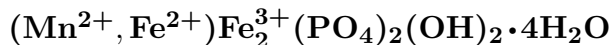


Earlshannonite

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Crystal Data: Monoclinic. *Point Group:* $2/m$. As crystals, to 1 mm, prismatic, elongated along [001], showing {110}, {100}, {011}, commonly in parallel growth along [001], and in hemispherical radiating clusters. *Twining:* On {100}.

Physical Properties: *Cleavage:* Two, poor. *Fracture:* Even. *Tenacity:* Brittle. Hardness = 3–4 D(meas.) = 2.90(4) D(calc.) = 2.92

Optical Properties: Transparent. *Color:* Dark reddish brown, yellowish brown, yellow-orange, bright yellow. *Streak:* Pale brown. *Luster:* Vitreous.

Optical Class: Biaxial (-). *Pleochroism:* Moderate; $X = Y$ = pale yellow-brown; Z = yellow-brown. *Orientation:* $Z = c$. *Absorption:* $Z > X \simeq Y$. $\alpha = 1.696(4)$ $\beta = 1.745(4)$ $\gamma = 1.765(4)$ $2V(\text{meas.}) = 64(4)^\circ$

Cell Data: *Space Group:* $P2_1/c$. $a = 9.910(13)$ $b = 9.669(8)$ $c = 5.455(9)$ $\beta = 93.95(9)^\circ$ $Z = 2$

X-ray Powder Pattern: Foote mine, North Carolina, USA. 9.8 (100), 6.9 (80), 2.789 (70), 4.18 (60), 3.45 (60), 2.856 (60), 4.95 (40)

Chemistry:

	(1)	(2)
P ₂ O ₅	30.0	31.0
Al ₂ O ₃	0.1	0.3
Fe ₂ O ₃	33.8	34.4
FeO	4.6	2.5
MnO	8.2	7.3
ZnO		0.3
MgO	0.8	2.3
CaO	0.6	
H ₂ O	[21.9]	[21.9]
Total	[100.0]	[100.0]

(1) Foote mine, North Carolina, USA; by electron microprobe, Fe confirmed as dominantly Fe³⁺ by microchemical tests and stoichiometry, H₂O by difference; corresponds to $(\text{Mn}_{0.55}^{2+}\text{Fe}_{0.30}^{2+}\text{Mg}_{0.09}\text{Ca}_{0.05})_{\Sigma=0.99}(\text{Fe}_{2.00}^{3+}\text{Al}_{0.01})_{\Sigma=2.01}(\text{PO}_4)_{2.00}(\text{OH})_{2.01} \cdot 4.75\text{H}_2\text{O}$. (2) Hagendorf, Germany; by electron microprobe, corresponds to $(\text{Mn}_{0.47}^{2+}\text{Mg}_{0.26}\text{Fe}_{0.16}\text{Zn}_{0.02})_{\Sigma=0.91}(\text{Fe}_{1.97}^{3+}\text{Al}_{0.03})_{\Sigma=2.00}(\text{PO}_4)_{2.00}(\text{OH})_{1.82} \cdot 4.66\text{H}_2\text{O}$.

Mineral Group: Arthurite group.

Occurrence: A very late-stage secondary mineral in a lithium-rich granite pegmatite (Foote mine, North Carolina, USA).

Association: Jahnsite, laueite, mitridatite, rockbridgeite, manganese oxide, quartz (Foote mine, North Carolina, USA); rockbridgeite–frondelite (Hagendorf, Germany).

Distribution: In the USA, from the Foote mine, Kings Mountain, Cleveland Co., and at the LCA pegmatite, Bessemer City, Gaston Co., North Carolina; in Maine, in the Emmons quarry, Greenwood, and at the Dunton quarry, Newry, Oxford Co. From Hagendorf, Bavaria, Germany. At Dolní Bori, near Velké Meziříčí, Czech Republic.

Name: To honor Earl V. Shannon (1895–1981), American mineralogist and chemist, U.S. National Museum, Washington, D.C., USA.

Type Material: National Museum of Natural History, Washington, D.C., USA, 150168, R12832.

References: (1) Peacor, D.R., P.J. Dunn, and W.B. Simmons (1984) Earlshannonite, the Mn analogue of whitmoreite, from North Carolina. *Can. Mineral.*, 22, 471–474. (2) (1985) *Amer. Mineral.*, 70, 871–872 (abs. ref. 1).

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