

Mordenite



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Crystal Data: Orthorhombic. *Point Group:* $mm2$ or $2/m\ 2/m\ 2/m$. Prismatic crystals, striated || elongation; acicular to fine fibrous, to 2.5 cm. In radiating groups or cottony aggregates; compact, porcelaneous.

Physical Properties: *Cleavage:* Perfect on {100}, distinct on {010}. *Fracture:* Uneven. *Tenacity:* Brittle. Hardness = 3–4 D(meas.) = 2.12–2.15 D(calc.) = 2.125

Optical Properties: Transparent to translucent. *Color:* Colorless, white, yellowish, pinkish; in thin section, colorless. *Luster:* Vitreous, pearly on {010}, silky if fibrous.

Optical Class: Biaxial (+) or (-). *Orientation:* $X = c$; $Y = a$; $Z = b$. $\alpha = 1.472\text{--}1.483$
 $\beta = 1.475\text{--}1.485$ $\gamma = 1.477\text{--}1.487$ $2V(\text{meas.}) = 76^\circ\text{--}90^\circ$

Cell Data: *Space Group:* $Cmc2_1$ or $Cmcm$. $a = 18.052\text{--}18.168$ $b = 20.404\text{--}20.527$
 $c = 7.501\text{--}7.537$ $Z = [4]$

X-ray Powder Pattern: Aros, Isle of Mull, Scotland.
3.483 (10), 3.222 (10), 9.10 (9), 6.61 (9), 3.999 (9), 3.393 (9), 4.525 (8)

Chemistry:	(1)	(2)
SiO ₂	66.06	67.35
Al ₂ O ₃	12.32	11.49
MgO	0.36	
CaO	3.02	3.87
Na ₂ O	3.86	2.63
K ₂ O	0.50	0.11
H ₂ O ⁺	9.19	8.82
H ₂ O ⁻	4.68	5.13
Total	99.99	99.40

(1) Challis, Idaho, USA; average of four analyses, corresponding to $(\text{Na}_{1.11}\text{Ca}_{0.48}\text{K}_{0.10}\text{Mg}_{0.08})_{\Sigma=1.77}\text{Al}_{2.16}\text{Si}_{9.80}\text{O}_{24} \cdot 5.86\text{H}_2\text{O}$. (2) Coyote, Garfield Co., Utah, USA; corresponds to $(\text{Ca}_{1.24}\text{Na}_{0.76}\text{K}_{0.02})_{\Sigma=2.02}\text{Al}_{2.02}\text{Si}_{10.04}\text{O}_{24} \cdot 6.94\text{H}_2\text{O}$.

Mineral Group: Zeolite group.

Occurrence: In veins and amygdules in various igneous rocks; a hydration product of volcanic glasses; an authigenic mineral in sediments.

Association: Zeolites, calcite, kaolinite, glauconite.

Distribution: Many localities for abundant and well-crystallized material. At Morden and along the Bay of Fundy, Nova Scotia, Canada. In the USA, from near Stevenson, Skamania Co., Washington; at Challis, Custer Co., Idaho; in Oregon, along Crooked Creek, Rome, Malheur Co., at Goble, Columbia Co., and at Cape Lookout, Tillamook Co. In Colorado, on Table Mountain, Jefferson Co. and in Wolf Creek Pass, Mineral Co.; from Crestmore, Riverside Co., California; and in Union Pass, Mohave Co., Arizona. At San Piero in Campo, Elba, Italy. In the Berufford area, Iceland. From Cinchwad and elsewhere in the Poona district, Maharashtra, India.

Name: For the locality at Morden, Nova Scotia, Canada.

Type Material: National Museum of Natural History, Washington, D.C., USA, R4062; The Natural History Museum, London, England, 52574.

References: (1) Dana, E.S. (1892) Dana's system of mineralogy, (6th edition), 572–573 [ptilolite, part]. (2) Deer, W.A., R.A. Howie, and J. Zussman (1963) Rock-forming minerals, v. 4, framework silicates, 401–407. (3) Schaller, W.T. (1932) Ptilolite [mordenite] from Utah. Amer. Mineral., 17, 125–127. (4) Harris, P.G. and G.W. Brindley (1954) Mordenite as an alteration product of pitchstone glass. Amer. Mineral., 39, 819–824. (5) Passaglia, E. (1975) The crystal chemistry of mordenites. Contr. Mineral. Petrol., 50, 65–77. (6) Alberti, A., P. Davoli, and G. Vezzalini (1986) The crystal structure refinement of a natural mordenite. Zeits. Krist., 175, 249–256.

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