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Treatment of leachate from alternative landfill covers with macro-porous cryo-gels

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Every year approximately 1 million ton of bottom ash (BA) is produced in Swedish waste to energy plants. Due its good geotechnical properties, BA is reused as an alternative construction material for landfill covers. This practice, however, has resulted in a need for treatment of drainage discharge or leachate from landfill covers since BA as compared to natural materials (sand and gravel) is enriched in various metals. The treatment of this leachate is not possible in existing treatment system due to low volume and the high strength of the leachate. Therefore, there is a need for an on-site treatment system which is low cost and efficient in pollutant removal. The objective of the present study was to test a low cost treatment method for the landfill cover leachates. The leachate treatment method was based on macro porous cryo-gels (MPCGs) with chelating ligands as adsorbing agent. The study particularly focused on removal of metal ions such as Al, Cu, Zn and Pb. The samples of bottom ash were washed at different liquid to solid ratios to generate leachates of various quality. Later the leachates were passed through glass columns, filled with gel containing beads, in upward flow conditions. The results showed that the MPCG system was capable of effectively handling the landfill cover leachates and treated leachates were able to meet the Swedish Environmental criteria for wastewaters. Higher removal efficiencies were achieved for divalent metals such Cu and Al (Fig 1) at lower liquid to solid ratios. However, at high liquid solid ratio 10 the leachate was too diluted to be treated effectively and resulted in errors. Therefore, it is recommended that dilution of the leachate should be avoided during onsite collection and storage. Further work is suggested on recovery of adsorbed metals especially Cu and Al through selective precipitation.

Biography

Aamir Ilyas is a PhD candidate at Department of Water Resources Engineering, Lund University. This paper is a part of PhD project on study of interactions of water and municipal solid waste incineration bottom ash at reuse sites and associated environmental impacts.

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