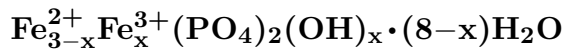


Metavivianite



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Crystal Data: Triclinic. *Point Group:* $\bar{1}$ or 1. As prismatic crystals, may be flattened, dominated by {110}, striated || [001], to 9 cm; typically pseudomorphous after vivianite crystals. *Twinning:* Polysynthetic twinning on {110} on a microscopic scale.

Physical Properties: *Cleavage:* Perfect on {110}. *Hardness* = n.d. *D(meas.)* = n.d. *D(calc.)* = 2.69

Optical Properties: Transparent to opaque. *Color:* Leek-green, khaki-green, brown. *Optical Class:* Biaxial (+). *Pleochroism:* X = light blue to blue-green; Y = yellow-green to light green; Z = yellow to light green. *Orientation:* X \perp {110}; YZ plane || {110}. *Absorption:* X > Z > Y. $\alpha = 1.579(6)$ $\beta = 1.603(2)$ $\gamma = 1.629(2)$ $2V(\text{meas.}) = 85(5)^\circ$

Cell Data: *Space Group:* $P\bar{1}$ or $P1$. $a = 7.81(2)$ $b = 9.08(2)$ $c = 4.65(1)$
 $\alpha = 94.77(10)^\circ$ $\beta = 97.15(10)^\circ$ $\gamma = 107.37(10)^\circ$ $Z = 1$

X-ray Powder Pattern: Big Chief mine, South Dakota, USA.
6.71 (100), 8.59 (40), 4.86 (40), 3.87 (30), 2.77 (30), 2.90 (20), 4.27 (10)

Chemistry:

	(1)	(2)
P ₂ O ₅	28.4	28.4
Fe ₂ O ₃		13.55
FeO	38.9	23.85
MnO	4.2	4.2
NiO	0.13	0.13
CaO	0.5	0.5
H ₂ O	[28.7]	
Total	[100.8]	

(1) Big Chief mine, South Dakota, USA; by electron microprobe, total Fe as FeO, H₂O from ideal formula with 8H₂O. (2) Do.; analysis (1) with Fe²⁺:Fe³⁺ = 1.14:1.86 from Mössbauer spectroscopy.

Occurrence: A secondary mineral typically formed from oxidizing vivianite, in complex granite pegmatites; authigenic, in bogs and soils.

Association: Kryzhanovskite, triphylite (Big Chief mine, South Dakota, USA); vivianite (many authigenic occurrences).

Distribution: Likely more widespread than reported here. Confirmed localities include: in the USA, from the Big Chief mine, one km south of Glendale, Pennington Co., South Dakota; Carroll, Carroll Co., Virginia. Large crystals from the Big Fish River area, Yukon Territory, Canada. From several localities in New Zealand, as at Hunua. Along the Wannan River, Victoria, Australia. At Wheal Jane, Truro, Cornwall, England. In the Norrö pegmatite, on Rånö Island, Sweden. From the Kamysh-Burun iron deposit, near Kerch, Crimean Peninsula, Ukraine.

Name: The prefix *meta* indicates the dehydration product of *vivianite*.

Type Material: National Museum of Natural History, Washington, D.C., USA, 127100.

References: (1) Ritz, C., E.J. Essene, and D.R. Peacor (1974) Metavivianite, Fe₃(PO₄)₂•8H₂O, a new mineral. *Amer. Mineral.*, 59, 896–899. (2) Dormann, J.-L., M. Gaspérin, and J.-F. Poullen (1980) Étude structurale de la séquence d'oxydation de la vivianite Fe₃(PO₄)₂•8H₂O. *Bull. Minéral.*, 105, 147–160 (in French with English abs.). (3) Sameshima, T., G.S. Henderson, P.M. Black, and K.A. Rodgers (1985) X-ray diffraction studies of vivianite, metavivianite, and baricite. *Mineral. Mag.*, 49, 81–85. (4) Rodgers, K.A. and J.H. Johnston (1985) Type metavivianite: Mössbauer evidence for a revised composition. *Neues Jahrb. Mineral., Monatsh.*, 539–542. (5) Rodgers, K.A. (1986) Metavivianite and kerchenite: a review. *Mineral. Mag.*, 50, 687–691.

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