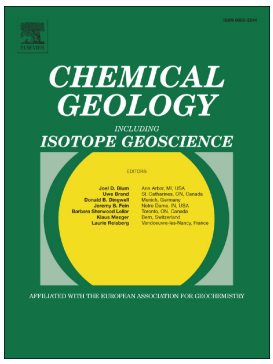

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Fractionation of the isotopes of boron between granitic melt and aqueous solution at 700°C and 800°C (200 MPa)

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Abstract

The fractionation of boron's isotopes, ^{10}B and ^{11}B, between granitic melt (M) and aqueous solution (V), represented as $\Delta^{11}B_{M\text{-}V}$, was investigated between 700°C and 800°C at 200 MPa_{H2O}. One series of experiments used the Macusani obsidian (MAC) to reassess the $\Delta^{11}B_{M\text{-}V}$ values reported by Hervig et al. (2002). Another series of experiments employed a synthetic glass (HG) made to the composition of the hydrous haplogranite minimum ($Ab_{36}Or_{29}Qtz_{35}$) at 200 MPa_{H2O}. Boron was added as boric acid (NIST SRM 951a) to two aliquots of HG glass to bring the concentration of B_2O_3 in each to ~ 2.5 ('Low B') and ~ 5 wt% B_2O_3 ('High B'). Thus, values of $\Delta^{11}B_{M\text{-}V}$ were examined as a function of B_2O_3 and temperature.

Results from the current study show significant fractionation of boron's isotopes between granitic melt and aqueous solution at these high temperatures. Values of $\Delta^{11}B_{M\text{-}V}$ for 'Low B' and 'High B' glasses range from -10.9 (±1.3‰) to -6.1 (±1.7‰) at 800°C and -7.8 (±1.5‰) to -