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REMOVAL OF BISPHENOLS A AND S DURING WASTEWATER TREATMENT IN A BARDENPHO MODIFIED INTEGRATED FIXED FILM ACTIVATED SLUDGE REACTOR

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Abstract
Conventional biological wastewater treatment technologies have shown limited efficiency to remove micropollutants in aqueous phase. Physical-chemical methods usually involve high cost, high energy input, and can generate toxic sludge. Therefore, in recent years, the attention of many researchers has turned to the improvements that can make biological treatment more effective for micropollutants removal, and for that, multi-stage hybrid bioreactors systems seem to be a promising strategy. In the present study, a non-conventional pilot reactor was evaluated for the treatment of real wastewater with highly variable composition over time, with a focus on the removal of two micropollutants of concern: Bisphenol A (BPA) and Bisphenol S (BPS). The reactor was formed by six treatment units/tanks (Anaerobic, Anoxic 1, Aerobic, Anoxic 2, Aerobic, and Sedimentation tank) with moving bed biofilm (MBBR) in the first aerobic tank. After the acclimatization period, weekly sampling was carried out during eight weeks at eight sampling points. BPA and BPS concentrations in the raw sewage were 112.6 ± 49.5 μg L^{-1} and 6.6 ± 3.0 μg L^{-1} respectively. After the sewage passed through the Anaerobic and the Anoxic tanks, BPA and BPS were reduced in 55.1 ± 20.2% and 65.3 ± 20.4% respectively. After the sewage passed through the Aerobic Tank, the reductions of BPA and BPS were 98.8 ± 0.8% and 97.4 ± 1.8% respectively. A negligible contribution to the reduction of BPA and BPS was observed in the other tanks in the system, resulting in a final removal of 99.8 ± 0.1% and 97.7 ± 1.0% for BPA and BPS respectively. The efficiency achieved by the reactor was higher than those achieved by most biological treatment systems reported in the literature. The concentrations of BPA and BPS in the final effluent were 230.3 ± 90.0 ng L^{-1} and 146.4 ± 99.6 ng L^{-1} respectively.

Keywords: Bardenpho modified, MBBR, IFAS, micropollutants, Bisphenol

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