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APPLICATION OF AGROINDUSTRIAL WASTE OF WHEAT HUSK FOR REACTIVE BLUE 5G AND RED 4B DYES BIOSORPTION

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Abstract

In the present work, the adsorption of reactive blue 5G and red 4B dyes by the agroindustrial waste of wheat husk was evaluated. The biosorbent material was characterized by pHpcz, FTIR, SEM and N2 physisorption. Kinetic and equilibrium adsorption tests were performed in batch system. The characterization of the biomaterial revealed a pHpcz of 6.2, a low specific surface area (0.0346 m2 g-1) and a dominance of macropores. FTIR analysis suggests that adsorption occurs through electrostatic interaction (H-bonding, e.g., with carboxyl functional groups). SEM images show an irregular structure and the presence of pores. An initial pH of 3.0, a temperature of 25 °C and a mixture of particle sizes were defined as suitable operating conditions. In the biosorption kinetics study, the pseudo-second order kinetic model adequately represented the experimental data for both dyes investigated. The equilibrium time was about 12 hours and an adsorption rate constant of about 0.2 g mg-1 h-1 was observed for both dyes. The Langmuir isotherm best represented the equilibrium study data for the reactive blue 5G and red 4B dyes, with R2 values of 0.9825 and 0.9881, respectively. The maximum adsorption capacity was 35 mg g-1 for both dyes evaluated. The results show that wheat husk is suitable as biosorbent with potential application in the treatment of industrial wastewater. This is a sustainable approach for the removal of dyes that is easily accessible for small textile companies to add to their wastewater treatment plants due to low cost, the design and operation are simple.

Key words: fluorescence in situ hybridization, image analysis, next-generation sequencing, Proteobacteria, Wilcoxon signed rank test

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