

# Cyanobacterial biomass as a potential biosorbent for the removal of recalcitrant dyes from water

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## Abstract

The accumulation of cyanobacteria produced due to eutrophication processes and the increment of different pollutants in water as a result of industrial processes affects aquatic environments such as the ocean, rivers, and swamps. In this work, cyanobacterial biomass was used as a biosorbent for the removal of a commercial dye, methylene blue (MB). Thus, MB was removed from biomass obtained from cyanobacterial samples collected from the swamp located in the Colombian Caribbean. Spectroscopical techniques such as FTIR, SEM, EDX measurements were used for the physico-chemical characterization of the bio-adsorbent material. Furthermore, we present the effect of various adsorption parameters such as pH, MB dose, time, and adsorbent concentration on the ad-sorbent equilibrium process. Three different isotherm models were used to model the MB adsorption on biomass. The functional groups identified on biomass suggest that these models are suitable for the characterization of the sorption of cationic dyes on the surfaces of the biomass; in addition, an SEM assay showed the heterogeneous surface of the biomass' morphology. The equilibrium tests suggested a multilayer type adsorption of MB on the biomass surface. The kinetics results show that a pseudo-second order kinetic model was suitable to describe the MB adsorption on the biomass surface. Finally, the herein obtained results give an alternative to resolve the eutrophication problems generated by cyanobacterial growth in the swamp "Ciénaga de Malambo". © 2021 by the authors. Licensee MDPI, Basel, Switzerland.

## Author keywords

Adsorption; Biosorbent; Cyanobacterial; Recalcitrant dyes