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Removal of methylene blue using magnetic multi-walled carbon nanotubes: process optimization study

Abstract

Adsorption is the most common methods used in industry for the removal of dye. In this study, magnetic multi-walled carbon nanotubes (MMWCNTs) was served as adsorbent for the removal of methylene blue (MB). Statistical optimization of the MB removal efficiency via response surface methodology coupled with central composite design was performed and reported. It was observed that all three experimental parameters: adsorption temperature (25-50 C), MB concentration (10-50 ppm) and MMWCNTs dosage (0.01-0.05 g/20mL) were significant in the removal of MB. The optimized conditions of 99.21 % MB removal efficiency can be achieved at adsorption temperature of 38 C, MB concentration of 23 ppm and MMWCNTs dosage of 0.033 g/20mL. The verification of the prediction was performed with 3 repeated experiments and the results were found to be in good agreement with the experimental data with only 0.21 % error.