

## **Geochemistry of pyrochlore minerals from the Motzfeldt Center, South Greenland: The mineralogy of a syenite-hosted Ta, Nb deposit**

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### **ABSTRACT**

Pyrochlore minerals are common accessory phases in the syenite and nepheline syenite rocks of the Motzfeldt alkaline center, Gardar Province, South Greenland, and are of important economic interest due to their exceptional ability to host various high field strength elements. In this study pyrochlore from two distinct intrusive units within the Motzfeldt Center have been studied. The largely homogeneous syenite and nepheline syenite rocks of the Flinks Dal formation host oscillatory and sector-zoned pyrochlore, which have experienced minor alteration in the presence of high-temperature, dominantly juvenile magmatic fluids. Alteration is characterized by variable decrease in the Na, Ca, and F contents and addition of Sr and K, accompanied by introduction of *A* and *Y* site vacancies. Pyrochlore from the more heterogeneous and intensely altered syenite rocks of the Motzfeldt Sø Formation are pervasively altered through interaction with lower temperature evolved hydrothermal fluids. During this phase of alteration cations are preferentially leached from the *A* and *Y* sites, accompanied by progressively increasing hydration. In both formations the proportion of *B*-site cations remains unaltered regardless of the degree of alteration. The alteration encoded in the pyrochlores of the Motzfeldt Center records the different hydrothermal conditions the two formations experienced during the subsolidus, showing how evolution of fluids within one intrusive unit can vary both spatially and temporally.

**Keywords:** Gardar province, alkaline rocks, high field strength elements, tantalum, hydrothermal alteration