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Application of hybrid biological techniques to the treatment of municipal wastewater containing oils and fats

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ABSTRACT

The research into the treatment of wastewater containing oils and fats (O&F) was carried out with a biological technique under aerobic conditions. Four laboratory installations were used: (1) activated sludge tank equipped with a secondary settling tank (AS-ST), (2) AS-ST and an ultrafiltration (UF) membrane module (AS-ST-UF), (3) membrane bioreactor (MBR) and (4) MBR with a nanofiltration (NF) membrane module (MBR-NF). AS-ST produced different wastewater treatment results from 46.1 to 91.5% (COD), 79.3% on average and from 85 to 92.5% (BOD_5), 91.2% on average. The application of additional treatment of wastewater with membrane techniques (AS-ST-UF) enables an increase in the effectiveness of the entire process up to 86% (COD). However, the formation of concentrates is its disadvantage. MBR yielded high and stable effectiveness of wastewater treatment containing O&F from 91.5 to 92.8% (COD), 92.2% on average and from 89.1 to 92.4% (BOD_5), 91.1% on average. In order to produce a very high effectiveness (100% COD), MBR can be facilitated by an additional step using a NF module. The wastewater treated in the MBR is transferred to the NF module where the wastewater is concentrated and the concentrate is gradually returned to the MBR, thereby increasing the reaction rate in the MBR.

Keywords: Wastewater treatment; Aerobic processes; Activated sludge; Edible oils

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