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Eckermannite revised: The new holotype from the Jade Mine Tract, Myanmar—crystal structure, mineral data, and hints on the reasons for the rarity of eckermannite

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Abstract

Following the characterization of the new amphibole species fluoro-leakeite, ideally $^{A}Na\ ^{B}Na_2\ ^{C}(Mg_2Al_2Li)\ ^{T}Si_8\ O_{22}\ ^{W}F_2$, at Norra Kärr (Sweden), so far considered the type locality of eckermannite, re-examination of the holotype material of eckermannite deposited at the Museum of Natural History in London (BM 1949.151) and of the original sample analyzed by Törnebohm (1906) confirmed that they both are actually fluoro-leakeite. A survey of literature data showed that the only analysis reported for eckermannite is that of sample AMNH 108401 from the Jade Mine Tract, Myanmar. Complete characterization of that sample has led to the approval of a new holotype for eckermannite (IMA-CNMNC 2013-136), ideally $^{A}Na\ ^{B}Na_2\ ^{C}(Mg_4Al)\ ^{T}Si_8\ O_{22}\ ^{W}(OH)_2$, which is described in this work.

Holotype eckermannite from Myanmar has the empirical unit formula $^{A}(Na_{0.87}K_{0.06})_{\Sigma=0.93}\ ^{B}(Na_{1.89}Ca_{0.11})_{\Sigma=2.00}\ ^{C}(Mg_{3.87}Fe^{2+}_{0.09}Mn_{0.01}Fe^{3+}_{0.38}Al_{0.62})_{\Sigma=4.97}\ ^{T}Si_{8.00}\ O_{22}\ ^{W}(F_{0.03}OH_{1.97})_{\Sigma=2.00}$. It is monoclinic, $C2/m$, with $a = 9.8087(7)$, $b = 17.8448(13)$, $c = 5.2905(4)$ Å, $\beta = 103.660(1)$, $V = 899.8(1)$ Å^3; $Z = 2$, $D_{calc} = 3.02$ g/cm^3. Optics: biaxial (–); $\alpha = 1.605$, $\beta = 1.630$, $\gamma = 1.634$ all ±0.002 ($\lambda = 590$ nm). The 10 strongest reflections in the X-ray powder pattern [d values (in Å), I, (hkl)] are: 2.702, 100, [($\bar{3}$31) (151)]; 3.395, 59, (131); 3.128, 56, (310); 2.525, 56, ($\bar{2}$02); 8.407, 42, (110); 2.574, 36, [(061) (002)]; 3.257, 34, (240); 2.161, 33, (261); 2.966, 33, (060); 4.460, 30, (040).

The reason for the rarity of eckermannite compositions are examined and discussed based on considerations on the short-range order of A cations and W anions.

Keywords: Eckermannite, new holotype, amphibole, chemical analysis, crystal structure, Myanmar