

Optimum process condition determination for the treatment of Disperse Blue 60 dye by electrocoagulation with Taguchi method

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ABSTRACT

Wastewater produced in textile processes cannot meet the discharge standards especially in terms of color content and therefore, the treatment demand occurs. In many studies, electrocoagulation has been used in the removal of dyestuff. High removal efficiency, lower space requirement, and easy controllability are the main advantages of the EC process. In this study, removal of Disperse Blue 60 of 100 mg L⁻¹ by electrocoagulation with Taguchi method was investigated. In the reactor, monopolar-parallel connected Al anode and stainless steel cathode were used as electrode materials. The initial pH, current density, and electrocoagulation time were optimized and the effects of these parameters on the dye removal were employed at conductivities values. The operational conditions for EC process according to Taguchi model were employed as conductivity values of 500; 1,000; and 1,500 $\mu\text{S cm}^{-1}$, pH 5, 6, and 7, current density (j) of 40, 80, and 100 mA cm⁻² and electrolysis time (t) of 2.5, 5, and electrolysis time 10 min. The highest removal efficiency (99%) was attained with the conductivity of 500 $\mu\text{S cm}^{-1}$, pH 6, $j = 80$ mA cm⁻², and $t = 10$ min. However, only 34% of color were removed with the conductivity value of 500 $\mu\text{S cm}^{-1}$, pH = 5 at $j = 40$ mA cm⁻² and $t = 2.5$ min.

Keywords: Electrocoagulation; Disperse Blue 60; Textile wastewater; Stainless steel electrode; Dye removal

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