



Zinc isotopes in meteorites: early solar nebula reservoirs and parent-body processes

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Zinc is a moderately volatile element ($T_c \sim 650\text{--}700\text{ K}$) which exhibits both chalcophilic and lithophilic behaviour. Variations in its isotopes (expressed as $\delta^{66}\text{Zn}$ vs. JMC stdt) may help resolving condensation vs. evaporation processes. Isotopic compositions are measured with MC-ICPMS [1]. All three isotopic ratios vary linearly with mass difference and define a common isotope fractionation line with terrestrial samples: this indicates that Zn was initially derived from a single homogenous reservoir.

Slightly decreasing $\delta^{66}\text{Zn}$ trend from CI to CM to CV-CO and to UOC parallels that of Zn content, and suggests that depletion of Zn in planetary bodies was not created by heating CI-like material. These observations favor incomplete-condensation models. The very low $\delta^{66}\text{Zn}$ values observed in refractory (HF-insoluble) materials and in a CAI from Allende, and in HF-residues from UOC all point to the presence in the early solar nebula (in addition to CI-like Zn), of isotopically light Zn presumably produced by previous evaporation of solid material.

$\delta^{66}\text{Zn}$ values of unequilibrated chondrites are rather uniform whereas equilibrated chondrites show distinctly more isotopic variability. Whole rock analyses on both unequilibrated (type 3) and equilibrated (type 6) ordinary chondrites, on sequential acid dissolutions and on separated materials from LL3 and H6 suggest the following : 1- type 3 OCs acquired a rather homogenous Zn isotopic signature ; 2- heavier Zn isotopic signatures observed in H-EOC whole rocks with respect to UOC indicate preferential loss of light isotopes. The corresponding increase in $\delta^{66}\text{Zn}$ suggests open system behaviour at high temperature with Zn loss. The heavy $\delta^{66}\text{Zn}$ values observed in IAB-IIICD irons, coupled with Cu isotopic variations in the same objects

[2], suggest percolation of metal through previously devolatilized material followed by mixing with liquid metal within the parent body.

References

- [1] Maréchal C. et al. (1999) *Chem. Geol.* 156, 251-273
- [2] Luck, J.M. et al (2003) *G.C.A.* 67, 143-151.