High-precision Measurements of Molybdenum Isotopic Compositions of Geochemical Reference Materials

JIN LI, XIANG-KUN ZHU AND SUOHAN TANG

State Key Laboratory for Continental Tectonics and Dynamics, Key Laboratory of Isotopic Geology, The Ministry of Land and Resources, Institute of Geology, Chinese Academy of Geological Sciences, Beijing 100037, China
Email: lijin80119@hotmail.com

A method using multiple-collector inductively coupled plasma mass spectrometry (MC-ICPMS) for high-precision measurement of Mo isotopic compositions in geological samples has been developed. Purification of Mo for isotope ratio measurements was realized by ion exchange chromatography using the Bio-Rad AG® 1-X8 anion exchange resin. This procedure separates Mo from matrix elements (Fe, Mg, K, Na, Ca, Al, Cu, Sr, Mn, Ti and Zr) effectively. Instrumental mass bias was calibrated by double spiking. The external standard reproducibility of double spiking ($\delta^{98/95}$Mo) is 0.08‰ (at 95% confidence). NIST 3134 (Lot No. 891307) Mo standard solution was employed as the in-house standard for measurement of Mo isotope ratios. Mo isotopic compositions of 6 geochemical reference materials from the CANMET Mining and Mineral Sciences Laboratories and the United States Geological Survey (USGS), including HV-2 (Copper-Molybdenum Ore), NOD-A-1 and NOD-P-1 (Manganese Nodule), SGR-1b and SCo-1 (Shale), and BCR-2 (Basalt) , were measured. $\delta^{98/95}$Mo of HV-2, NOD-A-1, NOD-P-1, SGR-1b, SCo-1 and BCR-2 are -0.48‰, -0.73‰, -0.91‰, 0.38‰, -0.50‰ and -0.01‰, respectively. Mo isotopic composition of NOD-P-1 of this paper are equal to the published one within errors. $\delta^{98/95}Mo_{Spex\text{-}NIST\ 3134}$=0.266‰ can be obtained from $\delta^{98/95}$Mo of HV-2 of this paper and the published one. The Mo isotopic compositions of SGR-1b, SCo-1 and BCR-2 were reported for the first time.

NOD-A-1, NOD-P-1, HV-2, BCR-2, SGR-1b and SCo-1 are commercially available, and suitable to be a control on quality of chromatographic separation and long-term variations in mass spectrometry performance. This study provides the necessary data for Mo isotope data comparison with different laboratory.

[1] Goldberg T, *et al* 2013. *J. Anal. At. Spectrom.*, **28**, 724-735. [2] Greber ND, *et al* 2012. *Geostandards and Geoanalytical Research*, **36**, 291-300. [3] Pearce CR, *et al* 2009. *Geostandards and Geoanalytical Research*, **33**, 219- 229.