

CHARACTERISATION OF WASTE MATERIAL MIXTURES FOR LANDFILL TOP COVER APPLICATION

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Introduction

The aim of this study is to investigate the behaviour of various waste mixtures in a landfill top cover construction. Waste materials like fly ash, sewage sludge, peat waste and gypsum were characterised and leaching behaviour of the mixtures was evaluated. The changes in distribution of trace elements in various fractions with an aid of the modified sequential extraction procedure were also investigated. Mixing various materials and using the mixtures as secondary construction materials, might lead to changes of materials behaviour that can cause leaching or immobilisation of hazardous compounds as well as the enhancement or deterioration of the mechanical stability of the construction. Therefore, it is important to understand the leaching behaviour of waste materials and their mixtures.

Material and methods

Two different ashes, sewage sludge, peat waste and gypsum waste samples were collected in the different places in Sweden. A standard one-stage compliance batch leaching test (SS-EN 12457-4) at a liquid to solid ratio of 10 l/kg (L/S 10) was applied to estimate leachable concentrations of chemicals in materials. Modified sequential extraction was performed and following fractions were obtained: *Fraction (I): Exchangeable metals. Fraction (II): Bound to Carbonates. Fraction (III): bound to Fe(III) oxyhydroxides. Fraction (IV): Bound to Fe-Mn oxides. Fraction (V): Bound to Organic matter and secondary sulphides. Fraction (VI): Residual fraction.*

Results

The following mixtures were analysed and presented in this paper: Mixture 1: MSWI fly ash 23.3%, Peat residues 53.7% and sewage sludge 23.0%; Mixture 2: MSWI fly ash 37.5%, gypsum waste 26.4% and sewage sludge 36.1%. For example mixing materials resulted in decreased leaching of Pb (Figure 1) and distribution of Pb in various fractions depends on the materials mixed (Figure 2). Further evaluation of results is on-going and conclusions will be drawn.

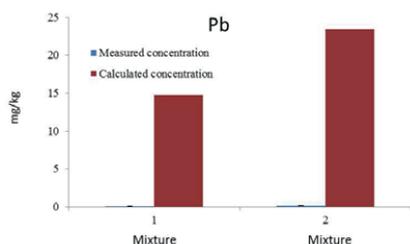


Figure 1. Measured and calculated leaching of Pb

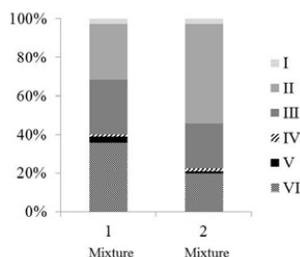


Figure 2. Distribution of Pb in various fractions