Tisinalite $\mathbf{Na_3H_3(Mn^{2+}, Ca, Fe)TiSi_6(O, OH)_{18} \cdot 2H_2O}$

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_2	53.27
TiO_2	8.45
ZrO_2	1.00
RE_2O_3	0.11
FeO	4.49
MnO	5.40
CaO	2.46
SrO	0.00
Na_2O	13.83
K_2O	trace
H_2O	10.65
Total	99.66

(1) Mt. Koashva, Russia; traces of Ba, V, and Zn found spectrographically; corresponds to $Na_{3.00}H_{3.00}(Mn_{0.54}Ca_{0.30}Fe_{0.16})_{\Sigma=1.00}(Ti_{0.72}Fe_{0.28})_{\Sigma=1.00}Si_{6.00}[O_{17.40}(OH)_{0.60}]_{\Sigma=18.00} \cdot 2.23H_2O$.

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, $Na_3H_3(Mn, Ca, Fe)TiSi_6(O, OH)_{18} \cdot 2H_2O$, 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).