Batch adsorption of methylene blue from aqueous solutions by untreated Alfa grass

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Received 2 May 2013; Accepted 28 August 2013

ABSTRACT

In this study, adsorption capacities of untreated Alfa stems were tested for the removal of methylene blue (MB) as a dye in aqueous solutions. The effects of initial dye concentration (10–150 mg/L), contact time, adsorbent dose (0.25–12.5 g/L), solution pH (2–12), temperature (283–330 K) and ionic strength (5–100 mg/L) on MB adsorption were investigated. The thermodynamic parameters, the kinetics and the factors controlling the adsorption process were also calculated and discussed. The experimental data modelling showed that the models of Langmuir and pseudo-second order, describe perfectly the adsorption process. The maximum value of the adsorption capacity calculated according to the Langmuir model is 200 mg/g. The thermodynamic parameters showed that MB adsorption onto Alfa grass is a favourable endothermic and spontaneous phenomenon and confirms the Alfa grass affinity for MB. The Alfa stems in a rough state have good adsorption effectiveness with respect to dyes without a preliminary treatment. In addition, the availability and the low cost of the Alfa grass could lead to its use for the coloured wastewater treatment.

Keywords: Adsorption; Methylene blue; Alfa grass; Water treatment; Dyes; Isotherm; Kinetic; Thermodynamics

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