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# Kinetic study and modelling of cephalexin removal from aqueous solution by advanced oxidation processes through artificial neural networks

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**ABSTRACT**

The degradation of the antibiotic cephalexin (CEX) was studied by UV direct photolysis and hydrogen peroxide combined with UVC and solar radiation. A factorial plan was used to evaluate the efficiency of the processes and the influence of variables. UVC direct photolysis had a minor contribution (12%) on CEX removal during the UV/$H_2O_2$ treatment. The best UV/$H_2O_2$ performance from the factorial plan was able to achieve a high degradation percentage for CEX and aromaticity (83.2% and 76.2%, respectively) in 60 min, while solar photolysis was not able to achieve high degradation percentage at the applied conditions. Statistical analyses pointed to the high statistical significance of the oxidant concentration for the process and the weak dependence of the other variables. The kinetic study demonstrated that the pseudo-first-order model was the more appropriate for both direct photolysis and UV/$H_2O_2$ treatments with rate constants of $k_{UVC}$ = 0.0031 $min^{-1}$ and $k_{UV/H_2O_2}$ = 0.0367 $min^{-1}$. The use of artificial neural network was proven to be efficient to predict CEX removal by photolysis and photochemical treatments from aqueous solutions.

*Keywords:* Advanced oxidation processes; Cephalexin; Photochemical oxidation; Photolysis; Artificial neural networks

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