



Comparative adsorption of anionic dye Congo red and purification of olive mill wastewater by chitin and their derivatives

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Received 3 May 2020; Accepted 30 December 2020

ABSTRACT

In this study, chitin (CH), chitosan (CS) and epichlorohydrin cross-linked chitosan beads were applied to remove Congo red (CR) from an aqueous medium. The same materials were used for olive mill wastewater treatment as industrial reject. First, the cross-linked chitosan was synthesized by the homogeneous reaction of chitosan with epichlorohydrin in an acid solution. Then, it was characterized by attenuated total reflection–Fourier-transform infrared spectroscopy (ATR-FTIR), thermogravimetric analysis (TGA, DTGA) and scanning electron microscopy. The dye (CR) removal was analyzed by kinetics, equilibrium and thermodynamic studies. Subsequently, the three materials were tested for olive mill wastewater purification as an innovative method, which presents the originality of our work. The adsorption isotherms indicate that the Congo red adsorption was well fitted by the Langmuir isotherm equation under the studied concentrations by comparing the linear correlation to the non-linear parameters. Moreover, thermodynamic parameters showed that the adsorption was exothermic and spontaneous. The ATR-FTIR indicated the adsorption of phenolic compounds on chitosan and epichlorohydrin cross-linked chitosan was a chemical reaction. The performed experiments showed that epichlorohydrin cross-linked chitosan has high adsorption of Congo red and it can be used as potential material for olive mill wastewater treatment.

Keywords: Chitosan; Congo red; Olive mill wastewater; Epichlorohydrin; Adsorption

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