

Crystal Data: Monoclinic. *Point Group:* 2/*m*. Crystals prismatic along [001], with dominant {110}, striated || {001}, and acute termination by {111}, {221}, etc., and {001}, with rhombic section, to 8 cm; cleavable to granular, stalactitic, porcelaneous massive. *Twinning:* On {100}, apparently universal, giving a grid pattern in thin section.

Physical Properties: *Cleavage:* {001}, good to indistinct. *Fracture:* Uneven. *Tenacity:* Brittle. Hardness = 3 D(meas.) = 2.965–3.008 D(calc.) = 2.97

Optical Properties: Transparent to translucent. *Color:* Colorless to white; colorless in transmitted light. *Luster:* Vitreous.

Optical Class: Biaxial (+). *Orientation:* $X = b$; $Z \wedge c = 69(1)^\circ$. *Dispersion:* $r < v$, weak; strong horizontal dispersion. $\alpha = 1.4065(1)$ $\beta = 1.4104(1)$ $\gamma = 1.4191(2)$ $2V(\text{meas.}) = 66.3^\circ\text{--}76^\circ$ ($2V_\gamma$).

Cell Data: *Space Group:* $F2/d$. $a = 12.117(4)$ $b = 10.414(3)$ $c = 15.680(4)$ $\beta = 90.37(2)^\circ$ $Z = 16$

X-ray Powder Pattern: Ivigtut, Greenland.

3.95 (100), 1.971 (90), 2.79 (70), 2.16 (50), 3.02 (20), 3.26 (10), 2.92 (10)

Chemistry:

	(1)	(2)	(3)
Na	10.23	10.23	10.35
Ca	18.14	18.06	18.05
Al	12.50	12.14	12.15
F	51.54	51.33	51.34
H ₂ O	8.19	8.10	8.11
Total	100.60	99.86	100.00

(1) Ivigtut, Greenland. (2) St. Peters Dome, Colorado, USA. (3) NaCaAlF₆•H₂O.

Polymorphism & Series: Dimorphous with thomsenolite.

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

Association: Cryolite, thomsenolite, chiolite, elpasolite, ralstonite, sellaite, fluorite.

Distribution: In the Ivigtut cryolite deposit, southwestern Greenland. From near Lake Gjerdingen, Nordmarka, Norway. In the Hagendorf pegmatite, Bavaria, Germany. In the USA, at St. Peters Dome, near Pikes Peak, El Paso Co., and in the Goldie carbonatite, McClure Mountain-Iron Mountain, Fremont Co., Colorado; at the Zapot pegmatite, 25 km northeast of Hawthorne, Fitting district, Mineral Co., Nevada; from the Morefield pegmatite mine, Amelia, Amelia Co., Virginia. From the El Criollo pegmatite, Cerro Blanco, Tanti district, 45 km west of Córdoba, Córdoba Province, Argentina.

Name: From the Greek for *frost* and *stone*, in allusion to its appearance.

Type Material: n.d.

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 114–116. (2) Pauly, H. and O.V. Petersen (1983) Pachnolite: new optical data with a note on artificial precipitates. Neues Jahrb. Mineral., Monatsh., 241–250. (3) Hawthorne, F.C. and R.B. Ferguson (1983) The crystal structure of pachnolite. Can. Mineral., 21, 561–566.