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Matioliite, the Mg-analog of burangaite, from Gentil mine, Mendes Pimentel, Minas Gerais, Brazil, and other occurrences

DANIEL ATENCIO,[1,*] JOSÉ M.V. COUTINHO,[1] YVONNE P. MASCARENHAS,[2] AND JAVIER A. ELLENA[2]

[1]Instituto de Geociências, Universidade de São Paulo, Rua do Lago, 562, 05508-080 São Paulo, SP, Brazil
[2]Instituto de Física de São Carlos, Universidade de São Paulo, Caixa Postal 369, 13560-970 São Carlos, SP, Brazil

ABSTRACT

Matioliite, ideally $NaMgAl_5(PO_4)_4(OH)_6 \cdot 2H_2O$, occurs as a secondary hydrothermal mineral in the Gentil mine granite pegmatite, Mendes Pimentel Co., Minas Gerais, Brazil. Some crystals are zoned to more Fe-rich compositions with an Fe^{2+}:Mg ratio of approximately 1:1, corresponding to an intermediate member of the burangaite-matioliite solid-solution series. Matioliite is intimately associated with fluorapatite, crandallite, and zoned gormanite-souzalite cystals. The mineral forms prismatic to tabular crystals, up to 1 mm long. Matioliite is transparent and displays a vitreous luster; it is blue to colorless with a white streak. It is non-fluorescent. Mohs hardness is about 5. Calculated density is 2.948 g/cm^3. Matioliite is biaxial negative, $\eta_\alpha = 1.597(2)$, $\eta_\beta = 1.627(2)$, $\eta_\gamma = 1.632(1)$ (white light), $2V$ (meas.) = 43(2)°, $2V$ (calc.) = 44°, dispersion $r > v$, orientation $X = \mathbf{b}$, $Z \wedge \mathbf{c} = 6°$. Pleochroism is $Y > X > Z$, X = light blue to colorless, Y = blue, Z = colorless. The empirical formula is $(Na_{0.94}Ca_{0.01})_{\Sigma 0.95}(Mg_{0.88}Fe^{2+}_{0.11}Mn_{0.01})_{\Sigma 1.00}(Al_{4.84}Fe^{3+}_{0.13})_{\Sigma 4.97}(PO_4)_{4.03}(OH)_{5.76} \cdot 2H_2O$. The mineral is monoclinic, space group $C2/c$, a = 25.075(1) Å, b = 5.0470(3) Å, c = 13.4370(7) Å, β = 110.97(3)°, V = 1587.9(4) Å^3, Z = 4. Crystal-structure determination was carried out and showed it is isostructural with burangaite, dufrénite, and natrodufrénite. Both the description and the name were approved by the CNMMN-IMA (Nomenclature Proposal 2005-011). The "magnesium analog of burangaite" described from the Gold Quarry mine, Carlin-trend, Eureka County, Nevada; "burangaite" from Hochgosch, Millstätter See-Rücken, Kärnten, Austria; and "burangaite" described from Córrego Pomarolli, Linópolis, Divino das Laranjeiras, Minas Gerais, Brazil, are probably matioliite.

Keywords: Matioliite, new mineral, crystal structure, burangaite, chemical composition, Gentil mine, Mendes Pimentel, Brazil