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BIOSORPTION OF SULFONIC AZODYES ON SPRUCE WOOD SHAVINGS: KINETICS AND SORPTION MECHANISMS

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Abstract

Various azodyes containing one or more sulfonic groups were removed from aqueous solutions by biosorption on untreated wood shavings from *Picea abies*. The sorption kinetics was described by the pseudo-first-order (PFO), pseudo-second-order (PSO) and modified pseudo-n-order (MPnO) equations, from which the MPnO model provided the best fit to the experimental data. The surface reaction was identified as a rate-limiting step governing the dye sorption on wood shavings, but a mixed kinetics (with a significant role of diffusional processes) may occur in certain stages of the dye sorption process. The removal efficiencies differed markedly in dependence on the dye structure. Although electrostatic interactions play certainly a significant role in the sorption of sulfonic dyes, the differences in the sorption efficiencies may be explained as a result of different hydrophobic interactions that occur between less-polar parts of the dye molecule (aromatic rings) and hydrophobic domains in the wood matrix. With some limitations, the sorption behavior of the azodyes can be predicted from their structural parameters using the Gibbs energy of hydration as an estimator.

Key words: biosorption, hydrophobic interactions, sorption isotherms, sorption kinetics, sulfonic azodyes

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