

Estimation and influence of physicochemical properties and chemical fractions of surface sediment on the bioaccessibility of Cd and Hg contaminant in Langat River, Malaysia

ABSTRACT

This study applied the use of sequential extraction technique and simple bioaccessibility extraction test to quantify the bioavailable fractions and the human bioaccessible concentration of metals collected from nine stations in surface sediment of the Langat River. The concentrations of total and bioaccessible metals from different stations were in the range of 0.49–1.04, 0.10–0.32 $\mu\text{g g}^{-1}$ for T-Cd, Bio-Cd, respectively, and 12.9–128.03, 2.06–8.53 $\mu\text{g kg}^{-1}$ for T-Hg, Bio-Hg, respectively. The results revealed highest R-Bio-Cd in Banting station (55.3 %), while the highest R-Bio-Hg was in Kajang station (49.61 %). The chemical speciation of Cd in most sampling stations was in the order of oxidisable-organic > residual > exchangeable > acid-reducible, while speciation of Hg was in the order of exchangeable > residual > oxidisable-organic > acid-reducible. The correlation matrix of mean content showed that the TOM, particle size and Mg^{++} in polluted surface sediments was highly correlated with total mercury. The PCA showed that the main factors influencing the bioaccessibility of Hg in surface sediments were the sediment TOM, F1 (EFLE) and F3 (oxidation-organic), while the factor influencing the bioaccessibility of Cd was the F3 (oxidation-organic) and T-Cd.

Keyword: Bioaccessibility; Sequential extraction; SBET; Langat River