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Partitioning of Sr, Ba, Rb, Y, and LREE between alkali feldspar and peraluminous silicic magma

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ABSTRACT

Samples from well-known rhyolitic systems in the western USA were analyzed to determine trace-element partition coefficients between sanidine and coexisting melt. Both D_{Sr} and D_{Eu} correlate positively with An concentration in sanidine. Barium, not surprisingly, shows more correlation with Or in sanidine. All three show negative correlations with whole-rock Al_2O_3. Partition coefficients for REE show a decreasing trend with strong positive D_{Eu}. D_{LREE} correlate negatively with the whole-rock Al_2O_3. In peraluminous rocks, Al_2O_3 in magma seems to exert a major influence on partition coefficients of trace elements. With increasing Al_2O_3 concentration, the melt composition becomes increasingly similar to that of feldspar. Incompatible trace elements (Rb, Y, Nb, and Zr) in sanidine show positive trends whereas compatible trace elements (Sr, Eu, and Ba) show negative correlations when plotted against whole-rock Al_2O_3. LREEs, which are expected to substitute for Ca in the sanidine structure, behave like Sr and Eu. Because trace-element partitioning is influenced by both crystal and magma compositions, multiple regression analysis has been used to predict trace-element partition coefficients. The equations will assist workers in the selection of partition coefficients used in petrogenetic models of silicic systems.