Improvement of leachate quality and waste stabilization in pilot-scale bioreactor landfills containing geotextile filters and sewage sludge

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**ABSTRACT**

In many developing countries, there has been growing interest in bioreactor landfills for municipal solid waste (MSW) management. This research study has been conducted for comparing leachate characterization and waste stabilization in simulated pilot-scale anaerobic bioreactor landfills. Four pilot-scale reactors were constructed and operated for 540 d. This study aimed to show whether a pilot-scale bioreactor containing sewage sludge mixed with MSW, with a geotextile filter in its drainage layer, and with recirculating leachate, could improve leachate quality and waste stabilization in a landfill. Bioreactor R1 comprised MSW and sewage sludge, while bioreactor R2 was the same as R1 but with a geotextile-1 (GT-1) filter fitted. R3 contained no sludge but only MSW and GT-1 fitted, while R4 contained no sludge but only MSW and two layers of geotextile filter (GT-2 and GT-3). All reactors were operated with leachate recirculation, simulating bioreactor landfills. The results showed that the chemical oxygen demand (COD) half-lives of leachate from the reactors were approximately 8, 7, 9, and 10 months for R1, R2, R3, and R4, respectively. By the end of the study, the waste in R2 and R4 was more stable, with 66% and 65% reductions in volatile solids, respectively. Reactor R2, which contained MSW, sewage sludge, and one-layer geotextile (GT-1), provided higher stabilization of MSW and shorter COD half life than the other reactors.

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