

Muirite**Ba₁₀Ca₂Mn²⁺TiSi₁₀O₃₀(OH, Cl, F)₁₀**

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Crystal Data: Tetragonal. *Point Group:* $4/m\ 2/m\ 2/m$. Subhedral to euhedral crystals not uncommon, bounded principally by {100} and {001}, also {110} and {h0l} forms; in grains and aggregates, to 3 mm.

Physical Properties: *Cleavage:* Indistinct on {001} and {100}. *Hardness* = ~ 2.5
D(meas.) = 3.86(2) D(calc.) = 3.88

Optical Properties: Transparent to translucent. *Color:* Orange; anomalous purple-brown interference color. *Streak:* Pale orange. *Luster:* Subvitreous.
Optical Class: Uniaxial (+). *Pleochroism:* O = orange; E = colorless. $\omega = 1.697(1)$
 $\epsilon = 1.704(2)$

Cell Data: *Space Group:* $P4/mmm$. $a = 14.000(3)$ $c = 5.625(2)$ $Z = 1$

X-ray Powder Pattern: Fresno Co., California, USA.

2.91 (100), 4.42 (75), 3.73 (60), 3.51 (60), 3.31 (60), 3.60 (50), 2.814 (40)

Chemistry:	(1)		(1)	
	SiO ₂	22.15	SrO	0.13
	TiO ₂	4.17	BaO	59.6
	Al ₂ O ₃	0.53	K ₂ O	0.1
	FeO	0.4	F	1.4
	MnO	2.04	Cl	4.5
	MgO	0.11	H ₂ O	1.8
	CaO	4.67	-O = (F, Cl) ₂	1.6
			Total	[100.0]

(1) Fresno Co., California, USA; by D-C emission arc spectrography, K and Cl by X-ray spectroscopy, stated to be recalculated to 100.0%; corresponds to (Ba_{9.82}K_{0.05}Sr_{0.03})_{Σ=9.90}Ca_{2.10}(Mn_{0.73}Fe_{0.14}Mg_{0.07})_{Σ=0.94}Ti_{1.32}(Si_{9.31}Al_{0.26})_{Σ=9.57}O_{29.52}[(OH)_{5.05}Cl_{3.21}F_{1.86}]_{Σ=10.12}.

Occurrence: In sanbornite-quartz-bearing metamorphic rock (Fresno Co., California, USA).

Association: Sanbornite, verplanckite (Fresno Co., California, USA); gillespite, sanbornite, taramellite, fresnoite, pellyite, barite (Itsy Mountains, Yukon, Canada).

Distribution: On Big Creek and Rush Creek, Fresno Co., California, USA. From the Gunn claim, near Macmillan Pass, Itsy Mountains, Yukon Territory, Canada.

Name: For John Muir (1834–1914), American mountaineer, conservationist, and naturalist, whose name is intimately associated with the California Sierra Nevada.

Type Material: California Division of Mines & Geology, San Francisco, California, USA.

References: (1) Alfors, J.T., M.C. Stinson, R.A. Matthews, and A. Pabst (1965) Seven new barium minerals from eastern Fresno County, California. *Amer. Mineral.*, 50, 314–340. (2) Alfors, J.T. and G. Putman (1965) Revised chemical analyses of traskite, verplanckite and muirite from Fresno County, California. *Amer. Mineral.*, 50, 1500–1503. (3) Malinovskii, Y.A., E.A. Pobedinskaya, and N.V. Belov (1975) Crystal structure of muirite Ba₉(Ca, Ba)(Ca, Ti)₄(OH)₈Si₈O₂₄(Cl, OH)₈. *Doklady Acad. Nauk SSSR*, 221, 343–345 (in Russian). (4) (1981) *Mineral. Abs.*, 32, 247 (abs. ref. 3).