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Ferripedrizite, a new monoclinic ^{B}Li amphibole end-member from the Eastern Pedriza Massif, Sierra de Guadarrama, Spain, and a restatement of the nomenclature of Mg-Fe-Mn-Li amphiboles

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ABSTRACT

Ferripedrizite, ideally $^{A}Na^{B}Li_2{}^{C}(Fe^{3+}_2Mg_2Li)^{T}Si_8O_{22}{}^{X}(OH)_2$, is a new amphibole end-member found in episyenites formed after cordierite-bearing porphyritic granites in the Eastern Pedriza Massif (Central System, Spain). It contains the maximum amount of Li that can be incorporated in the amphibole structure. The name was approved by the IMA-CNMMN together with restriction of the use of the prefix sodic in the pedrizite series to compositions with $^{B}Na > 0.5$ apfu; its use for compositions with $Na_{tot} > 0.5$ apfu has been maintained in the rest of the Mg-Fe-Mn-Li group. Complete solid solution between ferripedrizite and leakeite [ideally, $^{A}Na^{B}Na_2{}^{C}(Fe^{3+}_2Mg_2Li)^{T}Si_8O_{22}{}^{X}(OH)_2$] has been found in the Pedriza Massif. According to the present nomenclature rules, this join bridges three different amphibole groups. Samples with $^{B}(Mg + Fe + Mn + Li) \geq 1.0$ apfu and $0. 0 \leq {}^{B}Na \leq 0.50$ apfu belong to the Mg-Fe-Mn-Li group and are termed ferripedrizite; samples with $^{B}(Mg + Fe + Mn + Li) \geq 1.0$ apfu and $0.50 < {}^{B}Na \leq 0.99$ apfu belong to the Mg-Fe-Mn-Li group and are called sodic-ferripedrizite; samples with $^{B}(Mg + Fe + Mn + Li) < 1.0$ apfu and $^{B}Na \geq 1.50$ apfu belong to the sodic group and are named leakeite; samples with $^{B}(Mg + Fe + Mn + Li) < 1.0$ apfu and $1.0 \leq {}^{B}Na < 1.50$ apfu belong to the sodic-calcic group (albeit Ca is negligible) and deserve a new root name.

The ferripedrizite sample from Pedriza is black, vitreous, translucent, non-fluorescent, and brittle, and has gray streak, H = 6, uneven fracture, perfect {110} cleavage, $D_{meas} = 3.15$, $D_{calc} = 3.19$ g/cm^3. It is strongly pleochroic, X = yellow green, Y = green blue, Z = bluish green ($Y = Z >> X$), $Z = b$, $Y \wedge c = 15(6)°$, $X \wedge a = 3°$. It is biaxial positive: $\alpha = 1.695(1)$, $\beta = 1.700(2)$, and $\gamma = 1.702(1)$; $2V_Z = 125(17)°$, dispersion $r > v$. It is monoclinic, space group $C2/m$, $a = 9.501(1)$, $b = 17.866(2)$, $c = 5.292(1)$ Å, $\beta = 102.17(2)°$, $V = 878.1(2)$ Å^3. The ten strongest lines in the X-ray powder-diffraction pattern [d in Å,(I),(hkl)] are: 8.251(3)(110), 4.466(2)(040), 3.411(2)(131), 3.050(10)(310), 2.747(3)(330), 2.711(4)(151), 2.495(2)($\bar{2}$02), 2.161(2)(261), 1.642(4)(461), 1.394(3)($\bar{6}$61). Structure refinement and electron- and ion-microprobe analysis of a crystal with composition $^{A}(K_{0.04}Na_{0.52})^{B}(Na_{0.25}Ca_{0.05}Li_{1.70})^{C}(Li_{0.64}Fe^{3+}_{1.64}Mg_{1.49}Fe^{2+}_{0.85}Al_{0.21}Ti_{0.09}Mn_{0.07}Zn_{0.01})\ {}^{T}Si_8O_{22}\ {}^{X}(OH_{1.31}F_{0.69})$ are provided, together with some discussion on cation ordering.