Micheelsenite $(Ca,Y)_3Al(PO_3OH,CO_3)(CO_3)(OH)_6 \cdot 12H_2O$

Crystal Data: Hexagonal. *Point Group*: 6. As fibrous to acicular crystals, to 1 mm, striated along [001], terminated by {001} and hexagonal in cross-section. As rounded plates to 0.6 mm. In loosely packed spherical, fan-shaped or randomly matted aggregates.

Physical Properties: *Cleavage*: Good on $\{10\bar{1}0\}$ and {0001}. *Fracture*: Splintery.
Tenacity: Brittle. Hardness = 3.5-4 D(meas.) = 2.15(1) D(calc.) = 2.17

Optical Properties: Transparent to translucent. *Color*: White to colorless. *Streak*: White.
Luster: Vitreous.
Optical Class: Uniaxial (-). ω = 1.532(1) ε = 1.503(1)

Cell Data: *Space Group*: $P6_3$. a = 10.828(3) c = 10.516(4) Z = 2

X-ray Powder Pattern: Poudrette quarry, Mont Saint-Hilaire, Rouville County, Quebec, Canada.
9.38 (100), 2.491 (80), 4.59 (70), 2.143 (64), 3.36 (55), 3.77 (50), 4.82 (40)

Chemistry:

	(1)		(1)
CaO	16.90	SiO_2	0.07
Al_2O_3	6.70	P_2O_5	7.80
Y_2O_3	18.07	SO_3	0.53
Gd_2O_3	0.84	CO_2	[8.38]
Dy_2O_3	2.65	H_2O	[43.01]
Ho_2O_3	0.51	Total	107.34
Er_2O_3	1.88		

(1) Poudrette quarry, Mont Saint-Hilaire, Rouville County, Quebec, Canada; average of 3 electron microprobe analyses, CO_3 and H_2O calculated and confirmed in the IR spectrum; corresponding to $(Ca_{1.96}Y_{1.06}Dy_{0.09}Er_{0.06}Gd_{0.03}Ho_{0.02})_{\Sigma=3.20}Al_{0.85}[P_{0.71}C_{0.24}S_{0.04}Si_{0.01})_{\Sigma=1.00}O_3(OH)](CO_3)(OH)_6 \cdot 12H_2O$.

Mineral Group: Ettringite group.

Occurrence: A late-stage hydrothermal product in alkaline pegmatite.

Association: Aegirine, albite, ancylite-(Ce), catapleiite, fluorite, microcline, monteregianite-(Y), natrolite, nenadkevichite, rhodochrosite, sérandite in pegmatites; and natrolite, titanite, calcite, pyrite in hornfels (Mont Saint-Hilaire, Canada). Aegirine, astrophyllite, analcime, calcioancylite-(Ce), catapleiite, fluorite, galena, gibbsite, leucophanite, microcline, natrolite, nafertisite, orthoclase, polylithionite, sodalite (var. hackmanite), todorokite (Nanna pegmatite, Greenland).

Distribution: From the Nanna pegmatite at Narsaarsuup Qaava, South Greenland, the Narssârssuk pegmatite, Greenland and in pegmatites, hornfels, marble xenoliths, and silicate cavities at the Poudrette quarry, Mont Saint-Hilaire, Rouville County, Quebec, Canada.

Name: Honors Professor Emeritus of Mineralogy, Harry Ingvar Micheelsen (b. 1931) of the University of Copenhagen, Denmark. He discovered the Nanna pegmatite.

Type Material: Canadian Museum of Nature, Ottawa, Ontario, Canada (CMNMC 83049/50) and in the Geological Museum, University of Copenhagen, Denmark.

References: (1) McDonald, A.M., O.V. Petersen, R.A. Gault, O. Johnsen, G. Niedermayr, and F. Branstätter (2001) Micheelsenite, $(Ca,Y)_3Al(PO_3OH,CO_3)(CO_3)(OH)_6 \cdot 12H_2O$, a new mineral from Mont Saint-Hilaire, Quebec, Canada and the Nanna pegmatite, Narsaarsuup Qaava, South Greenland. Neues Jahrb. Mineral. Mon., 337-351. (2) (2002) Amer. Mineral., 87, 2355 (abs. ref. 1).