

Chemical analysis (12 points) was done with a JEOL 773 electron-microprobe (EDS mode, 20 kV, 2 nA, 3 μm beam diameter). The absence of H_2O is dictated by the crystal structure: in a rinkite-type structure with fully occupied cation sites, there is no space to accommodate a hydrogen bond involving OH or H_2O groups (Sokolova, 2006). Analytical results are given in Table 1.

Table 1_EDS. Analytical data for nacareniobsite-(Nd).

Constituent	wt%	Range	SD	Probe Standard
Nb_2O_5	13.73	12.43-14.81	0.98	LiNbO_3
TiO_2	0.93	0.35-1.69	0.56	Titanite
SiO_2	28.47	27.92-28.90	0.41	Diopside
Y_2O_3	2.31	2.10-2.71	0.29	Y_2O_3
La_2O_3	0.80	0.47-1.05	0.25	LaPO_4
Ce_2O_3	5.06	4.80-5.38	0.24	CePO_4
Pr_2O_3	0.99	0.78-1.12	0.18	PrPO_4
Nd_2O_3	6.45	5.91-6.85	0.40	NdPO_4
Sm_2O_3	1.54	1.19-1.83	0.27	SmPO_4
Eu_2O_3	0.15	0.01-0.24	0.09	EuPO_4
Gd_2O_3	0.86	0.65-0.99	0.15	GdPO_4
Tb_2O_3	0.22	0.10-0.25	0.10	TbPO_4
Dy_2O_3	0.32	0.04-0.36	0.15	DyPO_4
Ho_2O_3	0.27	0.03-0.27	0.11	HoPO_4
Er_2O_3	0.13	0.01-0.24	0.11	ErPO_4
Tm_2O_3	0.16	0.01-0.21	0.10	TmPO_4
Yb_2O_3	0.12	0.03-0.21	0.09	YbPO_4
Lu_2O_3	0.18	0.07-0.28	0.07	LuPO_4
SrO	3.30	2.65-3.74	0.28	SrTiO_3
CaO	18.47	18.24-18.95	0.51	Diopside
Na_2O	10.91	10.01-11.71	0.15	Albite
F	6.74	6.53-6.87	0.15	Fluorite
O=F	-2.84			
Total	99.27			

The empirical formula based on 18 (O+F) *apfu* is: $\text{Na}_{2.98}\text{Ca}_{2.79}\text{Sr}_{0.27}\text{Y}_{0.17}$
 $(\text{Nd}_{0.32}\text{Ce}_{0.26}\text{Sm}_{0.07}\text{Pr}_{0.05}\text{La}_{0.04}\text{Gd}_{0.04}\text{Tb}_{0.01}\text{Dy}_{0.01}\text{Tm}_{0.01}\text{Lu}_{0.01}\text{Ho}_{0.01}\text{Eu}_{0.01}\text{Er}_{0.01}\text{Yb}_{0.01})_{\Sigma 0.86}$
 $(\text{Nb}_{0.87}\text{Ti}_{0.10})_{\Sigma 0.97}(\text{Si}_{4.01}\text{O}_{14})\text{O}_{1.00}\text{F}_{3.00}$, $Z = 2$.

The formula based on the assigned site-populations (Table 4) is:

$(\text{Na}_{2.67}\text{Ca}_{0.33})(\text{Ca}_{2.46}\text{Sr}_{0.27}\text{Na}_{0.24})(\text{Ln}_{0.86}\text{Y}_{0.17})(\text{Nb}_{0.87}\text{Ti}_{0.13})(\text{Si}_2\text{O}_7)_2\text{OF}_3$, where $\text{Ln} =$
 $(\text{Nd}_{0.32}\text{Ce}_{0.26}\text{Sm}_{0.07}\text{Pr}_{0.05}\text{La}_{0.04}\text{Gd}_{0.04}\text{Tb}_{0.01}\text{Dy}_{0.01}\text{Tm}_{0.01}\text{Lu}_{0.01}\text{Ho}_{0.01}\text{Eu}_{0.01}\text{Er}_{0.01}\text{Yb}_{0.01})_{\Sigma 0.86}$ and Nd is
the dominant lanthanoid.

Chemical analysis (2 points) was done with a JEOL 773 electron-microprobe: 2 points (WDS mode, 20 kV, 20 nA, 3 μm beam diameter; Fersman Mineralogical Museum); F* - (WDS mode, 15 kV, 20 nA, 10 μm beam diameter).

Table 1 WDS. Analytical data for nacareniobsite-(Nd).

Constituent	wt%	Range	SD	Probe Standard
Nb ₂ O ₅	13.41	12.24-14.36	1.06	NaNbO ₃
TiO ₂	1.32	0.81-1.84	0.52	SrTiO ₃
SiO ₂	29.31	27.75-28.88	0.57	Wollastanite
Y ₂ O ₃	2.71	2.33-3.10	0.39	Y ₂ O ₃
La ₂ O ₃	1.08	0.82-1.34	0.26	LaPO ₄
Ce ₂ O ₃	4.92	4.85-4.99	0.07	CePO ₄
Pr ₂ O ₃	0.97	0.88-1.05	0.08	PrPO ₄
Nd ₂ O ₃	6.12	5.79-6.45	0.33	NdPO ₄
Sm ₂ O ₃	1.52	1.40-1.64	0.12	SmPO ₄
Eu ₂ O ₃	n.d.			EuPO ₄
Gd ₂ O ₃	1.13	0.12-1.15	0.02	GdPO ₄
Tb ₂ O ₃	0.01	0.01-0.02	0.01	TbPO ₄
Dy ₂ O ₃	0.32	0.30-0.33	0.02	DyPO ₄
Ho ₂ O ₃	0.02	0.01-0.03	0.01	HoPO ₄
Er ₂ O ₃	0.01	0.01-0.02	0.01	ErPO ₄
Tm ₂ O ₃	n.d.			TmPO ₄
Yb ₂ O ₃	n.d.			YbPO ₄
Lu ₂ O ₃	n.d.			LuPO ₄
SrO	3.95	3.21-4.59	0.69	SrTiO ₃
CaO	18.04	17.48-18.60	0.56	Wollastanite
Na ₂ O	11.41	11.40-11.41	0.00	Jadeite
F*	6.97	6.79-7.17	0.17	Fluorite
O=F	2.94			
Total	100.29			

n.d. – below detection limit.

The empirical formula based on 18 (O+F) *apfu* is: Na_{3.06}Ca_{2.67}Sr_{0.32}Y_{0.20}(Nd_{0.30}Ce_{0.25}Sm_{0.07}La_{0.06}Pr_{0.05}Gd_{0.05}Dy_{0.01}) Σ 0.79(Nb_{0.84}Ti_{0.14}) Σ 0.98(Si_{4.05}O₁₄)O_{0.95}F_{3.05}, Z = 2.

The formula based on the assigned site-populations (Table 4) is:

Na₃(Ca_{2.65}Sr_{0.32}Na_{0.03})(Ln_{0.79}Y_{0.21})(Nb_{0.84}Ti_{0.16})(Si₂O₇)₂O_{0.95}F_{3.05}, where Ln = (Nd_{0.30}Ce_{0.25}Sm_{0.07}La_{0.06}Pr_{0.05}Gd_{0.05}Dy_{0.01}) Σ 0.79 and Nd is the dominant lanthanoid.