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REMOVAL OF Cr(VI) FROM SIMULATED ELECTROPLATING WASTEWATER BY MAGNETITE NANOPARTICLES

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Abstract

In this study, the efficiency of magnetic nanoparticles for removal of hexavalent chromium from simulated electroplating wastewater was evaluated. The nanoparticles were prepared using the sol-gel method and were characterized by X-ray diffraction (XRD), X-ray fluorescence (XRF), a scanning electron microscopy energy dispersive X-ray analyzer (SEM-Edx), a particle sizer and a vibrating sample magnetometer (VSM). The results showed that synthesized nanoparticles were in the size range of 40-300 nm, had purity of about 90 percent, and had magnetization of 36.5 electromagnetic unit per gram (emu/g). In conditions including pH 2, Cr (VI) concentration of 10 mg/L, nanomagnetite concentration of 1 g/L, a shaking speed of 250 rpm and a 20 minute retention time, 82% of Cr(VI) was removed. Competition from common coexisting ions such as Na^{+}, Ni^{2+}, Cu^{2+}, NO_3^{-}, SO_4^{2-}, and Cl^{-} was negligible. The adsorption data was well fitted by the Freundlich isotherm. It was concluded that magnetite nanoparticles have considerable potential for removal of Cr(VI) from electroplating wastewaters.

Key words: adsorption, chromium, industrial wastewater, magnetite nanoparticles

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