

THE INFLUENCE OF SILICATE MELT COMPOSITION ON DISTRIBUTION OF SIDEROPHILE ELEMENTS AMONG METAL AND SILICATE LIQUIDS.

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Liquid metal - liquid silicate partitioning of Fe, Ni, Co, P, Ge, W and Mo among a carbon-saturated metal and a variety of silicate melts (magnesian -tholeiitic - siliceous - aluminous – aluminosiliceous basalts) depends modestly to strongly upon silicate melt structure and composition. Low valency siderophiles, Fe, Ni and Co show a modest influence of silicate melt composition on partitioning. Germanium shows a moderate but consistent preference for the depolymerized magnesian melt. High valency siderophiles, P, Mo, and W show more than an order of magnitude decrease in metalsilicate partition coefficients as the silicate melt becomes more depolymerized. Detailed inspection of our and other published W data show that polymerization state, temperature and pressure are more important controls on W partitioning than oxidation state. For this to be true for a high and variable valence element implies a secondary role in general for oxidation state even though some role must be present. Equilibrium core segregation through a magma ocean of 'ultrabasic' composition could provide a resolution to the 'excess' abundances of Ge, P, W and Mo in the mantle, but the mantle composition alone cannot explain the excess abundances of nickel and cobalt in chondritic proportions.

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