

**Crystal Data:** Cubic. *Point Group:*  $4/m\bar{3}2/m$ . As regular to flattened octahedral crystals, to 6 mm.

**Physical Properties:** *Cleavage:* None. *Fracture:* Conchoidal. *Tenacity:* Brittle. Hardness = 5 D(meas.) = 6.49(6) D(calc.) = 6.568

**Optical Properties:** Transparent. *Color:* Green. *Streak:* White. *Luster:* Adamantine. *Optical Class:* Isotropic.  $n = 2.11(2)$

**Cell Data:** *Space Group:*  $Fd\bar{3}m$ .  $a = 10.4451(2)$   $Z = 8$

**X-ray Powder Pattern:** Alto Quixaba pegmatite, Frei Martinho, Paraíba, Brazil. 3.015 (100), 1.846 (59), 1.574 (47), 3.14 (33), 6.023 (31), 2.610 (27), 1.198 (23)

<b>Chemistry:</b>	(1)
Na <sub>2</sub> O	6.39
CaO	6.96
Bi <sub>2</sub> O <sub>3</sub>	6.71
Ta <sub>2</sub> O <sub>5</sub>	76.81
F	3.63
<u>-O = F<sub>2</sub></u>	<u>1.53</u>
Total	98.97

(1) Alto Quixaba pegmatite, Frei Martinho, Paraíba, Brazil; average of 17 electron microprobe analyses, IR spectroscopy confirms absence of H<sub>2</sub>O and OH; corresponding to  $(\text{Na}_{1.10}\text{Ca}_{0.64}\text{Bi}_{0.15})_{\Sigma=1.89}\text{Ta}_{2.00}\text{O}_{5.91}\text{F}_{1.02}$ .

**Mineral Group:** Pyrochlore supergroup, microlite group.

**Occurrence:** In a granitic pegmatite.

**Association:** Perthitic microcline, albite, amblygonite, muscovite, quartz, elbaite, tantalite-(Fe), tantalite-(Mn), beryl.

**Distribution:** From the Alto Quixaba pegmatite, Frei Martinho municipality, Paraíba State, northeastern Brazil. Similar material from the Altai Mounains, Russia and the Borborema pegmatitic province, northeastern Brazil.

**Name:** As a member of the *microlite* group with dominant fluorine (*fluor*) at an anion site and sodium (*natro*) in the *A* structural site.

**Type Material:** Mineralogical Collection of the Bergakademie, Freiberg (77975), and in the Mineralogical Collection, Martin-Luther University, Institute for Geological Science, Halle (010356), Germany.

**References:** (1) Witzke, T., M. Steins, T. Doering, W. Schuckmann, R. Wegner, and H. Pöllmann (2011) Fluornatromicrolite,  $(\text{Na,Ca,Bi})_2\text{Ta}_2\text{O}_6\text{F}$ , a new mineral species from Quixaba, Paraíba, Brazil. *Can. Mineral.*, 49, 1105-1110. (2) (2012) *Amer. Mineral.*, 97, 1263 (abs. ref. 1).