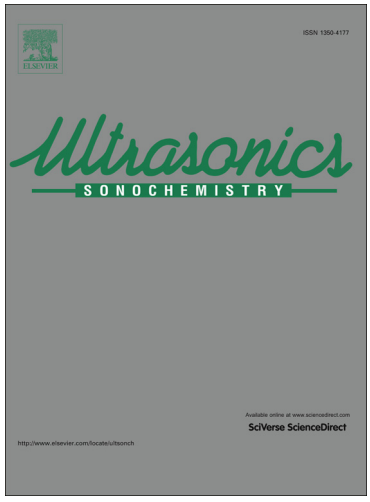

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Sono-Fenton process for metronidazole degradation in aqueous solution: Effect of acoustic cavitation and peroxydisulfate anion

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Abstract

The present work investigates the application of an improved treatment approach based on the ultrasound irradiation as clean technology driven Fenton in the presence of peroxydisulfate anion ($S_2O_8^{2-}$) for the removal of metronidazole (MTZ) from aqueous solution. The sono-generation of sulfate radicals ($SO_4^{\bullet-}$) as a stronger oxidizing agent from $S_2O_8^{2-}$ (redox potential of 2.6 V) has improved the degradation of MTZ. However, no studies have focused on the removal of MTZ using peroxydisulfate anion under sono-Fenton process. The MTZ concentration measurement during the processing allowed the evaluation of the kinetics of organic matter decay. The results have shown that the degradation of MTZ dependent on Fe^{2+}/H_2O_2 molar ratio, temperature and $S_2O_8^{2-}$ concentration. The MTZ concentration decay follows pseudo first-order kinetics, within the range studied. Sono-Fenton process using low iron and hydrogen peroxide doses was proved to be an efficient method for the elimination of MTZ with high degradation rates. At optimum conditions, 96% of MTZ removal was achieved at 60°C in the presence of 1 mM of $S_2O_8^{2-}$.

Keywords: Ultrasound irradiation; Clean technology; Fenton; Metronidazole; Acoustic cavitation.

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