The Dependence of Siderophile Element Partitioning on Pressure, Temperature, fO_2 and Si- and S-contents.

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In order to model the behaviour of a range of elements during planetary core formation, liquid metal – liquid silicate partitioning experiments have been performed in a multianvil apparatus covering a pressure and temperature range of 11 – 24 GPa and 2200 – 2800 K respectively. Si, O and S have been employed as additives to the starting metal material and oxygen fugacities varied between -2 to -5 logarithmic units relative to the iron-wüstite buffer.

We found that more than 10 wt% S in the metal phase can explain the similar depletions of Sn and Pb in the Earth´s mantle and furthermore account for the relative abundances of Ge, As and Ag, since increasing S-contents lead to increased siderophility for Ag, decreased siderophility for Ge, As and Sn and hardly affects Pb.

The interaction of Si with the elements Pb, Sn, Ge, Sb and Cu counteracts the effect of low fO_2 which normally results in increased siderophile behaviour showing that reducing conditions in the early stages of core formation do not necessarily result in complete depletion of siderophile elements as long as Si is present as light element in the metal phase.