

Determination of isotopic ratio of nickel, copper, and zinc in seawater using an ethylenediaminetriacetic acid chelating resin

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Nickel, Copper, and Zinc play important roles as a micronutrient for organisms and as geochemical tracers in the ocean. Dissolved Ni, Cu, and Zn have concentrations of 0.01–10 nmol/kg in seawater and their distributions exhibit a nutrient type for Ni and Zn, a nutrient-scavenging hybrid type for Cu. To elucidate the biogeochemical cycling of their metals in the ocean, it is useful to determine the profiles of their isotopes in the ocean, because isotopic fractionation occurs during various biogeochemical processes. However, precise isotopic analysis of Ni, Cu, and Zn in seawater has been impaired by the low concentrations of Ni, Cu, and Zn and interferences from co-existing elements that induce analytical errors on isotopic measurements using MC-ICP-MS. We have developed a novel pre-treatment method for determining the isotopic composition of dissolved Ni, Cu and Zn in seawater. First, a seawater sample was passed through a column containing ethylenediaminetriacetic acid chelating resin (NOBIAS Chelate-PA1, Hitachi High Technologies) [1]. Dissolved Ni, Cu, and Zn were quantitatively concentrated, and alkali and alkali earth elements were effectively removed. Pre-concentrated Ni, Cu, and Zn fraction was passed through a column containing anion exchange resin (AG MP-1M, Bio-Rad) to separate Ni, Cu, and Zn from each other. Then, the Ni fraction from the anion exchange column was passed through a NOBIAS Chelate-PA1 resin column again to remove Na, Mg, and SO₄.

[1] Takano, Tanimizu, Hirata & Sohrin (2013), *Anal. Chim. Acta* **784**, 33-41.