1-Removal of Pb and Cd from aqueous media and fish liver using novel polyurethane foam functionalized with pyrazolone as a new metal ion collector,

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Abstract

In the present paper, an off-line preconcentration procedure for the determination of cadmium and lead by flame atomic absorption spectrometry (FAAS) is proposed. Polyurethane foam (PUF) functionalized with o-aminophenol (o-AP) followed by Pyrazolone (Pyr) packed in a minicolumn was used as a sorbent material. The metals were retained on the modified PUF, from which it could be eluted and effectively preconcentrated. The detection limits were 0.072 and 0.016 \(\mu\)g L\(^{-1}\) for Pb and Cd respectively. Enrichment factors were 250 and 319 for lead and cadmium respectively. The procedure has been applied successfully to metal determination in water samples, fish liver and reference material.

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2-Flow injection analysis–solid phase extraction (FIA–SPE) method for preconcentration and determination of trace amounts of penicillins using methylene blue grafted polyurethane foam

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Abstract

A simple, fast, and fully automated FIA–SPE method with UV detection for the preconcentration and determination of the investigated penicillins has been developed. This paper provides adequate procedure for the preconcentration and determination of the studied compounds in pharmaceuticals and milk samples. Penicillins (penicillin G, amoxicillin, and ampicillin) are extracted in a minicolumn packed with methylene blue grafted polyurethane foam (MBGPUF) material. The antibiotics are eluted by hydrochloric acid solution to the flow cell of UV–vis spectrophotometer at 230 nm. The analytes are preconcentrated on the sorbent at pH 8.0–9.5 and sample flow rate 3.0 mL/min. Elution was performed with 200µL 0.2 mol L\textsuperscript{−1} hydrochloric acid at 2mL min\textsuperscript{−1}. Sample throughput is 12 h\textsuperscript{−1} at 120 s preconcentration time. High selectivity of the sorbent for the analytes was achieved at the specified pH range. The enrichment factors achieved are 14, 16, and 11 with 3σ detection limits of 12, 15, and 19 ngmL\textsuperscript{−1} for penicillin G, amoxicillin and ampicillin, respectively. The method was successfully applied to the determination of these antibiotics in pharmaceutical control and contaminated milk samples with RSD≤8.8%.
3- Synthesis and Application of Alizarin Complexone Functionalized Polyurethane Foam: Preconcentration/Separation of metal ions from Tap Water and Human Urine

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Abstract

A new chelating sorbent has been synthesized by the covalent condensation of alizarin complexone (ALC) to polyurethane foam (PUF) through $\text{N}$ $\text{C}$ group. The material was characterized by IR, 1H NMR and chemical proof. Iminodiacetic acid groups are found in the prepared sorbent and the reaction proceeded via condensation between the toluidine moieties in the PUF and non-hydrogen bonded carbonyl group in ALC. Also, the possibility of elimination reaction between the groups (NH$_2$,NH and OH) in the polymer and carboxylic groups in the reagent was excluded. The material has been used to separate/preconcentrate Cu$^{2+}$, Zn$^{2+}$ and Cd$^{2+}$ prior to their determination by flame atomic absorption spectrometry (FAAS). Chemical and flow variables such as sample pH, sorbent capacity, sample flow rate and interference from co-existing ions were investigated. All metal ions are quantitatively desorbed by 0.1 mol L$^{-1}$ nitric acid solution. The procedure provides concentration factor 100 and limits of detection 0.013 $\mu$g mL$^{-1}$. The method was validated by the analysis of certified reference materials and real samples such as tap water and human urine.

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Abstract

In the present paper, the sorption properties of caffeine (CAF) onto polyether type polyurethane foam (PUF) as solid phase sorbent were investigated with UV determination at 274.3 nm. Batch and column methods were used to optimize chemical, flow, kinetic and isothermal conditions for preconcentration of CAF. Results indicated quantitative sorption of CAF at pH 8 and 30 min shaking time. The maximum sorption capacity was found to be 4.1 mg g⁻¹. Column preconcentration was recommended at a flow rate of 1.5 mL min⁻¹ and desorption with 4 mL from 0.15 mol L⁻¹ hydrochloric acid. The procedure provided a linear analytical range of 0.05 – 30 mg L⁻¹. The detection and quantification limits are 0.016 and 0.047 mg L⁻¹, respectively. The procedure was applied to determination of CAF in spiked human plasma. The obtained recoveries were 98 – 101% and RSD values were from 0.05 to 9.5%.
5. Cationic polyelectrolyte copolymer modified polyurethane foam for flow injection preconcentration and separation of trace amounts of β-lactam antibiotics

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Abstract

A more sensitive flow injection preconcentration method has been developed for the determination of four β-lactam antibiotics (BLAs) namely cefaclor, cefotaxime, amoxicillin and ampicillin in urine, pharmaceuticals and milk. A mini-column packed with PUF functionalized with the cationic polyelectrolyte, poly(N-chloranil N,N,N',N'-tetramethylethylene diammonium dichloride) PCTDD, was utilized for selective preconcentration. The detection limits with this method were 3.3, 3.8, 5.1 and 7.0 ng mL⁻¹ and enrichment factors were 38, 21, 39, and 36 for cefaclor, cefotaxime, amoxicillin and ampicillin, respectively with a sample throughput of 12 h⁻¹ for all BLAs. Moreover, the BLAs were successfully separated by isocratic elution using a micellar mobile phase. Application of the method developed has resulted in recovery values in the range 95–109% (RSD ≤ 8.7), 83–99% (RSD ≤ 9.7) and 91–103% (RSD ≤ 4.0) for urine, pharmaceuticals and milk samples, respectively.