The comparison of Mo isotope compositions for selected international geological reference materials

J.M ZHU[12], D.C.TAN[2], L.LIANG[2] AND J.WANG[2]

[1] State Key Laboratory of Geological Processes and Mineral Resources, China University of Geosciences, Beijing 100083, China. (*correspondence:jmzhu@cugb.edu.cn)

[2] State Key Lab. of Environmental Geochemistry, Inst. of Geochemistry, CAS, Guiyang, 550081, China.

Molybdenum(Mo) stable isotopes have been widely applied to indicate the evolution of marine and atmospheric oxygenation related with continent weathering processes, to estimate the spatial extent of past oceanic euxinia, and to trace source and forming pathways of some Mo ore deposits. However, since NIST SRM 3134 was recently suggested as an internationally `zero-delta` standard reference, some work was still needed to evaluate the accuracy of Mo isotopic composion in the different geological reference materials relative to NIST SRM 3134.

Here, we used a ^{97}Mo-^{100}Mo(≈1:1) double spike whose composition was calibrated by silver isotopic standard(978a) rather than the Pd standard solution used in previous studies. The best ratio of spike (spk) to sample (spl) was obtained for $^{100}Mo_{spk}/^{98}Mo_{spl}$≈2.75(1~8 still works) based on double spike numerical optimization. All Mo isotopes measurement was determined at State Key Laboratory of Environmental Geochemistry, Inst. of Geochemistry-CAS, using Nu Plasma II HR-MC-ICP-MS equipped with sixteen Faraday cups that allowed simultaneous measurement of ^{90}Zr (L5), ^{92}Mo (L4) to ^{99}Ru (H3), ^{100}Mo (H4) in a static model, as well as ^{102}Ru/Pd, ^{104}Ru/Pd and ^{106}Pd monitored at H5, H7 and H8 if needed. All samples were purified as suggested procedures by Dr. Skierszkan. The long-term external reproducibility for $\delta^{98/95}$Mo of NIST SRM3134 is 0.00±0.07(2SD, n=135). $\delta^{98/95}$Mo values relative to SRM3134 for selected geological reference materials, Mo solution(JMC), seawater(IAPSO), USGS reference Materials, BCR-2, SDO-1 and SGR-1b are -0.19±0.07‰ (2 SD, n=61), -2.09±0.08‰ (2 SD, n=5), -0.01±0.08‰ (2 SD, n=6), 0.80±0.08‰ (2 SD, n=7), and 0.46±0.08‰ (2 SD, n=8), respectively. These results are well in agreement with the published values, and suggest SGR-1b could be as an alternative reference standard when SDO-1 was used up.

The work was supported by the National Key Basic Research Program of China (2014CB238903) and the National Natural Science Foundation of China (41473028□41273029).