

# ASSESSMENT OF ADVANCED PHOTOCATALYTIC OXIDATION PROCESS FOR MICROPOLLUTANT ELIMINATION IN MUNICIPAL AND INDUSTRIAL WASTE WATER TREATMENT PLANTS

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**P**harmaceuticals, personal care products, pesticides and other chemicals used for domestic purpose or industrial production are continuously discharged into wastewater and lead to global contamination of the aquatic environment. Conventional wastewater treatment removes only 20 to 50% of micropollutants. Analytical methods become more and more sensitive so that traces of organic compounds are nowadays detected in waste, surface and ground waters. The objective of the AOPTi project is to develop and validate an innovative technology to ensure efficient elimination of different types of micropollutants and toxic effects in waste water. The process is a tertiary treatment process, which can be easily integrated into municipal and industrial WWTPs. The process is based on oxidation by ozone and a subsequent photocatalytic treatment combined with a biological active adsorption step as final finishing process. Treated water will be characterized in term of chemical transformation products and toxicity. At the laboratory scale, 24 major micropollutants have been chosen to model waste water like pesticides, brominated compounds, pharmaceuticals, industrial chemicals, contrast agent. Their degradations are quantified by GC-MS/MS and UHPLC-MS. Photocatalysts have been synthesized by organic sol-gel method. The best photocatalyst for the degradation of the 24 micropollutants is TiO<sub>2</sub> doped with 2 wt% of Ag and 10 wt% P25. A film was then deposited inside the long alkaline-free tube for a pilot test. Experiments were conducted on 150 L of model water and on toxic industrial waste water at the exit of a WWTP. It is concluded that the use of an ozonation treatment followed by a photocatalytic treatment allow disrupting different micropollutants present in waste waters. Waters toxicity is evaluated before and after ozonation + UV photocatalytic treatments with daphnia magna microorganisms according to ISO Standards methods.

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