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Flow injection system for cadmium preconcentration on poly(octadecyl diitaconate) (PDI-18) and atomic absorption spectrometry detection☆

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Abstract

This work assesses the potential of a new adsorptive material: poly(octadecyl diitaconate) (PDI-18), for the preconcentration of cadmium traces. The procedure involves the formation of a neutral cadmium chelate with ammonium pyrrolidinedithiocarbamate (APDC) as chelating reagent, its adsorption on PDI-18 minicolumns, and its elution with 300 μl of methyl isobutyl ketone. Using 20 mg of the sorbent material with a loading time of 2 min per sample, preconcentration factors of cadmium of 110 were readily achieved related to the direct introduction of aqueous solutions into an atomic absorption spectrometer. To evaluate the performance of this material, a flow injection system was used for samples of water from different sources, and the accuracy was assessed through recovery experiments and using certified reference materials. All the analytical results obtained were in good agreement with the certified values. The linear range, the detection limit (3σ) and the relative standard deviation at 2 ng ml^{-1} were 0.5–5.0 ng ml^{-1}, 0.08 ng ml^{-1} and 2.1%, respectively. The effect of various ions on the determination of cadmium was investigated in order to evaluate the selectivity of the new sorbent material.

Keywords: On-line preconcentration; Poly(octadecyl diitaconate); Flow injection; Cadmium; Atomic absorption spectroscopy

1. Introduction

It is well documented [1–10] that there is an increasing interest for coupling flow injections (FI) systems to atomic absorption spectrometry (AAS) for separation and preconcentration purposes employing minicolumns, mainly because of their simplicity of construction and operation. Also, FI systems incorporating materials into micro-columns [11] allow for efficient preconcentration, matrix removal, reduced sample and reagent consumption, reduced risk of contamination and increased sample throughput [12].

The enrichment of heavy metals by off-line procedures have been performed usually after chelation with ammonium pyrrolidinedithiocarbamate (APDC), ammonium pyrrolidine-1-yl dithioformate [13], 8-hy-

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