Jahnsite-(CaMnMg) $CaMn^{2+}(Mg, Fe^{2+})_2Fe_2^{3+}(PO_4)_4(OH)_2 \cdot 8H_2O$

Crystal Data: Monoclinic. *Point Group:* $2/m$. As tabular to elongated prismatic crystals, striated on $\{\bar{2}01\}$ and $\{100\} \parallel [010]$, to 1 cm; common forms include $\{001\}$, $\{100\}$, $\{201\}$, $\{\bar{2}01\}$, $\{\bar{1}01\}$, $\{011\}$, $\{110\}$, $\{\bar{1}11\}$. May be acicular; in twinned parallel aggregates; as warty granular masses. *Twinning:* By reflection on $\{001\}$, producing a pseudo-orthorhombic appearance.

Physical Properties: *Cleavage:* Good on $\{001\}$. *Tenacity:* Brittle. Hardness = 4
D(meas.) = 2.706–2.718 D(calc.) = 2.715

Optical Properties: Transparent to translucent. *Color:* Nut-brown, purplish brown, yellow, yellow-orange, greenish yellow, red-brown, red-orange, pale green. *Luster:* Vitreous to subadamantine.
Optical Class: Biaxial (–). *Pleochroism:* X = pale purple; Y = deep purplish brown; Z = yellow with a tinge of green. *Orientation:* $Z = b$; $Y \wedge c \simeq 18°$. *Absorption:* $Y >> Z > X$.
$\alpha = 1.640(3)$ $\beta = 1.658(3)$ $\gamma = 1.670(3)$ 2V(meas.) = Large.

Cell Data: *Space Group:* $P2/a$. a = 14.94(2) b = 7.14(1) c = 9.93(1) $\beta = 110.16(8)°$
Z = 2

X-ray Powder Pattern: Tip Top mine, South Dakota, USA.
9.27 (10), 2.825 (8b), 4.91 (6b), 3.522 (5), 2.950 (5), 5.66 (4), 4.63 (4)

Chemistry:

	(1)		(1)
P_2O_5	32.2	MgO	9.4
Al_2O_3	2.1	CaO	6.6
Fe_2O_3	15.1	H_2O^+	18.8
MnO	8.0	Total	92.2

(1) Tip Top mine, South Dakota, USA; by electron microprobe, total Fe as Fe_2O_3, total Mn as MnO, H_2O by the Penfield method; corresponding to $Ca_{1.00}Mn^{2+}_{1.15}Mg_{1.75}(Fe^{3+}_{1.65}Al_{0.40})_{\Sigma=2.05}$ $(OH)_{2.05}(PO_4)_4 \cdot 7.9H_2O$.

Mineral Group: Whiteite group; $Fe^{3+} > Al$ in the M(3) structural site.

Occurrence: A late-stage hydrothermal decomposition product of primary triphylite-lithiophilite in complex granite pegmatites.

Association: Leucophosphite, huréaulite, collinsite, ferrisicklerite, robertsite, rockbridgeite, triphylite, tavorite, messelite, vivianite (Custer Co., South Dakota, USA); laueite, strunzite (Palermo #1 mine, New Hampshire, USA); graftonite, johnsomervilleite, mitridatite, phosphosiderite, rockbridgeite, vivianite, apatite, garnet (Glen Chosaidh, Scotland).

Distribution: In the USA, from the Tip Top, White Elephant, Bull Moose, Big Chief, and Linwood mines, near Custer, Custer Co., South Dakota. In the Sapucaia pegmatite mine, about 50 km east-southeast of Governador Valadares, Minas Gerais, Brazil. From Glen Chosaidh, Loch Quoich, Inverness-shire, Scotland.

Name: Honors Professor Richard Henry Jahns (1915–1983), specialist in pegmatite mineralogy, Stanford University, California, USA; the suffix indicates sequentially the dominant atom in the X, M(1), and M(2) structural positions.

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

References: (1) Moore, P.B. (1974) I. Jahnsite, segelerite, and robertsite, three new transition metal phosphate species. Amer. Mineral., 59, 48–53. (2) Moore, P.B. and T. Araki (1974) Jahnsite, $CaMn^{2+}Mg_2(H_2O)_8Fe_2^{3+}(OH)_2[PO_4]_4$: a novel stereoisomerism of ligands about octahedral corner-chains. Amer. Mineral., 59, 964–973. (3) Moore, P.B. and J. Ito (1978) I. Whiteite, a new species, and a proposed nomenclature for the jahnsite-whiteite complex series. Mineral. Mag., 42, 309–316.