Natroapophyllite $NaCa_4Si_8O_{20}F \cdot 8H_2O$

Crystal Data: Orthorhombic. *Point Group:* $2/m\ 2/m\ 2/m$ or $mm2$. As composite crystals, euhedral to subhedral, to 1 mm, with prismatic {100} and truncated by {111}, striated $\perp$ [001].

Physical Properties: *Cleavage:* Perfect on {001}, poor on {110}. Hardness = 4–5
D(meas.) = 2.50, including contaminants. D(calc.) = 2.30

Optical Properties: Transparent to translucent. *Color:* Colorless to white, brownish yellow to yellowish brown; colorless in thin section. *Streak:* Light gray. *Luster:* Vitreous to pearly.
Optical Class: Biaxial (+). *Dispersion:* $r < v$. $\alpha = 1.536(2)$ $\beta = 1.538(2)$ $\gamma = 1.544(2)$
2V(meas.) = 32(1)°

Cell Data: *Space Group:* $Pnnm$ or $Pnn2$. a = 8.875(4) $b = 8.881(6)$ $c = 15.79(1)$
Z = 2

X-ray Powder Pattern: Sampo mine, Japan.
3.96 (100), 2.98 (63), 2.48 (24), 7.83 (20), 4.54 (19), 7.77 (18), 2.50 (18)

Chemistry:

	(1)
SiO_2	52.79
Al_2O_3	0.00
CaO	25.41
Na_2O	3.05
K_2O	0.33
F	2.27
H_2O	[17.11]
$-O = F_2$	0.96
Total	[100.00]

(1) Sampo mine, Japan; by electron microprobe, H_2O by difference; corresponds to $(Na_{0.90}K_{0.06})_{\Sigma=0.96}Ca_{4.13}Si_8O_{20.07}F_{1.09} \cdot 8.6H_2O$.

Occurrence: In skarns, banded between granite and marble, of a contact metamorphic mineral deposit.

Association: Zeophyllite, cuspidine, apophyllite, calcite, andradite, xonotlite, wollastonite, clinopyroxene, magnetite, quartz, bismuth.

Distribution: At the Sampo mine, 10 km west of Takahashi, Okayama Prefecture, Japan.

Name: For sodium, *natrium*, in the composition, and its relation to other *apophyllite* species.

Type Material: National Science Museum, Tokyo, M21067; Institute of Mining Geology, Akita University, Akita, Japan; National Museum of Natural History, Washington, D.C., USA, 136398.

References: (1) Matsueda, H., Y. Miura, and J. Rucklidge (1981) Natroapophyllite, a new orthorhombic sodium analog of apophyllite: I. Description, occurrence, and nomenclature. Amer. Mineral., 66, 410–415. (2) Miura, Y., T. Kato, J. Rucklidge, and H. Matsueda (1981) Natroapophyllite, a new orthorhombic sodium analog of apophyllite II. Crystal structure. Amer. Mineral., 66, 416–423.