

Comparison of the efficiency of almond shell ash as a natural adsorbent versus commercial activated carbon in removal of basic red 18 dye from aqueous solutions

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Abstract

Background & Aim: Industrial wastewater is one of the most important sources of hazardous pollutant emissions. Having high levels of various dyes, textile wastewater is considered as one of the major environmental pollutants. The aim of this study was to compare the efficiency of almond shell ash as a natural adsorbent in comparison to commercial activated carbon in removing basic red 18 dye from aqueous solutions.

Methods: Considering the parameters affecting the adsorption process, the experiments were carried out to determine the optimal conditions of basic red 18 dye removal by means of the two adsorbents. At the end, three isotherms including Langmuir, Freundlich and Bet were used to evaluate the equilibrium conditions.

Results: The highest removal efficiencies of commercial activated carbon and almond shell ash as adsorbents were obtained %98.46 and %92.5 in alkaline pH and at 25 and 45 °C respectively. For commercial activated carbon the adsorption process followed the Freundlich isotherm, while for almond shell ash, the adsorption process followed the Langmuir isotherm.

Conclusion: The results showed that the higher efficiency of commercial activated carbon than almond shell ash in removal of basic red 18 dye. Nevertheless, almond shell ash as a food waste can be used as a low cost adsorbent to remove dyes from textile wastewaters.

Keywords: activated carbon, adsorption isotherm, adsorption