

CARRIER ELEMENT-FREE COPRECIPITATION (CEFC) METHOD FOR SPECIATION OF CHROMIUM

Volkan Numan Bulut¹, Duygu Özdes¹, Olcay Bekircan¹,
Ali Gundogdu¹, Celal Duran¹, Mustafa Soylak²

¹Department of Chemistry, Karadeniz Technical University, Faculty of Arts & Sciences, 61080 Trabzon, Türkiye
²Department of Chemistry, Erciyes University, Faculty of Arts & Sciences, 38039 Kayseri, Türkiye

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 [1]. The method, thus, has been called carrier element-free coprecipitation (CEFC). We have applied the method for separation, preconcentration and speciation of chromium with a new organic coprecipitant, 5-Chloro-3-[4-(trifluoromethoxy) phenylimino]indolin-2-one (CTFMEPI) without adding any carrier element. Cr(III) ions were coprecipitated quantitatively from the aqueous solutions with the CTFMEPI at pH 7. After reduction of chromium(VI) by concentrated H₂SO₄ and ethanol, the procedure was applied to the determination of total chromium following by flame atomic absorption spectrometry (FAAS). Chromium(VI) was calculated as the difference between the total chromium content and the chromium(III) content. The optimum conditions for coprecipitation and speciation processes were investigated on several commonly tested experimental parameters, such as pH of the solution, amount of coprecipitant and sample volume. No considerable interference was observed from the other investigated anions and cations, which may be found in natural water samples. The preconcentration factor was found to be 40. The detection limit for chromium(III) corresponding to three times the standard deviation of the blank (*N*=10) was found 0.7 µg L⁻¹. The present procedure was successfully applied for speciation of chromium in several liquid and solid environmental samples. In order to support the accuracy of the method, the certified reference materials (CRM-TMDW-500 Drinking Water and CRM-SA-C Sandy Soil C) were analyzed, and the results obtained were in good agreement with the certified values.

Reference

- [1] V.N. Bulut, C. Duran, A. Gundogdu, M. Soylak, N. Yildirim, L. Elci, *Talanta* (2008) in press.