The Effect of Temperature, Oxygen Fugacity, and Sulfur Content on Siderophile Partitioning; Constraints on Planetary Magma Ocean

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In the present study, high pressure and temperature experiment was performed to investigate the partitioning behavior of Ni, Co, and W between molten sulfide and silicate melt. The partition coefficient (D) is expressed as a function of oxygen fugacity, temperature, and sulfur content. In the fO2-D diagram, the slope of D is consistent with the valence state of siderophile elements in the silicate melt. In the T-D diagram, the slope of D shows a good agreement with an enthalpy change of reaction between sulfide and silicate. D(W) considerably decreases with increasing sulfur content. Based on these partitioning tendency, the partition expressions for Ni, Co, and W can be obtained. The magma ocean conditions of HPB and Moon estimated by their siderophile abundances.