

Charoite $(\text{K}, \text{Sr}, \text{Ba}, \text{Mn})_{15-16}(\text{Ca}, \text{Na})_{32}[\text{Si}_{70}(\text{O}, \text{OH})_{180}](\text{OH}, \text{F})_4 \cdot n\text{H}_2\text{O}$

Crystal Data: Monoclinic. *Point Group:* 2/m. Fibrous, massive.

Physical Properties: *Cleavage:* Good in three directions. Hardness = n.d. VHN = 412 (50 g load). D(meas.) = 2.54 D(calc.) = [2.77] Yellow-orange cathodoluminescence.

Optical Properties: Semitransparent. *Color:* Shades of deep lilac to violet; colorless in thin section. *Optical Class:* Biaxial (+). $\alpha = 1.550(2)$ $\beta = 1.553(2)$ $\gamma = 1.559(2)$ $2V(\text{meas.}) = 28^\circ - 30^\circ$

Pleochroism: X = rose; Z = colorless, in thick fragments. *Orientation:* X = b, Z \wedge c = 5°.

Cell Data: Space Group: P2₁/m. $a = 31.96(6)$ $b = 19.64(4)$ $c = 7.09(1)$ $\beta = 90.0(1)^\circ$ $Z = 1$

X-ray Powder Pattern: Murun massif, Russia.
3.348 (100), 3.134 (85), 12.5 (70), 2.79 (50), 2.71 (35), 3.90 (30), 2.97 (30)

| Chemistry: | (1) | (2) |
|--------------------------------|--------|--------|
| SiO ₂ | 56.88 | 58.5 |
| Al ₂ O ₃ | | 0.07 |
| Fe ₂ O ₃ | 0.12 | |
| FeO | | 0.01 |
| MnO | | 0.07 |
| CaO | 20.95 | 20.5 |
| SrO | 0.90 | 0.5 |
| BaO | 2.52 | 2.9 |
| Na ₂ O | 3.77 | 1.8 |
| K ₂ O | 10.36 | 8.9 |
| F | 0.92 | 0.7 |
| H ₂ O ⁺ | 4.40 | 4.7 |
| <u>- O = F₂</u> | 0.39 | [0.15] |
| Total | 100.43 | 98.5 |

(1) Murun massif, Russia; corresponds to $(\text{K}_{0.93}\text{Ba}_{0.07}\text{Sr}_{0.03})_{\Sigma=1.03}(\text{Ca}_{1.57}\text{Na}_{0.51})_{\Sigma=2.08}\text{Si}_4\text{O}_{10}[(\text{OH})_{0.58}\text{F}_{0.28}]_{\Sigma=0.86} \cdot 0.72\text{H}_2\text{O}$. (2) Do.; by electron microprobe, H₂O by TGA; corresponds to $(\text{K}_{0.88}\text{Ba}_{0.09}\text{Sr}_{0.02})_{\Sigma=0.99}(\text{Ca}_{1.71}\text{Na}_{0.28})_{\Sigma=1.99}\text{Si}_{4.55}\text{O}_{10}[(\text{OH})_{0.78}\text{F}_{0.18}]_{\Sigma=0.96} \cdot 0.82\text{H}_2\text{O}$.

Occurrence: In potassic feldspar metasomatites at the contact of nepheline and aegirine syenites with limestones.

Association: Canasite, tinaksite.

Distribution: In the Murun massif, between the Chara and Olekma Rivers, southwest of Olekminsk, Yakutia, Russia.

Name: For the *Chara* River, Russia, near which the studied material was discovered.

Type Material: University of Rome, Rome, Italy (24352); A.E. Fersman Mineralogical Museum, Academy of Sciences, Moscow, Russia.

References: (1) Rogova, V.P., Y.G. Rogov, V.A. Drits, and N.N. Kutnetsova (1978) Charoite, a new mineral and a new jewelry stone. *Zap. Vses. Mineral. Obshch.*, 107, 94-100 (in Russian). (2) (1978) Amer. Mineral., 63, 1282 (abs. ref. 1). (3) Kraeff, A., R.P.E. Poorter, and R.D. Schuiling (1980) Additional information on charoite. *Neues Jahrb. Mineral., Monatsh.*, 498-500. (4) Rozhdestvenskaya, I., E. Mugnaioli, M. Czank, W. Depmeier, U. Kolb, A. Reinholdt, and T. Weirich (2010) The structure of charoite, $(\text{K}, \text{Sr}, \text{Ba}, \text{Mn})_{15-16}(\text{Ca}, \text{Na})_{32}[(\text{Si}_{70}(\text{O}, \text{OH})_{180})](\text{OH}, \text{F})_4 \cdot n\text{H}_2\text{O}$, solved by conventional and automated electron diffraction. *Mineral. Mag.*, 74, 159-177. (5) (2010) Amer. Mineral., 95(10), 1600 (abs. ref. 4).