

Cd isotope fractionation during photodissolution of cadmium sulphide

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Introduction.

Missing of fractionation factors in many processes is a hindrance for applying isotope characteristics as tracers in natural. To date, Cd isotope signatures have been well studied during biocycling, adsorption, precipitation, weathering and evaporation/condensation[1]. Despite some studies indicate photoirradiation could also impact Cd sulphide geochemical cycles[2], however, to our knowledge, Cd isotope behaviors during Cd sulphide photodissolution has not been identified.

Results and Discussion.

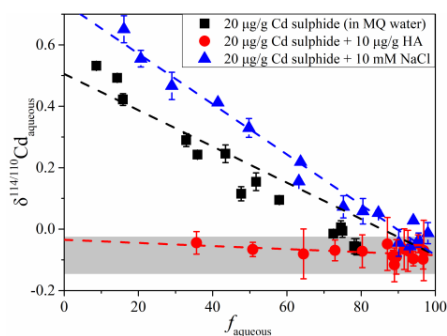


Figure 1. Cd isotope variations during photodissolution.

In MQ water, heavier Cd isotopes were preferentially dissolved into aqueous, well fitted equilibrium fractionation giving a $\alpha_{\text{remained-aqueous}}$ of 0.99941 with $\Delta_{\text{aqueous-remained}} = +0.59\text{‰}$ which is comparable to weathering process[3]. However, dissolved Cd didn't isotopically fractionate against raw solid sulphide in the presence of humic acid (HA), endowing a unique isotope signature. In the case of NaCl, photodissolution generated a greater $\alpha_{\text{remained-aqueous}}$ of 0.99918 with $\Delta_{\text{aqueous-remained}} = +0.81\text{‰}$ than in MQ water. These results reveal Cd would behave distinguishable isotope signals during photodissolution in different settings.

[1] Wiederhold *et al.* (2015) *ES&T* **49**, 2606-2624. [2] Liu *et al.* (2017) *ES&T* **51**, 6877-6886. [3] Zhang *et al.* (2015) *Environ. Pollut.* **216**, 9-17.