Molybdenum in magmatic iron meteorites

Y.-H. LIANG[12*], A. N. HALLIDAY[1]

[1] Department of Earth Sciences, University of Oxford, South Parks Road, Oxford, OX1 3AN, UK
[2] Institute of Earth Sciences, Academia Sinica, 128, Sec. 2, Academia Road, Nangang, Taipei 11529, Taiwan
(*correspondence: yuhsuanl@earth.sinica.ntu.tw)

Molybdenum (Mo) is a refractory siderophile and chalcophile element. We report Mo abundances and isotopic compositions for 23 magmatic iron meteorites from Groups IC, IIAB, IIIAB, IIIF and IVA. Molybdenum correlates with Ga, which is also slightly chalcophile, during crystallisation of magmatic iron cores. Using Au as one of the most highly incompatible elements and a strong indicator of degree of fractional crystallisation, it can be seen that Mo increases intitally and then declines in concentation in IIIAB and IVA irons during crystallisation, in a similar fashion to Ga and Ge [1,2]. The Ga/Mo remains broadly constant with Au concentration, though differing between Groups. Experimetal data show that partition coefficients for several siderophile elements change as a function of S content [3,4], and our data indicate that this may explain the behaviour of Mo.

Relative to the chondritic average (-0.14±0.18‰) the $\delta^{98/95}Mo_{SRM3134}$ of the magmatic irons range between light (down to -0.24±0.06‰) to heavy (0.28±0.04‰). Most have $\delta^{98/95}Mo_{SRM3134}$ of -0.24 to -0.10‰, and are similar to the compositions of bulk ordinary and CI carbonaceous chondrites, which is the most likely bulk core (and starting) composition. The most extreme variability is found in the IVAs (10 meteorites), which are both light and heavy, varying with Au/Mo and providing evidence that some are cumulate rich. The Au/Mo ratios provide supporting evidence that Mo is being removed during core differentiation leading to isotopic fractionation.

[1] Wasson (1999) *Geochimica et Cosmochimica Acta* **63**, 2875-2889. [2] Wasson and Richardson (2001) *Geochimica et Cosmochimica Acta* **65**, 951-970. [3] Fleet et al. (1999) *Geochimica et Cosmochimica Acta* **63**, 2611-2622. [4] Chabot and Jones (2003) *Meteoritics & Planetary Science* **38**, 1425–1436.