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Low-Cost Anaerobic Treatment Method for Landfill-Leachate
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Anaerobic treatment methods are usually suitable for landfill-leachate. However, most of the anaerobic methods are quite expensive due to the high cost of artificial filtration media. Hence the aim of this study was to investigate the performances of several low-cost/waste materials as filtration media in anaerobic filters to treat landfill-leachate. The experimental set-up consisted of four anaerobic filter columns, two of which were controls while the other two were experimental columns. One control column was filled with granular activated carbon (GAC) and the other with plastic pall rings (PPR). One experimental column was filled with a mixture of dewatered alum sludge (DAS), sea sand (SS) and firewood charcoal (FC), while the other column with the same materials as layers. Throughout the experimental run of applying 10% landfill-leachate continuously as influent, the removal efficiencies of COD (76%), BOD₅, TN (63%) and NH₃-N (54%) of the layered low-cost filtration materials were higher than those of the mixed filtration materials. The BOD₅ removal efficiency rapidly increased up to 80% and remained constant. The average TP removal efficiency of the layered media was 70%. The average removal efficiencies of Pb, Cd and total dissolved solids (TDS) of the experimental columns were 42%, 63% and 55%, respectively. Overall, the removal efficiencies of the measured contaminants in the experimental columns were higher than those of the PPR column and lower than those of the GAC column. The results prove that the low-cost materials can effectively be applied as filtration media.

Keywords: landfill-leachate, anaerobic filters, filtration media, organic, compounds, nutrients, heavy metals