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AB STR A C T

The main purpose of the present study is to investigate the mechanism which governs the adsorption of the pesticide onto electro-granular activated carbon (GAC). The operating conditions assessed are: electrical potential, electro-activation time, the initial metribuzin—electro-activated GAC concentration ratio ($R = C_p/C_{GAC}$). In the first step, it has been confirmed using an experimental design that the C/C_0 ratio is much more affected by the electrochem- ical potential application than by R ratio. The mathematical model indicates that the electrochemical potential has a significant effect during the metribuzin adsorption during the first half an hour on GAC and thereby demonstrates the electroactivation beneficial effect. In the second step, a mass transfer model has been applied in order to evaluate the effect of the electroactivation of GAC on the kinetic constant. Indeed, the results showed that the elec- troactivation accelerates the process with kinetic constants 2–3 times higher than those obtained without the electro-activation of GAC.

Keywords: Granular activated carbon; Electro-activation; Pesticide; Metribuzin; Adsorption; Water treatment

1. Introduction

An increasing concern about the pollution of superficial waters by pesticides has been observed during the last decade, which has led to renewed interest from industrial operators in existing processes in order to be able to promote their affordable use in the face of increasingly severe environmental stan- dards [1–6]. These processes are based on conven- tional techniques of oxidation, photolysis, chemical hydrolysis, adsorption, and microbial degradation [7–12]. Recently, a technique was developed for the activation of granular activated carbon (GAC) based on the electrochemical method [13]. It was applied to a column of GAC, in which the adsorption of the pes- ticide metribuzin was investigated under process- affecting variables, namely, the electrochemical poten- tial, the initial metribuzin to GAC concentration ratio, and the ionic strength of the adsorbed solution, which was varied by adding solutions of NaCl, KCl, and Na_2SO_4. The results obtained for a solution with an initial metribuzin to GAC concentration ratio of

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