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Uncertainty estimation for the determination of Fe, Pb and Zn in natural water samples by SPE-ICP-OES

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ABSTRACT

In this paper we estimate measurement of uncertainty for determination of Fe, Pb and Zn in natural water samples by solid-phase extraction and i nductively coupled plasma optical emission spectrometry (SPE-ICP-OES). The procedure is based on the retention of analytes in the form of 8-hydroxyquinoline (8-HQ) complexes on a mini column of XAD-4 resin and subsequent elution with nitric acid. The influence of various analytical parameters including the amount of solid phase, pH, elution factors (concentration and volume of eluting solution), volume of sample solution, and amount of ligand on the extraction efficiency of analytes was investigated. To estimate the uncertainty of analytical result obtained, we propose assessing trueness by employing spiked sample. Two kinds of bias (proportional bias and constant bias) estimated. We applied Nested design for calculating proportional bias and Youden method to calculate the constant bias. The results we obtained for proportional bias are calculated from spiked samples. Estimated uncertainty in Karaj water is: (1.0198 ± 0.0075) for Fe, (0.999 ± 0.010) for Pb and (1.0321 ± 0.0137) for Zn.

Keywords: Solid phase extraction; Amberlite XAD-4; Inductively coupled plasma-optical emission spectroscopy (ICP-OES); Uncertainty

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