



COMPARISON OF PHENOL PHOTODEGRADATION BY UV/H₂O₂ AND PHOTO-FENTON PROCESSES

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Abstract

In this study, advanced photochemical oxidation processes, UV/H₂O₂ and photo-Fenton systems were investigated for phenol degradation in wastewater with low-pressure mercury vapor lamp. The results indicated that in the UV/H₂O₂ system, a sufficient amount of H₂O₂ was necessary, but a very high H₂O₂ concentration inhibited the photolysis rate. The optimum H₂O₂ concentration was achieved in the range of 0.05-0.1 mol/L at phenol concentration of 100 mg/L. No pH effects were observed in the range of 4-10. The results of study showed that the UV/H₂O₂/Fe(II) system was the most effective treatment process under acidic condition and generated a higher rate of phenol degradation at a very short time. It enhanced the oxidation rate by 3 times the rate for the UV/H₂O₂ process. For all these reactions, the degradation rates are evaluated by determining their first-order rate constants and half-life times. At the optimum condition, phenol completely disappeared with UV/H₂O₂ and UV/H₂O₂/Fe(II) systems in less than 50 min and 20 min, respectively.

Key words: hydroxyl radical, phenol, photo-Fenton process, photooxidation, UV/ H₂O₂

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