Closing Gaps of Knowledge with respect to Advanced Chemical Oxidation Processes for the Removal of Contaminants of Emerging Concern

GAPS

ΚΟΥΛΤΟΥΡΑ/ΒΕΝΣ/0412/24

Deliverable 9 (D9) of Work Package 3 (WP3):

A comprehensive report including the analysis of the information presented in the 3 activities of WP3

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Brief Summary

Dissolved effluent organic matter (dE_fOM) constitutes the major fraction of the effluent organic matter (E_fOM) present in biologically treated wastewater. dE_fOM contains a heterogeneous mixture of refractory organic compounds with diverse structures and varying origin, including natural organic matter, soluble microbial products, endocrine disrupting compounds, pharmaceuticals and compounds of personal care products, disinfection by-products, metabolites/transformation products and others, which can reach the aquatic environment through reuse applications. Due to its chemical complexity, it is necessary to utilize a battery of complementary analytical techniques to adequately describe its structural and functional character. dE_fOM has shown to exhibit contrasting effects towards various aquatic organisms. It decreases metal uptake, thus potentially reducing their bioavailability to exposed organisms. On the other hand, dE_fOM can be adsorbed on cell membranes inducing toxic effects. In this Deliverable, the performance of various advanced treatment processes (i.e. membrane filtration, activated carbon adsorption, ion-exchange resin, and advanced chemical oxidation processes [AOPs]) in removing dE_fOM from aqueous matrices was evaluated. For this purpose and wherever possible, data on the dE_fOM removal were provided, so as to be able to extract solid conclusions with regard to the varying experimental conditions applied. In general, the literature findings revealed that dE_fOM removal by advanced treatment processes depends on the type and the amount of organic compounds present in the aqueous matrix, as well as the operational parameters and mechanisms of the treatment.

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