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REMOVAL OF Cr(VI) FROM AQUEOUS ENVIRONMENT USING PEAT MOSS: EQUILIBRIUM STUDY

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Abstract

The removal of Cr (VI) from aqueous solutions by sphagnum peat moss was investigated in batch experiments as a function of solution pH and initial Cr (VI) concentration. The highest removal percentage (R=99%) was obtained at pH = 1, in solutions of 20.8 mg Cr (VI)/L. In order to establish the mechanism of the removal process, Cr (VI) and total Cr (Cr (VI) + Cr (III)) in residual solutions was analyzed. The Cr (VI) removal by the peat moss at low pH is governed by two processes – electrostatic attraction between HCrO4- anions and positive charged functional groups of the peat and also, the direct reduction of Cr (VI) to Cr (III) in solution, in presence of the peat. Equilibrium sorption data were interpreted by Freundlich, Langmuir, Dubinin-Radushkevich and Tempkin isotherm models; Freundlich isotherm provide a better understanding of sorption than Langmuir or Tempkin isotherms. The values of mean free sorption energy from the Dubinin-Radushkevich isotherm indicate an ion exchange mechanism of sorption. The Fourier transform infrared analysis suggests the binding of Cr (VI) by the peat at low pH via protonated hydroxyl groups as well as oxidation of lignin moieties as a result of Cr (VI) reduction. The results of this study show that the peat moss can be efficiently used as low cost sorbent for the removal of Cr (VI) from polluted wastewater.

Key words: chromium, reduction, removal, peat moss, sorption

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