Nefedovite  
Na$_5$Ca$_4$(PO$_4$)$_4$F

Crystal Data: Triclinic, pseudotetragonal.  
Point Group: $\overline{1}$ or 1; pseudo $\overline{4}$.  
As irregular rounded grains, to 1 mm, in aggregates, typically replacing apatite.

Physical Properties: Fracture: Conchoidal.  
Hardness = ~4.5  
D(meas.) = 3.01(1)  
D(calc.) = 3.05

Optical Properties:  
Transparent.  
Color: Colorless.  
Luster: Vitreous.  
Optical Class: Biaxial (+); sensibly uniaxial (+).  
$\alpha = 1.571(2)$  
$\beta = 1.571(2)$  
$\gamma = 1.590(2)$  
$2V$(meas.) = n.d.

Cell Data:  
Space Group: $P\overline{1}$ or $P\overline{1}$.  
$a = 5.401(6)$  
b = 11.647(8)  
c = 16.484(7)  
$\alpha = 134.99(3)^\circ$  
$\beta = 90.04(6)^\circ$  
$\gamma = 89.96(7)^\circ$  
$Z = 2$, or, for the pseudotetragonal cell:  
Space Group: $I\overline{4}$.  
a = 11.644(2)  
c = 5.396(1)  
$Z = 2$

X-ray Powder Pattern: Khibiny massif, Kola Peninsula, Russia.  
2.772 (100), 3.73 (80b), 2.508 (80), 2.290 (80), 2.703 (70), 1.877 (60), 5.83 (40)

Chemistry:  
\[
\begin{array}{ccc}
 & (1) & (2) \\
P_2O_5 & 42.1 & 42.11 \\
CaO & 33.7 & 33.27 \\
Na_2O & 22.7 & 22.99 \\
K_2O & 0.8 & \\
F^- & 2.5 & 2.82 \\
-O=F_2 & 1.0 & 1.19 \\
\hline
\text{Total} & 100.8 & 100.00 \\
\end{array}
\]

(1) Khibiny massif, Kola Peninsula, Russia; by electron microprobe, average of three analyses;  
corresponds to (Na$_{4.90}$K$_{0.11}$)$_{\Sigma=5.01}$Ca$_{4.02}$(P$_{0.99}$O$_4$)$_{4}$F$_{0.88}$.  
(2) Na$_5$Ca$_4$(PO$_4$)$_4$F.

Occurrence: In pegmatitic segregations in nepheline syenite in a differentiated alkalic massif.

Association: Apatite, nacaphite, eudialyte, delhayelite, canasite, djerfisherite, rasvumite,  
orthoclase, alkalic amphibole, titanite.

Distribution: On Mt. Yukspor and from a drillcore in the Kuniok River valley, Khibiny massif,  
Kola Peninsula, Russia.

Name: To honor Dr. Yevgeny I. Nefedov (1910–1976), Russian mineralogist, St. Petersburg,  
Russia, involved in the discovery of a number of Kola minerals.

Type Material:  
Mining Institute, St. Petersburg, 1302/1; A.E. Fersman Mineralogical  
Museum, Academy of Sciences, Moscow, Russia, 82759.

References:  
ref. 1).  
(in Russian).