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REMOVAL OF Zn(II) IONS FROM AQUEOUS SOLUTION BY SORRPTION USING CELLULOSE FUNCTIONALIZED WITH REACTIVE DYES AS SORBENT

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Abstract

The influence of initial metal ion concentration and temperature on the adsorption of Zn(II) from aqueous solution onto amino ethyl cellulose (AEC) functionalized with Orange 16 reactive dye, was examined. Batch experiments were performed at pH of 4.0 and adsorbent dose of 8.0 g/L previously established as optimum, ranging the initial Zn(II) concentration between 22.74-181.92 mg/L and temperature between 2 and 60 °C. Three isotherm models (Langmuir, Freundlich and Dubinin – Radushkevich) were applied to the equilibrium data and the fitted parameters were used to determine the thermodynamic parameters of adsorption process. The adsorption equilibrium was well described by the Langmuir model. Maximum adsorption capacity of functionalized AEC for Zn(II) ions slightly increase with increasing of temperature, from 33.56 to 36.50 mg/g. In addition, the adsorption energy, calculated from Dubinin - Radushkevich model, indicate that the Zn(II) uptake process occurs via electrostatic interactions. Thermodynamic studies indicated that adsorption of Zn(II) onto functionalized AEC is and endothermic process (ΔH = 9.98 kJ/mol) and spontaneous (ΔG = - 14.50 ÷ - 19.64 kJ/mol), in the studied temperature range.

Key words: functionalized amino ethyl cellulose, Zn(II) ions, reactive dye, isotherm, thermodynamic study

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