

Sulfate Radicals Applied to the Elimination of Selected Pollutants in Water Matrices

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Abstract : Five selected pollutants which are frequently present in waters and wastewaters have been degraded by the advanced oxidation process constituted by UV radiation activated with the additional presence of persulfate (UV/PS). These pollutants were 1H-benzotriazole (BZ), N,N-diethyl-m-toluamide or DEET (DT), chlorophene (CP), 3-methylindole (ML), and nortriptyline hydrochloride (NH). While UV radiation alone almost not degraded these substances, the addition of PS generated the very reactive and oxidizing sulfate radical SO_4^- . The kinetic study provided the second order rate constants for the reaction between this radical and each pollutant. An increasing dose of PS led to an increase in the degradation rate, being the highest results obtained at near neutral pH. Several water matrices were tested, and the presence of bicarbonate showed different effects: a decrease in the elimination of DT, BZ, and NH; and an increase in the oxidation of CP and ML. The additional presence of humic acids (AH) decreased this degradation, because of several effects: light screening and radical scavenging. The presence of several natural substances in waters (both types, inorganic and organic matter) usually diminishes the oxidation rates of organic pollutants, but this combination UV/PS process seems to be an efficient solution for the removal of the selected contaminants when are present in contaminated waters.

Keywords : water purification, UV activated persulfate, kinetic study, sulfate radicals

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