Miniaturisation of a sequential extraction method for the fractionation of potentially toxic elements in urban particulates

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Total concentrations are insufficient to assess the environmental impact of potentially toxic elements (PTE) associated with urban solids such as dusts and airborne particles. A better approach is to fractionate the PTE content, hence obtaining information on potential mobility, bioavailability and toxicity.

Fractionation is often performed using sequential extraction, for example the modified sequential extraction procedure proposed by the European Community Bureau of Reference (BCR) [1]. Unfortunately, this protocol specifies the use of 1 g sample mass, which may be difficult to obtain in some circumstances.

This work attempts to miniaturise the BCR procedure with the aim of applying it to road side dust and airborne particles, which may be available in only mg quantities.

The effect of changing the sample size (1, 0.5, 0.25, 0.125 and 0.0625 g) on the amount of Cr, Cu, Fe, Mn, Ni, Pb, and Zn extracted in each step of the procedure from two particle size fractions (1000-500 and < 45 µm) of a Glasgow urban soil were studied. The analytes were determined using ICP-AES (Perkin Elmer Optima 3000). Results obtained in each fraction were statistically compared (P= 0.95) for all the elements studied and no significant difference was found for most of the steps when the sample sizes were varied but significant differences were found when the particle size and the centrifuge tube size were changed.

References

[1] Rauret, G.et al. Journal of Environmental Monitoring 1999, 1 (1), 57-61.

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