The Second Intercontinental Landfill Research Symposium, Asheville, 2002

LULEÅ UNIVERSITY OF TECHNOLOGY

Immobilisation of Cu and Cr(VI) Leached from MSWI Bottom Ashes Using Organic Matter Amended Soil

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Introduction

The use of bottom ashes from MSWI in road constructions leads to consequent problems of a site contamination.

Organic matter (OM) amended soil could be used as a cover material for the ditches constructed along the roads to immobilise metals in the soil and prevent groundwater pollution.

Risk: alkaline leachate conditions lead to dissolution of soil OM, which may increase the mobility of soluble metal-OM complexes.

Research question

What is the influence of leachate properties (high pH, high ionic strength) on the retention capacity of the mould and peat towards Cu and Cr(VI) leached from bottom ashes?

Experiment and results

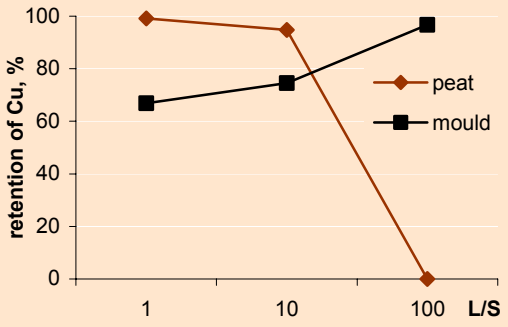
Peat and soil-compost mixture (mould) were used in the laboratory column test using leachate generated from the MSWI bottom ashes at L/S of 1, 10, and 100 l/kg.

Characteristics of the leachate used in column test

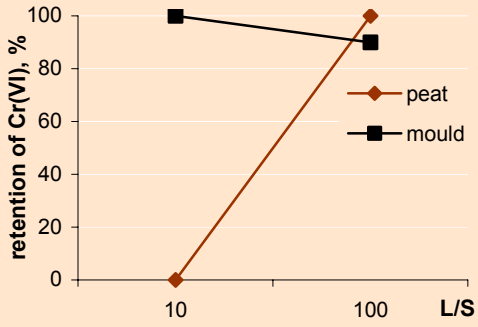
L/S	Cu (µg/l)*	Cr (µg/l)*	pH	EC (dS m^{-1})	I (mol m^{-3})
1	4670	<0.3	12.6	29.90	0.42
10	707	3	12.6	8.61	0.32
100	75	5	11.7	1.04	0.07

* Permissible levels for Cu and Cr in drinking water in Sweden are <50 µg/l

Retention of Cu by substrates using leachate of L/S 1, 10, 100



Retention of Cr(VI) by substrates using leachate of L/S 10 and 100



Conclusions

- The retention capability of peat towards Cu and Cr increased with increasing pH and metal concentration in the leachate despite the dissolution of SOM. High ionic strength of ash leachate favoured the retention of metals.
- The retention capacity of the mould towards increasing concentrations of Cu and Cr was limited. However, mould was more effective in retention of metals at low initial concentrations and low ionic strength of the solution.