Paper Number: 1427

Preliminary study of oxygen isotopes in tourmaline, quartz and muscovite from three granitic pegmatites of the Borborema Pegmatite Province, northeastern Brazil

Soares, D.R[1], Sial, A.N[2]., Ferreira, V.P[2].

[1] Instituto Federal de Educação, Ciência e Tecnologia da Paraíba/Núcleo de Estudos de Pegmatitos (N-PEG)
[2] Universidade Federal de Pernambuco/Dept. de Geologia/LABISE

The Borborema Pegmatite Province, Northeastern Brazil, occurs in the States of Rio Grande do Norte and Paraíba and encompasses the eastern–southeastern portions of the Seridó Belt. In this work, we focus on the behavior of oxygen isotopes in tourmaline, quartz and muscovite in two pegmatites from this province (Boqueirão and Capoeira, and Alto Serra Branca), sampled along sections across different pegmatite zones. These pegmatites are classified as rare elements, LCT family (enriched in Li, Cs and Ta), and are Ta-Nb, Sn, Bi, industrial mineral and gem producers and are hosted by metaconglomerates (Boqueirão and Capoeira) and biotite-schist (Alto Serra Branca). Oxygen-isotope ratios for 1-2 mg mineral separates were measured by CO_2-laser fluorination at the Stable Isotope Laboratory (LABISE), Departament of Geology, Federal University of Pernambuco, Recife, Brazil. Equilibrium temperatures have been estimated from quartz-tourmaline and quartz-muscovite pairs. Oxygen isotope values for tourmaline, quartz and muscovite lie, respectively, within the 9.29–11.40, 11.18 –14.20 and 10.47–10.69 ‰. Equilibrium temperatures for the quartz-tourmaline pair (Kotzer et al.,1993, Zheng ,1993 and Jiang, 1998), and for the quartz-muscovite pair (Zheng , 1993; Eslinger et al., 1979) range from 299 to 519 ^{0}C in the Boqueirão pegmatite, from 322 to 633 ^{0}C, in the Alto Serra Branca pegmatite and 618 to 678 ^{0}C in the Capoeira pegmatite (only border zone, using quartz-tourmaline pair), typical temperature ranges for pegmatitic crystallization, showing a temperature decrease from the outermost areas to the cores of the pegmatite bodies. Quartz oxygen isotope values decrease from the border to the cores of the pegmatites, whereas tourmaline displays a well-defined pattern. It is not possible to assess the muscovite behavior due to limited number of data. The $\Delta_{Qz\text{-}Tur}$ values increased along the sequence of crystallization, resulting in a decrease in the equilibrium temperature. Values determined here are similar to those encountered by Beurlen et al. (2001) who found temperature ranges from 580 to 400^{0}C between the intermediate and core zones of these pegmatites.

References:

Beurlen H et al. (2001) Chemical Geology 173: 107–123
Eslinger E Vet al. (1979) SEPM, Special Publication 26: 113–124
Jiang S-Y (1998) Journal of Czech Geological Society 43: 75–90
Kotzer T G et al. (1993) Geochimica et Cosmochimica Acta 57: 3421–3426
Zheng Y (1993) Earth and Planetary Science Letters 120:247–263