

Improvement the Quality of Wastewater using Porous Concrete for Irrigation

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Abstract

In recent years, due to the overpopulation, serious water shortages, and need to consume more water, the use of wastewater treatment plant has attracted lots of attention. When the pollution load is not high, biofilm reactors are commonly used for the purpose. In this study, the porous concrete as a bed biofilm in reducing pollution load of wastewater was investigated. In order to evaluate porous concrete, basic mix designs were selected according to regulations ACI211.3R. To increase the specific surface area of concrete for biofilm growth, fine particles were added to the basic mix in three stages with each stage 10% by weight of coarse particles. Experimental design was a randomized complete block. A rectangular channel (with the cross section $20 \times 30 \text{ cm}^2$) and 8 meters in length was constructed near the wastewater treatment plant of Isfahan University of Technology. Then, the concrete blocks were made, put on the channel and biofilm processing operations were conducted on the pores of porous concrete cubes. Qualitative tests for BOD, COD, TSS and total coliform of samples from wastewater inflow and outflow were performed. Results showed that the removal of these parameters increased by adding fine particles. The average removal rates of BOD, COD, TSS and total coliform for the first mix design (1400 kg per cubic meter of coarse particle and without fine sand) were 25%, 33%, 45% and 37%, respectively. Similarly, the average removal rates of BOD, COD, TSS and total coliform for the fourth mix (1400 kg per cubic meter of coarse particle and 420 kg per cubic meter of fine sand) were 36%, 40%, 57% and 81%, respectively. It could be concluded that porous concrete can be used as a bed biofilm, and the third mix design (1400 kg per cubic meter of coarse particle and 280 kg per cubic meter of fine sand) was the best mix design.

Keywords: Effluent, Biofilm, BOD, COD, TSS, Total coliform.

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