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HETEROGENEOUS PHOTO-FENTON DEGRADATION OF QUINOLINE WITH A NOVEL INTERNAL CIRCULATING FLUIDIZED-BED REACTOR

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Abstract

The removal of quinoline from synthetic wastewater by heterogeneous photo-Fenton in a novel internal circulating fluidized-bed reactor was investigated systematically. The flow field in the reactor was simulated by FLUENT software conjoined with tracer particles experiment, and the influence of reaction parameters such as initial quinoline concentration, catalysts dosage and H_2O_2 dosage were evaluated. Results indicated that the designed reactor was suitable for the heterogeneous photo-Fenton process, and the catalysts could be fully fluidized. Moreover, the quinoline degradation reactions were well described with pseudo first-order kinetics, the removal rate was negatively correlated with the initial concentration of quinoline, whereas properly increasing catalysts and H_2O_2 dosage showed a positive effect. The optimal dose of catalysts and H_2O_2 were 1.0 g/L and 14.70 mmol/L, respectively, and resulted in 94.2% removal efficiency after 120 min reaction. The results suggest that heterogeneous photo-Fenton in an internal circulating fluidized-bed reactor is potentially applicable for organic wastewater treatment.

Key words: FLUENT software, internal circulation fluidized-bed reactor, photo-Fenton, quinoline

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