PHOTOCATALYTIC DEGRADATION OF ANILINE IN AQUEOUS SOLUTION USING ZnO NANOPARTICLES

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Abstract

Aniline is a priority pollutant, which is known as a toxic organic pollutant released as effluent from several industries. Several physicochemical methods have been used for degradation of this pollutant. In this study, photocatalytic degradation of aniline from synthetic wastewater by ZnO nanoparticle was considered. The effects of different variables, such as irradiation time, the amount of photocatalyst, initial pH values and initial concentration of pollutant on the photodegradation of aniline were investigated to find the optimum condition. A laboratory-scale batch photocatalytic reactor with a low pressure UV lamp in the center was used. Results showed that the photocatalytic system was highly efficient for degrading aniline in a reasonable time. No statistically significant changes for photodegradation of aniline was observed in different concentrations of ZnO, pH and irradiation times (P_value<0.05). The maximum degradation efficiency of aniline was 93.9% in 500 mg/L of ZnO and alkaline pH. The degradation kinetic of aniline, based on Langmuir-Hinshelwood mechanism, illustrated a pseudo first-order kinetic model with a rate constant of surface reaction equal to 3.04 mg/L.min, and adsorption equilibrium constant of 0.31 L/mg. As a conclusion, the photocatalytic process by using ZnO has great potential for aniline degradation in wastewaters.

Key words: aniline, Langmuir-Hinshelwood mechanism, photocatalytic degradation, ZnO nanoparticles

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