

عنوان مقاله:

Direct Blue Y1 Removal from Aqueous Solutions by Adsorption on Pistachio Hull Waste: Equilibrium, Kinetic and Thermodynamic Studies

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خلاصه مقاله:

Background and Purpose: Azo dyes including Direct Blue Y1 (DBY1) are toxic, mutagenic and carcinogenic contaminants in effluents of industries. This study aimed to investigate the adsorption of DBY1 from aqueous solution onto pistachio hull waste (PHW) as a low-cost adsorbent. **Materials and Methods:** A series of experiments were performed via batch adsorption technique to examine the effect of the process variables such as contact time 0-210 minutes, initial dye concentration 10-100 mg/l, pH 2-12, adsorbent 0.05-1 g/l, and the processing temperature of 25, 40, and 50° C. The concentration changes of DBY1 were measured using the colorimetric method by the spectrophotometer T80 ultraviolet/visible at the 587 nm wavelength. Moreover, The PHW was characterized by scanning electron microscopy, Fourier transform infrared spectroscopy, Freundlich and Langmuir isotherm model, pHpzc and Brunauer–Emmett–Teller (BET) surface area analysis. **Results:** Maximum adsorption capacity was 90.48 mg DBY1 per 1 g adsorbent at pH 2, DBY1 100 mg/l, temperature 50° C, and time 210 minutes. In general, by increasing the adsorbent dosage, time, and processing temperature, the removal efficiency was increased; however, incrementing pH and dye concentration had a reverse effect. Maximum BET specific surface and total pore volume on the adsorbent were 1.04 m²/g and 0.0002 cm³/g, respectively. The Freundlich isotherm (R² = 0.9912) model fits the equilibrium data better than the Langmuir isotherm (R² = 0.9024) model. The adsorption kinetic was found to be well described by the pseudo-second-order model. Thermodynamic analysis indicated that the adsorption process is a spontaneous and endothermic process. **Conclusion:** PHW can be used well as a low-cost surface adsorbent in the .treatment of DBY1 from aquatic environments

کلمات کلیدی:

Direct Blue Y1, Adsorption, Pistachio Hull, Aqueous

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