

Loparite-(Ce)**(Ce, Na, Ca)(Ti, Nb)O₃**

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Crystal Data: Cubic. *Point Group:* $4/m\bar{3}2/m$. As cubic or octahedral crystals, to 2 cm, which may be highly modified; overgrowing perovskite and massive. *Twinning:* Commonly as penetration twins on {111}.

Physical Properties: *Cleavage:* Imperfect on {100}. *Fracture:* Uneven. *Tenacity:* Brittle. Hardness = 5.5–6 VHN = 734–893; 908–1422 (100 g load). D(meas.) = 4.60–4.89 D(calc.) = [4.75–4.94]

Optical Properties: Opaque, transparent in thin fragments. *Color:* Black to grayish black; dark brown in thin section, may be zoned; light gray or white with a creamy tinge and brownish red internal reflections in reflected light. *Streak:* Cinnamon-brown to brown. *Luster:* Metallic to submetallic.

Optical Class: Isotropic, anomalously anisotropic. $n = 2.26\text{--}2.38$

R: (400) 18.8, (420) 18.2, (440) 17.8, (460) 17.3, (480) 17.0, (500) 16.8, (520) 16.6, (540) 16.4, (560) 16.3, (580) 16.1, (600) 16.1, (620) 16.0, (640) 15.9, (660) 15.9, (680) 15.9, (700) 15.8

Cell Data: *Space Group:* $Pm\bar{3}m$. $a = 3.85\text{--}3.90$ $Z = 1$

X-ray Powder Pattern: Kola Peninsula, Russia.

2.749 (10), 1.583 (10), 1.226 (10), 1.936 (9), 1.373 (9), 1.120 (4), 2.244 (2)

Chemistry:		(1)	(2)	(1)	(2)	(1)	(2)	
Nb ₂ O ₅	9.74	15.1	Al ₂ O ₃	0.20		CaO	5.00	2.42
Ta ₂ O ₅	0.75	1.01	La ₂ O ₃		13.2	SrO	3.42	
SiO ₂	0.38		CeO ₂		17.7	Na ₂ O	8.32	10.7
TiO ₂	39.65	35.8	Ce ₂ O ₃	16.04		K ₂ O	0.13	
ZrO ₂		0.20	Nd ₂ O ₃		2.95	rem.	0.57	
ThO ₂	0.76	0.80	RE ₂ O ₃	14.76		Total	100.08	[100.07]
Fe ₂ O ₃		0.19	FeO	0.36				

(1) Kola Peninsula, Russia. (2) Tenerife, Canary Islands; by electron microprobe, total Fe as Fe₂O₃, original total given as 100.10%; corresponding to (Na_{0.58}Ce_{0.17}La_{0.14}Ca_{0.07}Nd_{0.03})_{Σ=0.99}(Ti_{0.76}Nb_{0.19}Ta_{0.01})_{Σ=0.96}O₃.

Mineral Group: Perovskite group; Ti_B > 0.5.

Occurrence: A primary phase in differentiated nepheline syenite massifs and alkalic pegmatites; replacing perovskite in carbonatites.

Association: Nepheline, microcline, aegirine, rare-earth-bearing apatite, arfvedsonite, perovskite, ilmenite, eudialite-eucolite, titanite, lamprophyllite.

Distribution: Widespread in the Khibiny and Lovozero massifs, Kola Peninsula; in the Yllmakh massif, Aldan; large crystals from the Burpala massif, 120 km north of Lake Baikal, eastern Siberia, Russia. From Bratthagen, Lagendalen, near Larvik and Buer, Bjørkdalen, Norway. From the Gardiner complex, Kangerdlugssuaq Fjord, eastern Greenland. On Tenerife, Canary Islands. In the Schryburt Lake carbonatite, Ontario, Canada. At Sarambi and Chiriquelo, Paraguay. From the Salitre I alkaline complex, Minas Gerais, Brazil. On Boa Vista, Cape Verde Islands.

Name: From the Russian name for the Lapps, *Lopar*, inhabitants of the Kola Peninsula, Russia, first noted place of occurrence of the mineral, and for its *cerium* content.

Type Material: A.E. Fersman Mineralogical Museum, Academy of Sciences, Moscow, Russia, 21043–21045.

References: (1) Palache, C., H. Berman, and C. Frondel (1944) Dana's system of mineralogy, (7th edition), v. I, 730–735 [perovskite, part]. (2) Vlasov, K.A., Ed. (1966) Mineralogy of rare elements, v. II, 418–424. (3) Ferguson, A.K. (1978) The occurrence of ramsayite, titan-låvenite and a fluorine-rich eucolite in a nepheline-syenite inclusion from Tenerife, Canary Islands. *Contr. Mineral. Petrol.*, 66, 15–20.

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