

Utilization of sugarcane bagasse for removal of basic dyes from aqueous environment in single and binary systems

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ABSTRACT

In the present study a biodegradable and low cost sorbent was investigated for its sorptive capacity for various basic dyes in both single and binary dye solutions. As wastewaters from textile industries may contain a variety of dyes, therefore, it is of great interest to have a sorbent capable of removing dyes either singly or simultaneously. The agricultural by-product has shown its potential to remove Basic Blue 3 (BB3), Methylene Blue (MB) and Basic Yellow 11 (BY11) in both single and binary systems. The effect of pH, contact time and initial concentration, dosage and particle size was studied in batch experiments at room temperature. The optimum pH for the removal of studied dyes was observed in the pH range 4–9 and the sorption reached equilibrium at 60 min. The optimum sorbent dosage was recorded at 0.10 g. The sorption process fitted well in the pseudo-second order kinetic model and Langmuir isotherm was applicable for all the dye systems studied. Maximum sorption capacities were 23.64 mg g⁻¹, 28.25 mg g⁻¹ and 67.11 mg g⁻¹ for BB3, MB and BY11, respectively, in single dye system. However, a decrease in the maximum sorption capacity was observed in the binary systems and this might be resulted from the competition of the same binding sites.

Keywords: Sorption; Low cost sorbent; Sugarcane bagasse; Basic dyes; Isotherms; Kinetics

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