Influence of electrodes connection mode and type of current in electrocoagulation process on the removal of a textile dye

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ABSTRACT

The main objective of this study was to investigate the operation of a continuous electrochemical reactor comprising an electrocoagulation part provided with aluminium electrodes and a settling zone, for the removal of a red nylosan dye (Acid Red 336). More precisely the effect of the operating parameters has been followed, e.g. initial pH, initial concentration (C₀), residence time (τ), current density (j), inlet flow rate (Q), direct/ alternating current (DC/AC) and electrode connection mode. Abatement yields between 87% and 96% for color and turbidity were observed with direct current, for dye concentration ranging from 100 mg L⁻¹ to 1000 mg L⁻¹, at 300 A/m², for inlet flow rate Q = 15 L h⁻¹ and 26 L/h. The specific electrical energy consumption was found at 9.5 kWh kg⁻¹ removed dye for direct current and monopolar connection. At the same current density, bipolar connection with four electrodes immersed is more effective than monopolar connection in terms of color and turbidity abatement, but with far larger energy consumption. The performance difference between the two modes at comparable energy consumption is discussed.

Keywords: Electrocoagulation; Color; Turbidity; Red nylosan dye; Electrode connection modes; Alternating/direct current

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