

4.0.P10**Cd isotopic composition of geological/environmental reference materials and anthropogenic samples**

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Cd isotopic compositions of terrestrial and extraterrestrial materials measured by TIMS [1] and by MC ICP MS [2] have been investigated but no significant isotopic variation was observed so far in terrestrial samples in spite of the high precision of the measurements [2]. This study aims to further investigate the natural variations of Cd isotopic composition and to evaluate the possibility to use Cd isotopes for environmental monitoring in anthropogenic samples. The samples, having an environmental interest, have different compositions and origins, geological reference material (RM) : Soils (GXR 1, GXR 2, GSS1, NIST 2711), Stream Sediment (GSD 12), Mn-nodules (Nod A1, Nod P1), City waste incinerator fly ash (CRM BCR 176) and anthropogenic samples : dust and slag from a lead smelter. Measurements are done on MC-ICP-MS Isoprobe using the standard bracketing technique and results are given in delta notation (‰) per amu (normalised to light isotopes). The long term reproducibility (2 sigma) on samples and reference solutions varies between 0.04 ‰ and 0.08 ‰.

All the Cd reference solutions measured yielded the same isotopic composition. As no official isotopic standard for Cd is adopted yet, this implies that inter-laboratory comparison is possible. To check the long term accuracy and reproducibility of the measurements, a second reference solution (Münster Cd) is used. The latter is made of industrially fractionated Cd mixed with a Cd reference solution giving a theoretical value of 1.12 ‰ (Wombacher, pers.comm.) (1.12 ± 0.07 measured, n=30).

The total variation observed between all the samples measured is about 0.3 ‰. The variation on the geological RM is 0.2 ‰ between GSD 12 and NIST 2711 (polluted soil) whereas the variation on the other RM is not significant, with delta values identical within error to our Cd reference solution. The variation on the anthropogenic samples is near 0.3 ‰ between the dust (volatile phase, -0.21 ‰) and the slag (residue phase, 0.07 ‰). A negative value is also observed for the city waste incinerator fly ash CRM BCR 176 (-0.08 ‰). This suggests that some industrial processes may introduce isotopically fractionated Cd in the environment.

References

[1] Sands et al. (2001) *EPSL* **186**, 103-111.

[2] Wombacher et al. (2003) *GCA* **67**, 4639-4654.