

Crystal Data: Monoclinic. *Point Group:* 2/m. As lath-shaped crystals elongated along [001], with prominent {100}, {410}, and {310}, to 3 mm; fibrous; in subparallel crystal aggregates.

Physical Properties: *Cleavage:* {011}, good. *Fracture:* Uneven. Hardness = 5
D(meas.) = 3.45 D(calc.) = 3.539

Optical Properties: Transparent. *Color:* Colorless. *Luster:* Vitreous.

Optical Class: Biaxial (+). $\alpha = 1.662$ $\beta = 1.671$ $\gamma = [1.692]$ $2V(\text{meas.}) = 66(1)^\circ$
Orientation: $X = b$, $Y \approx c$, $Z \wedge a = 11^\circ$.

Cell Data: *Space Group:* $P2_1/c$. $a = 7.468(2)$ $b = 5.689(1)$ $c = 18.891(4)$ $\beta = 101.37(3)^\circ$ $Z = 2$

X-ray Powder Pattern: Ilímaussaq intrusion, Greenland.

3.077 (10), 3.089 (5), 2.955 (5), 2.031 (5), 1.5518 (5), 1.8652 (4), 1.6879 (4)

Chemistry:	(1)	(2)	(3)		(1)	(2)	(3)
SiO ₂	29.63	28.30	28.28	Dy ₂ O ₃	0.05		0.35
TiO ₂	2.79	2.24	0.16	Y ₂ O ₃	0.78	0.57	0.31
ZrO ₂	< 0.10			Nb ₂ O ₅	11.61	12.01	15.47
Al ₂ O ₃	< 0.05			Ta ₂ O ₅	0.34	0.33	0.35
La ₂ O ₃	4.09	4.42	2.76	CaO	19.92	19.79	18.67
Ce ₂ O ₃	10.32	10.55	9.54	SrO	0.27	0.45	0.16
Pr ₂ O ₃	1.42	1.12	1.70	Na ₂ O	10.01	10.07	11.00
Nd ₂ O ₃	4.19	4.34	6.17	F	6.87	6.15	6.79
Gd ₂ O ₃		0.47	0.52	- O = F ₂	2.89	2.59	2.86
Sm ₂ O ₃	0.81	0.64	1.27	Total	100.21	98.86	100.65

(1) Ilímaussaq intrusion, Greenland; by electron microprobe, average of 10 analyses; corresponds to (Nb_{0.71}Ti_{0.28}Ta_{0.01}) $\Sigma=1.00$ Na_{2.62}(Ca_{2.88}RE_{1.08}Sr_{0.02}) $\Sigma=3.98$ Si_{4.00}O₁₄(F_{2.93}O_{0.70}) $\Sigma=3.63$. (2) Kvanefjeld tunnel, Ilímaussaq intrusion, Greenland; by electron microprobe; corresponds to Na_{2.77}(Ca_{3.01}Sr_{0.04}) $\Sigma=3.05$ (Ce_{0.55}La_{0.23}Nd_{0.22}Pr_{0.06}Sm_{0.03}Gd_{0.02}Y_{0.04}) $\Sigma=1.15$ (Nb_{0.77}Ti⁴⁺_{0.24}Ta_{0.01}) $\Sigma=1.02$ (Si₂O₇)₂(O_{1.24}F_{0.76}) $\Sigma=2.00$ F₂. (3) Morro Redondo Complex, Brazil; electron microprobe analysis; average of 8 corresponds to Na_{3.0}(Ca_{2.75}Sr_{0.01}) $\Sigma=2.76$ (RE, Y)_{1.16}(Nb_{0.95}Ta_{0.02}Ti_{0.04}) $\Sigma=1.01$ Si_{3.99}O₁₄(O_{1.11}F_{2.89}) $\Sigma=4$.

Polymorphism & Series: Complete solid solution series with rinkite.

Occurrence: In alkaline undersaturated igneous rocks and oversaturated peralkaline granites.

Association: Arfvedsonite, sodalite, eudialyte, villiaumite, microcline, albite (Ilímaussaq intrusion); quartz, microcline, albite, arfvedsonite, aegirine (Morro Redondo Complex, Brazil).

Distribution: Found in the Kvanefjeld tunnel and at another unspecified locality in the Ilímaussaq intrusion, southern Greenland. From the Papanduva Pluton, Morro Redondo Complex, Graciosa Province, Southern Brazil; the Mecsek Mountains, Hungary; Los Isle, Guinea; Kilombe volcano, Kenya and Ambohimirahavavy, Madagascar.

Name: For sodium, NAtrium, CAlcium, Rare Earths, NIOBium, and Silicon in its composition; a suffix indicates that cerium is the dominant rare earth element.

Type Material: University of Copenhagen, Copenhagen, Denmark; National Museum of Natural History, Washington, D.C., USA, 160684.

References: (1) Petersen, O.V., J.G. Rønsbo, and E.S. Leonardsen (1989) Nacareniobsite-(Ce), a new mineral species from the Ilímaussaq alkaline complex, South Greenland, and its relation to mosandrite and the rinkite series. *Neues Jahrb. Mineral., Monatsh.*, 84-96. (2) (1990) *Amer. Mineral.*, 75, 708 (abs. ref. 1). (3) Sokolova, E. and F.C. Hawthorne (2008) From structure topology to chemical composition. V. Titanium silicates: the crystal chemistry of nacareniobsite-(Ce). *Can. Mineral.*, 46, 1333-1342. (4) (2009) *Amer. Mineral.*, 94(7), 1332 (abs. ref. 3). (5) Vilalva, F.C.J.,

S.R.F. Vlach, and A. Simonetti (2013) Nacareniobsite-(Ce) and britholite-(Ce) in peralkaline granites from the Morro Redondo Complex, Graciosa Province, Southern Brazil: occurrence and compositional data. *Can. Mineral.*, 51, 313-332.