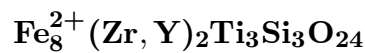


# Tranquillityite



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**Crystal Data:** Hexagonal. *Point Group:* n.d. As thin laths, to 65  $\mu\text{m}$ , and as sheaves of laths.

**Physical Properties:** Hardness = n.d.  $D(\text{meas.}) = \text{n.d.}$   $D(\text{calc.}) = 4.7(1)$

**Optical Properties:** Opaque to semitransparent. *Color:* Gray; foxy-red [deep reddish brown] in strong transmitted light.

*Optical Class:* Isotropic to weakly anisotropic.  $n = 2.11\text{--}2.13$

**Cell Data:** *Space Group:* n.d.  $a = 11.69(5)$   $c = 22.25(10)$   $Z = 3$

**X-ray Powder Pattern:** Sea of Tranquillity, Moon.

3.23 (100), 1.781 (70), 2.155 (60), 4.04 (50), 3.34 (40), 3.18 (40), 3.13 (40)

## Chemistry:

	(1)
SiO <sub>2</sub>	14.00
TiO <sub>2</sub>	19.45
ZrO <sub>2</sub>	17.15
HfO <sub>2</sub>	0.17
Al <sub>2</sub> O <sub>3</sub>	1.12
Cr <sub>2</sub> O <sub>3</sub>	0.11
Nb <sub>2</sub> O <sub>3</sub>	0.33
Y <sub>2</sub> O <sub>3</sub>	2.76
Nd <sub>2</sub> O <sub>3</sub>	0.24
FeO	42.48
MnO	0.29
CaO	1.26
Total	[99.36]

(1) Sea of Tranquillity, Moon; by electron microprobe, average of 12 analyses, original total given as 99.32%; corresponds to  $(\text{Fe}_{7.36}\text{Ca}_{0.28}\text{Ti}_{0.25}\text{Mn}_{0.05})_{\Sigma=7.94}(\text{Zr}_{1.73}\text{Y}_{0.30}\text{Nd}_{0.02}\text{Hf}_{0.01})_{\Sigma=2.06}(\text{Ti}_{2.78}\text{Al}_{0.17}\text{Nb}_{0.03}\text{Cr}_{0.02})_{\Sigma=3.00}(\text{Si}_{2.90}\text{Al}_{0.10})_{\Sigma=3.00}\text{O}_{24}$ .

**Occurrence:** A late-stage crystallization product of lunar basaltic magma.

**Association:** Troilite, pyroxferroite, tridymite, cristobalite, alkalic feldspar, felsic glass.

**Distribution:** On the Moon, at the Apollo 11, 12, 14, 16, and 17 collection sites.

**Name:** For the Sea of Tranquillity, Moon, from which the mineral was first collected.

**Type Material:** Lunar Science Institute, Houston, Texas, USA.

**References:** (1) Lovering, J.F., D.A. Wark, A.F. Reid, N.G. Ware, K. Keil, M. Prinz, T.E. Bunch, A. El Goresy, P. Ramdohr, G.M. Brown, A. Peckett, R. Phillips, E.N. Cameron, J.A.V. Douglas, and A.G. Plant (1971) Tranquillityite: a new silicate mineral from Apollo 11 and Apollo 12 basaltic rocks. *Proc. Second Lunar Sci. Conf.*, 1, *Geochim. Cosmochim. Acta*, 35, suppl., 39–45. (2) (1973) *Amer. Mineral.*, 58, 140–141 (abs. ref. 1).