Conversion of foliar residues of Sansevieria trifasciata into adsorbents: dye adsorption in continuous and discontinuous systems

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Abstract

The study analyzed the potential of leaf powder prepared from the residual leaves of the species Sansevieria trifasciata, as a potential adsorbent for methylene blue (MB) removal. The equilibrium was reached fast for almost all concentrations after 60 min, obtaining the maximum capacity of 139.98 mg g−1 for 200 mg L−1. The increase in temperature disfavored the dye adsorption, with the maximum adsorption capacity of 225.8 mg g−1, observed for 298 K. The thermodynamic parameters confirmed that the adsorption process is spontaneous and exothermic. A direct sloping curve was established for the fixed bed, with breakthrough time (tb), column stoichiometric capacities (qeq), and the mass transfer zone lengths (Zm) were 1430, 1130, and 525 min; 60.48, 187.01, and 322.65 mg g−1; and 8.81, 11.28, and 10.71 cm, for 100, 200, and 500 mg L−1, respectively. Furthermore, in a mixture of several dyes, the adsorbent obtained the removal of 51% of the color.

Keywords

Residual adsorbent, Continuous, Discontinuous, Adsorption, Methylene blue