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EVALUATION OF COMBINED FENTON OXIDATION AND CHEMICAL PRECIPITATION PROCESS PERFORMANCE IN CYANIDE REMOVAL FROM AQUEOUS SOLUTION

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Abstract

This study was conducted to evaluate the cyanide removal efficiency by coupled process of Fenton and coagulation/precipitation from aqueous solution. The study was performed at laboratory scale in a batch system. Variations of pH, Fenton and precipitation reagents (molar ratios of $\text{Fe}^{2+}/\text{H}_2\text{O}_2$ and ferric chloride), contact time and initial concentration of cyanide were investigated, and the optimum conditions obtained from each of the Fenton and precipitation processes were followed in the coupled process. The removal efficiency of cyanide during the Fenton process, reached up to 92%, however, cyanide removal by precipitation process was about 40% in optimum conditions. Combination of Fenton with coagulation process showed to outperform conventional Fenton in terms of cyanide removal and 4-log elimination was attained in this hybrid treatment process. Also, Kruskal-Wallis test showed a significant difference (5% level) among the potential of these three methods in cyanide removal ($p_{\text{value}} \leq 0.05$). Considering the effluent discharge limits for cyanide, it is concluded that except for coagulation/precipitation, two other studied processes namely Fenton process solely or coupled Fenton and coagulation process can be used for cyanide removal from aqueous solutions.

Keywords: coagulation/precipitation, cyanide, Fenton, hybrid treatment

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