Molybdenum isotope analysis using anion and cation exchange resins and MC-ICP-MS

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In the past 15 years, molybdenum stable isotope ($\delta^{98/95}$Mo) has become a valuable tool for assessing plaeo-ocean redox conditions (Arnold et al., 2004 Science; Dahl et al., 2010 PNAS). To measure Mo isotopic compositions in Fe and Mn rich samples, we conducted (1) chemical purification of reference Mn nodules (JMn-1, Nod P-1, and Nod A-1) by two-stage of ion exchange chemistry (AG1X-8 and AG50WX-8)(Barling et al., 2001 EPSL; Gordon et al., 2009 Geology), and (2) isotope measurements of spiked Mo standard solutions (NIST 3134 and Alfa Aesar Specpure standard solution), using multi-collector inductively coupled plasma mass spectrometry (MC-ICP-MS, Thermo Fisher Scientific Neptune) at Geological Survey of Japan. The yields during the column chemistry were better than 95%. Although isobaric interferences on Mo masses are possible from Fe (or Fe argide), Zr, and Ru (Siebert et al., 2001 G-cubed; Malinovsky et al., 2005 Int. J. Mass Spectrom.), their concentrations in the purified samples were comparable to our chemical procedural blank values. The difference in $\delta^{98/95}$Mo between NIST 3134 and the Alfa Aesar standard solution was 0.17 ±0.14‰. The observed offset was consistent with previously reported values (0.12 ±0.11‰; Greber et al., 2012 Geostand. Geoanal. Res.). Hence, accurate and high precision Mo isotope measurements of Fe-Mn oxides are possible using the anion and cation exchange resins and MC-ICP-MS. In the presentation, we will also report new $\delta^{98/95}$Mo data of hydrothermal Mn and Fe crusts based on this method.

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