Olmsteadite

\[ \text{KFe}^{2+}_2(\text{Nb, Ta})\text{O}_2(\text{PO}_4)_2 \cdot 2\text{H}_2\text{O} \]

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Crystal Data: Orthorhombic. Point Group: \( \text{mm}2 \). Crystals are prismatic, elongated along \( [010] \), thick tabular parallel to \( \{001\} \) to thin tabular parallel to \( \{001\} \), to 1 mm. Forms include \( \{001\} \), \( \{100\} \), \( \{111\} \), \( \{11\} \), \( \{10\} \), \( \{01\} \).

Physical Properties: Hardness = 4 D\( \text{meas.} \) = 3.31–3.36 D\( \text{calc.} \) = 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: \( X \gg Z > Y \). \( \alpha = 1.725–1.765 \) \( \beta = 1.755–1.775 \) \( \gamma = 1.815–1.835 \) \( 2V(\text{meas.}) = 60^\circ \)

Cell Data: Space Group: \( \text{Pb}2_1m \). \( a = 7.512(1) \quad b = 10.000(3) \quad c = 6.492(2) \quad Z = 1 \)

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

Chemistry:

\[
\begin{align*}
\text{P}_2\text{O}_5 & \quad 26.6 & \quad 28.3 & \quad 28.29 \\
\text{Nb}_2\text{O}_5 & \quad 17.8 & \quad 23.2 & \quad 26.49 \\
\text{Ta}_2\text{O}_5 & \quad 7.6 & \quad 0.2 \\
\text{FeO} & \quad 24.6 & \quad 23.0 & \quad 28.65 \\
\text{MnO} & \quad 2.9 & \quad 4.9 \\
\text{K}_2\text{O} & \quad 7.8 & \quad 8.6 & \quad 9.39 \\
\text{H}_2\text{O} & \quad 7.18 \\
\text{Total} & \quad 87.3 & \quad 88.2 & \quad 100.00
\end{align*}
\]

(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.
