"The 3rd International and 21st
national Conference on environmental Health"
February 26-28, 2019
Zanjan, Iran

Use of chemical activation method for the preparation of activated carbon from cherry tree waste and its application in removing cationic contaminants from aqueous environments

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Abstract

Aim of study: Synthetic dyes are the major environmental pollutants that enter the environment. The synthetic dyes can cause problems for humans and aquatic organisms due to toxicity and carcinogenicity. In this study, activated carbon made from cherry tree wood was used to adsorption of cationic paint.

Methodology: This experimental study was carried out in a laboratory scale. The effect of pH, concentration, adsorbent dose, contact time and temperature on removal efficacy were examined. SEM, BET, XRD and FTIR spectra were used to characterize the synthesized absorbent nature. The remaining dye concentration was detected by using a spectrophotometer at wavelength of 514 nm. The obtained data were analyzed using isotherm and kinetic models.

Results: The results of this study showed that the efficiency of dye removal increases with increasing contact time, temperature and pH while decreases with increasing initial concentration of dye. Optimum conditions of the experiment were obtained for removal of cationic red 14 at pH = 11, 45 minutes, dye concentration of 50 mg/L, and adsorption dose of 0.25 g/l. According to the results, cationic red14 followed the Langmuir isotherm and pseudo-second model with (R^2 = 0.9972) and (R^2 = 0.9947), respectively. **Conclusion:** The results of this study showed that activated carbon derived from Cherry tree can be used as an effective adsorbent for removal of cationic red 14 from industrial wastewater containing high concentration of color.

Keywords: Cationic Red 14, Activated Carbon, Adsorption, Isotherms, Kinetics