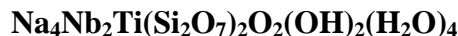


**Epistolite**

**Crystal Data:** Triclinic. *Point Group:*  $\bar{1}$ . As crystals, rectangular and tabular on (001), to 5 cm. Also as irregular plates and curved lamellar masses.

**Physical Properties:** *Cleavage:* Perfect on {001}, distinct on {110}. *Tenacity:* Very brittle to friable. Hardness = 1.5-3 D(meas.) = 2.65-2.89 D(calc.) = 2.987

**Optical Properties:** Opaque to translucent, transparent in thin sheets. *Color:* White, gray, yellow-gray, tan, light brown; in thin section, colorless. *Luster:* Pearly to silky. *Optical Class:* Biaxial (-). *Orientation:*  $Z \wedge c = 70^\circ$ . *Dispersion:*  $r > v$ ; inclined.  $\alpha = 1.610$   $\beta = 1.650-1.720$   $\gamma = 1.682-1.770$   $2V(\text{meas.}) = 60-80^\circ$

**Cell Data:** *Space Group:*  $P\bar{1}$ .  $a = 5.460(1)$   $b = 7.170(1)$   $c = 12.041(2)$   $\alpha = 103.63(3)^\circ$   $\beta = 96.01(3)^\circ$   $\gamma = 89.98(3)^\circ$   $Z = 1$

**X-ray Powder Pattern:** Ilímaussaq alkaline complex intrusion, Greenland. 4.322 (10), 2.99 (9), 2.869 (9), 12.00 (8), 5.902 (7), 1.790 (7), 2.155 (6)

| <b>Chemistry:</b>              | (1)   | (2)   | (3)   |                                    | (1)         | (2)   | (3)    |
|--------------------------------|-------|-------|-------|------------------------------------|-------------|-------|--------|
| SiO <sub>2</sub>               | 27.59 | 25.60 | 29.59 | CaO                                | 0.77        | 0.00  | 1.89   |
| TiO <sub>2</sub>               | 7.22  | 14.55 | 10.24 | Na <sub>2</sub> O                  | 17.59       | 4.97  | 14.45  |
| ZrO <sub>2</sub>               |       | 0.00  |       | K <sub>2</sub> O                   | trace       | 0.70  | 0.27   |
| Al <sub>2</sub> O <sub>3</sub> |       | 2.05  |       | F                                  | 1.98        | 0.00  | 1.32   |
| Nb <sub>2</sub> O <sub>5</sub> | 33.56 | 31.40 | 31.43 | H <sub>2</sub> O <sup>+</sup>      | 9.26        | 7.35  |        |
| Ta <sub>2</sub> O <sub>5</sub> |       | 0.90  | 0.28  | H <sub>2</sub> O <sup>-</sup>      | 1.75        | 8.20  |        |
| Fe <sub>2</sub> O <sub>3</sub> |       |       | 0.35  | H <sub>2</sub> O <sub>(calc)</sub> |             |       | 10.46  |
| FeO                            | 0.20  | 0.90  |       | P <sub>2</sub> O <sub>5</sub>      |             | 2.10  | 0.36   |
| MnO                            | 0.30  | 1.20  | 0.34  | <u>-O = F<sub>2</sub></u>          | <u>0.83</u> |       |        |
| MgO                            | 0.13  | 0.00  |       | Total                              | 99.52       | 99.92 | 100.43 |

(1) Julianehåb district, Greenland; material partly altered. (2) Lovozero massif, Russia. (3) Ilímaussaq alkaline complex, South Greenland; electron microprobe analysis, H<sub>2</sub>O calculated from structure analysis; K and P considered contaminants; corresponding to  $(\text{Na}_{3.79}\text{Ca}_{0.27}\text{Mn}_{0.04})_{\Sigma=4.06}(\text{Nb}_{1.92}\text{Ti}_{1.04}\text{Fe}^{3+}_{0.04})_{\Sigma=3.00}(\text{Si}_2\text{O}_7)_2\text{O}_2(\text{OH}_{1.44}\text{F}_{0.56})(\text{H}_2\text{O})_4$ .

**Occurrence:** A low temperature mineral in alkalic pegmatites, albitites, sodalite xenoliths, and hydrothermal veins.

**Association:** Aegirine, albite, murmanite, sphalerite, manganoan pectolite, neptunite, steenstrupine, sodalite, eudialyte, nenadkevichite.

**Distribution:** At a number of localities in the Ilímaussaq alkaline complex intrusion, southern Greenland. From the Lovozero massif, Kola Peninsula, Russia. At Mont Saint-Hilaire and near Saint-Amable, Quebec, Canada.

**Name:** From the Greek for *letter*, in allusion to the flat rectangular crystal habit and white color.

**Type Material:** University of Copenhagen, Copenhagen, Denmark, 319, 320.

**References:** (1) Dana, E.S. and W.E. Ford (1909) Dana's system of mineralogy, (6th edition), app. II, 39. (2) Vlasov, K.A., Ed. (1966) Mineralogy of rare elements, v. II, 562-564. (3) Khalilov, A.P., Y.S. Makarov, K.S. Mamedov, and L.A. P'yanzina (1965) Crystal structure of minerals of the murmanite-lomonosovite group. Doklady Acad. Nauk SSSR, 162, 179-182 (in Russian). (4) Karup-Møller, S. (1986) Epistolite from the Ilímaussaq alkaline complex in South Greenland. Neues Jahrb. Mineral., Abh., 155, 289-304. (5) Mandarino, J.A. and V. Anderson (1989) Monteregian Treasures. Cambridge Univ. Press, 76. (6) Sokolova, E., and F.C. Hawthorne (2004) The crystal chemistry of epistolite. Can. Mineral., 42, 797-806.