Chemical speciation and contamination assessment of Zn and Cd by sequential extraction in surface sediment of Klang River, Malaysia

ABSTRACT

The concentration and chemical speciation of Cd and Zn as well as total organic carbon (TOC) were studied in surface sediments from 21 stations along Klang River. Sequential extraction technique (SET) was applied to assess the four (exchangeable, acid-reducible, oxidisable-organic and residual) fractions in surface sediment. And also, to obtain an overall classification of cadmium and zinc pollution in this area. This investigation was the first study on the basis of the chemical speciation of Cd and Zn in surface sediments of the Klang River. The total concentrations of metals were ranged (0.60–2.26 μg g− 1) for Cd and (33.26–268.24 μg g− 1) for Zn. The chemical speciation of Cd and Zn in most sampling stations were in the order of residual > acid-reducible > oxidisable-organic > exchangeable, and it showed that the Zn in Klang River surface sediments existed in the nonresistant fractions, whilst Cd existed in the resistant fraction. The degree of surface sediments contamination was determined for individual contamination factors (ICF) and global contamination factor (GCF). The result of ICF and GCF values showed that those stations located vicinity of municipal area had high potential risk to fauna and flora of the Klang River. The relationship between the concentration of cadmium and zinc at the oxidation-organic fraction with TOC in surface sediment was identified. The results showed that TOC had a positive function to complex with Cd and Zn in the surface sediment of Klang River.

Keyword: Heavy metals; Chemical speciation; Sequential extraction; Surface sediments