

(学位第 3 号様式)

学 位 論 文 要 旨

氏 名

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題 目

Bioavailability and Bioaccumulation of Heavy Metals from Contaminated Coastal Sediments

This study consists of three major objectives; at first, the distribution and geochemical speciation of metals in the contaminated coastal sediments in Osaka Bay, Japan were investigated as a case study; secondly, bioavailability of metals in sediments were predicted from the above chemical data; and at last, the agreement between predicted bioavailability and actual bioavailability through the accumulation tests with contaminated coastal sediments by the polychaete (*Perineris nuntia*) was examined. In the first objective, the distributions and geochemical speciation of heavy metals such as cadmium (Cd), copper (Cu), lead (Pb) and zinc (Zn) in sediments were investigated at 25 sites in Osaka Bay, Japan. High concentrations of Zn (76-967 mg/kg dry weight (DW)) were observed followed by Cu (not detected (ND)-399 mg/kg DW), Pb (ND-73 mg/kg DW) and Cd (0.2-2.9 mg/kg DW). A considerable fraction of Cd was exchangeable and carbonate-bound. Cu occurred predominantly in the organic material-bound fraction. Both Pb and Zn occurred predominantly in the Fe-Mn oxide fraction. From those results, especially high bioavailability of Cd and Zn was predicted. Then, polychaete, *P. nuntia*, was exposed to sediments collected from two sites of Kagoshima Bay, Japan, for 28 days. The polychaete adsorbed metals such as copper (Cu) and zinc (Zn) from sediments. The prediction of bioavailability of metals through chemical analysis could roughly reflect the actual absorbance of metals in the polychaete. Therefore, the prediction of metal bioavailability through chemical analysis examining depending on geochemical speciation was concluded as useful to reliably estimate actual bioaccumulation in the benthic organism.