PHOTOCHEMICAL DEGRADATION AND MINERALIZATION OF AMOXICILLIN IN DIFFERENT WATER MATRICES

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There are various sources of pharmaceuticals exposure to the aquatic environment such as effluent discharge of pharmaceutical industry, hospital wastewater and excretion from humans and livestock [1]. Antibiotics are generally only partially removed by conventional wastewater purification processes as these are not designed to completely eliminate organic compounds at low concentrations [2]. Recent studies on radical-based advanced oxidation technologies (AOTs) have shown promising results to relieve this problem [3,4]. Amoxicillin (AMX), a β-lactam antibiotic, is one of the most prescribed antibiotics to humans and animals worldwide. Furthermore, it is listed as an essential medicine by WHO indicating its continuous exposure to the environment [5].

In the current study, AMX was degraded by UVC- and Fe^{2+}-activated $S_2O_8^{2-}$ processes in various aqueous matrices. The influence of oxidant and ferrous iron concentrations, pH value and water matrix (ultrapure water, groundwater, drinking water, secondary effluent) was assessed. The efficacies of the treatment were evaluated and compared by the decrease in AMX concentration and TOC content. The obtained results indicated that all the UVC-induced treatment systems proved to follow pseudo-first reaction kinetics. AMX removal was greatly influenced by the type of aqueous media. The pH value had significant impact to AMX degradation in all matrices except ultrapure water referring to buffering properties of real water matrices. The results of this research could provide important data for the removal of beta-lactam antibiotics from different environmental matrices and industrial effluents.

References

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