

Mercury isotopic ratios in environmental CRMs and biological samples by using Multi-collector ICP/MS

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This study was purposed to determine Hg isotopic ratios in 10 CRMs(Lichen, Pine needle, Fish protein, Rice, Human hair, Human urine, Coal, Estuarine sediment, Coal fly ash, Urban particulate matter) and biological samples(Human Hair, Human blood) by Multi Collector-ICP/MS. The precision and accuracy were measured by 1 μ g/L of zero-delta isotope standard material(NIST 3133). As a result, 0.194 % of precision and 0.075 % of accuracy(% Bias) with ²⁰²Hg/¹⁹⁸Hg ratio.

The 10 environment CRMs of $\delta^{202}\text{Hg}$ isotope values were ranged from -2.26 to 4.00 ‰ and the highest value was showed in Fish protein(DORM-4). $\Delta^{199}\text{Hg}$ isotope values were ranged from -0.02 to 2.96 ‰ and human urine showed the highest isotopic values(QM-U-Q1305).

The Hg isotopic values in human blood and hair samples are demonstrated that the occurrence of mass dependent fractionation (MDF) in hair samples which showed heavier $\delta^{202}\text{Hg}$ value (+1.42 ‰) than those of the blood samples. The hair samples showed significant difference($p>0.05$) in Hg isotopic values according to Hg concentration. Mass independent fractionation (MIF) was observed in high concentration of Hg group with +1.64 ‰($\Delta^{199}\text{Hg}$) value which was expected with influence by consumption of mercury sources. Consequently, using the mercury isotopic signature in human hair, it can be useful to determine the mercury exposure route and source to human body.