

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

Mohammed Tiaiba^a, Belkacem Merzouk^{b,c,*}, Abdallah Amour^d, Mohammed Mazour^a, Jean-Pierre Leclerc^e, François Lapicque^e

^aLaboratoire d'Hydrologie Appliquée et Environnement, Centre Universitaire d'Ain Témouchent, Ain Témouchent, Algérie, Tél./Fax +213 43 60 34 31, email: tiaibamohamed@hotmail.com (M. Tiaiba), mohamed_mazour@yahoo.fr (M. Mazour)

^bDépartement Hydraulique, Faculté de Technologie, Université Mohamed Boudiaf de M'sila, B.P. 166, Ichbilia, M'sila, 28000 – Algérie, Tél. +213 772 78 29 63, Fax +213 35 55 94 94, email: mbelka01@yahoo.fr

^cLaboratoire 3BS, Université de Bejaia, Bejaia 06000, Algérie

^dLaboratoire de Recherche en Hydraulique Appliquée et Environnement, Faculté de Technologie, Université de Bejaia, Bejaia 06000, Algérie, Tél. +213 661 63 28 50, email: azerfaz@yahoo.fr

^eLaboratoire Réactions et Génie des Procédés (LRGP) UMR 7274, CNRS, Université de Lorraine, 1 rue Grandville, BP 20451, 54001 Nancy Cedex, France, Tél. +333 83 17 52 66, Fax +333 73 32 29 75, email: jean-pierre.leclerc@univ-lorraine.fr (J.-P. Leclerc), francois.lapicque@univ-lorraine.fr (F. Lapicque)

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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 (C_0), 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; Elecrode connection modes; Alternating/direct current

*Corresponding author.

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