



Contents lists available at ScienceDirect

Journal of Molecular Liquids

journal homepage: www.elsevier.com/locate/molliq

Ultrasound-assisted supramolecular solvent dispersive liquid-liquid microextraction for preconcentration and determination of Cr(VI) in waters and total chromium in beverages and vegetables

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ARTICLE INFO

Article history:

Received 31 December 2020

Received in revised form 23 January 2021

Accepted 30 January 2021

Available online 1 February 2021

Keywords:

Ultrasound assisted

Supramolecular solvent

Dispersive liquid-liquid microextraction

Chromium

Water and food samples

FAAS

ABSTRACT

Simple, sensitive, selective and green ultrasound assisted supramolecular solvent dispersive liquid-liquid microextraction (UA-SUPRAS-DLLME) method was developed for preconcentration and determination of chromium ions in waters, beverages and vegetables by using flame atomic absorption spectrometry. All SUPRAS were prepared using combinations of THF and tetrabutylammonium hydroxide (Bu_4NOH) with three different alcohol including 1-undecanol, 1-decanol and 1-dodecanol. 4-hydroxy-2-[(E)-(4-sulfonato-1-naphthyl) diazenyl] naphthalene-1-sulfonate (azorubine) was used complexing agent for Cr(VI) ions. Various analytical parameters such as pH, azorubine amount, composition, molar ratio and volume of SUPRAS, ultrasound time, ionic strength and sample volume were optimized for the extraction efficiency. Tolerance limits of common coexisting ions were also studied. Enhancement factor, limit of detection, limit of quantification and relative standard deviation values were found as 134, $0.03 \mu\text{g L}^{-1}$, $0.1 \mu\text{g L}^{-1}$, and 2.1%, respectively. Calibration curve was found linear in the range of $0.1\text{--}350 \mu\text{g L}^{-1}$. The accuracy of the present method was confirmed with certified reference materials including GBW 10052 Green tea and SRM-1643e Trace elements in water. Optimized method was successfully applied for preconcentration and determination of Cr(VI) in waters and total chromium in beverages and vegetables.