Thomsenolite $NaCaAlF_6 \cdot H_2O$

Crystal Data: Monoclinic. *Point Group:* $2/m$. Crystals prismatic ‖ [001], to 5.5 cm, commonly in parallel groups; may be pseudocubic through development of {001} and {110} or tabular on {001}, with a number of forms. Rarely spherulitic, stalactitic, or massive, in opaline crusts.

Physical Properties: *Cleavage:* {001}, perfect; {110}, distinct. *Fracture:* Uneven. *Tenacity:* Brittle. Hardness = 2 D(meas.) = 2.981 D(calc.) = 2.986(3)

Optical Properties: Transparent to translucent. *Color:* Colorless to white, can be brownish or reddish with included iron oxide; colorless in transmitted light. *Luster:* Vitreous, pearly on cleavages.
Optical Class: Biaxial (–). *Orientation:* $X \wedge c = -52°$; $Z = b$. *Dispersion:* $r < v$, weak.
$\alpha = 1.4072–1.4073$ $\beta = 1.4135–1.4136$ $\gamma = 1.4150–1.4152$ 2V(meas.) = 50°–55°

Cell Data: *Space Group:* $P2_1/c$. $a = 5.563(2)$ $b = 5.541(2)$ $c = 16.115(1)$
$\beta = 96.35(3)°$ Z = 4

X-ray Powder Pattern: Ivigtut, Greenland.
4.02 (100), 1.963 (90), 1.996 (80), 2.92 (50), 1.761 (30), 2.16 (20), 1.640 (20)

Chemistry:

	(1)	(2)
Na	10.43	10.35
Ca	17.22	18.05
Al	13.26	12.15
F	50.61	51.34
H_2O	8.42	8.11
Total	99.94	100.00

(1) Ivigtut, Greenland. (2) $NaCaAlF_6 \cdot H_2O$.

Polymorphism & Series: Dimorphous with pachnolite.

Occurrence: As an alteration product of cryolite and other alkali aluminum fluorides, most commonly in granite pegmatites.

Association: Cryolite, pachnolite, ralstonite, chiolite, cryolithionite, elpasolite, sellaite, fluorite.

Distribution: From the Ivigtut cryolite deposit, southwestern Greenland. At Miass, Ilmen Mountains, Southern Ural Mountains and other undefined localities in Russia. At Songshugang, Jiangxi Province, China. From near Lake Gjerdingen, Nordmarka, Norway. In the USA, at St. Peters Dome, near Pikes Peak, El Paso Co., Colorado; at the Spider mine, Honeycomb Hills, Juab Co., Utah; from the Quitman Mountains, Hudspeth Co., Texas; and in the Morefield pegmatite mine, Amelia, Amelia Co., Virginia. From near Saint-Amable, Quebec, Canada.

Name: To honor Hans Peter Jörgen Julius Thomsen (1826–1909), Danish physical chemist, who founded the Danish cryolite industry and first noted the species.

Type Material: University of Copenhagen, Copenhagen, Denmark, 1868.1499.

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 116–118. (2) Ferguson, R.B. (1946) On the crystallography of thomsenolite and pachnolite. Trans. Royal Soc. Canada, Sect. IV, 11–26. (3) Pauly, H. and O.V. Petersen (1983) Pachnolite: new optical data with a note on artificial precipitates. Neues Jahrb. Mineral., Monatsh., 241–250. (4) Adhikesavalu, D., T.S. Cameron, and O. Knop (1985) Thomsenolite, $NaCaAlF_6 \cdot H_2O$: hydrogen bonding and comparison with pachnolite. Can. J. Chem., 63, 3322–3327.