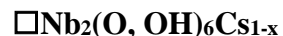


## Cesiokenopyrochlore



**Crystal Data:** Cubic. *Point Group:*  $4/m\bar{3}2/m$ . As rough equant crystals to 0.05 mm overgrowing béhierite and rynersonite.

**Physical Properties:** *Cleavage:* None. *Tenacity:* Brittle. *Fracture:* Uneven. Hardness = ~5 VHN = 567-625, 598 average (100 g load). *D(meas.)* = n.d. *D(calc.)* = 5.984

**Optical Properties:** Translucent. *Color:* Light brown, light gray with strong light-brown internal reflections in reflected light. *Streak:* n.d. *Luster:* Resinous.  
*Optical Class:* Isotropic.  $n(\text{calc.}) = 2.064$  Nonpleochroic.  
R: 14.5 (470), 14.1 (546), 13.9 (589), 13.9 (650)

**Cell Data:** *Space Group:*  $Fd\bar{3}m$ .  $a = 10.444(1)$   $Z = 8$

**X-Ray Diffraction Pattern:** Tetezantsio-Andoabatokely pegmatite field, Betafo, Madagascar. 3.15 (100), 6.03 (37), 3.02 (36), 1.848 (19), 2.012 (17), 1.576 (11), 3.70 (9)

<b>Chemistry:</b>	(1)
Cs <sub>2</sub> O	22.66
Na <sub>2</sub> O	1.74
CaO	0.64
Nb <sub>2</sub> O <sub>5</sub>	20.87
Ta <sub>2</sub> O <sub>5</sub>	21.27
WO <sub>3</sub>	30.67
<u>H<sub>2</sub>O</u>	<u>[0.12]</u>
Total	97.97

(1) Tetezantsio-Andoabatokely pegmatite field, Betafo region, Vankinankaratra, Madagascar; average electron microprobe analysis, H<sub>2</sub>O calculated for charge balance; corresponds to Na<sub>0.29</sub>Ca<sub>0.06</sub>(Nb<sub>0.81</sub>W<sub>0.69</sub>Ta<sub>0.50</sub>)<sub>Σ=2</sub>[O<sub>5.93</sub>(OH)<sub>0.07</sub>]<sub>Σ=6</sub>Cs<sub>0.83</sub> or structural formula [□<sub>0.65</sub>(H<sub>2</sub>O)<sub>0.30</sub>Na<sub>0.29</sub>Ca<sub>0.06</sub>]<sub>Σ=1.00</sub>(Nb<sub>0.81</sub>W<sub>0.69</sub>Ta<sub>0.50</sub>)<sub>Σ=2.00</sub>[O<sub>5.93</sub>(OH)<sub>0.07</sub>]<sub>Σ=6.00</sub>(Cs<sub>0.83</sub>□<sub>0.17</sub>)<sub>Σ=1.00</sub>.

**Mineral Group:** Pyrochlore supergroup, pyrochlore group; with <sup>A</sup>□<sub>2</sub><sup>B</sup>(Nb, W, Ta)<sub>2</sub><sup>X</sup>O<sub>6</sub><sup>Y</sup>Cs.

**Occurrence:** From a rare-element granitic pegmatite formed by natural cation exchange with a hydrothermal solution at a late stage of pegmatite evolution.

**Association:** Elbaite, muscovite, xenotime-(Y), pollucite, zircon, albite, kaolinite, quartz, orthoclase.

**Distribution:** From the Tetezantsio-Andoabatokely pegmatite field, Betafo region, 40 km southwest of Antsirabe, Vankinankaratra, Madagascar.

**Name:** The first prefix, *cesio*, indicates the dominant cation at the *Y* site, the second prefix, *keno*, indicates the dominant vacancy in the *A* site of a member of the *pyrochlore* subgroup.

**Type Material:** A.E. Fersman Mineralogical Museum, R.A.S., Moscow, Russia (95895).

**References:** (1) Agakhanov, A.A., A.V. Kasatkin, S.N. Britvin, O.I. Siidra, L.A. Pautov, I.V. Pekov, and V.Yu. Karpenko (2020) Cesiokenopyrochlore, the first natural niobate with an inverse pyrochlore structure. *Can. Mineral.*, 59, 149-157. (2) (2021) *Amer. Mineral.*, 106, 1187-1188 (abs. ref. 1).