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FLUOROMAGNESIOHASTINGSITE: A NEW MEMBER OF THE AMPHIBOLE-GROUP FROM DEALUL UROI, APUSENI MOUNTAINS, ROMANIA

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Fluoromagnesiohastingsite occurs in small cavities of a xenolith in the trachyandesite of the Uroi-hill, 10 km east of Deva, Hunedoara district, Romania. The xenolith consists of augite, Ti-rich hematite, fluorphlogopite, fluorapatite, plagioclase and enstatite. The fluoromagnesiohastingsite crystals are often in close association with green augite. Fluoromagnesiohastingsite is monoclinic and forms idiomorphic, longprismatic crystals up to 3 mm. It has the characteristic perfect cleavage {110} of monoclinic amphiboles, intersecting at ~56°. The colour and the streak of the crystals are reddish-brown and the luster is vitreous.
Fluoromagnesiohastingsite crystals were analyzed with a Jeol electron microprobe, Jeol JSM-6310, equipped with ED- and WD- spectrometers (analytical conditions: 15kV, 5nA, minerals have been used as standards). The calculation of the empirical formula indicates that the complete iron is ferric. Electron microscope analyses of fluoromagnesiohastingsite show up to 2.12 apfu, far in excess of the usual maximum value of 2.0 apfu observered in amphibole-group minerals. This indicates that Ca occupy also the A position. The empirical formula of Fluoromagnesiohastingsite is (average of 15 analyses):
$(K_{0.22}\,Na_{0.58}\,Ca_{0.18})_{0.98}\,(Ca_{1.9}\,Mg_{0.1})_{2.0}\,(Mg_{4.13}\,Fe^{3+}_{0.65}\,Al_{0.09}\,Ti_{0.13})_{5.00}\,(Si_{5.86}\,Al_{2.24})_{8.0}\,O_{22}\,(F)_{2.04.}$
The crystal structure of fluoromagnesiohastingsite, a = 9.858(2), b = 17.975(4), c = 5.297(1) Å, ß = 105.45(3)º, V = 904.8 $Å^3$, C2/m, Z = 2, has been refined to an R index of 5.9% using 957 observed intensities measured with MoKα X-radiation (Bruker AXS SMART APEX). The refinement of the site occupancies and taking into account the calculated interatomic distances, the following site populations resulted (apfu): T1: 2.21 Si + 1.79 Al, (T1-O = 1.676 Å), T2: 3.74 Si + 0.26 Al, (T2-O = 1.640 Å), M1: 1.86 Mg + 0.14 Ti (M1-O = 2.063 Å), M2: 1.40 Mg + 0.60 Fe^{3+} (M2-O = 2.051 Å), M3: 0.98 Mg + 0.02 Fe^{3+} (M3-O = 2.058 Å), M4: 2.00 Ca (M4-O = 2.483 Å). Na, Ca and K are disordered around the A(2/m)-site and obtained by electron density at A(2): 0.48 Na and 0.18 Ca and A(m): 0.27 K. There is a significant order of Al at T1 and K at A(m) and the O3 site is fully occupied by F.
The formula from structure refinement is:
$(K_{0.27}\,Na_{0.48}Ca_{0,18})_{0.93}\,Ca_{2.00}\,(Mg_{4.24}\,Fe^{3+}_{0.62}\,Ti_{0.14})_{5.00}\,(Si_{5.95}\,Al_{2.05})_{8.00}\,O_{22}\,F_{2.00}$.
The calculated density is 3,24 g/cm^3.

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