

The treatment of spent caustic in the wastewater of olefin units by ozonation followed by electrocoagulation process

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ABSTRACT

The ozonation and electrocoagulation (EC) process were considered as possible methods for the treatment of spent caustic in olefin units of Arak petrochemical company in Iran. At first, the COD (chemical oxygen demand) and sulfide was removed by ozonation process and the effect of temperatures, reaction time and pH were investigated on COD removal efficiency. The experiments were designed by Taguchi method. The COD was decreased from 9600 to 3030 mg/l in ozonation at optimum conditions and the sulfide was oxidized to sulfate. At a later stage, the influence of carbon dioxide injection on reduction of the pH in the real alkaline wastewater was investigated. In the final step, the residual amounts of COD and sulfide compounds are removed by EC. The effect of the electrical current density, pH and operating time were explored on the removal of COD in EC process and the optimum conditions were obtained at 40 mA/cm², 9 and 60 min, respectively. The COD was reduced from 3030 to 250 mg/l. At optimum conditions for COD removal, the sulfide content was reduced from 2400 to 650 mg/l in ozonation and 650 to 50 mg/l in EC process, respectively. The results showed that the ozonation followed by EC process is a good and economic technique and about 97.4% of initial COD and 97.9% of sulfide content was removed in the combined process.

Keywords: Spent caustic; Electrocoagulation; COD (chemical oxygen demand); Taguchi Method; Ozonation process

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