

## Ferri-clinoholmquistite, $\text{Li}_2(\text{Fe}^{2+}, \text{Mg})_3\text{Fe}_2^+\text{Si}_8\text{O}_{22}(\text{OH})_2$ , a new $^{\text{B}}\text{Li}$ clinoamphibole from the Pedriza Massif, Sierra de Guadarrama, Spanish Central System

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### ABSTRACT

Ferri-clinoholmquistite is a new amphibole species from episyenites in the East Pedriza Massif (Central System, Spain), where it is associated to albite, augite-aegirine, titanite, andradite, magnetite, and apatite. It is black, vitreous, translucent, non-fluorescent, and brittle. It shows gray streak, H(Mohs) = 6, splintery fracture, perfect {110} cleavage, (001) parting,  $D_{\text{meas}} = 3.19$ , and  $D_{\text{cal}} = 3.25$ . Crystals are prismatic, elongated on [001]. In plane-polarized light, it is strongly pleochroic:  $X =$  yellow green,  $Y =$  indigo blue,  $Z =$  green blue, with absorption  $X < Y \leq Z$ ;  $Z = b$ ,  $Y - c = 10(2)^\circ$ ,  $X - a \sim -2^\circ$  (in  $\beta$  obtuse). Ferri-clinoholmquistite is biaxial positive,  $\alpha = 1.699(2)$ ,  $\beta = 1.703(2)$ ,  $\gamma = 1.708(2)$ ,  $2V_z(\text{meas}) = 72(7)$ ,  $2V_z(\text{calc}) = 84(6)$ ,  $r < v$ . It is monoclinic, space group  $C2/m$ ,  $a = 9.472(4)$ ,  $b = 17.844(6)$ ,  $c = 5.276(6)$  Å,  $\beta = 101.97(9)^\circ$ ,  $V = 872(1)$  Å<sup>3</sup>,  $Z = 2$ . X-ray powder-diffraction pattern data were determined. Analysis by a combination of electron microprobe and flame photometry gives the following formula, calculated assuming  $\text{OH} + \text{F} = 2$  and T sites fully occupied by Si:  $^{\text{A}}(\text{Na}_{0.43} \text{K}_{0.03})^{\text{B}}(\text{Li}_{1.66} \text{Na}_{0.30} \text{Ca}_{0.04})^{\text{C}}(\text{Fe}_{1.54}^{\text{Fe}_{1.35}^{2+}} \text{Mg}_{1.21} \text{Li}_{0.49} \text{Al}_{0.20} \text{Ti}_{0.12}^{4+} \text{Mn}_{0.07}^{2+} \text{Zn}_{0.02})^{\text{T}}(\text{Si}_8)\text{O}_{22}(\text{OH}_{1.58} \text{F}_{0.42})$ . From crystallographic refinements the M4 site is split, implying ordering of Li and Na, and within the A cavity, Na occupies the Am position.