The photocatalytic degradation and kinetic analysis of BTEX components in polluted wastewater by UV/H2O2-based advanced oxidation

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\textbf{ABSTRACT}

The present work mainly deals with the UV-based advanced oxidation; UV/H2O2 were tested in batch reactor systems to evaluate the removal efficiencies and optimal conditions for the photodegradation of Benzene, Toluene, Ethyl Benzene, and Xylene (BTEX) in order to treat the wastewater. The influences of operational parameters such as: the initial concentration of H2O2, pH, temperature, initial concentration of BTEX, reaction time, and UV amount on the degradation of BTEX were studied. The obtained results showed that the highest degradation rate occurred during the first 30 min of the reaction time. The optimal conditions of the average and different BTEX concentrations with 0.421, 0.724, 1.11, 1.34, and 1.736 g/L initial concentrations of H2O2 and an acidic pH value of 3.1 were applied under three UV lights. Under the optimal conditions, for the average (550 mg/L) and the lowest (210 mg/L) concentration of BTEX, the chemical oxygen demand reduction reached about 90 and 98%, respectively for the UV/H2O2 system during the first period of 180 min. A kinetic analysis has been done which showed that a pseudo-first-order kinetic model with respect to BTEX concentration can be used to explain the BTEX degradation for UV/H2O2 system.

\textbf{Keywords:} Advanced Oxidation; BTEX; Photodegradation; UV/H2O2; Wastewater; COD removal