Jahnsite-(NaMnMg) $(Na, Ca)Mn^{2+}(Mg, Fe^{3+})_2Fe^{3+}_2(PO_4)_4(OH)_2 \cdot 8H_2O$

Crystal Data: Monoclinic. *Point Group*: 2/*m.* As prisms to 0.5 mm, elongate along [100], exhibiting {100}, {001}, and {011}. *Twinning*: By reflection on {001}.

Physical Properties: *Cleavage*: Perfect on {001}. *Fracture*: Irregular, stepped splintery. *Tenacity*: Brittle. Hardness = ~4 D(meas.) = 2.68(1)-2.69(3) D(calc.) = 2.684-2.738 Slowly soluble in dilute HCl.

Optical Properties: Translucent to transparent. *Color*: Light orange to orange-yellow. *Streak*: Very pale yellow. *Luster*: Vitreous. *Optical Class*: Biaxial (-). $\alpha = 1.642$ $\beta = 1.675$ $\gamma = 1.677$ 2V(meas.) = 27(2)° *Orientation*: $Z = b$; $X \wedge c = 51°$ in obtuse β. *Pleochroism*: X = colorless, Y = Z = orange-yellow. *Absorption*: $Y \approx Z > X$. *Dispersion*: Very strong, $r < v$.

Cell Data: *Space Group*: $P2/a$. $a = 15.1045(15)$ $b = 7.1629(2)$ $c = 9.8949(7)$ $\beta = 110.640(7)°$ Z = 2

X-ray Powder Pattern: Sapucaia pegmatite, Conselheiro Pena district, Minas Gerais, Brazil. 9.29 (100), 2.834 (91), 2.601 (33), 1.944 (33), 3.546 (32), 4.91 (30), 5.02 (27)

Chemistry:

	(1)	(2)
Na_2O	2.16	2.35
CaO	1.73	1.53
MgO	7.64	6.15
MnO	[8.27]	[10.72]
Mn_2O_3	0	[3.94]
Fe_2O_3	23.83	20.77
Al_2O_3	1.31	0.13
P_2O_5	35.23	34.02
H_2O	20.31	19.45
Total	100.48	99.06

(1) Sapucaia pegmatite, Minas Gerais, Brazil; average electron microprobe analysis, H_2O and Mn apportioned from structure analysis; corresponds to $(Na_{0.56}Ca_{0.25}Mn^{2+}_{0.09})_{\Sigma=0.90}(Mn^{2+}_{0.85}Fe^{3+}_{0.15})_{\Sigma=1.00}(Mg_{1.53}Fe^{3+}_{0.47})_{\Sigma=2.00}(Fe^{3+}_{1.79}Al_{0.21})_{\Sigma=2.00}(PO_4)_4(OH)_{1.83}(H_2O)_{8.17}$. (2) White Rock No. 2 quarry, South Australia, Australia; average electron microprobe analysis, H_2O and Mn apportioned from structure analysis; corresponding to $(Na_{0.63}Ca_{0.23}Mn^{2+}_{0.14})_{\Sigma=1.00}(Mn^{2+}_{0.68}Mn^{3+}_{0.26}Fe^{3+}_{0.05}Mg_{0.01})_{\Sigma=1.00}(Mg_{1.26}Mn^{2+}_{0.43}Mn^{3+}_{0.16}Fe^{3+}_{0.15})_{\Sigma=2.00}(Fe^{3+}_{1.97}Al_{0.02})_{\Sigma=1.99}(PO_4)_4(OH)_{1.98}(H_2O)_{8.02}$.

Mineral Group: Jahnsite group, jahnsite subgroup; Fe^{3+} > Al in the M(3) structural site.

Occurrence: A low temperature, secondary mineral formed by alteration of primary phosphates in zoned granitic pegmatite.

Association: Frondelite, albite, meurigite-K, phosphosiderite, strengite (Sapucaia); phosphosiderite, ushkovite, strunzite, bermanite (White Rock); jahnsite-(NaFeMg) (Tip Top).

Distribution: In the Sapucaia pegmatite, 12 km north northeast of Galiléia, Conselheiro Pena district, Minas Gerais, Brazil and the White Rock No. 2 quarry, Bimbowrie Conservation Park, ~22 km north of Olary, South Australia, Australia. At the Tip Top pegmatite, South Dakota, USA.

Name: Root name, *Jahnsite*, indicates a member of the group with M(3) = Fe^{3+}; the suffix indicates sequentially the dominant atom in the X, M(1), and M(2) structural positions.

Type Material: Natural History Museum of Los Angeles County, Los Angeles, California, USA (66701) and the South Australian Museum, Adelaide, South Australia, Australia (G34298).

References: (1) Kampf, A.R., P. Elliott, B.P. Nash, L. Chiappino, and S. Varvello (2018) Jahnsite-(NaMnMg), a new Jahnsite-group mineral from the Sapucaia Mine, Brazil and the White Rock No. 2 quarry, Australia. Can. Mineral., 56(6), 871-882. (2) (2021) Amer. Mineral., 106, 1362 (abs. ref. 1).