

## ABSTRACT

Application of sequential extraction method to environmental samples provides relevant information about possible toxicity, mobility, and bioavailability of heavy metals when they are discharged into the environment. The concentration of heavy metals in three electroplating sludge samples (two samples from Zn electroplating industries and one sample from Ni electroplating industry) and potential of mobility based on its association form were studied. BCR sequential extraction method was used to fractionate the metal content into acid soluble/exchangeable, reducible and oxidizable fractions. Residual and total metal content were determined in aqua regia digest. The extract were analysed for metals using inductively coupled plasma mass spectrometry (ICP-MS). Zn concentration was found to be the highest in the samples collected from zinc electroplating industries (145.9 and 187.7 g kg<sup>-1</sup>) as compared to that of nickel electroplating industry (0.6 g kg<sup>-1</sup>). The descending order of the average total metal contents for these three samples were Zn>Ni>Fe>Cr>Pb>Cd. From the sequential extraction, Cd, Zn and Ni were found more frequently in acid soluble/exchangeable fraction, showed its susceptibility to be leached easily. The oxidizable form is dominant for all the three samples studied. Also, Fe and Pb extracted were higher in residual fraction. Due to the higher total Zn and Ni concentrations and its high mobility, the investigated sludges should be disposed off into landfill after stabilization to prevent the leaching of metals to the surrounding area.

## ABSTRAK

Penggunaan kaedah pengekstrakan berurutan untuk analisa sampel dari persekitaran dapat memberikan maklumat kemungkinan toksik, mobiliti dan kewujudan logam berat apabila sampel tersebut dilupuskan. Kepekatan logam berat dalam tiga sampel enapcemar saduran elektrik (dua sampel enapcemar diambil dari industri saduran elektrik zink dan satu sampel enapcemar diambil dari industri saduran elektrik nikel) dan keupayaan bergerak bentuk yang bergabung telah dikaji. Kaedah pengekstrakan berurutan BCR telah digunakan untuk membahagikan kandungan logam berat tersebut kepada bahagian larut asid/tertukarganti, bahagian yang dapat diturunkan dan bahagian yang boleh dioksidakan. Penentuan jumlah kandungan logam berat dan residu dianalisis menggunakan kaedah pengekstrakan *aqua regia*. Logam-logam yang telah diekstrak dianalisis menggunakan Spektrometer Jisim Plasma Gandingan Aruhan (ICP-MS). Didapati bahawa Zn mempunyai kepekatan yang paling tinggi bagi sampel enapcemar yang diambil dari industri saduran elektrik zink iaitu sebanyak  $145.9 \text{ g kg}^{-1}$  dan  $187.7 \text{ g kg}^{-1}$  berbanding sampel enapcemar yang diambil dari industri saduran elektrik nikel ( $0.6 \text{ g kg}^{-1}$ ). Secara purata urutan jumlah kandungan logam dalam ketiga-tiga sampel enapcemar tersebut ialah Zn>Ni>Fe>Cr>Cu>Pb>Cd. Daripada pengekstrakan berurutan ini, didapati bahawa Cd, Zn dan Ni lebih kerap berada dalam bahagian larut asid/tertukarganti. Ini menunjukkan bahawa logam Cd, Zn dan Ni yang terdapat dalam ketiga-tiga sampel enapcemar ini mudah melarut-resap ke persekitaran. Bahagian yang dioksidakan adalah dominan bagi ketiga-tiga sampel enapcemar tersebut. Lebih banyak Fe dan Pb juga diekstrak dalam bahagian residu. Oleh kerana kepekatan dan mobiliti Zn dan Ni tinggi, pelupusan ketiga-tiga enapcemar ini ke tapak pelupusan hanya boleh dilakukan selepas proses stabilisasi dijalankan bagi mengelakkan larutresapan logam-logam tersebut ke persekitaran .

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