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Separation And Preconcentration Of Cr(III), Fe(III), Pb(II) And Zn(II) With Carrier Element–Free Coprecipitation Method Using A Triazole

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Determination of metal ion concentrations in environmental samples is one of the most important fields of the analytical chemistry. Although direct determination of metals is possible in some samples without complex matrix, it may not be possible in real samples by using spectrometric techniques including atomic absorption spectrometry (AAS), inductively coupled plasma atomic emission spectrometry (ICP–AES), and inductively coupled plasma mass spectrometry (ICP-MS). As a result, separation and preconcentration processes are necessary prior to determination of metals by an instrumental technique [1]. Various analytical methods such as coprecipitation [2] and solid phase extraction [3] have been developed and widely used.

Coprecipitation is one of the efficient methods for separation, preconcentration and speciation of trace heavy metal ions in various environmental samples. Until now all of the coprecipitation procedures including the use of organic or inorganic coprecipitants have been done by using a carrier element. We have developed a new coprecipitation method in which no carrier element has been used.

A separation/preconcentration procedure, based on the coprecipitation of Cr^{3+}, Fe^{3+}, Pb^{2+} and Zn^{2+} ions using a new organic coprecipitant, 3-phenly-4-o-hydroxybenzylidenamino-4,5-dihydro-1,2,4-triazole-5-one (POHBAT) without adding any carrier element, following flame atomic absorption spectrometric determinations, has been developed. The influences of some analytical parameters including pH of the solution, amount of the coprecipitant, standing time, centrifugation rate and time, sample volume and diverse ions were investigated on the quantitative recoveries of analyte ions. The recovery values were in the range of 93–98%. The detection limits defined as three times the standard deviation of the blank (n=10) for the analytes were in the range of 0.3–2.0 μg L^{-1}. The precision of the method based on a series of ten replicate analyses, evaluated as relative standard deviation (RSD), was in the range of 3–7%. The validation of the present preconcentration procedure was performed by the analysis of two certified reference materials. The proposed method was successfully applied to environmental samples for the determination of the analytes.

Reference

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