



“Gheorghe Asachi” Technical University of Iasi, Romania



ELECTROCHEMICAL DECOLORIZATION TREATMENT OF NICKEL PHTHALOCYANINE REACTIVE DYE WASTEWATER

Konstantinos Dermentzis^{1*}, Dimitrios Marmanis², Evgenia Valsamidou²,
Achilleas Christoforidis², Konstantinos Ouzounis³

¹Technological Education Institute (TEI) of Kavala, Department of Science, Laboratory of Chemical Technology - Electrochemistry, 65404 Agios Loucas, Kavala, Greece

²Technological Education Institute (TEI) of Kavala, Department of Petroleum and Natural Gas Technology, Laboratory of Environment Protection, 65404 Agios Loucas, Kavala, Greece

³Democritus University of Thrace, Department of Environmental Engineering, Laboratory of Environmental Chemistry, 67100 Xanthi, Greece

Abstract

In this study, decolorization and degradation of aqueous nickel phthalocyanine reactive dye solutions was comparatively studied by electrochemical methods, such as electrocoagulation, electrooxidation and electro-Fenton processes. In the electrocoagulation process with aluminum electrodes the colored aqueous solutions containing 100 mg/L nickel phthalocyanine and 6 g/L NaCl were treated at initial pH 7.5 and applied current densities of 5, 10 and 20 mA/cm², where fast and 100% decolorization was achieved in 10, 5 and less than 2.5 minutes of electroprocessing respectively.

The electrooxidation process was conducted in acidic electrolyte solutions containing 100 mg/L nickel phthalocyanine and 6 g/L Na₂SO₄ with Ti/Pt and graphite plate electrodes at the applied current density of 5 mA/cm². Even after 60 minutes of electrolysis time the dye remained undegradable by 17 and 40%, respectively. Substituting Na₂SO₄ with the same concentration of NaCl, complete degradation of the dye was achieved in 30 and 20 minutes with Ti/Pt and graphite electrodes respectively. In the electro-Fenton process with Fe electrodes and added amounts of H₂O₂ at pH 3 and an applied current density of 5 mA/cm² complete degradation of nickel phthalocyanine occurred in 20 minutes.

Key words: electrocoagulation, electrooxidation, electro-Fenton, Fe - Al - Ti/Pt - graphite electrodes, phthalocyanine

Received: April, 2011; *Revised final:* July, 2011; *Accepted:* July, 2011

* Author to whom all correspondence should be addressed: e-mail: demerz@otenet.gr; Phone: +302510245133; Fax: +302510245133