Rinkite-(Ce) $(Ca_3REE)Na(NaCa)Ti(Si_2O_7)_2(OF)F_2$

Crystal Data: Monoclinic. *Point Group*: 2/*m*. Crystals prismatic along [001] and flattened on {100} with {hk0} faces strongly striated, to 10 cm; massive. *Twinning*: Lamellar, polysynthetic on {100}.

Physical Properties: *Cleavage*: Distinct on {100}. *Fracture*: Uneven, conchoidal. *Tenacity*: Brittle. Hardness = 4-5 D(meas.) = 3.18-3.44 D(calc.) = 3.376-3.502 Green cathodoluminescence.

Optical Properties: Opaque, translucent in thin fragments. *Color*: Reddish brown; alters to dull greenish or yellowish brown; bright red in transmitted light. *Streak*: Pale yellow, grayish brown, white. *Luster*: Vitreous on fractures, resinous to greasy on cleavages.
Optical Class: Biaxial (+). *Pleochroism*: Slight, in yellow tints. *Orientation*: $X \wedge c = 3°$.
Absorption: $Z > Y > X$. α = 1.643-1.662 β = 1.645-1.667 γ = 1.651-1.681 2V(meas.) = 43°-87°

Cell Data: *Space Group*: $P2_1/c$. a = 7.412(3) b = 5.679(3) c = 18.835(6) β = 101.26(3)° Z = 2

X-ray Powder Pattern: Ilímaussaq intrusion, Greenland.
3.071 (100), 2.702 (70), 2.945 (40), 2.798 (40), 1.853 (30), 3.581 (25), 2.024 (25)

Chemistry:

	(1)	(2)		(1)	(2)
Ta_2O_5	0.18		La_2O_3	3.21	3.56
Nb_2O_5	5.48	1.89	Y_2O_3	1.27	1.83
ThO_2	0.08	0.12	BaO	0.06	0.10
ZrO_2	0.81	0.62	SrO	0.07	1.73
TiO_2	5.81	8.21	FeO	0.11	
SiO_2	29.09	29.36	MnO	0.08	0.13
Dy_2O_3	0.26	0.41	CaO	23.09	24.43
Gd_2O_3	0.55	0.52	Na_2O	8.54	8.37
Sm_2O_3	0.78	0.58	F	6.96	6.47
Nd_2O_3	4.91	3.58	-O = F	2.93	2.72
Pr_2O_3	1.16	1.01	Total	98.80	99.20
Ce_2O_3	9.23	9.00			

(1) Ilímaussaq, Greenland, average electron microprobe analysis. (2) Mt. Yuskpor, Khibiny massif, Kola Peninsula, Russia, average electron microprobe analysis.

Mineral Group: Seidozerite supergroup, rinkite group.

Occurrence: Characteristic of some nepheline syenites and related pegmatites.

Association: Arfvedsonite, aegirine, eudialyte, steenstrupine, leucophanite, wöhlerite, rosenbuschite, sodalite.

Distribution: From the Kangerdluarssuk Plateau, in the Ilímaussaq intrusion, southern Greenland. On the Islands of Låven and Stokkø, and at Barkevik, Langesundsfjord, Norway. In the Khibiny and Lovozero massifs, Kola Peninsula, Russia. At the Dara-i-Pioz massif, Alai Range, Tien Shan, Tajikistan. From Mont Saint-Hilaire and near Saint-Amable, Quebec, and in the Red Wine complex, Labrador, Newfoundland, Canada. From the Saima alkaline complex, Liaodong Peninsula, China.

Name: For H. *Rink*, former Director of Danish-Greenland commerce. Suffix is the dominant *REE*.

Type Material: University of Copenhagen, Copenhagen, Denmark (2,3).

References: (1) Dana, E.S. (1892) Dana's system of mineralogy, (6th edition), 722 (rinkite), 721-722 (mosandrite), 720-721 (johnstrupite). (2) Vlasov, K.A., Ed. (1966) Mineralogy of rare elements, v. II, 312-316. (3) Sokolova, E. and F. Cámara (2017) The seidozerite supergroup of TS-block minerals: nomenclature and classification, with change of the following names: rinkite to rinkite-(Ce), mosandrite to mosandrite-(Ce), hainite to hainite-(Y) and innelite-1*T* to innelite-1*A*. Mineral. Mag., 81, 1457-1487. (4) Cámara, F., E. Sokolova, and F.C. Hawthorne (2011) From structure topology to chemical composition. XII. Titanium silicates: the crystal chemistry of rinkite, $Na_2Ca_4REETi(Si_2O_7)_2OF_3$. Mineral. Mag., 75, 2755-2774.