CARBONATE-RICH TOURMALINITES FROM NEOPROTEROZOIC META-EVAPORITES OF CENTRAL NAMIBIA

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Carbonate-rich tourmalinites from the Neoproterozoic Duruchaus Formation in the Gurumanas area of central Namibia show evidence for partial fluidization and mobilization of carbonate minerals related to south-vergent emplacement of the Naukluft Nappe Complex. The Duruchaus Formation is considered to be a playa-lake evaporite sequence. The mineral assemblage of the tourmalinites includes tourmaline, quartz, albite (An0-1), dolomite \([\text{Mg}/(\text{Mg+Fe+Mn}) = 0.87-0.99]\), calcite, and biotite \([\text{Mg}/(\text{Mg+Fe}) = 0.75]\). Optical cathodoluminescence (CL) imaging of the carbonate minerals and quartz reveals a complex growth history in open space during brecciation, which was associated with a compositionally variable and dynamic fluid. Preliminary geothermometry using Ti concentrations in biotite (Henry, 2005) suggests a maximum temperature of metamorphism for this tourmalinite of \(~600^\circ\text{C}\). Electron microprobe analyses of the tourmalines reflect the bulk composition of the meta-evaporite and display complex chemical zoning. All of the tourmalines fall in the alkali subgroup \([\text{Na}/(\text{Na+Ca+X-vacancy}) = 0.67-0.86]\) and are classified as dravite to “oxy-dravite” with most showing a range of \([\text{Mg}/(\text{Mg+Fe}) = 0.64-0.68]\). There is a trend toward the composition of povondraite \([\text{NaFe}^{3+}_3(\text{Fe}^{3+}_4\text{Mg}_2)(\text{BO}_3)_{2/3}\text{Si}_6\text{O}_{18}(\text{OH})_3\text{O}]\) with the significant substitution primarily related to a homovalent \(\text{Fe}^{3+}\)-\(\text{Al}^{3+}\) exchange. Some minor substitutions exist between \((\text{R+OH})\) and \((\text{Al+O}_2^-)\), \text{Al}, and \((\text{Na+R})\) where \text{R} represents \((\text{Mg+Fe})\). Combined with previously published boron isotope \((\delta^{11}\text{B})\) values of -4.2 and -8.1 ‰ (Palmer and Slack, 1989), it is suggested that the abundant B in the carbonate-rich tourmalinites originated from B-rich fluids associated with the non-marine evaporites, which were mobilized during diageneisis and possibly also during later carbonate remobilization related to emplacement of hot nappes of the Naukluft Nappe Complex.

General Information for this Meeting

Session No. 118—Booth # 113
Petrologic Mineralogy—The Study of Minerals in Context (Posters): In Honor of Charles V. Guidotti
Pennsylvania Convention Center: Exhibit Hall C
1:30 PM-5:30 PM, Monday, 23 October 2006