Spesiasi Logam Berat Pb dan Cr dengan Metode Ekstraksi Bertahap dan Migrasinya dari Sedimen Perairan Teluk Jakarta Menggunakan Metode Diffusive Gradient in Thin Film (DGT)

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Abstrak

Spesiasi logam berat Pb dan Cr dengan metode ekstraksi bertahap dan migrasinya dari sedimen perairan teluk Jakarta menggunakan metode Diffusive Gradient in Thin Film (DGT), telah dilakukan di laboratorium Departemen Kimia UI, dengan sampel sedimen dari Cengkareng Drain, Kapuk, Jakarta Utara. Hasil penelitian logam berat dengan Ekstraksi bertahap diperoleh, logam Pb antara 43,473 ppm hingga 58,123 ppm, logam Cr 20,763 ppm hingga 30.219 ppm. Distribusi logam berat Pb dalam sedimen berupa senyawa karbonat ± 6 % , 5,5% oksida Mn, 21,779% oksida Fe, 29,624% dalam senyawa organik dan fraksi sisa 36,879%. Distribusi logam Cr 4,183% berupa senyawa karbonat, 4,325% terikat dalam oksida Mn , 23,713% terikat dalam oksida Fe, 30,827% terikat dalam senyawa organik dan 36,325% dalam fraksi residu.

Hasil penelitian migrasi logam berat Pb dari sedimen ke badan air pada kondisi oxic penggelaran 1 hari berkisar 0,0108 ppm sampai 0,1314 ppm, pada penggelaran 4 hari diperoleh 0,042 ppm hingga 0,081 ppm. Untuk kondisi anoxic penggelaran 1 hari diperoleh 2,444 ppm , 3 hari 0,320 ppm dan 5 hari 3,432 ppm. Migrasi logam berat Cr pada kondisi oxic penggelaran 1 hari diperoleh berkisar 0,1413 ppm hingga 0,3431 ppm, 4 hari berkisar 0,0012 ppm hingga 0,0084 ppm.
Untuk kondisi anoxic penggelaran 1 hari 1,5792 ppm , 3 hari 0,0545 ppm dan 5 hari 2,9629 ppm. Pengukuran dengan DGT strip gel pada kondisi anoxic, diperoleh distribusi logam berat Pb berada pada kedalaman 1-5 cm dengan kadar 0,1279 ppm hingga 3,1977 ppm dan logam berat Cr berdistribusi pada kadar 2,6649 ppm hingga 7,2668 ppm.Dari hasil ini diperoleh gambaran bahwa ketersediaan konsentrasi logam berat dalam sedimen cukup memungkinkan adanya migrasi logam ke badan air.
.....Heavy metal speciation of Pb and Cr by sequential extraction and migration from sediments into the waters of Jakarta Gulf using Diffusive Gradient in Thin Films (DGT) method has been conducted using sediment samples from Cengkareng Drain Kapuk- North Jakarta. The extraction of heavy metals concentration, with sequential extraction for total Pb (sum of each fractions) is between 43.473 to 58.123 ppm, whereas for total Cr (sum of total fraction) is between 20.763 ppm to 30,219 ppm. The distribution of Pb in sediments adsorped in carbonate compounds is about 6%, manganese oxides is about 5,5%, iron oxides is about 21,779%, 29,624% in organic compounds and the residual fraction is about 36,879%. The Distribution of Cr in sedimen absorped in carbonate compounds is about 4,183%, in manganese oxides is about 4,325%, in iron oxides ia about 23,713%, 30,827% bound in organic compounds and the residual fraction is about 36,325%.
The results of DGT experiments to study the migration of Pb from sediment into water column in experimental chambers show that for deployment of 1st day in oxic conditions is in the range between 0.0108 ppm to 0.1314 ppm, and 0.042 ppm to 0.081 ppm for the 4th day. Under anoxic condition the results show that the metal concentration on the DGT resin is 2.444 ppm, 0.320 ppm and 3.432 ppm, on the 1st, 3rd and 5th day incubation period respectively. The results for migration of Cr from sediment into water column

in experimental chambers show that for deployment time of 1st day incubation oxic conditions is in the range between 0.3431 ppm up to 0.1413 ppm, and 0.0012 ppm to 0.0084 ppm for the 4th day.
Under anoxic conditions the result show that the metal concentration on the DGT resin is 1.5792 ppm, 0.0545 ppm and 2.9629 ppm on the 1st, 3rd, and 5th day incubation period respectively. The Measurements of metal concentration by DGT gel strip in anoxic conditions, show that the distribution of Pb at a depth of 1-5 cm in the range of 0.1279 ppm to 3.1977 ppm, whereas Cr concentration is between 2.6649 ppm levels up to 7.2668 ppm. This results show the availability of heavy metal concentrations in sediment which allow for migration of metals into water bodies.