



Evaluation of peroxide based advanced oxidation processes (AOPs) for the degradation of ibuprofen in water

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ABSTRACT

The occurrence and fate of pharmaceutically active components in the aquatic environment has been recognised as one of the emerging issues in environmental chemistry. One key component, which is found in considerable concentrations in European natural waters and is only partially eliminated during biological wastewater treatment is ibuprofen (IBU). This paper studies the application of classic Fenton, photo-assisted Fenton, H₂O₂/UV and peroxy-monosulphate (POMS) oxidation for degrading IBU from wastewater. It is seen that the applied advanced oxidation processes are capable of effectively degrading the IBU, with the photo-assisted Fenton oxidation having the highest efficiency. The IBU in the mixture (at an initial concentration of 22 mg/L) is completely removed by a H₂O₂ concentration of 0.024 and 0.03 mg/L for the photo-assisted Fenton and classic Fenton oxidation, respectively. A POMS concentration of 37 mg/L is required to remove all IBU. No complete mineralization is obtained: a chemical oxygen demand (COD) removal by 89 and 88% was obtained for a H₂O₂ concentration of 0.023 and 0.03 mg/L for photo-assisted Fenton and classic Fenton, respectively. A POMS concentration of 37 mg/L resulted in a 86% reduction of COD. Finally, the main degradation products produced during the Fenton oxidation are identified and are similar to those identified in other studies dedicated to oxidative IBU removal.

Keywords: Ibuprofen; Advanced oxidation processes (AOP); Wastewater; Pharmaceutical

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