

Berzeliite**NaCa₂(Mg, Mn²⁺)₂(AsO₄)₃**

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Crystal Data: Cubic. *Point Group:* $4/m\bar{3}2/m$. Very rare trapezohedra {211}, with small modifying faces {001}, {011}, {012}, to 4 mm; commonly as rounded grains or massive.

Physical Properties: *Fracture:* Subconchoidal to uneven. *Tenacity:* Brittle.
Hardness = 4.5–5 D(meas.) = 4.08 D(calc.) = 4.068

Optical Properties: Transparent to translucent. *Color:* Colorless, yellow, honey-yellow to yellow-orange, yellowish red, brownish orange; in transmitted light, colorless to orange. *Streak:* Nearly white to yellow-orange. *Luster:* Resinous.

Optical Class: Isotropic; may show weak anomalous birefringence. $n = 1.707\text{--}1.748$

Cell Data: *Space Group:* $Ia\bar{3}d$. $a = 12.355(2)$ $Z = 8$

X-ray Powder Pattern: Långban, Sweden. (ICDD 19-165).

2.754 (100), 1.712 (70), 1.648 (70), 5.03 (60), 3.09 (60), 2.632 (60), 2.517 (60)

Chemistry:	(1)	(2)	(3)		(1)	(2)	(3)
P ₂ O ₅	1.23	1.48		CaO	19.27	18.76	18.72
As ₂ O ₅	56.72	54.92	57.54	Na ₂ O	4.56	4.70	5.17
V ₂ O ₅	0.23	0.09		K ₂ O	0.08		
SiO ₂	0.66	0.57		Cl		0.03	
FeO	trace	0.03		H ₂ O ⁺	0.37	0.24	
MnO	2.83	9.59	11.84	H ₂ O ⁻	0.34	0.12	
PbO	0.35	0.19		-O = Cl ₂		0.01	
MgO	13.60	9.30	6.73	Total	100.24	100.01	100.00

(1) Långban, Sweden; corresponds to (Na_{0.84}K_{0.01})_{Σ=0.85}(Ca_{1.97}Pb_{0.01})_{Σ=1.98}(Mg_{1.94}Mn_{0.23})_{Σ=2.17}[(As_{0.94}P_{0.03}Si_{0.02}V_{0.01})_{Σ=1.00}O₄]₃. (2) Do.; corresponds to Na_{0.89}Ca_{1.96}(Mg_{1.35}Mn_{0.79})_{Σ=2.14}[(As_{0.93}P_{0.04}Si_{0.02})_{Σ=0.99}O₄]₃. (3) NaCa₂(Mg, Mn)₂(AsO₄)₃ with Mg:Mn = 1:1.

Polymorphism & Series: Forms a series with manganberzeliite.

Occurrence: In metamorphosed Fe–Mn orebodies.

Association: Hausmannite, rhodonite, tephroite, hedyphane, caryinite, manganoan biotite, långbanite, braunite, hematite, dolomite, barite, calcite.

Distribution: In Sweden, found at Långban and Nordmark, Värmland, and in the Sjö mine, near Grythyttan, Örebro.

Name: In honor of the noted Swedish chemist and mineralogist, Jöns Jacob Berzelius (1779–1848).

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 681–683. (2) Blix, R. and F.E. Wickman (1958) A contribution to the knowledge of the mineral berzeliite. *Arkiv Mineral. Geol.*, 2(33), 417–424. (3) Hawthorne, F.C. (1976) Refinement of the crystal structure of berzeliite. *Acta Cryst.*, 32, 1581–1583.