Zavalíaite $(Mn^{2+},Fe^{2+},Mg)_3(PO_4)_2$

Crystal Data: Monoclinic. *Point Group*: 2/*m*. As exsolution lamellae to 70 μm thick and 1.5 mm long in lithiophilite nodules.

Physical Properties: *Cleavage*: Perfect on {100} and {001}. *Fracture*: n.d. *Tenacity*: Brittle. Hardness = ~ 4 D(meas.) = n.d. D(calc.) = 3.68

Optical Properties: Transparent. *Color*: Colorless. *Streak*: White. *Luster*: Vitreous to resinous.
Optical Class: Biaxial (-). n = 1.66(1) 2V(meas.) = 15(5)° *Orientation*: $X \perp$ the cleavage plane at 45° to elongation.

Cell Data: *Space Group*: $P2_1/c$. a = 6.088(1) b = 4.814(2) c = 10.484(2) β = 89.42(3)° Z = 2

X-ray Powder Pattern: La Empleada pegmatite, Totoral pegmatite field, Argentina.
6.75 (vs), 1.894 (vs), 1.848 (vs), 1.652 (vs), 2.964 (s), 2.537 (s), 3.54 (w)

Chemistry:

	(1)	(2)
MgO	6.09	6.04
MnO	27.08	26.90
FeO	24.94	25.34
P_2O_5	41.38	41.72
Total	99.49	100.00

(1) La Empleada pegmatite, Totoral pegmatite field, Argentina; average of 27 electron microprobe analyses, absence of CO_2 and H_2O confirmed by structure analysis; corresponding to $(Mn^{2+}_{1.31}Fe^{2+}_{1.19}Mg_{0.52})_{\Sigma=3.02}(P_{1.00}O_4)_2$. (2) $(Mn^{2+}_{1.29}Fe^{2+}_{1.20}Mg_{0.51})_{\Sigma=3.00}(PO_4)_2$.

Mineral Group: Sarcopside group.

Occurrence: In the core margin of a zoned granitic pegmatite (beryl-columbite-phosphate subtype) as exsolution lamellae in ellipsoidal phosphate nodules.

Association: Lithiophilite, reddingite (by hydration).

Distribution: From the La Empleada granitic pegmatite, Totoral pegmatite field, San Luis Province, Argentina.

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Type Material: Laboratory of Mineralogy, University of Liège, Belgium (# 20384).

References: (1) Hatert, F., E. Roda-Robles, P. De Parseval, and J. Wouters (2012) Zavalíaite, $(Mn^{2+},Fe^{2+},Mg)_3(PO_4)_2$, a new member of the sarcopside group from the La Empleada pegmatite, San Luis Province, Argentina. Can. Mineral., 50(6), 1445-1452. (2) (2014) Amer. Mineral., 99, 2156-2157 (abs. ref. 1).