Chiolite

$\text{Na}_5\text{Al}_3\text{F}_{14}$

Crystal Data:  Tetragonal.  
Point Group:  $4/m$  
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  
$D(\text{meas.}) = 2.994–3.005$  
$D(\text{calc.}) = 2.998$

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:  

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:  

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Na</td>
<td>24.97</td>
<td>24.79</td>
<td>24.89</td>
</tr>
<tr>
<td>Al</td>
<td>17.66</td>
<td>17.54</td>
<td>17.53</td>
</tr>
<tr>
<td>F</td>
<td>57.30</td>
<td>57.81</td>
<td>57.58</td>
</tr>
<tr>
<td>$\text{H}_2\text{O}^-$</td>
<td></td>
<td>0.23</td>
<td></td>
</tr>
</tbody>
</table>

Total 99.93 100.37 100.00

(1) Miass, Russia.  (2) Ivigtut, Greenland.  (3) $\text{Na}_5\text{Al}_3\text{F}_{14}$

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:  
(2) Jacobini, C., A. Leble, and J.J. Rosseau (1981) Détermination précise de la structure de la chiolite $\text{Na}_5\text{Al}_3\text{F}_{14}$ et étude par R.P.E. de $\text{Na}_5\text{Al}_3\text{F}_{14}\cdot\text{Cr}^{3+}$. J. Solid State Chem., 36, 297–304 (in French with English abs.).  