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Abstract

The present study is aimed to evaluate the microwave–enforced sorption approach (MES) for instantaneous extraction and removal of trace concentration of metal ions using microwave-synthesized titanium oxide nanoparticles-bonded-chitosan nanolayer ($NTiO_2$-NCh). The proposed and designed nanocomposite was characterized by different techniques. The coveted ions were allowed to heat in presence of $NTiO_2$-NCh nanocomposite inside a microwave apparatus for 5-20 seconds to execute the sorption process. The contribution of microwave warming time, nanocomposite dose, concentration of $Cd^{(II)}$ and $Cu^{(II)}$ ions, pH and interfering ions were explored and optimized. Sorption of $Cd^{(II)}$ was characterized as 1050 and 1150 μmolg^{-1} and those of $Cu^{(II)}$ were identified as 450 and 800 μmolg^{-1} using 5 and 20 sec of microwave heating time, respectively. Optimization of the nanocomposite dose factor was found to enhance the metal uptake values of $Cd^{(II)}$ to 1800 μmolg^{-1} using 5.0 mg. The potential utilization of MES technique for removal and extraction of Cd(II) and Cu(II) at low concentration levels (mg L^{-1}) from water samples was also explored. The percentage extraction values of $Cu^{(II)}$ and $Cd^{(II)}$ from water and wastewater samples were ranged as 86.80-88.01% and 72.56 -70.67%, respectively using 60-70 sec heating via MES technique.