Charoite $(K, Sr, Ba, Mn)_{15\text{-}16}(Ca, Na)_{32}[Si_{70}(O, OH)_{180}](OH, F)_4 \cdot nH_2O$

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(meas.) = 28°-30° *Pleochroism*: *X* = rose; *Z* = colorless, in thick fragments. *Orientation*: $X = b$, $Z \wedge c = 5°$.

Cell Data: Space Group: $P2_1/m$. $a = 31.96(6)$ $b = 19.64(4)$ $c = 7.09(1)$ $\beta = 90.0(1)°$ 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_2O_3		0.07
Fe_2O_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_2O	3.77	1.8
K_2O	10.36	8.9
F	0.92	0.7
H_2O^+	4.40	4.7
$- O = F_2$	0.39	[0.15]
Total	100.43	98.5

(1) Murun massif, Russia; corresponds to $(K_{0.93}Ba_{0.07}Sr_{0.03})_{\Sigma=1.03}(Ca_{1.57}Na_{0.51})_{\Sigma=2.08}Si_4O_{10}[(OH)_{0.58}F_{0.28}]_{\Sigma=0.86} \cdot 0.72H_2O$. (2) Do.; by electron microprobe, H_2O by TGA; corresponds to $(K_{0.88}Ba_{0.09}Sr_{0.02})_{\Sigma=0.99}(Ca_{1.71}Na_{0.28})_{\Sigma=1.99}Si_{4.55}O_{10}[(OH)_{0.78}F_{0.18}]_{\Sigma=0.96} \cdot 0.82H_2O$.

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. Weirch (2010) The structure of charoite, $(K,Sr,Ba,Mn)_{15\text{-}16}(Ca,Na)_{32}[(Si_{70}(O,OH)_{180})](OH,F)_{4.0} \cdot nH_2O$, solved by conventional and automated electron diffraction. Mineral. Mag., 74, 159-177. (5) (2010) Amer. Mineral., 95(10), 1600 (abs. ref. 4).