



Valorization of food wastes as sorbent for dye retention from aqueous medium

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ABSTRACT

In this paper, batch removal of Brilliant Red HE-3B (BRed) and Methylene Blue (MB) dyes onto apple seeds powder was studied in order to evaluate the sorptive properties of this food waste. The experimental data equilibrium was analyzed using the Langmuir, Freundlich, and Dubinin–Radushkevich adsorption models. Results of the study reveal that the Langmuir model best describes the dyes sorption processes. The monolayer sorption capacity was established to be 66.225 mg/g BRed and, respectively, 26.316 mg/g MB at 25 °C. The values of the mean free energy obtained from the Dubinin–Radushkevich model indicated a porous structure of the sorbents and suggest that physical sorption is the main sorption type involved in the studied processes. The values of the thermodynamic parameters (ΔG , ΔH , and ΔS) showed that sorption of tested dyes was feasible, spontaneous, and endothermic under examined conditions. The Fourier transforms infrared spectroscopy has been used to investigate the interaction between apple seeds powder and dyes. Environmental scanning electron microscopy technique was used to analyze the surface morphology of the sorbent before and after dyes sorption.

Keywords: Aqueous medium; Apple seeds; Brilliant Red HE-3B reactive dye; Methylene Blue cationic dye; Sorption equilibrium; Thermodynamic studies

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