4.0.P08

Magnesium stable isotope compositions of reference solutions

F. WOMBACHER, A. EISENHAUER, B. BOCK AND J. FIETZKE

IFM-GEOMAR, Leibniz-Institut für Meereswissenschaften, Wischofstr. 1-3, 24148 Kiel (fwombacher@geomar.de)

The potential of many non-traditional stable isotope systems for geochemical studies has been explored within the last few years. For these new isotope systems, the analyses of reference materials is of particular importance to assure the accuracy of the results. Here, Mg isotope compositions of synthetic reference solutions and seawater (IAPSO normal standard seawater) were determined using an Axiom MC-ICPMS combined with an Aridus desolvating nebulizer. Internal normalization relative to $^{25}Mg/^{24}Mg = 0.12663$ with the exponential law yielded $^{26}Mg/^{24}Mg = 0.139480(14)$ (2 sd; n = 64) and 0.139497(20) (2 sd; n = 28) for two measurement sessions (with collector efficiencies set to unity). For mass bias correction, the standard-sample-standard bracketing technique was used.

Magnesium stable isotope compositions relative to DSM3

sample	n	$\delta^{26}Mg$	$\delta^{25}Mg$	reference
Cambridge 1	35	-2.58 ± 0.14	-1.33 ± 0.07	[1]
Cambridge 1	6	-2.62 ± 0.12	-1.35 ± 0.07	this study
OU Mg	4	-2.77 ± 0.12	-1.44 ± 0.08	this study
Spex Mg	20	-4.76 ± 0.20	-2.45 ± 0.12	this study
seawater *	4	-0.82 ± 0.04	-0.41 ± 0.08	[2]
seawater #	3	-0.55 ± 0.02	-0.30 ± 0.05	this study

Uncertainties are 2 standard deviations for the Axiom data. *Analyzed relative to NIST SRM 980_O [2] and recalculated relative to the DSM3 standard using $\Delta^{26}Mg_{SRM980\text{-}DSM3} = -3.40 \pm 0.13$ and $\Delta^{25}Mg_{SRM980\text{-}DSM3} = -1.74 \pm 0.07$ [1]. #Analyzed relative to Spex Mg (our in-house standard); recalculated relative to the DSM3 standard using the isotopic difference tabulated above.

Cambridge 1 [1], OU Mg (provided by the Open University, Milton Keynes), Spex Mg and the proposed Mg isotope reference standard DSM3 [1] are synthetic reference solutions. The seawater Mg has been purified using cation exchange resin.

The data for Cambridge 1 agrees within uncertainty. Our first analyses of seawater Mg just agrees with the published seawater data [2] if propagated uncertainties due to the standard conversion are included (only measurement uncertainties are given in the table). Currently, we cannot exclude that our preliminary chemical separation procedure introduced a small Mg isotope fractionation.

References

[1] Galy A., et al. (2003) *JAAS* **18,** 1352-1356.
[2] Chang V.T.-C., et al. (2003) *JAAS* **18,** 296-301.

4.0.P09

Intercomparison of new Th isotopic standards: Preliminary results

C. INNOCENT[1], C. BOLLINGER[2], F. CHABAUX[3], C. CLAUDE[4], N. DURAND[4], A. LE FAOUDER[2], B. KIEFEL[3] AND C. POMIES[5].

[1] brgm, Orléans, France (c.innocent@brgm.fr)
[2] IUEM, Plouzané, France (cbassoul@sdt.univ-brest.fr)
[3] EOST, Strasbourg, France (fchabaux@illite.u-strasbg.fr)
[4] CEREGE, Aix-en-Provence, France (cclaude@cerege.fr)
[5] University of Cambridge, England (cpm01@esc.cam.ac.uk)

During the past 15 years, with the advent of new generations of mass spectrometers (including solid and plasma-source mass spectrometers), the quality of Th isotopic measurements has been improved amazingly, compared to the classical alpha spectrometry technique.

In this context, the lack of Th isotopic standards tends to become more and more critical. At present there is only one reference material certified for its isotopic composition – provided by the JRC IRMM, Geel -. Apart from this CRM, some rock standards having a known Th isotopic composition, like for example, AThO, TML or Th S1 are classically utilized, but are expected to be rapidly depleted (this is already the case for Th S1) considering that the number of Th isotopic measurements is aimed to increase considerably in the near future.

Four synthetic Th solutions (Th 103, Th 104, Th 105 and Th 106) have been prepared at brgm, Orléans from mixtures of a Th Cl_4 salt (depleted in ^{230}Th) and a ^{230}Th pure solution, with isotopic ratios ranging from 10^3 to 10^6. Th 103, with a theoretical $^{232}Th/^{230}Th$ ratio of 1400 is dedicated to Th studies on materials like corals. The theoretical isotopic compositions of Th 104, Th 105 and Th 106 are 26800, 212000 and 1140000, respectively.

Preliminary measurements have been carried out in 5 different laboratories, using either alpha spectrometry (AS), thermal ionization mass spectrometry (TIMS) and/or plasma-source, multi-collector-magnet mass spectrometry (MC-ICP/MS). It is worth noticing that, for this first round of measurements, each laboratory has analyzed the Th standards with its own procedure, which obviously differ from a labratory to the other.

In addition to the 5 "pioneers", measurements are underway in other laboratories (France, Canada). Total quantities are in the order of : 20 mg of Th for Th 103, 200 mg for Th 104, and 2 g for both Th 105 and Th 106. Free aliquots of these standards are available upon request to the first author.