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Determination of Cadmium by FAAS After Solid-Phase Extraction of its 1-Benzylpiperazinedithiocarbamate Complex on Microcrystalline Naphthalene

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Abstract: By using 1-benzylpiperazinedithiocarbamate (1-BPzDC) as a new reagent, a method of solid-phase extraction is described for the pre-concentration of cadmium in water samples prior to its determination by flame atomic absorption spectrometry (FAAS). This method is based on the fact that cadmium forming in aqueous phase cadmium 1-benzylpiperazinedithiocarbamate complex ($Cd(1-BPzDC)_2$) can be extracted with microcrystalline naphthalene on solid phase, then back-extracted with potassium cyanide solution into aqueous phase and measured by FAAS. The optimum experimental parameters for the extraction and back-extraction of cadmium were investigated. The obtained recovery was nearly 97% when the enrichment factor was 500 for spiked cadmium solutions. The interfering effects of M(II), Fe(III), Cu(II), Ni(II), Pb(II), Cr(III), Hg(II), Zn(II), Bi(III), Ag(I), acetate, tartarate, oxalate, citrate, EDTA, cyanide, fluoride, chloride, bromide and iodide were investigated, and almost were eliminated except for EDTA and cyanide. The detection limit ($0.034 \mu g mL^{-1}$) and the determination limit of the proposed method ($0.114 \mu g mL^{-1}$) were evaluated as the concentration corresponding to three times and ten times the standard deviation of the blank signal, respectively.

Key Words: Solid-phase extraction, 1-benzylpiperazinedithiocarbamate, cadmium, flame atomic absorption spectrometry, microcrystalline naphthalene

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