

Experimental investigation of molybdenum isotopic fractionation during ferrite oxide adsorption

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The Molybdenum (Mo) isotopic fractionation has been applied successfully as a redox proxy in marine environments. Mo occurs as Mo (VI) anion molybdate, MoO_4^{2-} , in seawater and $\text{Mo}_{4-x}\text{S}_x$ in marine sediments. The latter species were converted from MoO_4^{2-} , MoS_4^{2-} and finally to form other sulfides. The Mo isotopic composition ($\delta^{98/95}\text{Mo}$) in seawater is $\sim 2\text{‰}$ heavier than of ferromanganese crusts or nodules, as a function of redox states. This application, however, is restricted by an incomplete understanding of Mo isotopic fractionation behaviors during key biogeochemical processes in nature.

This study aims to further explore the Mo isotopic fractionation in seawater-like matrix during ferrite oxide nanoparticles adsorption processes. Two batches adsorption/desorption experiments were conducted: (a) the sorbent dosage experiment and (b) the solution pH experiment. Various Mo isotopic fractionation factors were determined at different pH conditions, pH 3 \sim 10 at 25°C. These new results assist us to gain a better understanding of Mo sorption fractionation, as well as for other similar metals in environments.