Lignosulfonate-based ternary nanocomposite hydrogels for efficient textile dye absorption

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In the present study, a new solid adsorbent, lignosulfonate-graphene oxide-acrylamide (LS-GO-AM) ternary composite hydrogel possessing good mechanical strength and high dye adsorption capacity, was prepared by a simple polymerization, and used for the removal of dyes from aqueous solution. The adsorption property of a model dye, methylene blue (MB), onto the hydrogel was studied. The effects of adsorption time, initial pH, and concentration were investigated. When the initial MB concentration was 3 mg·L⁻¹ at an LS-GO-AM concentration of 4 g·L⁻¹, the absorption was 98.36% while the solution was nearly decolorized. Moreover, adsorption kinetic and equilibrium data were described well with pseudo-second-order and Langmuir isotherm models for MB adsorption. The LS-GO-AM composite hydrogel with enhanced mechanical strength could be easily separated from the reaction system.

Keywords: Lignosulfonate; Graphene oxide; Hydrogels; Adsorption

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