Batch and fixed bed column studies on removal of Orange G acid dye by a weak base functionalized polymer

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\begin{abstract}
The performance of a weak base anion-exchange resin in removing Orange G dye from aqueous solutions in batch and column system was investigated. The adsorption capacity was found to depend on: pH, dye concentration, contact time, adsorbent dosage, electrolyte presence and temperature. The adsorption equilibrium is best described by the non-linear Langmuir isotherm model. At the optimum pH of 2, the maximum adsorption capacity was 1,076 and 1,218 mg g\textsuperscript{-1}, at 20 and 50\textdegree C, respectively. The adsorption kinetics could be described by the pseudo-second-order reaction model. The thermodynamic parameters indicated that adsorption is a spontaneous and endothermic process. FT-IR and SEM analyses provided additional information on adsorption mechanism and on morphological changes of the adsorbent. The breakthrough experimental results were processed by means of Thomas, Yoon–Nelson and Wolborska models. The reusability of the column was examined by conducting several cycles of adsorption and desorption (with 0.05 M NaOH).

Keywords: Adsorption; Orange G; Anion-exchange resin; Isotherms; Kinetics; Column
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