Diclofenac potassium removal from water by adsorption on natural and pillared clay

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ABSTRACT

This study explores the removal of Diclofenac potassium, an example of hazardous pharmaceutical pollutant, from aqueous solution. Pharmaceutical pollutants are a group of emerging contaminants that contain different groups of human and veterinary medicinal compounds that are widely used all over the globe. Pharmaceutical pollutants have been considered as an emerging environmental problem. In this work, the removal of diclofenac potassium by the use of iron-pillared clays as adsorbents, in comparison with their starting material (a natural clay mineral) was studied. The aim of this study is to improve diclofenac potassium removal by an adsorption process, using modified clays instead of the natural clay mineral. The pillared clays were synthesized from a natural clay mineral from Algeria, by using iron oligocation. The samples were characterized by several techniques (emission scanning electron microscopy and Fourier transform infrared spectroscopy), remarking that some structural and textural changes were produced during the pillaring process. The pillared samples showed a considerable increase in their adsorption capacity in comparison to the natural clay mineral. This effect can be related to the textural and structural changes produced during the pillaring process. Consequently, iron-pillared clays could be the new material to be used in the studied environmental process.

Keywords: Diclofenac potassium; Pharmaceutical pollutant; Adsorption; Clay; Bentonite; Removal efficiency

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