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Determination of thallium in water samples using inductively coupled plasma optical emission spectrometry (ICP-OES) after ultrasonic assisted-dispersive solid phase microextraction.

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Abstract

A rapid and effective ultrasonic assisted-solid phase micro-extraction (UA-DSPME) was developed for the preconcentration of thallium in real water samples. The ZnO-ZrO₂@AC composite functionalized with 1-(2-Pyridylazo)-2-naphthol (PAN) was used as an adsorbent and the target analyte was quantified using inductively coupled plasma optical emission spectrometry (ICP-OES). The morphological, crystalline physical and chemical properties of the composite were characterized by scanning electron microscope/energy dispersive X-ray spectroscopy (SEM/EDS), transmission electron microscope (TEM) and X-ray powder diffraction (XRD). The two-level fractional factorial design and response surface methodology were used to optimize experimental parameters affecting the preconcentration procedure. Under optimum conditions, the enrichment factor (EF), limits of detection (LOD) and quantification (LOQ) were found to be 112, 0.25 ng L⁻¹, and 0.84 ng L⁻¹, respectively. Furthermore, intra-day and inter-day precisions expressed in terms of relative standard

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