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REMOVAL OF CR AND CU FROM WASTEWATER VIA APPLICATIONS OF GOETHITE AND NANOPARTICLES

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ABSTRACT

Chromium and copper are a toxic elements present in industrial waste water that threaten human health seriously. Various treatment techniques including adsorption, precipitation, ion exchange and reverse osmosis have been employed to eliminate or reduce the toxic ion concentration in waste water. Adsorption on solid surfaces is the most common one and efforts are being made continuously to develop new, low cost and efficient adsorbents for removal of heavy metals. In this study, the batch experiments were conducted in order to investigate the adsorption of Cr (VI) and Cu (II) ions from aqueous solutions on goethite and zero valent iron (ZVI). The influence of initial solution pH, adsorbent dosage, initial Cr and Cu concentration and contact time, was studied in order to establish the optimum experimental conditions for adsorption process. Data observed that the equilibrium concentrations of (Cr and Cu) were highly fitted to the linear form of adsorption isotherm equations of Langmuir and Freundlich with coefficients of determination (r^2) of (0.814,0.969 and 0.691,0.986) and (0.689,0.979 and 0.877,0.987) on goethite and ZVI respectively.

The maximum adsorption was observed at zero time on both adsorbents (Goethite and ZVI) at pH 2 and 9 for (Cr and Cu) respectively at initial concentration of $5\mu\text{g mL}^{-1}$. The maximum adsorption for (Cr and Cu) on goethite and ZVI were ($4970, 4874 \mu\text{g g}^{-1}$) and ($4956, 4862 \mu\text{g g}^{-1}$) respectively. The adsorption was 4970 and 4874 declined to 4350 and $4866 \mu\text{g Cr g}^{-1}$ at pH 7 of goethite and zero valent iron (ZVI) respectively. While, the adsorption of Cu showed an opposite behavior compared to chromium as its adsorbed quantities increased with increasing the pH and the maximum adsorption was observed at pH 7.0 for goethite and ZVI.

Key word: adsorption Goethite and Zero valent Iron, copper, chromium, Removal.