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Optimization of acetaminophen degradation by fluidized-bed Fenton process

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ABSTRACT

Recalcitrant compounds in pharmaceutical wastewaters render biological treatment inadequate. Conventional Fenton technology, though a promising alternative, suffers from high sludge generation. In this study, fluidized-bed (FB) Fenton process, an improvement of traditional Fenton method, was used to decompose acetaminophen (ACT) from aqueous solutions. Optimization of important parameters: initial pH, ferrous ion and hydrogen peroxide dosages, was carried out using Box–Behnken Design (BBD). Effects of all factors and their interactions on ACT decomposition were significant. At optimum operating conditions, ACT degradation reached 97.8% while iron removal of 62.92% was achieved. In addition, the high hydrogen peroxide efficiencies of FB-Fenton process with respect to ACT degradation and COD removal make this technology a cost-effective option in treating acetaminophen-contaminated wastewaters.

Keywords: Fluidized-bed Fenton process; Acetaminophen; Wastewater treatment; Box-Behnken design; Optimization; Advanced oxidation process

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