

عنوان مقاله:

Removal of Acid Orange 7 dye from aqueous solutions using polyaniline-modified rice bran: isotherms, kinetics, and thermodynamics

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خلاصه مقاله:

Background: Today, due to increasing usage of dyes in various industrials and their destructive effect on health and environment, it is necessary to remove them from industrial wastes. Although there are few studies on the use of rice bran modified with polyaniline (RB/PANI) for removal of different dyes, but the effect of this adsorbent on the removal of Acid Orange 7 (AO7) dye has not been evaluated yet. Therefore, this study was conducted to investigate the removal of AO7 dye by RB/PANI as an adsorbent. Methods: The adsorbent characteristics were determined using scanning electron microscopy (SEM) and Fourier transform infrared (FT-IR) spectroscopy. Also, the adsorbent surface area was measured by Brunauer–Emmett–Teller (BET) technique. The method of one-factor-at-a-time was used to optimize various factors including pH, temperature, and adsorbent dosage. Results: The optimal values for the factors affecting AO7 dye removal were calculated. It was revealed that the maximum dye removal was obtained at pH = 3, temperature = 25°C, dye concentration = 30mg/L, adsorbent dosage = 30 mg/L, and contact time = 60 minutes. The maximum removal percentage for RB/PANI was 97.13%. It was also revealed that Langmuir isotherm is the best fitted isotherm model. Conclusion: According to the results, the polyaniline-modified rice bran could be used as an excellent adsorbent for the removal of AO7 from aqueous solutions. The maximum dye removal efficiency for AO7 was obtained at pH = 3. Also, it was revealed that AO7 dye removal follows the pseudo-second order kinetic model and it is a spontaneous process.

کلمات کلیدی:

Temperature, Adsorption, Coloring agents, Kinetics, Thermodynamics

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