

Optimization of semi-continuous process treatment by electrocoagulation-flocculation-filtration for removal of Novacron Blue 4R (NB4R) dye using response surface methodology

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ABSTRACT

Novacron Blue 4R (NB4R) dye was removed in a semi-continuous process treatment by electrocoagulation-flocculation-filtration. Our results showed that the quadratic second order equation provided the best correlation for the decolorization of NB4R dye (CR%). On the other hand, the regression equation proved the large interaction between the current intensity and the initial concentration of the dye. Experiments were conducted to find the desired conditions for removal of the dye and lower Operation Cost. The results showed that CR% = 90.84% ($R^2 = 95.8\%$) of color removal for initial dye concentration of 30 mg/L, using a current intensity of 1 A and a flow rate of flocculent (FRF) injected of 9.14 mL/min. Under these conditions, electrical energy consumption (EEC: kWh/m³), electrode consumption (EMC: kg/m³), chemical consumption (CC: kg/m³) and operation cost (OC: US\$/m³) were respectively 0.073851 kWh/m³; 0.0184 kg/m³; 0.015 kg/m³ and 0.08474 US\$/m³.

Keywords: Dye Novacron Blue (NB4R); Electrocoagulation-flocculation-filtration; Operation cost; Optimization; Response surface methodology

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