

Rhodamine B dye removal aqueous solution by magnetic nanocomposite multi-walled carbon nanotubes

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In this project, magnetic nanocomposite of multi-walled carbon nanotube (MMWCNT) was used as adsorbent for removal of Rhodamine B (RB) aqueous solutions. The magnetic nanocomposite was synthesized by mixing commercial multi-walled carbon nanotube with a solution containing ferrous and ferric chlorides in highly basic media at 80°C under nitrogen atmosphere. The nanocomposite was characterized by scanning electron microscopy, Fourier transform infrared spectroscopy and X-ray diffraction pattern. The dye removal experiments were carried out based on Taguchi design and the effects of three variables including adsorbent dosage (0.010-0.025 g/L), contact time (20-35 min) and pH (3-9) on the process efficiency were investigated. In all experiments, dye concentration of 5 mg/L was taken as a fixed parameter. The results of running the experimental design were used to determine the optimum conditions for removal of RB using MMWCNT. Optimum values of the variables for RB removal by MMWCNT were determined as adsorbent dosage of 0.025 g/L, pH=9 and contact time of 35 minutes. Real sample analyses verified the applicability of the method for RB removal aqueous solutions. Kinetic study showed that the pseudo-second-order rate equation was able to describe adsorption kinetics of RB onto the magnetic nanocomposite of multi-walled carbon nanotube.

Keywords : Keywords: Adsorption; Rhodamine B; Magnetic nanocomposite; Multi-walled carbon nanotube; Taguchi design

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