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REMOVAL OF METHYLENE BLUE DYE FROM AQUEOUS SOLUTION USING SEASHELL WASTES AS BIOSORBENT

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Abstract

Waste powder of seashells as *Rapana Venosa* gastropod was studied as a new biosorbent for Methylene Blue cationic dye removal from aqueous solutions using batch technique. The adsorptive properties of the material were estimated depending on initial solution pH (6-11), biosorbent dose (4-24 g/L), temperature (5-45^{0}C), contact time (5-1440 min) and dye initial concentrations (6.4-81.6 mg/L). The maximum value of removal efficiency was obtained in following conditions: the initial solution pH equal to 11, seashells dose of 4 g/L, and dye initial concentrations ranging between 19.2-81.6 mg/L. It was observed that the higher temperatures favored the dye adsorption process. Processing of the equilibrium data obtained in batch experiments was carried out using Langmuir, Freundlich and Dubinin - Radushkevich isotherm equations. The maximum adsorption capacity of seashells waste was found to be 16.7785 mg/g (at 25^{0}C) according to the Langmuir model**.** The value of adsorption energy, determined by Dubinin - Radushkevich model, suggested a physical adsorption process occurring via electrostatic interactions between negative sites of adsorbent surface and cationic dye molecules.
The results prove that the seashells waste can be considered an efficient biosorbent for cationic dyes removal from aqueous environment, also in regard to the purchase cost. Moreover, they suggest that the adsorption equilibrium analysis lead to useful results (mechanism, kinetics) for extending the process at a large scale.

Key words: adsorption isotherm, cationic dye, seashell wastes, thermodynamic study

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