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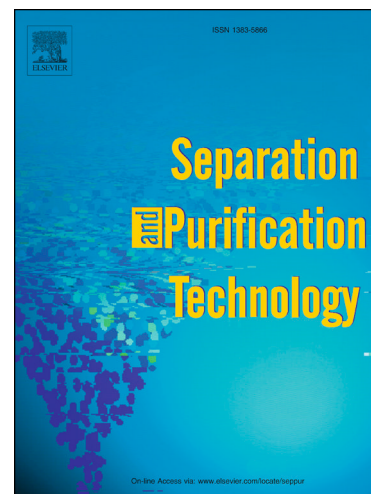
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Degradation of isopropyl alcohol using UV and persulfate in a large reactorChia-Chang Lin^{a,b,*}, Chi-Wei Tsai^a

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Abstract

This investigation concerns the degradation of isopropyl alcohol (IPA) in aqueous solutions using UV and persulfate (PS) in a large reactor, as well as the effects of PS concentration, initial IPA concentration, pH, and added anions on this process. A higher PS concentration was associated with more efficient degradation of IPA. However, an excessive PS concentration limited the degradation of IPA. Moreover, the efficiency of degradation of IPA increased with decreasing initial IPA concentration. $\text{SO}_4^{\bullet-}$ was identified by performing quenching studies using specific alcohols. The results thus obtained reveal that $\text{SO}_4^{\bullet-}$ was the predominant radical in the UV/PS process at pH 7. The degradation of IPA by the UV/PS process in a large reactor exhibited pseudo-first-order kinetics. The efficiency of degradation of IPA followed the order pH 7 > pH 4 > pH 10. Anions (Cl^- , CO_3^{2-} , and HCO_3^-) inhibited the degradation of IPA and their inhibitive effects followed the order $\text{Cl}^- > \text{CO}_3^{2-} > \text{HCO}_3^-$. At pH 7, a PS concentration of 2.10 g/L, and an initial IPA concentration of 100 mg/L, 100% of IPA was degraded in the absence of anions with an observed degradation rate constant of 0.1890 min^{-1} , as measured after 20 min. Comparison with the heat/PS process demonstrates that the degradation of IPA was improved by the UV/PS process at a low temperature. Accordingly, the proposed method that is based on the UV/PS process is an effective method for degrading IPA in aqueous solutions.

Keywords: degradation; isopropyl alcohol; UV; persulfate

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