



Removal of malathion from polluted water by adsorption onto chemically activated carbons produced from coffee grounds

N. Bouchenafa-Saïb^{a,*}, A. Mekarzia^b, B. Bouzid^c, O. Mohammedi^a, A. Khelifa^c, K. Benrachedi^d, N. Belhaneche^b

^aFaculté de Technologie, Laboratoire d'Analyse Fonctionnelle des Procédés Chimiques, Université Saad Dahlab de Blida, B.P. 270, Route de Soumâa, Blida, Algeria

Tel./Fax: + 213 (0) 25 43 36 31; email: naima_bouchenafa@yahoo.fr

^bDépartement de Génie de l'Environnement, Laboratoire des Sciences et Techniques de l'Environnement, Ecole Nationale Polytechnique, B.P. 182 El Harrach, Alger, Algeria

^cFaculté de Technologie, Laboratoire de Génie chimique, Université Saad Dahlab de Blida, B.P. 270, Route de Soumâa, Blida, Algeria

^dFaculté des Sciences, Laboratoire de Technologie Alimentaire, Université de Boumerdes, B.P. 70, Boumerdes, Algeria

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ABSTRACT

The present work is concerned with a comparative study to evaluate the adsorptive properties of activated carbons produced from coffee grounds. Activation was done using different chemical activation agents such as H_3PO_4 and $ZnCl_2$ either separately or mixed together. Characterization of these prepared samples was carried out by determining their physicochemical properties such as specific surface area, porosity, and surface acidity. The results indicated that the produced carbonaceous materials generally developed different and interesting porous structures. Indeed, H_3PO_4 -activated carbon (PPAC-P) develops a porous volume of $0.98\text{ cm}^3/\text{g}$ and a surface acidity of $317.6\text{ meq}/100\text{ g}$ (with a high mesoporous proportion). By contrast, $ZnCl_2$ -activated carbon (PPAC-Z) seems to be the most microporous material with a rather limited surface acidity. Adsorption trials with Malathion, a commercial pesticide widely used in Algeria, were carried out onto produced samples of carbonaceous materials in batch experiments at 30°C . Various parameters such as pH, contact time, nature, and amount of adsorbent were investigated for removal efficiency under different operational conditions. Results herein showed that an interesting removal efficiency of 96% was achieved under the following conditions: pH 6, adsorbent amount of $1\text{ g}/\text{L}$, and an equilibrium time of 60 min.

Keywords: Adsorption; Coffee grounds; Active carbon; Pesticides

1. Introduction

Water pollution is a very persistent problem. It is a well-known fact that some organic compounds are

highly toxic. Among all organic pollutants, pesticides are considered to be the most hazardous, because of their widespread use and persistence in agricultural land. Consequently, their intrusion into the food chain represents a highly potential health hazard for humans

*Corresponding author.