

**Tisinalite** **$\text{Na}_3\text{H}_3(\text{Mn}^{2+}, \text{Ca}, \text{Fe})\text{TiSi}_6(\text{O}, \text{OH})_{18} \cdot 2\text{H}_2\text{O}$** 

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**Crystal Data:** Hexagonal. *Point Group:*  $\bar{3} 2/m$ . As rough crystals, to 1 mm, and granular aggregates.

**Physical Properties:** *Fracture:* Uneven to conchoidal. Hardness = 5 D(meas.) = 2.66–2.69 D(calc.) = 2.862

**Optical Properties:** Transparent to translucent. *Color:* Yellow-orange. *Luster:* Vitreous. *Optical Class:* Uniaxial (-).  $\omega = 1.624$   $\epsilon = 1.590$ – $1.592$

**Cell Data:** *Space Group:* n.d.  $a = 10.14$   $c = 13.08$   $Z = 3$

**X-ray Powder Pattern:** Mt. Koashva, Russia.

3.60 (100), 3.18 (80), 5.19 (70), 3.26 (60), 2.590 (60), 1.802 (55), 2.510 (50)

**Chemistry:**

	(1)
SiO <sub>2</sub>	53.27
TiO <sub>2</sub>	8.45
ZrO <sub>2</sub>	1.00
RE <sub>2</sub> O <sub>3</sub>	0.11
FeO	4.49
MnO	5.40
CaO	2.46
SrO	0.00
Na <sub>2</sub> O	13.83
K <sub>2</sub> O	trace
H <sub>2</sub> O	10.65
Total	99.66

(1) Mt. Koashva, Russia; traces of Ba, V, and Zn found spectrographically; corresponds to  $\text{Na}_{3.00}\text{H}_{3.00}(\text{Mn}_{0.54}\text{Ca}_{0.30}\text{Fe}_{0.16})_{\Sigma=1.00}(\text{Ti}_{0.72}\text{Fe}_{0.28})_{\Sigma=1.00}\text{Si}_{6.00}[\text{O}_{17.40}(\text{OH})_{0.60}]_{\Sigma=18.00} \cdot 2.23\text{H}_2\text{O}$ .

**Mineral Group:** Lovozerite group.

**Occurrence:** Formed by the hydrothermal alteration of lomonosovite and barytolamprophyllite in alkalic pegmatites in a differentiated alkalic massif.

**Association:** Koashvite, shcherbakovite, lamprophyllite.

**Distribution:** From Mt. Koashva, Khibiny massif, Kola Peninsula, Russia.

**Name:** For Titanium, Silicon, and sodium, NAtrium, in the composition.

**Type Material:** A.E. Fersman Mineralogical Museum, Academy of Sciences, Moscow, Russia, 81407; The Natural History Museum, London, England, 1994,33.

**References:** (1) Kapustin, Y.L., Z.V. Pudovkina, and A.V. Bykova (1980) Tisinalite,  $\text{Na}_3\text{H}_3(\text{Mn}, \text{Ca}, \text{Fe})\text{TiSi}_6(\text{O}, \text{OH})_{18} \cdot 2\text{H}_2\text{O}$ , a new mineral of the lovozerite group. *Zap. Vses. Mineral. Obshch.*, 109, 223–229 (in Russian). (2) (1981) *Amer. Mineral.*, 66, 219–220 (abs. ref. 1).