Treatment of pulp mill waste cooking liquor using an electrocoagulation method / 謝佳融 撰 .- 彰化縣大

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ABSTRACT

In a kraft pulping process, effluents often entrain sulfides and mercaptans which give malodorous smell to the ambience. Therefore, an electrocoagulation system was used to treat the spent pulping liquor of a kraft pulp mill after adding sequestration chemicals such as calcium carbonate, iron sulfate, activated bentonite. Efficacies of the treatments in reducing sulfurous compounds in water were examined. After adding calcium carbonate and then applying an electrocoagulation treatment, the results showed good true color removal, and at a current density of 86.6 A/m2, hydraulic retention time (HRT) of 10 min, 85% of the colorant was removed. With regard to effluent COD, the aluminum electrodes outperformed cast iron electrodes, with respective removal rates of 50% and 40% at a current density of 86.6 A/m2 and HRT of 10 min. Removal of methanol was less than ideal, with a 44% removal rate under the optimal conditions. Removal of hydrogen sulfide reached ca. 80%, even the least performing aluminum electrode recorded a removal rate of 53%. Adding iron sulfate prior to electrocoagulation at 88.6 A/m2 and 10 min HRT produced result of maximal 72% true color removal. The COD removal rates were better, with 65% removal rate. Mediocre SS removal rate of 60~65% was obtained in this additive group. The methanol removal rate was the poorest, 30% at the best trial; removal of hydrogen sulfide, however attained 96% maximum, the best of 3 additives. The trials involving addition of activated bentonite prior to electrocoagulation at 86.6A/m2 and 10 min HRT produced a optimal true color removal rate of 87% with the aluminum electrodes which was not much different from the calcium carbonate group. The minimum removal rates 0f 49% for the group, however, was superior to the other 2 additives. COD removal reached 65% maximum for this group. Removal of SS was the best among the 3 groups, reaching 89% maximum. The same was observed for methanol removal rate of 46%. And hydrogen sulfide removal rate of 88% was deemed adequate. Overall, adding activated bentonite in conjunction with the electrocoagulation treatment produced superior results to those of the calcium carbonate and iron sulfite groups.

Keywords : Electrocoagulation、bentonite、pulping effluent、factorial design

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