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The abundances of siderophile elements in the Earth's mantle are the result of core formation in the early Earth. Many variables are involved in the prediction of metal/silicate siderophile partition coefficients during core segregation: pressure, temperature, oxygen fugacity, silicate and metal compositions. Despite publications of numerous results of metal-silicate experiments, the experimental database and predictive expressions for elements partitioning are hampered by a lack of systematic study to separate and evaluate the effects of each variable. Only a relatively complete experimental database that describes Ni and Co partitioning now exists but is not sufficient to unambiguously decide between the most popular model for core formation with a single stage core-mantle equilibration at the bottom of a deep magma ocean (e.g. Li and Agee, 2001) and more recent alternative models (e.g. Wade and Wood, 2005; Rubie et al., 2007). In this experimental work, systematic study of metal silicate partitioning is presented for elements normally regarded as moderately siderophile (Mo, As, Ge, W, P, Ni, Co), slightly siderophile (Zn, Ga, Mn, V, Cr) and refractory lithophile (Nb, Ta). Using a new piston-cylinder design assembly allows us to present a suite of isobaric partitioning experiments at 3 GPa within a temperature range from 1600 to 2600 ºC and over a range of relative oxygen fugacity from IW-1.5 to IW-3.5. Silicate melts range from basaltic to peridotite in composition. The individual effect of pressure is also investigated through a combination of piston cylinder and multi anvil isothermal experiments from 0.5 to 18 GPa at 1900 ºC. Absolute measurements of partitioning coefficients combining EMP and LA-ICPMS analytical methods are provided. New results are obtained for elements whose partitioning behavior is usually poorly constrained and not integrated into any accretion or core formation models. We find notably that Ge, As, Mo become less siderophile with increasing temperature. In contrast Zn, Nb and Ta become more siderophile while Ga, W and P show negligible dependence with increasing temperature. Moreover, As, Mo, W, Ga and Nb become less siderophile with increasing pressure while a small influence of pressure is observed for Ta, Ge and Zn. At 3 GPa, regressions of the partitioning data show a 5+ valence state for As, Mo, W and Ta, 3+ for Ga, and 2+ for Ge and Zn. Finally regressions show that highly charged cations (Nb, P, W, Mo and As) are, as expected, the most sensitive to variations in silicate melt composition with the exception of Ta that shows a surprisingly small dependence. Generally, models of partitioning behaviors during core segregation are obtained for each element and seem to exclude the possibility of a single stage equilibrium scenario for the earth's core formation.

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