Removal of indigo carmine from aqueous solution by microwave-treated activated carbon from peanut shell

Jixiang Zhang\textsuperscript{a,}\textsuperscript{*}, Qiuxiang Zhou\textsuperscript{a}, Lailiang Ou\textsuperscript{b}

\textsuperscript{a}Department of Chemistry, Langfang Teachers' College, Langfang, Hebei 065000, China, Tel. +86 316 2188377; Fax: +86 316 2188416; email: zhangjixiang1973@163.com (J. Zhang)

\textsuperscript{b}Key Laboratory of Bioactive Materials of Ministry of Education, Institute of Molecular Biology, Nankai University, Tianjin 300071, China

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ABSTRACT

Activated carbon (AC) prepared from peanut shell (PS) with microwave treatment was used to remove indigo carmine (IC) from aqueous solution in this study. PS and AC were examined by pore structural analysis, scanning electron microscopy, and elemental analysis. Effect of initial dye concentration, contact time, pH, and temperature on IC removal was investigated by batch experiments. The adsorption capacity increased with the increase of initial concentration, and decreased with increasing pH. Higher temperatures were favorable for the adsorption. The adsorption equilibrium could be reached within 90 min for all studied concentrations. The results showed that the Langmuir isotherm model had a good fit for the equilibrium data. Kinetic studies revealed that the adsorption followed the pseudo-second-order kinetic model. Thermodynamic studies indicated that the adsorption was a spontaneous, endothermic process.

Keywords: Activated carbon; Adsorption; Indigo carmine; Microwave; Peanut shell

*Corresponding author.

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