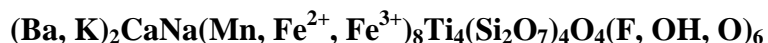


**Surkhobite**

**Crystal Data:** Monoclinic. *Point Group:* 2. As poorly formed platy crystals, to 1 mm, dominated by {001} and as grains, to 2 cm. *Twinning:* Microscopic twins on (001).

**Physical Properties:** *Cleavage:* Perfect {001}. *Fracture:* Uneven. *Tenacity:* Brittle. Hardness = 4.5 VHN = 482 on {001}, 250 perpendicular to {001} (20-30 g load). D(meas.) = 3.84(10) D(calc.) = 3.98

**Optical Properties:** Translucent. *Color:* Brownish red. *Streak:* White. *Luster:* Vitreous. *Optical Class:* Biaxial (-).  $\alpha = 1.790$  (calculated from 2V)  $\beta = 1.858(10)$   $\gamma = 1.888(10)$   $2V = 65(5)^\circ$  *Orientation:*  $X = b$ ;  $Z \wedge a = 34^\circ$ . *Dispersion:*  $r < v$ , strong. *Pleochroism:*  $Y = \text{orange}$ ;  $Z = \text{bright yellow}$ ;  $X = \text{yellow}$ . Absorption:  $Y > Z \geq X$ .

**Cell Data:** *Space Group:* C2.  $a = 10.723(1)$   $b = 13.826(2)$   $c = 20.791(4)$   $\beta = 95.00(1)^\circ$   $Z = 4$

**X-ray Powder Pattern:** Dara-i-Pioz massif, Tajikistan. 3.454 (100), 2.592 (70), 2.074 (40), 10.39 (20), 3.186 (15), 2.862 (15), 1.728 (15)

Chemistry:	(1)
Na <sub>2</sub> O	2.27
K <sub>2</sub> O	1.87
CaO	2.53
SrO	0.26
BaO	11.16
MgO	0.13
MnO	16.32
FeO	13.92
Fe <sub>2</sub> O <sub>3</sub>	2.11
Al <sub>2</sub> O <sub>3</sub>	0.02
SiO <sub>2</sub>	27.17
TiO <sub>2</sub>	16.14
Nb <sub>2</sub> O <sub>5</sub>	2.14
ZrO <sub>2</sub>	0.34
F	2.94
H <sub>2</sub> O	1.17
-O = F <sub>2</sub>	1.24
Total	99.25

(1) Dara-i-Pioz massif, Tajikistan; electron microprobe and Mössbauer analysis, water by Penfield method, corresponding to Na<sub>2.60</sub>K<sub>1.41</sub>Ca<sub>1.60</sub>Sr<sub>0.09</sub>Ba<sub>2.58</sub>(Mn<sub>8.17</sub>Fe<sup>2+</sup><sub>6.88</sub>Fe<sup>3+</sup><sub>0.94</sub>Mg<sub>0.115</sub>Al<sub>0.01</sub>)<sub>Σ=16.115</sub>(Ti<sub>17.17</sub>Nb<sub>0.57</sub>Zr<sub>0.10</sub>)<sub>Σ=7.84</sub>Si<sub>16.06</sub>H<sub>4.61</sub>F<sub>5.49</sub>O<sub>70.51</sub>.

**Occurrence:** In a zoned alkaline syenite pegmatite replacing astrophyllite and bafertisite.

**Association:** Aegirine, microcline, albite, quartz, amphibole, annite, bafertisite, astrophyllite, zircon, fluorite, polyolithionite, stillwellite, sogdianite, tadjikite.

**Distribution:** Dara-i-Pioz massif, central Tajikistan.

**Name:** For the Surkhob river, in the basin of which the first specimens were collected.

**Type Material:** A.E. Fersman Mineralogical Museum, Academy of Sciences, Moscow, Russia.

**References:** (1) Rastsvetaeva, R.K., E.M. Eskova, V. D. Dusmatov, N.V. Chukanov, and F. Schneider (2008) Surkhobite: revalidation and redefinition with the new formula, (Ba,K)<sub>2</sub>CaNa(Mn,Fe<sup>2+</sup>,Fe<sup>3+</sup>)<sub>8</sub>Ti<sub>4</sub>(Si<sub>2</sub>O<sub>7</sub>)<sub>4</sub>O<sub>4</sub>(F,OH,O)<sub>6</sub>. Eur. J. Mineral., 20, 289–295. (2) (2009) Amer. Mineral., 94, 404 (abs. ref. 1). (3) (2004) Amer. Mineral., 89, 469–470.