Environmental Engineering and Management Journal *March 2015, Vol.14, No. 3, 639-645*
http://omicron.ch.tuiasi.ro/EEMJ/

"Gheorghe Asachi" Technical University of Iasi, Romania

REMOVAL OF CARBAMAZEPINE BY ELECTROCOAGULATION: INVESTIGATION OF SOME KEY OPERATIONAL PARAMETERS

Tania Yehya[1,2], Lidia Favier[3,4*], Yassine Kadmi[3,4], Fabrice Audonnet[1,2], Nidal Fayad[1,2], Maria Gavrilescu[5,6], Christophe Vial[1,2]

[1]*Clermont Université, Université Blaise Pascal, Institut Pascal, 24 avenue des Landais, BP 20206, 63174 Aubière cedex, France*
[2]*CNRS, UMR 6602, IP, 63171 Aubière, France*
[3]*Ecole Nationale Supérieure de Chimie de Rennes, CNRS, UMR 6226, 11 Allée de Beaulieu, CS 50837, 35708 Rennes Cedex 7, France*
[4]*Université Européenne de Bretagne, France*
[5]*"Gheorghe Asachi" Technical University of Iasi, Faculty of Chemical Engineering and Environmental Protection, Department of Environmental Engineering and Management, 73 Prof. dr. docent Dimitrie Mangeron Str., Iasi 700050, Romania*
[6]*Academy of Romanian Scientists, 54 Splaiul Independentei, RO-050094 Bucharest, Romania*

Abstract

The performance of electrocoagulation (EC) process, a non-specific electrochemical technology, was investigated for the removal of carbamazepine (CBZ), an antiepileptic drug, from water. Experiments were carried out in synthetic wastewater in a batch cell. The respective influences of some key process parameters were studied, such as mixing conditions, initial pH, and current on aluminium electrodes. Experimental results showed that a CBZ removal efficiency of 62% was observed under slightly acidic initial conditions (pH 4) with a current density as high as 44 mA cm^{-2} (I=4.5 A) using Al electrode. This clearly indicates that CBZ removal proceeds through an electrochemical mechanism, while the adsorption of CBZ onto the aluminum hydroxide flocs was shown to be negligible. Furthermore, the increase of initial pH to alkaline values was shown to decrease the drug elimination efficiency. Conversely, as expected, an increase of current intensity improved the removal of CBZ. As a result, low initial pH 4 coupled with high current elevates the electrochemical elimination of CBZ: in this case, one metabolite could also be detected.

Key words: carbamazepine, electrocoagulation, micropollutants removal, wastewater treatment

Received: November, 2014; Revised final: March, 2015; Accepted: March, 2015

[*] Author to whom all correspondence should be addressed: e-mail: lidia.favier@ensc-rennes.fr; Phone: +33223238135; Fax: +33223238120