

Turkish Journal of Chemistry

Turkish Journal

of

Chemistry

Application of a Three-Stage Sequential Extraction Procedure for the Determination of Extractable Metal Contents in Highway Soils

Şerife TOKALIOĞLU, Şenol KARTAL and Gökhan BİROL
Erciyes University, Faculty of Arts and Sciences, Department of
Chemistry,
TR-38039, Kayseri-TURKEY
e-mail: serifet@erciyes.edu.tr

 [Keywords](#)
[Authors](#)



chem@tubitak.gov.tr

[Scientific Journals Home](#)
[Page](#)

Abstract: A sequential extraction procedure, a three-step protocol proposed by the Standards, Measurements and Testing programme (SM & T--formerly BCR) of the European Union, was applied to soil samples for the determination of metals (Cd, Co, Cr, Cu, Fe, Mn, Ni, Pb and Zn). This procedure provides measurements of extractable metals from media such as acetic acid (0.11 mol L^{-1}), hydroxylammonium chloride (0.1 mol L^{-1}) and hydrogen peroxide (8.8 mol L^{-1}) plus ammonium acetate (1 mol L^{-1}), which are exchangeable, reducible and oxidisable metals, respectively. Analyses were carried out using flame atomic absorption spectrometry (FAAS). The results obtained from the sequential extraction procedure were compared with pseudototal metal levels obtained with aqua regia digestion. The amounts of metals extracted by the sequential extraction procedure generally agreed well with pseudototal digestion results with aqua regia. Recoveries were found to be satisfactory and the detection limits of the elements investigated were in the range 0.01 to $0.72 \mu\text{g mL}^{-1}$ for the different extraction stages. The effect of matrix components on the determination of metals was investigated by using a standard additions method. This study illustrates the importance of considering metal speciation when assessing the mobility of potentially toxic elements in industrially (especially from traffic) contaminated land. Enrichment factors were calculated based upon abundances of the elements in the Earth's crust for soils, taking into consideration their total metal levels. This approach may represent a new dimension in the understanding of the dry and wet accumulation or pollution load of toxic heavy metals in soils.

Key Words: Sequential extraction, heavy metals, highway soils, enrichment, flame atomic absorption spectrometry

Turk. J. Chem., **27**, (2003), 333-346.

Full text: [pdf](#)

Other articles published in the same issue: [Turk. J. Chem., vol.27, iss.3.](#)