Trace elements in chondritic meteorites and their components

H. PALME

Senckenberg Forschungsinstitut, Frankfurt/M, Germany, palmeherbert@gmail.com

Ion size and charge are the main criteria for trace element partitioning in planetary environments. In chondritic meteorites volatility plays the dominant role. Calculated condensation temperatures are a measure of volatility. Refractory elements with condensation temperatures above Mg-silicates and metal display unusual fractionations. Large abundance variations of neighbouring REE (e.g. Lu-Yb) can be understood by differences in volatilities [1]. Such fractionations are not only found in Ca,Al-rich inclusions, but also, less pronounced, in chondrules. The first few per cent of condensable matter represent the super-refractory component, highly enriched in Zr, Hf, Lu, Os, Re, etc. Super-refractory inclusions have been identified in CO-chondrites [2]. Many chondrules and even bulk meteorites have refractory element patterns requiring previous loss of a super-refractory component [3], an unequi-vocal indication of high temperatures at the location of formation of chondritic meteorites in the early solar nebula.

Although igneous processes did not play a role in establishing the bulk trace element patterns of individual chondrules, closed system crystalli-zation of single chondrule melts produce geo-chemical fractionations, expected from experimentally determined mineral-melt partition coefficients, e.g. [4].

[1] Boynton W.V. (1975) *GCA* **39**, 569; [2] Palme H. et al. (1982) *EPSL* **61**, 1; [3] Misawa K. and Nakamura N. (1988) *GCA* **52**, 1699; [4] Jones R.H. and Layne G.D. (1997) *AmMin* **82**, 534.