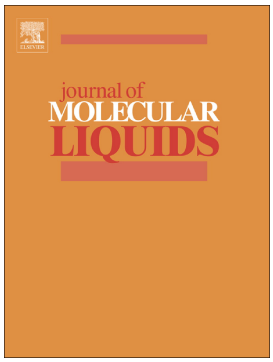

Trace amounts of Cd(II), Cu(II) and Pb(II) ions monitoring using Fe3O4@graphene oxide nanocomposite modified via 2-mercaptobenzothiazole as a novel and efficient nanosorbent

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Trace amounts of Cd(II), Cu(II) and Pb(II) ions monitoring using Fe_3O_4@graphene oxide nanocomposite modified via 2-mercaptobenzothiazole as a novel and efficient nanosorbent

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Abstract

In the current research for the first time, modification of magnetic graphene oxide ($GO@Fe_3O_4$) with 2-mercaptobenzothiazole (MBT) groups was described and applied for rapid separation/preconcentration of trace heavy metal ions including cadmium(II), copper(II), and lead(II). This nanosorbent can be recovered by applying an external magnetic field which results in easy separation of the sorbent without filtration. The effects of several factors such as pH, amount of sorbent, extraction time, type and volume of the eluent, sample volume, sorption capacity, and potentially interfering ions were investigated. Under the optimum conditions, linear dynamic ranges were achieved in the range of 0.3-80 ng mL^{-1} for Cd(II), 0.4-100 ng mL^{-1} for Cu(II), and 1-140 ng mL^{-1} for Pb(II). The limits of detection (LODs) calculated using 3(Sb) blank/m and were 0.19, 0.24 and 0.35 ng mL^{-1} for Cd(II), Cu(II), and Pb(II), respectively. In conclusion, the proposed method was simple, rapid, novel, straightforward, and highly efficient procedure for trace determination of cadmium, copper, and lead ions in different matrices.

Keywords: Graphene oxide, 2-mercaptobenzothiazole, Solid-phase extraction, Cadmium, Copper, Lead