Methylene blue adsorption onto native watermelon rind: batch and fixed bed column studies

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\textbf{ABSTRACT}

This study reports the feasibility of waste watermelon rind as adsorbent for the removal of methylene blue in batch and continuous column studies. Batch mode adsorption studies were performed by varying the batch parameters such as pH, contact time, adsorbent dose, initial dye concentration, and temperature. The equilibrium data were analyzed with Langmuir, Freundlich, and Temkin isotherm models and found to better with Langmuir and Temkin models. The kinetic data reveal that the present system follows pseudo-second-order kinetic model. Thermodynamic studies reveal that the present process is spontaneous and exothermic in nature. Fixed bed column studies were performed by varying the column parameters such as flow rate, bed height, and initial inlet concentration. The breakthrough curves obtained were analyzed with Adams–Bohart, Thomas, and Yoon–Nelson models. The results show that watermelon rind an agro waste can be successfully employed for the elimination of methylene blue from aqueous solution.

\textit{Keywords:} Watermelon rind; Methylene blue; Adsorption; Fixed bed