Assessment of a sulfite/iron/UV-A system in urban wastewater disinfection

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Abstract

Although the application of sulfite in advanced oxidation-reduction processes has shown good results in some fields, there are very few studies addressing its efficacy in wastewater disinfection. In this study, the efficacy of a sulfite system activated by different iron species and UV-A radiation was studied for the first time in the inactivation of *Enterococcus sp.*

Among the assessed iron species, Fe(III)-cit stood out as the best sulfite activator, reaching complete bacteria inactivation (>5-log) when treating simulated wastewater, while a maximum disinfection rate of 2.3-log units was achieved when using Fe(II). However, these values dropped to 1.4 and 0.5 log, respectively, when treating real wastewater, suggesting a strong influence of the matrix composition on the treatment.

Enterococcus sp. inactivation was also negatively affected by the presence of Escherichia coli in the water. The presence of two different species in the matrix led to a significant decrease

in the efficiency of the sulfite/Fe(III)-cit system, reaching a maximum disinfection rate of 2.1-log. This result highlights the need to carry out tests to determine whether there is radical selectivity towards the different microorganisms in the matrix.

Even though radical scavengers were used to identify the main radical species involved in the disinfection, further studies are needed to fully understand the mechanisms. Nonetheless, this study is a first approach to the use of sulfite-based treatments in wastewater disinfection, and it has shown that it may be a promising alternative.

Keywords: Sulfite, ion species, wastewater disinfection, advanced oxidation/reduction processes, UV radiation.