



Treatment of pulp and paper wastewater by lab-scale coagulation/SR-AOPs/ultrafiltration process: optimization by Taguchi

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Received 15 April 2017; Accepted 4 October 2017

ABSTRACT

In this study, the treatment of pulp and paper wastewater using combined approach of coagulation/sulfate radical-advanced oxidation process (SR-AOPs)/ultrafiltration (UF) was studied in the lab scale. In the beginning of this system, the performance of three coagulants such as polyaluminum chloride (PACl), ferric chloride (FeCl₃) and alum was evaluated to achieve high recycled fiber. According to the results yielded, the FeCl₃, with high fiber recycling (98%) and removal efficiency, was more efficacious. In the next step, the potassium persulfate (PPS)-Fe(II) and PPS-Fe(III) efficiency in the removal of the chemical oxygen demand (COD), aromatic compounds (UV₂₅₄) and the value of sludge volume index were evaluated using Taguchi design of the experiment. The results showed that the removal efficiency of COD and UV₂₅₄ in the process of PPS-Fe(II) was 92.6% and 95.8% which had the better performance than the process of PPS-Fe(III). The results showed that electrical conductivity (EC) in coagulation/SR-AOPs had increased to 30.64%. Moreover, there was a significant amount of sulfate in the effluent; whereas, UF was applied. Accordingly, using UF after pretreatment by coagulation/PPS-Fe(II), the removal efficiency of sulfate, EC, COD and UV₂₅₄ increased to 99.44%, 62.05%, 97.35% and 98.75%, respectively.

Keywords: Advanced oxidation processes; Sulfate radicals; Coagulation; Ultrafiltration; Taguchi

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