Immobilization of copper in aqueous solution by un-calcined sodium exchanged and acid modified montmorillonite

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The removal of Cu^{2+} from aqueous solution by batch adsorption technique using un-calcined sodium exchanged (Na-MMT) and acid modified montmorillonite (A-MMT) was investigated. The sensitivity of the Cu^{2+} removal process using Na-MMT and A-MMT was highly influenced by pH, initial Cu^{2+} concentration, reaction time and temperature. The rate kinetics for the adsorption of Cu^{2+} onto Na-MMT and A-MMT followed the pseudo-second-order kinetic model for the range of concentrations studied. Isotherm models were applied. The Redlich-Peterson and Dubinin-Radushkevich model fit best the equilibrium data of Na-MMT and A-MMT respectively. The thermodynamic parameters, such as ΔG^{o}, ΔH^{o}, and ΔS^{o} were also determined and evaluated. Na-MMT has a better adsorption potential than A-MMT. The potentials of both Na-MMT and A-MMT can be explored as effective adsorbents for the removal of toxic heavy metals in industrial effluents.