

(237)

Development of a Laboratory Scale Filter Using Laterite to Treat Landfill Leachate

Nayanthika I.V.K.* and Jayawardana D.T.

*Department of Forestry and Environmental Science, University of Sri Jayewardenepura, Sri Lanka
knayanthika@yahoo.com

Abstract

Municipal Solid waste (MSW) is a severe problem in Sri Lanka due to lack of proper solid waste management system, and leachate is one of the major issue associated with MSW. Around 95% of MSW is disposing into poorly managed open dump sites, where do not have methods to treat the leachate. Therefore, proper low-cost leachate treatment method is highly demanded in Sri Lanka.

This study was carried out to develop a laboratory scale filter using laterite based earth materials in order to remove the pollutants from leachate. Study the durability of the filtering media and possible composition are the other aims. Six laterite soil samples were collected from six different locations in western province were geochemically tested prior to use as a filtering media.

The experiment setup was designed with five filter columns. Four columns were made using laterite soil by mixing with 10%, 20%, 30%, and 40% compost ratios by weight. Remaining column was made from pure laterite as a control. Each column consists of 2 kg of filtering medium. Leachate from Karadiyana landfill site was used for the experiment after 50% dilution. Leachate feeding was done, with total volume of 750 ml per day by keeping two days of recovering time between each feeding session. The removal efficiencies of BOD, COD, TSS, TDS, conductivity, pH, Oxidation-Reduction Potential, phosphate, nitrate, and selected heavy metals such as Cu, Mn, Zn, Cd, Ni, Pb, and Fe were analyzed in fifty days of time period.

Results indicate that, there are different filtering efficiencies for different parameters. In each column, pH level of the filtrate was within 6.3-8.0 and all were contributed to oxidize in the influent leachate. Filtering efficiencies for the important pollutants of leachate such as BOD, COD, phosphate, nitrate, and all the heavy metals were stable in considerable level even after fifty days of experiment except TSS, TDS, and conductivity. This indicates higher level of durability of the filtering materials. In general, life time of the filtering media has been enhanced by the batch wise feeding method. Therefore, further feeding of leachate is needed to select the suitable filtering media.

Keywords: Laterite, Leachate, Removal efficiency