Chiolite $Na_5Al_3F_{14}$

Crystal Data: Tetragonal. *Point Group:* $4/m\ 2/m\ 2/m$. Crystals, to 10 cm, dipyramidal {111}, with {001} and {114}; commonly granular, massive. *Twinning:* On {011}.

Physical Properties: *Cleavage:* {001}, perfect; {011}, distinct. Hardness = 3.5–4 D(meas.) = 2.994–3.005 D(calc.) = 2.998

Optical Properties: Transparent to translucent. *Color:* Nearly colorless to snow-white; colorless in transmitted light. *Luster:* Vitreous, pearly on the basal cleavage. *Optical Class:* Uniaxial (–). $\omega = 1.3486$ $\epsilon = 1.3424$

Cell Data: *Space Group:* $P4/mnc$. $a = 7.00$–7.01 $c = 10.39$–10.41 $Z = 2$

X-ray Powder Pattern: Synthetic; composite pattern. (ICDD 2-749).
2.91 (100), 5.18 (80), 2.32 (70), 1.99 (70), 1.79 (70), 1.75 (70), 1.55 (70)

Chemistry:

	(1)	(2)	(3)
Na	24.97	24.79	24.89
Al	17.66	17.54	17.53
F	57.30	57.81	57.58
H_2O^-		0.23	
Total	99.93	100.37	100.00

(1) Miass, Russia. (2) Ivigtut, Greenland. (3) $Na_5Al_3F_{14}$.

Occurrence: In some granite pegmatites.

Association: Topaz, phenakite, fluorite, cryolithionite, thomsenolite (Miass, Russia); cryolite, elpasolite, pachnolite, thomsenolite, ralstonite (Amelia, Virginia, USA).

Distribution: At Miass, Ilmen Mountains, Southern Ural Mountains, Russia. From the Ivigtut cryolite deposit, southwestern Greenland. In the USA, in the Morefield pegmatite mine, Amelia, Amelia Co., Virginia.

Name: From the Greek for *snow* and *stone*, as compared to *cryolite*, *ice-stone*.

Type Material: Vernadsky State Geological Museum, Moscow, Russia, 18270, 18271.

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 123–124. (2) Jacobini, C., A. Leble, and J.J. Rosseau (1981) Détermination précise de la structure de la chiolite $Na_5Al_3F_{14}$ et étude par R.P.E. de $Na_5Al_3F_{14}$:Cr^{3+}. J. Solid State Chem., 36, 297–304 (in French with English abs.). (3) Dirken, P.J., J.B.H. Jansen, and R.D. Schuiling (1992) Influence of octahedral polymerization on ^{23}Na and ^{27}Al MAS NMR in alkali fluoroaluminates. Amer. Mineral., 77, 718–724.