



Possible utilization of PET waste as adsorbent for Orange G dye removal from aqueous media

Bianca Cojocariu^{a,b}, Anca Mihaela Mocanu^c, Gabriela Nacu^a, Laura Bulgariu^{a,*}

^aDepartment of Environmental Engineering and Management, Faculty of Chemical Engineering and Environmental Protection "Cristofor Simionescu", "Gheorghe Asachi" Technical University of Iași, 73 Prof. Dimitrie Mangeron Street, 700050 Iași, Romania, Tel./Fax: + 40 232 271759; emails: lbulg@ch.tuiasi.ro (L. Bulgariu) bianka_eco@yahoo.com (B. Cojocariu); grusu@ch.tuiasi.ro (G. Nacu)

^bGreenFiber International Company, Calea Chisinaului, 29, 700177 – Iași, Romania

^cDepartment of Organic, Biochemical and Food Engineering, Faculty of Chemical Engineering and Environmental Protection "Cristofor Simionescu", "Gheorghe Asachi" Technical University of Iași, 73 Prof. Dimitrie Mangeron Street, 700050 Iași, Romania, email: ancamocanu@ch.tuiasi.ro

Received 13 November 2017; Accepted 4 January 2018

ABSTRACT

In this study, easy and rapid adsorption of Orange G dye from aqueous solution using PET (polyethylene terephthalate) waste as low-cost adsorbent was examined. The optimal values of most important experimental parameters (initial solution pH, adsorbent dose and contact time) were established, in batch experiments, at room temperature (20°C ± 1°C). The kinetics of adsorption process follows the pseudo-second order kinetic model, and the Langmuir isotherm model provides the best fitting for the adsorption of Orange G dye onto PET waste. The maximum adsorption capacity, calculated in this case, was 6.9961 mg/g. Unfortunately, this value is quite small, and therefore an activation treatment of PET waste is necessary. The activation of PET waste with NaOH solution (4 N, 48 h) determines the increase of maximum adsorption capacity with 33.48%, indicating the formation of new active sites on adsorbent surface, probably due to the hydrolysis of some ester groups from superficial polymer chains. The adsorption capacities obtained for the Orange G adsorption onto activated PET waste from five different water samples does not differ significantly, which highlight the potential applicability of this adsorbent in the treatment of industrial effluents.

Keywords: Orange G dye; PET waste; Chemical activation; Isotherm and kinetic modelling

* Corresponding author.