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Meurigite-Na, a new species, and the relationship between phosphofibrite and meurigite

Anthony R. Kampf,[1,*] Paul M. Adams,[2] Uwe Kolitsch,[3] and Ian M. Steele[4]

[1]Mineral Sciences Department, Natural History Museum of Los Angeles County, 900 Exposition Blvd., Los Angeles, California 90007, U.S.A.
[2]126 S. Helberta Avenue, no. 2, Redondo Beach, California 90277, U.S.A.
[3]Institut für Mineralogie und Kristallographie, Geozentrum, Universität Wien, Althanstr. 14, A-1090 Wien, Austria
[4]Department of the Geophysical Sciences, The University of Chicago, 5734 S. Ellis Avenue, Chicago, Illinois 60637, U.S.A.

Abstract

The new mineral meurigite-Na, $[Na(H_2O)_{2.5}][Fe^{3+}_8(PO_4)_6(OH)_7(H_2O)_4]$, is monoclinic with space group $C2/c$ and cell parameters a = 28.835(2), b = 5.1848(4), c = 19.484(1) Å, β = 106.983(6)°, V = 2785.8(2) Å^3, and Z = 4. It is the Na analog of meurigite, which is now named meurigite-K. The type locality of meurigite-Na is the Silver Coin mine, Valmy, Iron Point district, Nevada, where it occurs as radial sprays of cream-colored, flattened fibers (thin laths) to 0.4 mm in length. At the Silver Coin mine, meurigite-Na occurs very late in a paragenetic sequence that includes (in approximate order from early to late) quartz, barite, apatite-(CaF), goethite, rockbridgeite, cacoxenite, alunite, wardite, turquoise/chalcosiderite, leucophosphite, lipscombite/zinclipscombite, kidwellite, strengite/variscite, crandallite/perhamite, and jarosite. Meurigite-Na also occurs at Tom's quarry and Moculta quarry in South Australia, Australia, Lake Boga quarry and probably Rixon's Sandstone quarry in Victoria, Australia, and at an unnamed pegmatite prospect near Linopolis, Minas Gerais, Brazil. The streak is white, the luster is silky, and the Mohs hardness is about 3. The measured density is 2.94(2) g/cm^3 and the calculated density is 2.954 g/cm^3. Optical properties: biaxial (–), α = 1.740(3), β = 1.759(3), γ = 1.763(3), $2V_{meas}$ = 50(10)°; X ≅ c, Z = b. The strongest powder X-ray diffraction lines are [d(*hkl*)*I*]: 13.8(200)20, 9.35(002)100, 4.843(111)20, 3.206($\bar{7}$12)40, 3.107($\bar{7}$13)30, 2.971(513)15, and 2.593(116)15. Meurigite-Na is insoluble in concentrated HCl. Evaluation of powder XRD and chemical-analytical data in light of the structure determination for meurigite-K leads to the conclusion that type phosphofibrite is isostructural with meurigite and represents the alkali-deficient member of a series with meurigite-K.

Keywords: Meurigite-Na, meurigite-K, phosphofibrite, new mineral, crystal chemistry, Silver Coin mine