Research on the possibility of using moving bed biofilm reactors for treating car wash wastewater

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Abstract
Wastewater from car washes is an important environmental problem worldwide, both quantitatively and qualitatively. The goal of the article is to investigate the influence of the type and geometry of biofilm carriers on the efficiency of wastewater treatment in moving bed biofilm reactors. The experiments were conducted on laboratory models, in 4 types of biological reactors allowing treatment of 20 L of wastewater each. Three types of biofilter media were used as filling for the bioreactors: Mutag BioChip 30™, BioFLO 9 and Hel-X (H2X36 35/36), and the control group as reference. The tests were carried out for the retention times of wastewater in the bioreactors: 0 h (raw sewage), 1, 3, 6 and 20 h. In each measurement series, the following physical and chemical parameters were measured: organic matter chemical oxygen demand (COD), biochemical oxygen demand (BOD5), total nitrogen (TN) and total phosphorus (TP), colour, turbidity, pH and conductivity. The conducted experiments proved that the application of filter media (as a biological bed) in each of the tested variants resulted in the significant reduction of analyzed wastewater parameters. The main research results indicated Mutag BioChip 30™ carriers as the most effective type of biological filter media. Bioreactors with the aforementioned carriers achieved up to 90% color removal and 94% suspended solids reduction in raw sewage. The COD and BOD5 reduction was also highly effective, reaching 66%–73% reduction, respectively. The removal of nutrients was also significant, with a reduction of 58% for TN and 68% for TP. The lowest treatment efficiency and circulation parameters were observed for Hel-X (H2X36 35/36) bed.

Keywords: Moving bed biofilm reactors; Biological beds; Car wastewater treatment; Water quality

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