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REMOVAL OF COPPER FROM INDUSTRIAL WASTEWATER USING MANGANESE FERRITE NANOPARTICLES: EVALUATION OF EQUILIBRIUM AND KINETIC MODEL

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Abstract

In this study, the removal of Cu(II) from real industrial wastewater, being taken from galvanotechnique industry, by means of manganese ferrite ($MnFe_2O_4$) nanoparticles (NPs) was investigated. The effects of pH, adsorbent dosage, and contact time on Cu(II) removal from wastewater were monitored using the real wastewater while the effect of initial concentration was studied on synthetic aqueous solutions.

Optimal conditions were found for copper removal in this study. Cu(II) removal and adsorption capacity of $MnFe_2O_4$ NPs were achieved as 84.25% and 43.02 mg/g, respectively. In addition, other optimum conditions such as pH, adsorbent dosage and contact time were found as 5, 2 g/L and 120 min in this study, respectively. The removal of copper using $MnFe_2O_4$ NPs was fitted with Freundlich isotherm and pseudo second-order kinetic models. According to data obtained from desorption studies, $MnFe_2O_4$ NPs are regenerable and can be used several times. The results indicated that $MnFe_2O_4$ NPs are suitable adsorbents for removing Cu(II) from industrial wastewater.

Key words: adsorption, copper, manganese ferrite, nanoparticle, real wastewater treatment

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