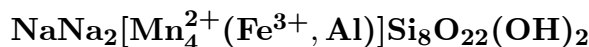


Kôzulite

©2001 Mineral Data Publishing, version 1.2

Crystal Data: Monoclinic. *Point Group:* $2/m$. As prismatic crystals, to 3.5 mm, in banded aggregates.

Physical Properties: *Cleavage:* Perfect on $\{110\}$. *Tenacity:* [Brittle.] *Hardness* = 5
D(meas.) = 3.30 D(calc.) = 3.36

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

Optical Class: Biaxial (-). *Pleochroism:* Strong; X = yellow-brown; Y = reddish brown; Z = dark brown. *Orientation:* $Y = b$; $X \wedge c = 25^\circ$. *Dispersion:* $r > v$, weak. *Absorption:* $Z > Y > X$. $\alpha = 1.685$ $\beta = 1.717$ $\gamma = 1.720$ $2V(\text{meas.}) = 34^\circ\text{--}36^\circ$

Cell Data: *Space Group:* $C2/m$. $a = 9.914$ $b = 18.111$ $c = 5.308$ $\beta = 104.50^\circ$ $Z = 2$

X-ray Powder Pattern: Tanohata mine, Japan.

8.51 (100), 3.15 (65), 2.827 (30), 3.30 (17), 4.53 (10), 3.40 (10), 2.722 (10)

Chemistry:	(1)	(2)		(1)	(2)
SiO ₂	51.38	49.24	MgO	2.71	0.03
TiO ₂		0.00	CaO	1.12	0.11
Al ₂ O ₃	1.69	0.02	Na ₂ O	8.41	8.91
Fe ₂ O ₃	2.85		K ₂ O	1.36	0.03
Cr ₂ O ₃		0.03	F	0.08	
FeO		0.06	H ₂ O ⁺	2.10	
MnO	27.96	37.06	H ₂ O ⁻	0.06	
ZnO	0.03		-O = F ₂	0.03	
			Total	99.72	95.48

(1) Tanohata mine, Japan; corresponding to $(\text{Na}_{2.54}\text{K}_{0.27}\text{Ca}_{0.19})_{\Sigma=3.00}(\text{Mn}_{3.69}\text{Mg}_{0.63}\text{Fe}_{0.33}^{3+}\text{Al}_{0.31})_{\Sigma=4.96}\text{Si}_{8.00}\text{O}_{21.78}[(\text{OH}), \text{F}]_{2.22}$. (2) Woods mine, Australia; by electron microprobe.

Mineral Group: Amphibole (alkali) group: $\text{Mn}^{2+}/(\text{Mg} + \text{Fe}^{2+} + \text{Mn}^{2+}) > 0.33$;
 $\text{Fe}^{3+}/(\text{Fe}^{3+} + \text{Al}^{\text{vi}}) \geq 0.5$; $(\text{Na} + \text{K})_{\text{A}} \geq 0.5$; $\text{Na}_{\text{B}} \geq 1.34$; $\text{Mn}_{\text{C}} \geq 2.5$.

Occurrence: In metamorphosed manganese-rich sediments along the contact of a granodiorite intrusion (Tanohata mine, Japan).

Association: Braunite, rhodonite, manganiferous alkalic pyroxene, quartz (Tanohata mine, Japan).

Distribution: In the Tanohata and Noda-Tamagawa mines, Iwate Prefecture, Japan. From the Woods mine, 30 km north-northeast of Tamworth, New South Wales, Australia.

Name: To honor Shukusuke Kôzu (1880–1955), Professor at Tohoku University, Sendai, Japan.

Type Material: Tohoku University, Sendai, Japan.

References: (1) Nambu, M., K. Tanida, and T. Kitamura (1969) Kôzulite, a new alkali amphibole from Tanohata mine, Iwate Prefecture, Japan. *J. Japan. Assoc. Mineral. Petrol. Econ. Geol.*, 62, 311–328. (2) (1970) *Amer. Mineral.*, 55, 1815 (abs. ref. 1). (3) Kitamura, M. and N. Morimoto (1972) Crystal structure of kôzulite and tetrahedral Al in amphiboles. *Acta Cryst.*, A28, S71. (4) Kawachi, Y. and D.S. Coombs (1993) Namansilite, $\text{NaMn}^{3+}\text{Si}_2\text{O}_6$: a widespread clinopyroxene? *Mineral. Mag.*, 57, 533–538.