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BOOK OF ABSTRACTS

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OP1.8 - EXPLORING THE FATE OF CHIRAL PHARMACEUTICALS IN AN AGS SYSTEM UNDER SALTWATER INTRUSION PHENOMENA

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ABSTRACT

Aerobic granular sludge (AGS) is a robust technology, largely adopted in wastewater treatment plants (WWTPs) worldwide. However, there is a lack of knowledge regarding how this technology deals with saltwater intrusion and variable daily wastewater salinity loads. With the sea level rise, in coastline WWTPs, seawater infiltration into sewers is a growing problem. In addition, the increase in pharmaceutical production and consumption led to their accumulation in wastewater. Many of these are chiral pharmaceuticals (CPs) whose enantiomers can differ in their degradation ratio and toxicity in the environment. The fate of CPs in AGS systems is scarcely reported, especially if combined with variable salt concentration in wastewater.

In this study, an AGS reactor was operated for 132 days for the treatment of urban saline wastewater sporadically containing a mixture of CPs namely: tramadol and venlafaxine and its metabolites o-desmethyltramadol and o-desmetylvenlafaxine, respectively, at concentrations near those found in the environment (8 µg/L). Both daily salinity fluctuations and the presence of CPs in wastewater did not affect the biological removal of COD, N, and P. However, the AGS system was not able to remove the CPs that ended up in the effluent. To address this challenge, a parallel experiment was performed using a bone char material derived from fish-food waste (tuna bones) to adsorb the pharmaceuticals tramadol and venlafaxine. The bone char exhibited removal efficiencies of around 40%, as such in combination with AGS systems it can help to decrease the release of CPs into the environment.

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