Development of cloud point extraction preconcentration of cadmium and lead in solid samples using flame atomic absorption spectrometry

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ABSTRACT

2-[(6-Morpholin-4-ylpyridin-3-yl)amino]-N′-(4-oxo-3-phenyl-1,3thiazolidin-2-ylidene) acetohydrazide (MPAPTAH) was first used in a cloud point extraction procedure to determine the cadmium and lead ions in solid samples. Triton X-114 was used as a mixed micellar medium. The optimal extraction parameters (e.g. surfactant concentrations, amount of ligand, pH etc.) were evaluated. The optimum experimental conditions for Cd and Pb ions during the extraction procedure were carried out with 0.7 mg of MPAPTAH agent, 1.0 mL 0.2% (w/v) of the surfactant, a pH of 8.0. Under the best analytical parameters, the detection limit (LOD) for Cd(II) and Pb(II) ions were found to be 0.6 μg L^{-1} and 1.91 μg L^{-1}, while the relative standard deviation (RSD) was taken as 2.78 and 2.86%, respectively. Preconcentration factor (PE) of 50 was obtained from using 50 mL of the sample volume for both ions. The accuracy of the method was tested through analysis of Pb^{2+} and Cd^{2+} in certified reference material (CRM Sandy Soil C). The interference effect of certain cations and anions were also investigated. The recoveries of the analyte ions were almost quantitative in the presence of all the interfering ions. Afterwards, the developed method was successfully applied to find lead and cadmium in real solid samples, including black tea, tobacco, and chili pepper.

Keywords: Triton X-114; Nonionic surfactant; Cloud point extraction; Lead; Cadmium

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