

EVALUATION OF PERACETIC ACID FOR THE REMOVAL OF PHARMACEUTICALS IN WASTEWATER

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contaminants.

Chlorine disinfection is traditionally applied in tertiary treatment of urban wastewaters with the aim of reducing microbial contamination and preventing the spread of pathogens into the environment for their capacity to inactivate bacteria, viruses and protozoan cysts. However, it has long been warned that chlorine and its compounds react with organic matter present in wastewater (humic and fulvic acids) leading to the formation of toxic disinfection by-products (DBPs) like trihalomethanes and haloacetics with mutagenic and/or carcinogenic activity that are potentially harmful to human and aquatic organisms. Moreover, where reclaimed water is applied for environmental uses, or uses in which water is discharged into the environment (i.e., into a coastal stream for seawater intrusion control), the effect of the residual chlorine, even if applied at these low polishing doses, has been observed to be negative for the aquatic ecosystem.

Peracetic acid or peroxyacetic acid (PAA) is proposed as an alternative to chlorine for the disinfection in wastewater treatment plants (WWTPs). Peracetic acid is a strong oxidant and disinfectant whose oxidation potential is larger than chlorine or chlorine dioxide. PAA was found to be effective against bacteria and viruses present in urban wastewater and recently has been shown to produce only carboxylic acids after reaction with organic material, which has no mutagenic properties.

Recent studies have shown that removal in wastewater treatment of pharmaceuticals active compounds (PhACs) is often incomplete because WWTPs are not designed to remove quantitatively organic compounds. Some of the most representative PhACs found in WWTPs are lipid regulators as clofibrac acid and non-steroidal anti-inflammatory drugs as diclofenac, naproxen and ibuprofen, which have been detected at levels of several $\mu\text{g l}^{-1}$ in effluent wastewater.

A comparison of the efficiency of PAA and chlorine treatments in the removal of PhACs in reclaimed water have been carried out. Also, PAA and chlorine treatments combined with UV disinfection have been tested in laboratory experiments and in El Port de la Selva WWTP (Northern Costa Brava, Girona).