

Photodegradation of diclofenac in wastewaters

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ABSTRACT

A major environmental concern has recently developed due to emerging pollutants (EC) that are nowadays being detected in the effluents of municipal and industrial wastewater treatment plants (WWTP) at very low concentrations, thanks to improved analytical techniques. Pharmaceutical compounds (PhACs) are some of the most hazardous EC. These compounds can be retained into the water cycle (from users to WWTP, and then to water sources by discharge) virtually endlessly. Thus innovative solutions are required, such as the advanced oxidation processes (AOP). Among them, combined treatments based on UV light appear to be eco-friendly, giving very interesting removal efficiencies if opportunely devised. In this paper, the removal of diclofenac, a widely used non-steroidal anti-inflammatory drug (NSAID), from synthetic water streams was explored by using a lab-scale experimental device, consisting of a batch reactor equipped with a lamp emitting monochromatic UV light at fixed wavelength and intensity (254 nm; 400 mJ m⁻²). The experimental tests have been carried out to evaluate the effect of treatment time and to verify the possibility of further degrading the obtained compound. The preliminary results confirm what has been recently and unexpectedly found in literature, that is the formation of a dimer during the first minutes of photolysis, carbazole, a very stable coloured intermediate.

Keywords: Diclofenac; Photo degradation; Carbazole; Advanced oxidation processes; Modelling; Wastewaters

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