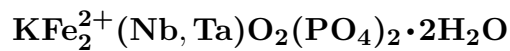


Olmsteadite



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Crystal Data: Orthorhombic. *Point Group:* $mm2$. Crystals are prismatic, elongated along $[010]$, thick tabular $\parallel \{100\}$ to thin tabular $\parallel \{001\}$, to 1 mm. Forms include $\{001\}$, $\{100\}$, $\{111\}$, $\{1\bar{1}1\}$, $\{110\}$, $\{101\}$.

Physical Properties: Hardness = 4 D(meas.) = 3.31–3.36 D(calc.) = 3.41

Optical Properties: Semitransparent. *Color:* Deep brown, red-brown to black.

Streak: Olive-green. *Luster:* Subadamantine, may be bronzy.

Optical Class: Biaxial (+). *Pleochroism:* Marked; X = blue-green or dark blue; Y = yellow or light brown; Z = brown to dark brown. *Orientation:* X = c; Y = a; Z = b. *Absorption:* X \gg Z > Y. $\alpha = 1.725\text{--}1.765$ $\beta = 1.755\text{--}1.775$ $\gamma = 1.815\text{--}1.835$ $2V(\text{meas.}) = \sim 60^\circ$

Cell Data: *Space Group:* $Pb2_1m$. $a = 7.512(1)$ $b = 10.000(3)$ $c = 6.492(2)$ $Z = 1$

X-ray Powder Pattern: Big Chief mine, South Dakota, USA.

6.006 (10), 3.03 (7), 3.047 (6), 2.856 (6), 7.512 (5), 6.492 (5), 4.409 (5)

Chemistry:

	(1)	(2)	(3)
P ₂ O ₅	26.6	28.3	28.29
Nb ₂ O ₅	17.8	23.2	26.49
Ta ₂ O ₅	7.6	0.2	
FeO	24.6	23.0	28.65
MnO	2.9	4.9	
K ₂ O	7.8	8.6	9.39
H ₂ O			7.18
Total	87.3	88.2	100.00

(1) Big Chief mine, South Dakota, USA; by electron microprobe, average of five analyses, original total given as 85.0%. (2) Hesnard mine, South Dakota, USA; by electron microprobe, average of two analyses. (3) $\text{KFe}_2\text{NbO}_2(\text{PO}_4)_2 \cdot 2\text{H}_2\text{O}$.

Occurrence: A rare mineral, presumably formed by hydrothermal leaching of primary phosphates and columbite-tantalite in complex granite pegmatites.

Association: Siderite, quartz (Big Chief mine, South Dakota, USA); rockbridgeite (Hesnard mine, South Dakota, USA).

Distribution: From the Big Chief mine, one km south of Glendale; the White Cap mine, three km south of Keystone; and the Hesnard mine, three km southwest of Keystone, Pennington Co., South Dakota, USA.

Name: Honoring Milo Olmstead, Rapid City, South Dakota, USA, amateur collector of microscopic minerals, who called attention to the mineral.

Type Material: National Museum of Natural History, Washington, D.C., USA, 135924.

References: (1) Moore, P.B., T. Araki, A.R. Kampf, and I.M. Steele (1976) Olmsteadite, $\text{K}_2\text{Fe}_2^{2+}[\text{Fe}_2^{2+}(\text{Nb, Ta})_2^{5+}\text{O}_4(\text{H}_2\text{O})_4(\text{PO}_4)_4]$, a new species, its crystal structure and relation to vauxite and montgomeryite. *Amer. Mineral.*, 61, 5–11. (2) Dunn, P.J., D.R. Peacor, D.B. Sturman, R.A. Ramik, W.L. Roberts, and J.A. Nelen (1986) Johnwalkite, the Mn-analogue of olmsteadite, from South Dakota. *Neues Jahrb. Mineral., Monatsh.*, 115–120.