

Crystal Data: Orthorhombic. *Point Group:* 2/m 2/m 2/m. As crystals tabular on (100), equant, or slightly elongate along [010] or [001] to 200 μm, with {100} dominant, {010} and {101} intermediate, and {032} minor. As subspherical aggregates to 1.8 mm.

Physical Properties: *Cleavage:* {100}, good. *Tenacity:* Brittle. *Fracture:* Irregular. Hardness = n.d. D(meas.) = 2.14(3) D(calc.) = 2.14 Nonfluorescent. Reversibly hydrates and dehydrates.

Optical Properties: Transparent. *Color:* Colorless to pale milky white. *Streak:* White. *Luster:* Vitreous to silky. *Optical Class:* Biaxial (-). $a = 1.485(2)$ $\beta = 1.487(2)$ $\gamma = 1.488(2)$ $2V(\text{calc.}) = 110^\circ$ *Orientation:* $X = b, Y = a, Z = c$.

Cell Data: *Space Group:* Pnma. $a = 20.223(7)$ $b = 20.052(8)$ $c = 13.491(5)$ $Z = 1$

X-ray Powder Pattern: Mt. Adamson, Northern Victoria Land, Antarctica. 3.85 (100), 3.75 (98), 11.20 (84), 9.98 (35), 3.00 (32), 3.67 (27), 2.007 (13)

Chemistry:	(1)
SiO ₂	72.22
Al ₂ O ₃	8.08
MgO	0.12
CaO	3.00
Na ₂ O	1.21
K ₂ O	0.07
<u>H₂O</u>	<u>15.30</u>
Total	100.00

(1) Mt. Adamson, Northern Victoria Land, Antarctica; average electron microprobe analysis supplemented by IR spectroscopy, H₂O by TGA; corresponds to (Ca_{3.78}Na_{2.76}K_{0.11}Mg_{0.21}) $\Sigma=6.86$ (Si_{84.91}Al_{11.20}) $\Sigma=96.11$ O₁₉₂·60H₂O.

Mineral Group: Zeolite group.

Occurrence: In cavities in dolerite.

Association: Heulandite, terranovaite, tschernichite, smectite, quartz, cristobalite, opal-CT, apophyllite, gypsum, calcite.

Distribution: At Mt. Adamson, Northern Victoria Land, Antarctica.

Name: From *Mutina*, the ancient Latin name of Modena, Italy, a center of modern zeolite research.

Type: Museum of Natural History, University of Pisa, Italy (15520).

References: (1) Galli, E., G. Vezzalini, S. Quartieri, A. Alberti, and M. Franzini (1997) Mutinaite, a new zeolite from Antarctica: the natural counterpart of ZSM-5. *Zeolites* 19, 318-322. (2) (1998) *Amer. Mineral.*, 83, 909 (abs. ref. 1). (3) Vezzalini, G., S. Quartieri, E. Galli, A. Alberti, G. Cruciani, and Å. Kvik (1997) Crystal structure of the zeolite mutinaite, the natural analog of ZSM-5. *Zeolites* 19, 323-325.