Fenton oxidation of indole-3-acetic acid by iron alginate beads

S. Ben Hammouda, N. Adhoum, L. Monser*

Laboratoire de Chimie Analytique et d’Electrochimie, Institut National des Sciences Appliquées et de Technologie, University of Carthage, Centre Urbain Nord, B.P.No. 676, 1080 Tunis Cedex, Tunisia, Tel. +216 22 625196; Fax: +216 71 704329; emails: Samiabenhammouda@gmail.com (S. Ben Hammouda), nafaa.adhoum@gmail.com (N. Adhoum), lotfi.monser@insat.rnu.tn (L. Monser)

Received 3 March 2014; Accepted 22 January 2015

ABSTRACT

A heterogeneous Fenton reaction using Iron alginate beads (Fe-AB) was evaluated for the removal of an N-heterocyclic compound indole-3-acetic acid (IAA), which ranked as uremic toxin and an herbicide derivative. The efficiency of the process was studied as a function of the experimental conditions: initial pH; H2O2 dose, temperature, initial concentrations of IAA, and Iron alginate beads loading. Under the best experimental conditions: pH 3.0; H2O2 dose = 9.8 mM; and [alginate beads] = 1.0 g L\(^{-1}\), it was possible to remove 100% of 0.11 mM IAA in 120 min in a batch reaction at 25°C. The experimental results indicate also that the use of this catalyst allows a significant removal of total organic carbon without significant leaching of Fe ions. A kinetic analysis showed that the removal of IAA followed a first-order kinetics model. In addition, the Fe-AB catalyst can be reused for successive runs, without significant loss of activity.

Keywords: Alginate beads; Indole-3-acetic acid; Iron (II); Heterogeneous Fenton process

*Corresponding author.