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Pauloabibite, trigonal $NaNbO_3$, isostructural with ilmenite, from the Jacupiranga carbonatite, Cajati, São Paulo, Brazil

Luiz A.D. Menezes Filho[1,†], Daniel Atencio[2,*], Marcelo B. Andrade[3], Robert T. Downs[4], Mário L.S.C. Chaves[1], Antônio W. Romano[1], Ricardo Scholz[5] and Aba I.C. Persiano[6]

[1]Instituto de Geociências, Universidade Federal de Minas Gerais, Avenida Antônio Carlos, 6627, 31270-901, Belo Horizonte, Minas Gerais, Brazil
[2]Instituto de Geociências, Universidade de São Paulo, Rua do Lago 562, 05508-080, São Paulo, São Paulo, Brazil
[3]Instituto de Física de São Carlos, Universidade de São Paulo, Caixa Postal 369, 13560-970, São Carlos, São Paulo, Brazil
[4]Department of Geosciences, University of Arizona, Tucson, Arizona 85721-0077, U.S.A.
[5]Departamento de Geologia da Escola de Minas da Universidade Federal de Ouro Preto, Campus Morro do Cruzeiro, Ouro Preto, 35400-000, Minas Gerais, Brazil
[6]Departamento de Física do Instituto de Ciências Exatas da Universidade Federal de Minas Gerais, Avenida Antônio Carlos, 6627, 31279-901, Belo Horizonte, Minas Gerais, Brazil

Abstract

Pauloabibite (IMA 2012-090), trigonal $NaNbO_3$, occurs in the Jacupiranga carbonatite, in Cajati County, São Paulo State, Brazil, associated with dolomite, calcite, magnetite, phlogopite, pyrite, pyrrhotite, ancylite-(Ce), tochilinite, fluorapatite, "pyrochlore", vigezzite, and strontianite. Pauloabibite occurs as encrustations of platy crystals, up to 2 mm in size, partially intergrown with an unidentified Ca-Nb-oxide, embedded in dolomite crystals, which in this zone of the mine can reach centimeter sizes. Cleavage is perfect on {001}. Pauloabibite is transparent and displays a sub-adamantine luster; it is pinkish brown and the streak is white. The calculated density is 4.246 g/cm^3. The mineral is uniaxial; $n(\text{mean})_{\text{calc}}$ is 2.078. Chemical composition (n = 17, WDS, wt%) is: Na_2O 16.36, MgO 0.04, CaO 1.36, MnO 0.82, FeO 0.11, SrO 0.02, BaO 0.16, SiO_2 0.03, TiO_2 0.86, Nb_2O_5 78.66, Ta_2O_5 0.34, total 98.76. The empirical formula is $(Na_{0.88}Ca_{0.04}Mn^{2+}_{0.02})_{\Sigma 0.94}(Nb_{0.98}Ti_{0.02})_{\Sigma 1.00}O_3$. X-ray powder-diffraction lines (calculated pattern) [d in Å(I)(hkl)] are: 5.2066(100)(003), 4.4257(82)(101), 3.9730(45)(012), 2.9809(54)(104), 2.3718(88)(2$\bar{1}$3), 1.9865(28)(024), 1.8620(53)(2$\bar{1}$6), and 1.5383(30)(300). It is trigonal, space group: $R\bar{3}$, a = 5.3287(5), c = 15.6197(17) Å, V = 384.10(7) Å^3, Z = 6. The crystal structure was solved (R_1 = 0.0285, wR_2 = 0.0636 for 309 observed reflections). Pauloabibite is isostructural with ilmenite and is polymorphic with isolueshite (cubic) and lueshite (orthorhombic). The name is in honor of Paulo Abib Andery (1922–1976).

Keywords: Pauloabibite, new mineral, carbonatite, ilmenite structure, crystal structure, chemical composition, Jacupiranga mine, Cajati, Brazil