Chromium and nickel removal from industrial wastewater using Tunisian clay

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ABSTRACT

In this study, illitic Tunisian (MOM R) clay was applied for the removal of Cr(III) and Ni(II), from industrial wastewater. The considered adsorbent (MOM R) was collected from Jebel El Hamma, Lower Cretaceous age. To characterize the adsorbent structures, infrared spectroscopy and X-ray diffraction techniques were used. The effects of agitation time, adsorbent quantity, pH, initial metal ion concentration, and temperature on the removal of these metals were studied. In order to study the adsorption isotherm, two equilibrium models, the Freundlich and Langmuir isotherms, were analyzed. The estimated optimum pH of chromium (III) ion retention for the considered adsorbents was 2.13 and 6.43 for nickel (II). The equilibrium data were analyzed using the Langmuir and Freundlich isotherms. The adsorption capacities of Cr(III) were 7.751 mg/g and 62.5 mg/g Ni(II). The effect of temperature on the adsorption phenomenon was also investigated. The results indicated that adsorption is an endothermic process for chromium and nickel ions removal. This study demonstrates that the considered adsorbent can be used as an alternative emerging technology for water treatment without any side effect.

Keywords: Adsorption; Isotherms models; Tunisian clay; Heavy metals; Wastewater treatment

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