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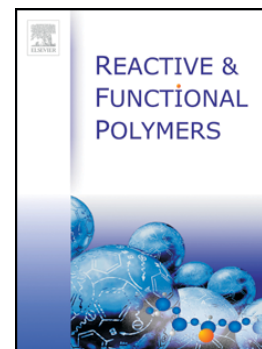
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The synthesis and absorption dynamics of a lignin-based hydrogel for remediation of cationic dye-contaminated effluent

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ABSTRACT

Lignosulfonate-g-acrylic acid (LS-g-AA) hydrogels that possess superabsorbent capacity were synthesized by grafting acrylic acid (AA) on the backbone of lignosulfonate (LS) in the presence of N,N'-methylene-bis-acrylamide (MBA) as initiated by laccase/*t*-BHP(tert-butyl hydroperoxide). Specifically, the carboxylic acid groups introduced by grafting acrylic acid, significantly enhanced the absorption capacity of LS-g-AA hydrogels. In this case, methylene blue (MB) was the representative dye substrate to study absorption dynamics. It was found that the equilibrium absorption of MB reached 2013 mg•g⁻¹ while pH, absorption time, and initial MB concentration affected the overall absorption capacity. The absorption isotherms and kinetics obeyed standard Freundlich and pseudo-2nd-order models, respectively. Furthermore, preliminary desorption experiments were conducted in weak acid solution and showed that ~ 50% of the original MB could be removed over one rinse cycle.

Keywords: Lignin, Acrylic acid, Hydrogels, Absorption, Superabsorbent

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