Adsorptive removal of diazinon: kinetic and equilibrium study

Zohra Bensaadi Ouznadji[a], Mohamed Nasser Sahmoune[b,*], Nacèra Yeddou Mezenner[a]

[a]Laboratory of Chemical Engineering, Faculty of Mechanical and Chemical Engineering, University of Sciences and Technology Houari-Boumediene, USTHB, BP 32 El Alia, Bab Ezzouar, Algiers, Algeria, Tel. +213 0559 14 46 24; email: saidouz@hotmail.fr (Z.B. Ouznadji), Tel. +33213021247169; email: mezennerna@yahoo.fr (N.Y. Mezenner)
[b]Faculty of Engineering Sciences, Department Genius of Environment, University of Boumerdes, Algeria, Tel. +213 0668 25 06 77; email: sahmoune63@yahoo.fr (M.N. Sahmoune)

ABSTRACT

The adsorption of diazinon on bentonite acid treated with dilute H_2SO_4 solutions has been studied. Bentonite activated with 0.06 N sulfuric acid showed a higher efficiency in removing diazinon from aqueous solutions and was selected for further investigation. The effect of initial diazinon concentration, contact time, pH, and adsorbent dosage on the adsorption was studied in a batch mode process. Equilibrium data were analyzed by the Langmuir, Freundlich, Temkin, and Dubinin–Radushkevitch isotherm models. Langmuir isotherm provided the best fit to the equilibrium data with maximum adsorption capacity of 5.56 mg/g. The kinetic data were found to follow closely the pseudo-second-order model. The sorption process was found to be controlled by both film and pore diffusion with film diffusion at the earlier stages followed by pore diffusion at the later stages. Thermodynamics studies revealed the spontaneous and exothermic nature of the sorption process.

Keywords: Diazinon; Bentonite; Adsorption; Kinetic; Thermodynamic

*Corresponding author.