ID:4046

Treatment of Water Loaded with Pharmaceutical Residues Using a Natural Material

Feddal Imene[1,2*], Sekkal Hannane[3]

[1]Abdel Hamid Ibn Badis University of Mostaganem 27000, Algeria.

[2]Laboratory of Materials & Catalysis, Faculty of Exact Sciences Djillali LIABES University (UDL)
[3]Djillali Liabes University of Sidi Bel Abbes 22000, Algeria
*Corresponding author's email: fimene22@hotmail.com

ABSTRACT

A new form of water pollution threatens countries, hospital effluents and the pharmaceutical industry, are the main sources of emission of pharmaceutical residues into the environment and water sources in particular. In the present work, we try to study the adsorption and elimination of amoxicillin in an aqueous solution on activated sodium bentonite . Our materials were analyzed and characterized by various methods, including infrared spectroscopy, X-ray fluorescence spectrometry and textural measurement of specific surface area (BM method), pH measurement, measurement of cation exchange capacity, moisture content, measurement of swelling index and determination of zero charge point pH. Optimization of certain parameters influencing the adsorption process, such as : contact time, quantity of adsorbent involved, pH of the medium, temperature, this study was carried out by monitoring the influence of physico-chemical parameters and modeling adsorption kinetics and thermodynamics, and from the results we can conclude that there is monolayer adsorption followed by saturation and multilayer adsorption of Lamoxuciline on activated clay. . finally, the ΔH values show that the adsorption reactions are exothermic.

Keywords: Wastewater, Pollution, Pharmaceutical residue, Material, Environment.

1 Introduction

For several years now, we have been witnessing increasing pollution of surface and ground waters. The main pollutants, linked to human activity, are industrial waste (metals, dyes, chemicals) [1], phytosanitary products (surfactants, agricultural treatment products) and pharmaceutical products (veterinary products and therapeutic molecules such as antibiotics, anticancer agents and synthetic hormones). The persistence of drugs in the environment varies according to their physico-chemical properties. Among these contaminants, antibiotics pose a threat to the health of aquatic organisms and humans, despite their presence at very low concentrations (of the order of µg/L or ng/L) in the environment. With this in mind, our study involves the removal of a pharmaceutical residue (Amoxicillin) by thermally activated Algerian clay [2,3].

2 Experimental

The prepared material was characterized by infrared spectroscopy, X-ray fluorescence spectrometry and textural measurement of the specific surface area (Methylene Blue Method), as well as measurement of the cation exchange capacity CEC, moisture content, swelling index measurement, and we also determined the zero charge point pH.

3 Results and Discussion

The study of adsorption consists in studying the effects of certain parameters such as: contact time, adsorbent mass, pH and temperature. These experiments revealed that the adsorption capacity of our

DOI: 10.21467/abstracts.170 ISBN: 978-81-970666-1-0 (eBook)

thermally-activated clay is 2.81mg/g. Furthermore, the adsorption mechanism can be described as pseudo-first-order kinetics with intraparticle diffusion in the early stages. The results confirmed that the adsorption is monolayer followed by saturation and multilayer adsorption The thermodynamic study shows that exothermic adsorption of a physical nature.

4 Conclusions

Based on these results, we can assume that the application of sodium clay is highly effective in removing Amoxicillin from contaminated water.

References

[1] H,Akan, J.Q. Bay, Removal of heavy metals from aqueous solution by multiwalled carbon nanotubes: equilibrium, isotherms, and kinetics. Desalination and water treatment 13 *(2009) 3521-3530.*

[2] M.Alkan, Ö. Demirbaş, M. Doğan , Adsorption Kinetics and Thermodynamics of an Anionic Dye Onto Sepiolite ;; Microporous and Mesoporous Materials 101, *(2007) 1548-1576.*

[3] G. Rytwo, E. Ruiz-Hitzky. Journal of Thermal Analysis and Calorimetry *(2003) 741- 751.*

ISBN: 978-81-970666-1-0

Series: AIJR Abstracts

DOI: 10.21467/abstracts.170