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© Почетный член *А. П. ХОМЯКОВ*,* д. чл. *Г. Н. НЕЧЕЛЮСТОВ*,**
д. чл. *Р. К. РАСЦВЕТАЕВА****

АКВАЛИТ $(H_3O)_8(Na,K,Sr)_5Ca_6Zr_3Si_{26}O_{66}(OH)_9Cl$ — НОВЫЙ МИНЕРАЛ ГРУППЫ ЭВДИАЛИТА ИЗ ЩЕЛОЧНОГО МАССИВА ИНАГЛИ, САХА-ЯКУТИЯ, РОССИЯ, И ПРОБЛЕМА ОКСОНИЯ В ГИДРАТИРОВАННЫХ ЭВДИАЛИТАХ[1]

A. P. KHOMYAKOV, *G. N. NECHELYUSTOV*, *R. K. RASTSVETAEVA*. AQUALITE, $(H_3O)_8(Na,K,Sr)_5Ca_6Zr_3Si_{26}O_{66}(OH)_9Cl$, A NEW EUDIALYTE-GROUP MINERAL FROM INAGLI ALKALINE MASSIF (SAKHA-YAKUTIA, RUSSIA), AND THE PROBLEM OF OXONIUM IN HYDRATED EUDIALYTES

* *Институт минералогии, геохимии и кристаллохимии редких элементов, 121357, Москва, ул. Вересаева, 15*
** *Всероссийский научно-исследовательский институт минерального сырья, 109017, Москва, Старомонетный пер., 31*
*** *Институт кристаллографии РАН, 117333, Москва, Ленинский пр., 59*

This paper describes a new eudialyte-group mineral from hydrothermally altered agpaitic pegmatites of the Inagli alkaline massif (Sakha-Yakutia, Russia). It associates with natrolite, microcline, eckermannite, aegirine, batisite, innelite, lorenzenite, thorite, and galena. The mineral forms isometric crystals up to 3 cm acros. It is pale pink, transparent, with conchoidal fracture; brittle; no cleavage or parting observed; luster vitreous; streak white. Mohs' hardness 4—5. D(meas.) = 2.58(2) g/cm^3 (volumetric method), D(calc.) = 2.66 g/cm^3. Optically uniaxial, positive, n_o — 1.569(1), n_e — 1.571(1). Pleochroism $N_o < N_e$; N_o — colorless to pale pink, N_e — pink. Its weak fluorescence is dull yellow in ultraviolet light and the mineral is stable in 50 % HCl and HNO_3 at room temperature. Weight loss with annealing at 500 °C is 9.8 %. Trigonal, space group $R3$, a = 14.078(3) Å, c = 31.24(1) Å, V = 5362(2) Å^3, Z = 3. The strongest lines in the powder diffraction pattern are [d, Å (I)(hkl)]: 4.39(100) (2005), 2.987(100) (315), 2.850(79) (404), 10.50(44) (003), 6.63(43) (104), 7.06(42) (110), 3.624(41) (027), 11.43(39) (101). Chemical composition (wt %, electron microprobe, H_2O content by the Penfield method): Na_2O 2.91, K_2O 1.93, CaO 11.14, SrO 1.75, BaO 2.41, FeO 0.56, MnO 0.30, La_2O_3 0.17, Ce_2O_3 0.54, Nd_2O_3 0.36, Al_2O_3 0.34, SiO_2 52.70, ZrO_2 12.33, TiO_2 0.78, Nb_2O_5 0.15, Cl 1.50, H_2O 9.93, $-O=Cl_2$ 0.34; total 99.46. Empirical formula based on $\Sigma(Si,Zr,Ti,Al,Nb) = 29$ is $[(H_3O)_{7.94}Na_{2.74}K_{1.20}Sr_{0.49}Ba_{0.46}Fe_{0.23}Mn_{0.12}]_{\Sigma 13.18}(Ca_{5.79}REE_{0.19})_{\Sigma 5.98}(Zr_{2.92}Ti_{0.08})_{\Sigma 3.0}(Si_{25.57}Ti_{0.21}Al_{0.19}Nb_{0.03})_{\Sigma 26.0}[O_{66.46}(OH)_{5.54}]_{\Sigma 72.0}[(OH)_{2.77}Cl_{1.23}]_{\Sigma 4.0}$. Idealized formula: $(H_3O)_8(Na,K,Sr)_5Ca_6Zr_3Si_{26}O_{66}(OH)_9Cl$. The mineral differs from typical eudialyte by having the extremely low contents of Na and Fe, with more than 50 % Na isomorphically replaced by $(H_3O)^+$ groups. The presence of oxonyum ions is confirmed by IR-spectroscopic and X-ray single crystal structure analyses. The mineral is compared with five other structurally studied high-oxonium analogues from alkaline massif in several different regions. All these minerals are shown to having been formed under relatively low-temperature conditions through ion-exchange transformation of some «proto-eudialytes», with the successor minerals inheriting the main structural and compositional features of the precursor minerals. The name «aqualite» derives from Latin «aqua» in allusion to its specific chemical composition. Type material is deposited at the Fersman Mineralogical Museum, Moscow.