

In situ capping technology for controlling heavy metals release from contaminated sediment

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ABSTRACT

The efficiency and the mechanism of calcite/sand as a capping layer to simultaneously prevent the Pb, Cr, and Mn releasing from the contaminated sediments were investigated using the simulated in situ capping batch experiments. The results showed that the order for the inhibition efficiency of the different capping materials is: calcite > calcite + sand > sand for the three metals. The capping materials of calcite (325 mesh) + sand could hinder the release of Pb, Cr, and Mn effectively, with the inhibition efficiencies of 77.90%, 81.16%, and 86.26%, respectively, which were approaching to the inhibition efficiencies of calcite (mesh 800). Toxicity characteristic leaching procedure test showed that the leaching amounts of Pb, Cr, and Mn from sediments with capping system were lower than that from the control. The least leaching concentrations were recorded in the sediments with the calcite (mesh 800) and concentrations for Pb, Cr, and Mn were 0.0049, 0.015, and 2.05 mg L⁻¹, respectively, and for the calcite (mesh 325) + sand, the concentrations were 0.0074, 0.016, and 2.50 mg L⁻¹, respectively. Tessier extraction test proved that the element fractions in the sediments with caps tended to transform the metal fractions of exchangeable, carbonate, Fe–Mn oxidize, organic to the metal fraction of residual.

Keywords: In situ capping; Calcite; Sand; Contaminated sediment; Heavy metal

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