

High precision Zn and Ca isotope analysis by multi-collector ICP/MS

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Analysis of naturally occurring isotopic variations is a promising tool for investigating Zn and Ca transport and cycling in geological and biological settings. To establish stable isotopes (Zn, Ca) analytic techniques, we evaluated the instrument conditions, correction method of mass fractionation and necessarily minimum sample concentration. Instrumental mass bias was corrected using the “sample-standard bracketing” method, and compared with “Internal standardization” with Cu doping for only Ca isotope analysis. After evaluating the potential effects of varying fractionation, Zn and Ca isotope data were obtained with a higher precision better than %RSD < 0.1 %, % bias < 0.01 % and %RSD < 0.044 %, % bias < 0.0028 % respectively, over a period of 5 months. For Ca isotope analysis, it should be consider the isobaric effect to minimize the interferences such as ⁴⁰Ar⁺, ⁴¹K⁺, ⁴⁷Ti⁺, ⁸⁷Sr²⁺. To remove an isobaric interference of ⁴⁰Ar⁺, the radio frequency (RF) power was reduced from 1300 to about 575 W, so-called “cool plasma”. The standard-sample bracketing method was used in correction of Ca isotopic ratios for mass fractionation. The precision (%RSD) of ^{42/40}Ca, ^{43/40}Ca, ^{44/40}Ca were 0.028, 0.097, and 0.044 %, and the accuracy (%bias) were -0.0012, -0.0079, and 0.0028 %, respectively. The results imply that Zn and Ca isotopic ratios measured in our multi-collector ICP/MS system can be used in tracers for the environmental pollution.