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An adsorption and thermodynamic study of lac dyeing on cotton pretreated with chitosan

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Abstract

Adsorption and thermodynamic studies of lac dyeing on cotton pretreated with chitosan were investigated under dyeing conditions of pH 3.0, a material to liquor ratio (MLR) of 1:100 and a contact time of 3 h. Batch equilibrium studies showed that the adsorption of lac dye on cotton pretreated with chitosan could be described by the Langmuir isotherm with an enthalpy change (ΔH°) of -17.43 kJ. The pretreatment of cotton with chitosan provided a significant enhancement of dye uptake onto the cotton and also a decrease in the dye desorbed from the cotton compared with the results in the absence of chitosan or on lac dyeing in the presence of NaCl. In addition, sodium chloride had no effect on the adsorption of lac dye on cotton at pH 2.5, 3.0 and 3.5. It indicated that hydrogen ions (H^+) play a more important role than sodium ions (Na^+) in the dyeing process.

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