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Enhanced peroxymonosulfate activation for sulfamethazine degradation by ultrasound irradiation: performances and mechanisms

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Abstract

In this study, ultrasound (US) technology was adopted for peroxymonosulfate (PMS) activation, and it increased the efficiency of sulfamethazine (SMT) antibiotic degradation. US can considerably activate PMS, increasing the SMT degradation rate by the US/PMS process up to 6.4 and 86 times that of PMS alone and US alone processes, respectively. The scavenger quenching experiments and electron paramagnetic resonance (EPR) spectrometry proved that US can activate PMS to generate sulfate radicals ($SO_4^{-}\cdot$) and hydroxyl radicals ($\cdot OH$), which contributed to efficient SMT degradation in the US/PMS system. Furthermore, density functional theory (DFT) calculations and dual descriptor were used to provide insights into SMT degradation. The calculation results offered good agreement with the experimental detection, which indicated that the central cleavages of SMT such as S–N, S–C, and

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