



Removal of a mix of endocrine disrupters from different natural matrices by ozone/activated carbon coupling process

Tatianne Ferreira de Oliveira^a, Benoît Cagnon^b, Olivier Chedeville^{b,*}, Henri Fauduet^a

^aICOA, CNRS-Université, Rue d'Issoudun, BP 16729, 45067 Orléans, France

^bCRMD, CNRS-Université, 1B, Rue de la Ferrollerie, 45071 Orléans, France

Tel. + 33 02 38 41 72 64; Fax: + 33 2 38 49 44 25; email: olivier.chedeville@univ-orleans.fr

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ABSTRACT

Ozone (O₃)/activated carbon (AC) coupling was studied for the removal of phthalates. These compounds, intensively used as additives (particularly as plasticizers), are suspected to be endocrine disrupters and carcinogenic compounds. The aim of this work was to study the removal of a mix of different phthalates (dimethylphthalate [DMP], diethylphthalate and diethylhexylphthalate) present in different matrices (deionised water, tap water, surface water and municipal wastewater treatment plant [WWTP] outflow) by O₃/AC coupling. Two different ACs (basic and acid) were used to study the influence of the material on the coupling process. Results were compared to those obtained with both ozonation and adsorption processes. Degradation kinetics was modelled by a global pseudo-first-order kinetic model based on the sum of all the effects occurring during the treatment process. The results obtained with deionised water show that the degradation kinetics strongly depends on the pH value. Experiments performed with more complex matrices doped with phthalates show that the presence of natural radical scavengers and competitive reactions with other products lead to a significant decrease in the phthalate degradation kinetic constants, which vary for DMP from 0.262 min⁻¹ (tap water) to 0.148 min⁻¹ (municipal WWTP outflow). Nevertheless, in all experimental conditions, and with all the matrices used, O₃/AC coupling was much more efficient at removing phthalates than conventional methods.

Keywords: Ozone/activated carbon coupling; Phthalates; Wastewater treatment; Natural matrices

*Corresponding author.