SOLID PHASE PRECONCENTRATION ON ACTIVATED ALUMINA WITH EDTA FOR DETERMINATION OF TRACE ELEMENTS IN WATER AND FISH OTOLITHS BY ICP-AES

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Abstract: The use of solid phase extraction or preconcentration protocols has afforded powerful tools to environmental chemists for determination of trace elements and heavy metals at sub-ppb levels from various matrices. For this purpose different adsorbents, including silica gel, activated carbon, amberlite resins, ambersorb, pumice stone and alumina have been used as a solid support material. In this study, a procedure for the determination of trace and toxic metals has been described by ICP-AES after solid phase extraction of their EDTA complexes on a minicolumn containing alumina. Optimum conditions for pH, amount of adsorbent, eluent solution and flow rate have been determined for quantitative preconcentration of the elements. All elements were retained on the column between pH 2 and 4 followed by elution with 5 mL of 5% HCl solution. The recoveries for Cd, Co, Cu, Fe, Mn, Ni, Pb, V and Zn varied between 95 and 100%. Enrichment factors varied from 200-fold for Cu, Fe, Ni and Pb, 150-fold for Cd, Co, V, Zn 150 to 50-fold for Mn. The preconcentration method allowed detection limits to be improved at least by factor of ten for metals of interest. The proposed procedure was applied for the determination of the elements in water and fish otoliths by ICP-AES.

Keywords: Multi element, Preconcentration, Alumina, water samples, EDTA, ICP-AES