

ORIGINAL PAPER

Assessment of the fate of some household micropollutants in urban wastewater treatment plant

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Everyday domestic activity is a significant source of water pollution. The presence of six household micropollutants in an urban wastewater treatment plant (WWTP) was assessed in wastewater and sludge. A multi-target analytical method was developed for the quantification of ibuprofen, erythromycin, ofloxacin, 4-nonylphenol, 5-chloro-2-(2,4-dichlorophenoxy)phenol (triclosan), and sucralose. The micropollutants were extracted from the liquid and solid phases and their concentrations were determined by LC-MS/MS. The efficiency of micropollutants' removal within a conventional activated sludge process was assessed. From 50 % to 90 % of ibuprofen and erythromycin was removed from the wastewater liquid phase. Their removal can be attributed to biological degradation as they were not found adsorbed on the outlet sludge. Ofloxacin and triclosan were removed from the liquid phase with similar efficiencies; however, they were adsorbed on the sludge, so it was not possible to determine their removal mechanism (whether biodegradation or displacement to solid phase/sequestration). Sucralose was not removed from wastewater ($3 \mu\text{g L}^{-1}$ in inlet and outlet liquid phase) and not adsorbed on the sludge. 4-Nonylphenol concentrations were sometimes higher in the WWTP outlet water; this may relate to the degradation of alkylphenol ethoxylates in the wastewater treatment process. 4-Nonylphenol was always present in the outlet sludge.

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Introduction

Our society's development over the past fifty years has led to the increased use of pharmaceutical products and complex chemicals in households. Hence, our everyday life has become a source of environmental pollution transported by urban wastewater. Wastewater treatment plants (WWTPs) have been designed to eliminate macropollutants such as organic matter,

nitrogen, and phosphorus. Even if the removal mechanisms for conventional contaminants are largely understood, this is not the case for most of the micropollutants (Radjenović et al., 2009a; Suarez et al., 2010). The removal of compounds such as pharmaceuticals, personal care products or surfactants is not commonly investigated because few or no regulations exist for their release in water bodies. The EU Parliament (2008) has established an initial list of just 41

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