



Elimination of the endocrine disruptor diethyl phthalate (DEP) using porous materials in advanced oxidative processes (AOP)

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Received 28 June 2018; Accepted 20 October 2018

ABSTRACT

The object of this study was to evaluate different methods of elimination of the micro-pollutant diethyl phthalate (DEP), within an advanced oxidative process – UV-C/H₂O₂ – and coupling with activated carbon (UV-C/H₂O₂/AC), by comparing the kinetics of each process at constant levels. This study of the kinetics of adsorption and oxidation followed a factorial design of eleven tests, varying the pH's of the medium, temperature and H₂O₂ concentration. The experimental conditions with the highest results were found in tests K9, K10 and K11, which presented a DEP elimination rate of approximately 95.82%; 98.41% and 96.90%, respectively, at pH 7, using 20 mM of H₂O₂ at 30°C for 60 min. For the elimination rate of the pollutant DEP (%), the pH variable showed a significant variance of ($p < 0.05$). The study of the contribution in heterogeneous and homogeneous phases revealed a higher percentage for homogeneous phase efficacy; however, there was AC catalytic activity determined by the application of the radical inhibitor (t-butanol). The thermo-gravimetric analysis of the AC determined the mass of the adsorbed products in the AC, whereas scanning electron microscopy analysis revealed the possibility of AC reuse, because the textural properties were maintained. Therefore, the UV-C/H₂O₂/AC coupling process proposed in the treatment of DEP elimination in effluent is efficient and is an alternative for the degradation of this micro-pollutant in aqueous phases.

Keywords: Diethyl phthalate; Advanced oxidative process; UV-C/H₂O₂, UV-C/H₂O₂/AC coupling

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