

Crystal Data: Hexagonal. *Point Group:* 6/m. As prismatic crystals exhibiting {1010} and {0001}, to 1.5 mm; usually massive.

Physical Properties: *Fracture:* Uneven. Hardness = 5 D(meas.) = 3.60(5) D(calc.) = 3.63
Fluoresces bright orange under SW UV; may be phosphorescent.

Optical Properties: Translucent. *Color:* Colorless, grayish white. *Streak:* White.
Luster: Vitreous to slightly greasy.
Optical Class: Uniaxial (-). $\omega = 1.708(3)$ $\epsilon = 1.700(3)$

Cell Data: *Space Group:* P6₃/m. $a = 9.9218(3)$ $c = 6.8638(2)$ $Z = 2$

X-ray Powder Pattern: Långban, Sweden.

2.907 (100), 2.826 (90), 3.43 (60), 3.98 (50), 2.670 (50), 1.864 (40), 1.995 (30)

Chemistry:	(1)	(2)		(1)	(2)
P ₂ O ₅	6.1	0.20	CaO	43.8	41.39
V ₂ O ₅		0.01	SrO		0.12
As ₂ O ₅	44.9	51.76	BaO		0.52
SO ₃		0.22	F	1.2	0.32
SiO ₂		0.06	Cl	3.2	2.56
Na ₂ O		0.02	H ₂ O	n.d	[0.58]
MnO	1.9	1.89	- O = (F,Cl) ₂	1.2	0.71
PbO	0.7	0.10	Total	100.6	99.04

(1) Långban, Sweden; by electron microprobe, total Mn as MnO; corresponding to (Ca_{4.85}Mn_{0.16}Pb_{0.02}) $\Sigma=5.03$ [(AsO₄)_{2.42}(PO₄)_{0.54}] $\Sigma=2.96$ (Cl_{0.56}F_{0.39}) $\Sigma=0.95$. (2) Brattfors mine, Nordmark, Värmland, Sweden; average of 10 electron microprobe analyses supplemented by FTIR spectroscopy, H₂O calculated so that (Cl+F+OH) = 1 apfu; corresponds to (Ca_{4.82}Mn_{0.17}Ba_{0.02}Sr_{0.01}) $\Sigma=5.02$ (As_{2.94}P_{0.02}S_{0.02}Si_{0.01}) $\Sigma=2.99$ O₁₂[Cl_{0.47}(OH)_{0.42}F_{0.11}] $\Sigma=1.00$.

Mineral Group: Apatite group.

Occurrence: A rare component of manganese ores in high-grade marbles.

Association: Andradite, magnetite, calcite (Långban, Sweden); magnetite, andradite, manganian calcite (Franklin, New Jersey, USA); donpeacorite, tirodite, ferrian braunite, dravite, anhydrite, manganian dolomite (Fowler, New York, USA).

Distribution: From the Brattfors mine, Nordmark, (Långban), Värmland, Sweden. At Franklin, Sussex Co., New Jersey and in the Balmat #4 mine, Fowler, St. Lawrence Co., New York, USA.

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Type Material: Harvard University, Cambridge, Massachusetts (124237) and the National Museum of Natural History, Washington, D.C., USA (134981, C6270-1, C6270-2, 159862).

References: (1) Dunn, P.J., E.U. Petersen, and D.R. Peacor (1985) Turneureite, a new member of the apatite group from Franklin, New Jersey, Balmat, New York and Långban, Sweden. *Can. Mineral.*, 23, 251-254. (2) (1986) *Amer. Mineral.*, 71, 1280 (abs. ref. 1). (3) Biagioni, C., F. Bosi, U. Hålenius, and M. Pasero (2017) The crystal structure of turneureite, Ca₅(AsO₄)₃Cl, the arsenate analog of chlorapatite, and its relationships with the arsenate apatites johnbaumite and svabite. *Amer. Mineral.*, 102, 1981-1986.