Interferences and matrix effects during ^{57}Fe-^{58}Fe double spike iron isotope MC-ICPMS measurements

F. LACAN[1], C. PRADOUX[1], J. CHMELEFF[2]

[1]LEGOS, University of Toulouse, CNRS, CNES, IRD, UPS, 31400 Toulouse, France;
[2]GET, University of Toulouse, CNRS, CNES, IRD, UPS, 31400 Toulouse, France;

Iron isotopic composition measurements are widely used in scientific areas as diverse as environmental studies, cosmochemistry, archaeology or medicine. Multi-Collector Inductively Coupled Plasma Mass Spetrometer (MC-ICPMS) is the instrument of choice for more than 15 years for these measurements. The latters may be very accurate (typically better than 0.1‰, $\delta^{56}Fe$, 95% confidence interval), but may also be subject to significant biases due to interferences and matrix effects. The thresholds above which these perturbations significantly degrades the accuracy have therefore to be determined. This work has been conducted more than a decade ago in the case of instrumental mass fractionation correction performed through standard bracketing and Ni doping [Schoenberg and von Blanckenburg 2005]. However ^{57}Fe-^{58}Fe double spike is increasingly used instead of Ni-doping for instrumental mass fractionation correction, but the above mentioned threshold have never been published in the case of double spiking. The present work presents experiments conducted in order to determine these thresholds. We used a Thermo-Finnigan Neptune MC-ICPMS, equipped with an Apex-IR desolvator. The ^{57}Fe-^{58}Fe double spike / sample mixtures were doped with variable amounts of Cr, Ni , Na, Ca, Mg, K and Mo. The results show the critical role played by Ca interferences (in addition to Cr and Ni) on the final quality of the Fe isotope ratio determination.

Schoenberg, R., et F. von Blanckenburg (2005), An assessment of the accuracy of stable Fe isotope ratio measurements on samples with organic and inorganic matrices by high-resolution multicollector ICP-MS, International Journal of Mass Spectrometry, 242(2‐3), 257‐272.