Abstract

Cellulose-*g*-oxolane-2,5-dione nanofibers were prepared as an adsorbent for simultaneous separation and preconcentration of trace amounts of Cd, Cu, Fe, Pb and Zn ions in gasoline samples prior to ICP-OES detection. The nanofibers were chemically and morphologically characterized by FTIR, solid-state ^{13}C NMR, BET and SEM techniques. The influences of experimental parameters such as pH, HNO_3 concentration on metal ion elution from the nanofibers, flow rate and sample volume were investigated. The metal ions were retained on 0.5 g of the adsorbent at pH 6 and recovered with 5.0 mL of 2.0 mol L^{-1} HNO_3. The adsorption capacities for the adsorbent were 273.1, 183.6, 195.5, 236.2 and 182.4 mg g^{-1} for Cd, Cu, Fe, Pb and Zn, respectively. The relative standard deviation was <3% (n = 15), limits of detection and quantification were 0.13–0.68 μg L^{-1} and 0.42–2.2 μg L^{-1}, respectively, and the maximum preconcentration factor was 60. It was observed that cellulose-*g*-oxolane-2,5-dione nanofibers can be used for more than 30 adsorption–elution cycles without decreasing the extraction efficiency. The accuracy of the method was confirmed by analyzing a certified reference material and by performing the spike recovery test. The accuracy and recovery for different metal ions were in the range of 97–102% and 96–99%, respectively. The optimized method was applied for the separation and preconcentration of metal ions in gasoline samples.