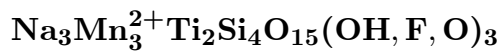


Janhaugite

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Crystal Data: Monoclinic. *Point Group:* $2/m$. As sprays of prismatic crystals, to 1.5 cm, slightly bent, flattened on {010} and striated || [001]; in lamellar aggregates; as subhedral grains. *Twining:* Rarely on {100}.

Physical Properties: *Cleavage:* Distinct on {010}. *Tenacity:* Very brittle. Hardness = 5
D(meas.) = 3.60(5) D(calc.) = 3.71

Optical Properties: Semitransparent. *Color:* Reddish brown. *Streak:* Light brown.
Luster: Vitreous.

Optical Class: Biaxial (+). *Pleochroism:* Weak; X = nearly colorless; Y = beige. *Orientation:*
 $Z = b$; $X \wedge c = 12^\circ\text{--}18^\circ$. $\alpha = 1.770(4)$ $\beta = 1.828(4)$ $\gamma = [1.910]$ $2V(\text{meas.}) = 70^\circ\text{--}90^\circ$

Cell Data: *Space Group:* $P2_1/n$. $a = 10.668(2)$ $b = 9.787(4)$ $c = 13.931(3)$
 $\beta = 107.82(2)^\circ$ $Z = 4$

X-ray Powder Pattern: Gjerdingen, Norway.

2.839 (100), 2.833 (90), 2.782 (90), 3.202 (60), 1.744 (50), 3.920 (40), 2.742 (40)

Chemistry:

	(1)
SiO ₂	29.79
TiO ₂	15.18
ZrO ₂	5.98
Nb ₂ O ₅	5.00
Ta ₂ O ₅	0.26
FeO	5.52
MnO	22.26
CaO	1.45
Na ₂ O	11.02
K ₂ O	0.19
F	2.69
H ₂ O	[1.63]
–O = F ₂	1.13
Total	[99.84]

(1) Gjerdingen, Norway; by electron microprobe, average of three analyses, H₂O calculated; corresponds to $(\text{Na}_{2.75}\text{Ca}_{0.20}\text{K}_{0.03})_{\Sigma=2.98}(\text{Mn}_{2.43}\text{Fe}_{0.60})_{\Sigma=3.03}(\text{Ti}_{1.32}\text{Zr}_{0.38}\text{Nb}_{0.29}\text{Ta}_{0.01})_{\Sigma=2.00}(\text{Si}_{3.84}\text{Ti}_{0.15})_{\Sigma=3.99}\text{O}_{15}[(\text{OH})_{1.40}\text{F}_{1.10}\text{O}_{0.50}]_{\Sigma=3.00}$.

Occurrence: In both the groundmass andmiarolitic cavities in sodium-rich granite.

Association: Pyrophanite, elpidite, monazite, dalyite, kupletskite.

Distribution: From Gjerdingen, 30 km north of Oslo, Norway.

Name: Honors Jan Haug, an amateur mineralogist who first observed the mineral.

Type Material: University of Oslo, Oslo, Norway.

References: (1) Raade, G. and M.H. Mladek (1983) Janhaugite, $\text{Na}_3\text{Mn}_3\text{Ti}_2\text{Si}_4\text{O}_{15}(\text{OH}, \text{F}, \text{O})_3$, a new mineral from Norway. *Amer. Mineral.*, 68, 1216–1219. (2) Annehed, H., L. Fälth, and G. Raade (1985) The crystal structure of janhaugite, a sorosilicate of the cuspidine family. *Neues Jahrb. Mineral., Monatsh.*, 7–18.