

Os solubility in silicate melts: New efforts and results

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ABSTRACT

New experimental results are reported on the partitioning of Os between Ni₉₄Os₆ (at) alloys and silicate melt at 1400 °C at one atmosphere total pressure and oxygen fugacities ranging from 10⁻⁶ to 10⁻⁸ atm. Specially designed experiments allowed us to avoid nugget formation, which was responsible for the anomalously high Os solubilities reported by Borisov and Palme (1998). Experimental glasses were analyzed by instrumental neutron activation analysis and by isotope dilution analysis. Results reveal a strong dependence of Os solubility on f_{O_2} , with Os contents decreasing from about 100 ppb to about 5 ppb as f_{O_2} decreases. The slope of $\log(\text{Os solubility})$ vs. $\log f_{O_2}$ implies that Os³⁺ is the dominant Os valence state in silicate melts.

The relative geochemical behavior of Os and Pt is also compared. Results suggest that Pt is more siderophile, and may also be more chalcophile than Os under the conditions considered.