

Application of *Beauveria bassiana* spore waste as adsorbent to uptake acid red 97 dye from aqueous médium

Jordana Georjin, Eliana Alves, Fernanda Drumm, Denise Tonato, Patrícia Grassi, Jeferson S. Piccin, Marcos L. S. Oliveira, Guilherme L. Dotto, Marcio A. Mazutti

Abstract

The adsorption of acid red 97 dye (RED 97) by the waste of the filamentous fungus *Beauveria bassiana* was analyzed. The adsorbent was obtained as a waste of a fermentative process, and characterized by scanning electron microscopy (SEM), Fourier transform infrared spectroscopy (FT-IR), X-ray powder diffractometry (XRD), and specific surface area (BET). After the characterization, adsorption tests were carried out to determine the ideal conditions of pH, adsorbent mass, and contact time for the process. Adsorption isotherms, thermodynamic studies, and the treatment of textile effluent were also investigated. The adsorbent characterization allowed the visualization of its amorphous structure, with irregular and heterogeneous particles. The pore diameter was 51.9 nm and the surface area was 0.247 m² g⁻¹. 1.2 g L⁻¹ of the adsorbent and pH of 2.0 were the ideal conditions for RED 97 adsorption. The pseudo-second-order kinetic model was the most appropriate to represent the experimental data, being the equilibrium reached in about 110 min. The Langmuir model was the most suitable to represent the equilibrium data, with maximum adsorption capacity of 194.1 mg g⁻¹ at 45 °C. The adsorption processes was thermodynamically spontaneous, favorable, and exothermic. In the treatment of a real textile effluent, 5 g L⁻¹ of the spores was capable to decolorize 70% of the solution. Therefore, spore wastes of *Beauveria bassiana* were promising for RED 97 adsorption.

Keywords

Adsorption, Decolorization, Dye, Effluent, Fungus.