

## THE DISCOVERY OF A NEW IRON-DOMINANT ALLANITE AND ITS CRYSTALLOCHEMICAL SIGNIFICANCE FOR THE EPIDOTE GROUP.

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Two types of octahedral chains, which involve 3 nonequivalent sites, are the basic building blocks of the epidote group structure: (1) a branched chain composed of the large and distorted M3 and M1 octahedra and (2) a single chain formed by the smallest and the most symmetric octahedron, M2. It is considered that M2 sites can be occupied only by Al<sup>3+</sup> ions and never by Fe. After reviewing more than 300 published allanite analyses we found two analyses of allanite from India and Siberia that contained 57 and 60 at.% of the end member CaCeFe<sub>2</sub>+Fe<sub>3</sub>+2Si<sub>3</sub>O<sub>12</sub>(OH), where Fe<sup>3+</sup> occupy the M2 site. Unfortunately these analyzed samples are not available for study. A new occurrence of low-Al (2-8 wt.% Al<sub>2</sub>O<sub>3</sub>) allanite-(Ce) was found by us in alkaline granite pegmatites of Khaldzan Buragtag massif, W.Mongolia. It occurs with zircon, b<sup>+</sup>-fergusonite-(Y), kainosite-(Y), hingganite-(Ce), yttrian ilvaite, allanite-(Nd) and replaces REE-bearing eudialyte. The composition of the most Fe-rich allanite-(Ce) from Mongolia is (Ca<sub>1.0</sub>REE<sub>0.9</sub>Mn<sub>0.1</sub>)<sub>2</sub>(Fe<sub>3</sub>+1.7Fe+20.8Al<sub>0.2</sub>Ti<sub>0.2</sub>Mn<sub>0.1</sub>)<sub>3</sub>(Si<sub>2.8</sub>Al<sub>0.2</sub>)<sub>3</sub>O<sub>12</sub>(OH). A gradual transition to less Fe-rich allanite-(Ce) is observed. Thus, mongolian mineral contains up to 80 at.% of the proposed end member. The presence of nearly 2 Fe<sup>3+</sup> pfu implies that Fe<sup>3+</sup> occupies the M2 site, which other investigators had considered impossible. The uncommon composition of the mineral is responsible for a significant increase of density and refractive indices. We suggest that such high ferric allanites can form by replacement of pre-existing Al-poor REE minerals under oxidizing conditions. For example, the Siberian allanite mentioned above replaced Al-free britholite-(Ce). It would be logical to name allanites with predominance of Fe<sup>3+</sup> in M2 sites ferriallanites. A useful compositional diagram for epidote-group minerals is proposed.