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Removal of Oxytetracycline Using Sonophotocatalysis: Parametric Study

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Abstract : Water treatment and especially, medicament pollutants are nowadays important problems. Degradation of oxytetracycline was carried out using combined process of low-frequency ultrasound (US), ultraviolet irradiation and a catalyst. The effectiveness of the coupled processes has been evaluated by studying the effects of various operating parameters including initial OTC concentration, solution pH and catalyst mass. For the photolysis process, the monochromatic ultraviolet light wavelength utilized was 365 nm. The sonolysis experiments were performed with ultrasound at a frequency of 40 kHz. The heterogeneous photocatalysis was studied in the presence of TiO2. The processes were employed individually, and simultaneously to examine the details of the processes and to investigate the contribution of each process. Low UV intensity (12W), low pH and high mass of TiO2 conditions enhanced the sono-photocatalytic degradation of OTC. The results showed that the individual contribution sonochemical and photochemical reactions are very low, however, their coupling increases the degradation rate of 8 times compared to photolysis and 2 times compared to sonolysis. There is a synergistic effect between the two modes of radiation, UV and U.S. leading to 82.04% degradation yield. An application of these combined processes on the treatment of a real pharmaceutical wastewater was examined.

Keywords : sonolysis, photocatalysis, combined process, antibiotic
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