

Phosinaite-(Ce)**Na₁₃Ca₂CeSi₄O₁₂(PO₄)₄**

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Crystal Data: Orthorhombic. *Point Group:* 222. As columnar crystals, to 1 cm, with {011} predominant, and {100}, {010}, {001}; as irregular accumulations.

Physical Properties: *Cleavage:* Perfect on {001}, imperfect on {010} and {011}.
Hardness = 3.5 VHN = 207–340 D(meas.) = 2.62–3.00 D(calc.) = [3.36]

Optical Properties: Transparent. *Color:* Colorless, pale rose to brownish rose.
Luster: Vitreous.

Optical Class: Biaxial (–). *Orientation:* X = b; Y = a; Z = c. $\alpha = 1.567\text{--}1.570$
 $\beta = 1.569\text{--}1.572$ $\gamma = 1.570\text{--}1.573$ 2V(meas.) = 68°–70°

Cell Data: *Space Group:* P2₁2₁2. a = 7.234(3) b = 14.670(4) c = 12.231(4) Z = 2

X-ray Powder Pattern: Lovozero massif, Russia.
2.74 (100), 7.44 (55), 2.566 (55), 6.92 (50), 3.51 (40), 3.62 (30), 3.94 (20)

Chemistry:

	(1)	(2)
SiO ₂	18.30	23.78
RE ₂ O ₃	13.44	13.80
Fe ₂ O ₃		0.49
MnO	trace	1.90
CaO	12.20	5.39
Li ₂ O		0.24
Na ₂ O	28.10	28.78
K ₂ O	0.74	0.47
H ₂ O	6.07	4.41
P ₂ O ₅	21.30	20.50
Total	100.15	99.76

(1) Khibiny massif, Russia. (2) Lovozero massif, Russia; spectrographic analyses show RE = Y 0.6%, La 16.8%, Ce 53.9%, Pr 4.4%, Nd 19.5%, Sm 3.0%, Eu 0.5%, Gd 0.7%, Tb 0.3%, Er 0.3%.

Occurrence: Filling interstices between large crystals of anorthoclase in alkalic pegmatites in a differentiated alkalic massif (Khibiny massif, Russia); in ussingite veinlets in a differentiated alkalic massif (Lovozero massif, Russia).

Association: Anorthoclase, nepheline, aegirine, lomonosovite, lamprophyllite (Khibiny massif, Russia); belovite, nordite, neptunite, vuonnemite (Lovozero massif, Russia).

Distribution: On Mt. Koashva, Khibiny massif, and Mt. Karnasurt, Lovozero massif, Kola Peninsula, Russia. At Mont Saint-Hilaire, Quebec, Canada.

Name: For PHosphorus, SiLicon, and sodium, NAtrium, in the composition.

Type Material: Geology Museum, Kola Branch, Academy of Sciences, Apatity, 4456; Mining Institute, St. Petersburg, 1210/1; Institute of Mineralogy and Geochemistry of Rare Elements, Moscow; A.E. Fersman Mineralogical Museum, Academy of Sciences, Moscow, Russia, 76195; National School of Mines, Paris, France.

References: (1) Kapustin, Y.L., A.P. Khomyakov, E.I. Semenov, E.M. Es'kova, A.V. Bykova, and Z.V. Pudovkina (1974) Phosinaite, a new rare-earth mineral. Zap. Vses. Mineral. Obshch., 103, 567–570 (in Russian). (2) (1975) Amer. Mineral., 60, 488 (abs. ref. 1). (3) Krutik, V.M., D.Y. Pushcharovskii, A.P. Khomyakov, E.A. Pobedinskaya, and N.V. Belov (1981) Crystal structure and typomorphism of phosinaite. Kristallografiya (Sov. Phys. Crystal.), 26, 1197–1203 (in Russian).

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