Environmental Engineering and Management Journal *March 2011, Vol.10, No.3, 375-380*
http://omicron.ch.tuiasi.ro/EEMJ/

"Gheorghe Asachi" Technical University of Iasi, Romania

NEURAL NETWORKS BASED MODELS APPLIED TO AN ELECTROCOAGULATION PROCESS

Ciprian-George Piuleac, Renata Furtuna, Marius Pislaru, Silvia Curteanu*

"Gheorghe Asachi" Technical University of Iasi, Department of Chemical Engineering,
73 Prof.dr.doc. Dimitrie Mangeron Street, 700050 Iasi, Romania

Abstract

The electrocoagulation process is a very efficient technology for the treatment of wastes polluted with colloids. The more important variables in the process are the aluminum concentration generated in the system and pH, but the concentration of pollutant, salinity, electrocoagulation time, and operation current density also significantly affect the process performance. The process is complex and phenomenological models usually are unsuccessful in reproducing experimental observations. In this work, an artificial intelligence modeling tool based on neural networks has been applied in order to study the electrocoagulation process of a synthetic wastewater polluted with colloids. The obtained results were useful in clarifying the mechanisms that are involved in the electrocoagulation of this kind of wastes and also in studying the influence of the operation conditions on the efficiency of the process. Different types of neural networks were used to predict the increasing of the removal turbidity and voltage current as a result of the influence of other parameters such as: current density, time, pH, concentrations of kaolin and NaCl. The best results, with global errors under 2.5 % in the validation stage, were obtained using a multilayer perceptron network and a generalized feed-forward neural network.

Key words: electrocoagulation, modeling, multilayer perceptron, neural networks

Received: December, 2010; Revised final: February, 2011; Accepted: March, 2011

* Author to whom all correspondence should be addressed: e-mail: silvia_curteanu@yahoo.com; Phone/Fax: +40-232-278683 ext. 2358