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Experimental investigation of refractory lithophile elements fractionation during evaporation

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Volatility-fractionated refractory lithophile elements (RLE) patterns are commonly found in Ca-, Al-rich inclusions (CAIs) and occasionally recognized in chondrules. Thermodynamic calculations predict that the REE abundances in meteorites are controlled by the relative REE volatilities that depend on their oxidation state. There are, however large discrepancies between thermodynamic calculations and observations. In order to put stronger constraint on the volatility fractionation of REEs we conduct fO_2 -dependent, high temperature – low pressure evaporation experiments using a vertical gas mixing furnace. Furthermore, as it is suggested that even refractory lithophile elements may follow the metal phase at reducing conditions and be depleted in the primordial mantle, we will conduct experimental studies on the partitioning of REEs between a metal and a silicate phase. The goal of the study is the better understanding of the redox conditions that occurred during the formation of condensed matter in the solar system by investigating the behaviour of REEs at conditions ranging from relatively oxidized to highly reduced.

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Cite abstract as:

Di Rocco, T., Marquardt, C., Pack, A (2013) Experimental investigation of refractory lithophile elements fractionation during evaporation . Paneth Kolloquium, Nördlingen (Germany), abstract URL: <http://www.paneth.eu/PanethKolloquium/2013/0085.pdf> (abstract #0085).