Arisite-(Ce) $NaCe_2(CO_3)_2[F_{2\times}(CO_3)_{1-x}]F$

Crystal Data: Hexagonal. *Point Group*: $\bar{6}\,m2$. As hexagonal micaceous plates to 1.5 mm and as hexagonal tabular prisms {100}. Also in rosettes and spherical aggregates. *Twinning*: Reentrant angles observed of an unidentified twin law.

Physical Properties: *Cleavage*: Poor on {001}. F*racture*: Conchoidal. *Tenacity*: Brittle, flexible. D(meas.) = > 3.3 D(calc.) = 4.126 *Hardness* = 3-3.5 Effervesces in dilute HCl.

Optical Properties: Transparent. *Color*: Beige, beige-yellow, light lemon-yellow to pinkish, silvery. *Streak*: White. *Luster*: Vitreous.
Optical Class: Uniaxial (-). ω = 1.696–1.714(4) ε = 1.594–1.611(3)

Cell Data: *Space Group*: $P\bar{6}\,m2$. a = 5.1109(2) c = 8.6713(4) Z = 1

X-ray Powder Pattern: Ariskop and Railroad (Aris phonolite) quarry, central Namibia.
4.439(100), 3.103(87), 4.352(52), 1.9748(42), 2.561(38), 2.424(21), 1.9501(16)

Chemistry:

	(1)	(2)		(1)	(2)
Na_2O	5.89	4.49	Sm_2O_3	0.47	0.69
CaO	1.51	5.39	Gd_2O_3	0.01	0.54
SrO	0.11	2.78	CO_2	[23.40]	[20.92]
La_2O_3	25.47	15.56	F	5.93	9.62
Ce_2O_3	29.80	30.71	-O=F	2.50	4.05
Pr_2O_3	1.43	3.05	Total	95.26	97.90
Nd_2O_3	3.54	8.12			

(1) Namibia; average of 6 electron microprobe analyses supplemented by TGA-DTA for CO_2; corresponds to $(Na_{0.97}Ca_{0.03})_{\Sigma=1.00}(Ce_{0.92}La_{0.80}Nd_{0.11}Pr_{0.04}Sm_{0.01}Ca_{0.09})_{\Sigma=1.97}(CO_3)_2[(CO_3)_{0.71}F_{0.59}]F$.
(2) Mont Saint-Hilaire, Canada; average of 3 electron microprobe analyses supplemented by IR spectroscopy and TGA-DTA; corresponds to $(Na_{0.70}Ca_{0.30})_{\Sigma=1.00}(Ce_{0.90}La_{0.49}Nd_{0.23}Pr_{0.09}Sm_{0.02}Gd_{0.01}Ca_{0.16}Sr_{0.13})_{\Sigma=2.03}(CO_3)_2[F_{1.43}(CO_3)_{0.28}]F$.

Occurrence: A late-stage, post-magmatic to hydrothermal mineral in miarolitic cavities in small alkaline pegmatite veins and lenticular patches within syenite and syenite sodalite xenoliths in phonolite of an alkaline intrusive complex (Mont Saint-Hilaire).

Association: Villiaumite, aegirine, labuntsovite-group minerals, tuperssuatsiaite, natrolite, analcime, manganoneptunite, apophyllite-(KF), fluorite, makatite (Namibia); natrolite, aegirine, albite, manganoneptunite, rhodochrosite, sphalerite, astrophyllite (Saint-Amable); aegirine, albite, a clinoamphibole, a eudialyte-group mineral, microcline, mosandrite, natrolite, gonnardite, fluorapatite (Mont Saint-Hilaire pegmatite); aegirine, "tetranatrolite", polylithionite, fluorite, sodalite, serandite, microcline, catapleiite, pyrite, pyrochlore, pyrrhotite, goethite, an alkali feldspar, an astrophyllite-group mineral (Mont Saint-Hilaire sodalite syenite xenoliths).

Distribution: From the Ariskop and Railroad (Aris phonolite) quarry, central Namibia; and in Quebec, Canada from Mont Saint-Hilaire and the Varennes quarry (Saint-Amable sill), Verchères County.

Name: For the *Aris* phonolite, Namibia, and the dominant rare earth element, *Ce*.

Type Material: Canadian Museum of Nature, Ottawa, Ontario, Canada (CMNMC 86067 and CMNMC 86068).

References: (1) Piilonen, P.C., A.M. McDonald, J.D. Grice, R. Rowe, R.A. Gault, G. Poirier, M.A. Cooper, U. Kolitsch, A.C. Roberts, W. Lechner, and A.G. Palfi (2010) Arisite-(Ce), a new rare-earth fluorcarbonate from the Aris phonolite, Namibia, Mont Saint-Hilaire and the Saint-Amable sill, Quebec, Canada. Can. Mineral., 48, 661-671. (2) (2011) Amer. Mineral., 96, 936-937 (abs. ref. 1).