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BIOSORPTION OF METANIL YELLOW DYE FROM AQUEOUS SOLUTIONS BY THE ENTIRE WATER HYACINTH PLANT (*Eichhornia crassipes*) AND ITS VEGETATIVE ORGANS

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Abstract

This study explored the kinetics of metanil yellow (MY) dye biosorption onto the water hyacinth plant (*Eichhornia crassipes*) and its vegetative organs (leaves, roots, and stems). The water hyacinth's leaves exhibited the highest capacity for and initial volumetric rate of MY biosorption, followed by the entire plant, roots, and stems. Modeling the kinetics for MY biosorption onto the entire plant and vegetative organs showed that the best agreement of experimental data was achieved with the pseudo-second-order kinetic model, suggesting that the rate-determining step in the overall reaction of MY biosorption onto the biosorbents might be chemisorption. Fourier-transform infrared spectroscopy studies suggest that the amide I and II functional groups, which are present in the biosorbent proteins, participated in the biosorption of MY from aqueous solutions. A linear dependence of MY biosorption capacity at equilibrium on total protein content was observed, confirming that MY molecules bind to biosorbent proteins. Scanning electron and confocal laser scanning microscopy studies corroborated the presence of MY on the biosorbents' surface.

Key words: biosorption, *Eichhornia crassipes*, metanil yellow, pseudo-second-order kinetic

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