

Evaluation of basic red 18 removals from aqueous solution using peanut shell ash

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Abstract

Background & Aim: Dyes are one of the most important pollutants of textile industrial wastewater which are toxic, carcinogenic, teratogenic, and non-biodegradable. Basic red is the most commonly used pigment for dyeing. In this study, peanut shell ash was used as a low cost adsorbent for the removal of basic red 18 from aqueous solutions.

Methods: This research was conducted in bench scale in a batch reactor on synthetic wastewater. The effect of important parameters such as pH (2-12), reaction time (5-150 min), adsorbent dosage (0.02-1.2 g/l) and initial dye concentration (20-150 mg/l) on dye removal were evaluated. Also, the adsorption behavior of dye evaluated by Freundlich, Langmuir and Temkin isotherms.

Results: Removal efficiency of 96.2 % was achieved at optimal pH equal to 11, contact time of 90 min, adsorbent dosage of 0.8 g/l and 60 mg/l initial dye concentration. With increasing dye concentration from 20 to 60 mg/l, removal efficiency was increased from 90.12% to 96.16%. The results of isotherm study showed that adsorption process of basic red 18 using peanut shell ash follows from Freundlich isotherm ($R^2=0.977$).

Conclusion: The results showed that this material is an effective, natural and inexpensive adsorbent in treatment of wastewater containing basic red 18. Hence, using this material suggested for removal basic red 18 from aqueous solutions after additional studies.

Keywords: Peanut shell ash, Basic red 18, Adsorption, Adsorption isotherm.