins on {10*1}, common.

Physical Properties: *Cleavage:* {10*0}, distinct; parting on {00*1}. *Fracture:* Uneven. *Tenacity:* Brittle. Hardness = 4.5 D(meas.) = 2.02-2.17 D(calc.) = 2.098 Piezoelectric.

Optical Properties: Transparent to translucent, opaque. *Color:* Colorless, white, reddish white, salmon-red, yellowish, greenish white; colorless in thin section. *Luster:* Vitreous. *Optical Class:* Uniaxial (-) or (+); may be anomalously biaxial. $\omega = 1.476-1.494$ $\varepsilon = 1.474-1.480$

Cell Data: *Space Group:* P6₃/mmc. $a = 13.75-13.80$ $c = 9.97-10.08$ $Z = 4$

X-ray Powder Pattern: Montecchio Maggiore, Italy.
4.106 (100), 11.908 (63), 2.978 (55), 2.690 (44), 3.227 (41), 7.68 (29), 5.026 (28)

Chemistry:	(1)	(2)		(1)	(2)
SiO ₂	50.00	46.57	Na ₂ O	7.20	4.35
Al ₂ O ₃	19.17	21.12	K ₂ O	0.10	0.27
CaO	2.95	7.04	<u>H₂O</u>	<u>20.00</u>	<u>20.40</u>
SrO	0.58	0.25	Total	100.00	100.00

(1) Montecchio Maggiore, Italy; by electron microprobe, corresponds to (Na_{2.32}Ca_{0.52}Sr_{0.06}K_{0.02}) $\Sigma=2.92$ Al_{3.76}Si_{8.32}O₂₄·11.08H₂O. (2) South quarry, White Head, Co. Antrim, Ireland; by electron microprobe, corresponds to (Na_{1.42}Ca_{1.28}Sr_{0.06}K_{0.02}) $\Sigma=2.78$ Al_{4.20}Si_{7.84}O₂₄·11.43H₂O.

Mineral Group: Zeolite group.

Occurrence: Formed from sodium-rich fluids, in basalts and related igneous rocks, also pegmatites.

Association: Zeolites, calcite, aragonite, quartz.

Distribution: Widespread in small amounts. A few localities for well-studied material follow. From Montecchio Maggiore, Vicenza, Italy. At Glenarm and elsewhere in Co. Antrim, Ireland. On the Isle of Skye, Scotland. At Pyrgos, Cyprus. In the USA, from Bergen Hill, Hudson Co., and Great Notch, Paterson, and Prospect Park, Passaic Co., New Jersey; at Springfield, Lane Co., Oregon. From around Flinders, Victoria, Australia. On Pinnacle Rock, Five Islands, and Two Islands, Nova Scotia, Canada. In the Ilímaussaq intrusion, southern Greenland. At Sarbay-Sokolov, Kazakhstan. Large crystals from Bekiady, Madagascar.

Name: For Christian Gottlob *Gmelin* (1792-1860), mineralogist and chemist of Tübingen, Germany. The suffix indicates the dominance of Na as the extra-framework cation.

References: (1) Dana, E.S. (1892) Dana's system of mineralogy, (6th edition), 593-594. (2) Deer, W.A., R.A. Howie, and J. Zussman (1963) Rock-forming minerals, v. 4, framework silicates, 387-400. (3) Passaglia, E., D. Pongiluppi, and G. Vezzalini (1978) The crystal chemistry of gmelinites. Neues Jahrb. Mineral., Monatsh., 310-322. (4) Galli, E., E. Passaglia, and P.F. Zanazzi (1982) Gmelinite: structural refinements of sodium-rich and calcium-rich natural crystals. Neues Jahrb. Mineral., Monatsh., 145-155. (5) Coombs, D.S., A. Alberti, T. Armbruster, G. Artioli, C. Coltella, E. Galli, J.D. Grice, F. Liebau, J.A. Mandarino, H. Minato, and others (1997) Recommended nomenclature for zeolite minerals: Report of the Subcommittee on Zeolites of the IMA, Commission on New Minerals and Mineral Names. Can. Mineral., 35, 1571-1606.