

Hydroxynatropyrochlore**(Na, Ca, Ce)₂Nb₂O₆(OH)**

Crystal Data: Cubic. *Point group:* $4/m\bar{3}2/m$. As cubic or cube-octahedral crystals, to 0.7 mm, with irregularly shaped cores of amorphous U-Ta-rich hydroxykenopyrochlore.

Physical Properties: *Cleavage:* Average on {111}. *Tenacity:* Brittle. *Fracture:* Conchoidal. Hardness = ~ 5 D(meas.) = 4.60(5). D(calc.) = 4.77

Optical Properties: Transparent to translucent. *Color:* Pale brown, light brown in transmitted light. *Streak:* White. *Luster:* Adamantine to greasy. *Optical Class:* Isotropic. $n = 2.10(5)$

Cell Data: *Space Group:* $Fd\bar{3}m$. $a = 10.3275(5)$ $Z = 8$

X-ray Powder Pattern: Kovdor phoscorite-carbonatite pipe, Kola Peninsula, Russia. 2.580 (100), 5.96 (47), 3.110 (30), 1.8257 (25), 2.368 (19), 1.5561 (14), 1.9875 (6)

Chemistry:	(1)		(1)
Na ₂ O	7.97	Ta ₂ O ₅	4.73
CaO	10.38	ThO ₂	5.73
TiO ₂	4.71	UO ₂	3.66
FeO	0.42	H ₂ O	[2.37]
Nb ₂ O ₅	56.44	F	0.05
Ce ₂ O ₃	3.56	<u>-O = F₂</u>	<u>0.02</u>
		Total	100.00

(1) Kovdor phoscorite-carbonatite pipe, Kola Peninsula, Russia; average of 2 electron microprobe analyses supplemented by Raman spectroscopy, H₂O calculated for weight deficit; corresponds to (Na_{1.02}Ca_{0.73}Ce_{0.09}Th_{0.09}U_{0.05}Fe²⁺_{0.02})_{Σ=2.00}(Nb_{1.68}Ti_{0.23}Ta_{0.09})_{Σ=2.00}O_{6.03}[(OH)_{1.04}F_{0.01}]_{Σ=1.05}.

Mineral Group: Pyrochlore supergroup (general formula - A₂B₂X₆Y); pyrochlore group (B = Nb⁵⁺).

Occurrence: A secondary hydrothermal mineral resulting from the alteration of Nb-rich baddeleyite in low-carbonate phoscorite in the contact zone of a phoscorite-carbonatite pipe with host foidolite as well as in the carbonate-rich phoscorite and carbonatite of the pipe axial zone.

Association: Calcite, dolomite, forsterite, hydroxylapatite, magnetite, phlogopite, baddeleyite, barite, barytocalcite, chalcopyrite, chamosite-clinochlore, galena, gladiusite, juonniite, ilmenite, magnesite, pyrite, pyrrhotite, quintinite, spinel, strontianite, valleriite, zirconolite.

Distribution: From the Kovdor phoscorite-carbonatite pipe, Kola Peninsula, Russia.

Name: For a member of the *pyrochlore* group with prefixes to indicate dominant OH⁻ (*hydroxy*) in the Y site and dominant sodium (*natro*) in the A site.

Type Material: Mineralogical Museum, St. Petersburg State University, Russia (1/19679).

References: (1) Ivanyuk, G.Yu., V.N. Yakovenchuk, T.L. Panikorovskii, N. Konoplyova, Ya.A. Pakhomovsky, A.V. Bazai, V.N. Bocharov, and S.V. Krivovichev. (2018) Hydroxynatropyrochlore, (Na,Ca,Ce)₂Nb₂O₆(OH), a new member of the pyrochlore group from the Kovdor phoscorite-carbonatite pipe, Kola Peninsula, Russia. *Mineral. Mag.*, 83, 107-113. (2) (2018) *Amer. Mineral.*, 103, 2047-2048 (abs. ref. 1). (3) Atencio, D., M.B. Andrade, A.G. Christy, R. Gieré, and P.M. Kartashov (2010) The pyrochlore supergroup of minerals: nomenclature. *Can. Mineral.*, 48, 673-698.