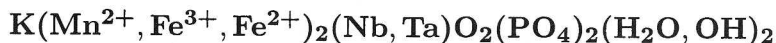


Johnwalkite

Crystal Data: Orthorhombic. *Point Group:* $mm2$. As prismatic crystals, to 6 mm, elongated along [010] and flattened on {001}; forms include {001}, {100}, {111}, {110}; in radial aggregates.

Physical Properties: *Cleavage:* Good on {001} and {100}; poor on {010}. *Tenacity:* Brittle. Hardness = 4 $D(\text{meas.}) = 3.40(3)$ $D(\text{calc.}) = 3.44$

Optical Properties: Opaque, transparent on thin edges. *Color:* Very dark reddish brown. *Streak:* Medium greenish yellow. *Luster:* Vitreous.

Optical Class: Biaxial (+). *Pleochroism:* Very strong; X = blue-green; Y = yellow to pale brown; Z = brown. *Orientation:* X = c; Y = a; Z = b. *Absorption:* $X \gg Z \gg Y$. $\alpha = 1.748(5)$ $\beta = 1.763(5)$ $\gamma = 1.84(1)$ $2V(\text{meas.}) = 53(2)^\circ$

Cell Data: *Space Group:* $[Pb2_1m]$ (by analogy to olmsteadite). $a = 7.516(4)$ $b = 10.023(8)$ $c = 6.502(4)$ $Z = 1$

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

6.01 (100), 3.005 (80), 3.054 (70), 2.862 (70), 6.51 (40), 2.563 (40), 7.54 (30)

Chemistry:

	(1)
P ₂ O ₅	27.3
Nb ₂ O ₅	21.5
Ta ₂ O ₅	5.1
Fe ₂ O ₃	12.5
FeO	3.3
MnO	14.8
MgO	0.5
K ₂ O	8.6
H ₂ O	6.5
Total	100.1

(1) Champion mine, South Dakota, USA; by electron microprobe, oxidation state of Fe determined by titration, total Mn as MnO, H₂O by thermoanalyzer-mass spectrometer; corresponding to $\text{K}_{0.92}(\text{Mn}_{1.04}\text{Fe}_{0.71}^{3+}\text{Fe}_{0.23}^{2+}\text{Mg}_{0.06})_{\Sigma=2.04}(\text{Nb}_{0.81}\text{Ta}_{0.12}\text{Fe}_{0.08}^{3+})_{\Sigma=1.01}\text{O}_2(\text{PO}_4)_{1.93}[(\text{H}_2\text{O})_{1.42}(\text{OH})_{0.78}]_{\Sigma=2.20}$.

Occurrence: A rare secondary mineral derived from the dissolution of triphylite-lithiophilite and columbite-tantalite in a complex granite pegmatite.

Association: Fluorapatite, childrenite-eosphorite, rockbridgeite-frondelite, huréaulite, fairfieldite, ludlamite, jahnsite-whiteite, goethite, manganese oxides, quartz.

Distribution: In the Expectation pegmatite at the Champion mine, about 2.5 km southeast of Keystone, Pennington Co., South Dakota, USA.

Name: Honoring Richard JOHNSon (1936–1998) and Frank WALKup (1943–1993), mineral preparators, National Museum of Natural History, Washington, D.C., USA.

Type Material: National Museum of Natural History, Washington, D.C., USA, 162676.

References: (1) 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. (2) (1987) Amer. Mineral., 72, 223 (abs. ref. 1).