**Removal of selected antibiotics and antiretroviral drugs from water by ozonation and ozone-based AOPs**

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The environmental fate of pharmaceuticals has been in the scope of public concerns as well as in the focus of scientific interest since late 1990s, when ubiquitous presence of active pharmaceutical ingredients in the environment was found. Pharmaceuticals and their metabolites were quantified in surface and ground water, seawater, soil, sediment and landfill leachates in the concentrations up to μg L-1 level 1.

A recent study 2 shows that antiretroviral drugs are becoming emerging pollutants in some countries. In Nairobi Kenya for example, high concentration in the µg/L scale have been reported in river waters 2.

The presence of pharmaceuticals in the environment has diverse environmental effects, such as the development of antibiotic resistance, suppression of degradation potential of bacteria in wastewater treatment plants and toxicity to various aquatic species. It strongly indicates that abiotic elimination of pharmaceuticals from industrial and municipal wastewaters is urgently required prior to their release into natural water bodies.

We report the latest findings on application of ozonation and ozone-based AOPs (O3 + H2O2, catalytic ozonation) for removal of selected antibiotics (*sulfamethoxazole*, *trimethoprim*, and *ciprofloxacin*) and antiretroviral drugs (*lamivudine*, *nevirapine*, and *zidovudine*) from water. Quantification of the parent pharmaceuticals was performed using SPE and HPLC-MS techniques. Degradation kinetics profiles were plotted, and the AOPs were compared in terms of elimination efficiency for low and high concentrations of the pharmaceuticals. Mathematical modelling allowed to describe kinetics of ozone decomposition and assisted in estimation of the concentration of hydroxyl radical. In addition, the contributions of direct molecular (by O3) and indirect radical (by •OH) ozonation pathways were evaluated.

The obtained results can serve as a valuable basis for developing of ozone-based wastewater treatment methods for purification of industrial and hospital effluents with high concentration of pharmaceuticals.

*References*

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