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Comparison of Filter Media for Wastewater Treatment by a Prototype Trickling Filter

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Abstract

The microbial process of wastewater treatment, attached growth, has significantly improved during recent years. Different filter media are used for microbial attached growth in trickling filters (TF) in the world. One of the main functions of filter media is the high surface area for the attachment of microorganisms to grow. Major wastewater treatment plants use stones as a medium for increasing the surface area in TFs. The proper grade of stone could not always be found within a reasonable distance from the wastewater treatment plant sites, significantly increasing transportation costs. Low-cost substitute materials, instead of stones, can reduce the cost of TF while increasing their treatment efficiency. This study attempted to use crushed waste polythene as a low-cost substitute material for stones. The objectives of this study were to evaluate the performance of prototype TF with crushed waste polythene and; to compare the treatment efficiency of two prototype TFs (with stone and with crushed waste polythene). Two prototype TFs were prepared using plastic barrels (250L) with two types of filter materials. The flow rate of the filters was 922mL/min and trickling filters were evaluated for two months for treatment efficiency. Water samples were taken before and after the trickling filter to determine the treatment efficiency. During the process of trickling filters, COD removal appeared to increase and it may be due to the adaptation of microbes to the new environment. The COD removal was comparatively higher in trickling filters with crushed polythene (62%) than in stones (42.6%). Almost similar results of pH and EC were found in both trickling filters. Total solids in treated wastewater were also almost similar in the two trickling filters. Based on the results of this study, it can be concluded that crushed polythene is a good alternative for stones in trickling filters.

Keywords: Crushed polythene, Filter material, Stone, Trickling filter, Wastewater