

Partition behavior of platinum-group elements during the segregation of arsenide melts from sulfide magma

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ABSTRACT

Evidence of immiscibility between arsenide and sulfide melts has been observed both in experimental studies and natural samples from several localities worldwide (e.g., Ronda, Spain; Beni Bousera, Morocco; Dundonald Beach South, Canada). Platinum-group elements (PGE) have shown to have a strong affinity for arsenide melts, but little is known about their partitioning behavior between arsenide and sulfide melts. In this study, we experimentally determine the partition coefficients of PGE (Pt, Pd, Ir, Ru, and Os) between both types of melt in As-saturated sulfide systems doped with trace amounts of PGE. Results show that all PGE display a strong preference to the arsenide melt with $D_{\text{PGE}}^{\text{As/sulf melts}}$ ranging from 20 to 2700, with Ir and Pt showing a marked preference for arsenide melts. These partition coefficients values are similar to estimates made from natural samples and demonstrate that the separation of arsenide melts from sulfide magmas can be an efficient mechanism to scavenge PGE from magmas and to fractionate Os, Ru, and Pd from Pt and Ir.

Keywords: PGE, arsenide melt, sulfide melt, liquid immiscibility, LA-ICP-MS, partition coefficients