Calciobetafite $Ca_2(Nb,Ti)_2(O,OH)_7$

Crystal Data: Cubic; may be metamict. *Point Group:* $4/m\ \overline{3}\ 2/m$. As octahedra, to 0.2 mm.

Physical Properties: *Fracture:* [Conchoidal to uneven] (by analogy to betafite). *Tenacity:* [Brittle.] Hardness = [3–5.5] D(meas.) = n.d. D(calc.) = [4.12] May be radioactive.

Optical Properties: Semitransparent. *Color:* Reddish brown to black. *Luster:* [Greasy, waxy to adamantine.]
Optical Class: Isotropic. n = n.d.

Cell Data: *Space Group:* $Fd3m$. a = 10.2978(5) Z = 8

X-ray Powder Pattern: Monte di Procida, Italy.
2.973 (100), 1.820 (53), 1.552 (45), 2.574 (27), 1.181 (16), 1.151 (13), 1.051 (12)

Chemistry:

	(1)	(2)		(1)	(2)
Nb_2O_5	27.5	32.9	Pr_2O_3		0.6
Ta_2O_5		2.4	Nd_2O_3	1.2	1.4
TiO_2	14.3	15.0	FeO	1.9	2.0
ZrO_2	1.1	1.0	CaO	16.0	16.0
ThO_2		4.5	Na_2O	1.7	1.7
UO_2		4.8	F	1.3	
Y_2O_3	0.6	0.6	H_2O	n.d.	n.d.
La_2O_3	0.7	0.7	$-O = F_2$	0.5	
CeO_2	4.0	4.0	Total	69.8	87.6

(1–2) Monte di Procida, Italy; by electron microprobe, the average corresponding to $[(Ca,Na)_{1.52}RE_{0.20}Th_{0.08}U_{0.08}]_{\Sigma=1.88}[(Nb,Ta)_{1.16}Ti_{0.84}(Fe,Mn,Mg,Al)_{0.12}Zr_{0.04}]_{\Sigma=2.16}(O,F)_7$.

Polymorphism & Series: Dimorphous with zirkelite.

Mineral Group: Pyrochlore group, betafite subgroup; $Ca_A > 20\%$; $2Ti_B \geq (Nb + Ta)_B$.

Occurrence: In a subvolcanic rock, locally termed "sanidinite", present in a phreatomagmatic explosion breccia.

Association: Sanidine, plagioclase, polymignite, zirkelite, zirconolite, magnesian hastingsitic amphibole, clinopyroxene, biotite, magnetite, apatite, titanite.

Distribution: From Monte di Procida, Campi Flegrei, near Naples, Campania, Italy. In Canada, at Hybla, Ontario.

Name: For a mineral with the *betafite* structure with high CALCIum content.

Type Material: National Museum of Natural History, Washington, D.C., USA, 150338.

References: (1) Mazzi, F. and R. Munno (1983) Calciobetafite (new mineral of the pyrochlore group) and related minerals from Campi Flegrei, Italy; crystal structures of polymignyte and zirkelite: comparison with pyrochlore and zirconolite. Amer. Mineral., 68, 262–276. (2) Hogarth, D.D. (1977) Classification and nomenclature of the pyrochlore group. Amer. Mineral., 62, 403–410.