

Adsorption characteristic and permeability for three mixed materials in Sri Lanka

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In developing countries including Sri Lanka, municipal solid waste is often dumped directly without incineration or any other treatments, resulting in groundwater contamination by leachate originated from the dumped waste inside. Because the leachate contains harmful chemical compounds such as heavy metals, it is important to treat the groundwater contaminated by leachate with low-cost and maintenance free systems. Permeable reactive barrier (PRB) system is suitable as in-situ remediation technique for the contaminated groundwater. In this study, adsorption (for Cd and Pb) and permeability characteristics were evaluated for locally available and low-cost materials (soil, coconuts shell biochar, and crushed brick) obtained from Sri Lanka as filling materials in the PRB system. In the experiments, the mixed materials with different ratios were used. Maximum adsorption capacity for both Cd and Pb was the highest observed in biochar 100%. For the permeability characteristics, hydraulic conductivity for the mixed materials generally increased with decreasing degree of compaction. The mixed material, soil 25% + biochar 25% + brick 50%, showed the highest hydraulic conductivity at degree of compaction with around 75%, showing more than 10^{-3} cm/s.

Keywords: Leachate, Permeable reactive barrier (PRB), Adsorption Characteristic, Hydraulic Conductivity, Degree of compaction