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Emre Yavuz, Şerife Tokalıoğlu, Şaban Patat



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Dispersive solid-phase extraction with tannic acid functionalized graphene adsorbent for the preconcentration of trace beryllium from water and street dust samples

Emre Yavuz, Şerife Tokaloğlu*, Şaban Patat

Erciyes University, Faculty of Science, Chemistry Department, TR- 38039, Kayseri, Turkey

*Corresponding author: serifet@erciyes.edu.tr (Ş. Tokaloğlu).

Abstract

In this study, tannic acid functionalized graphene as an adsorbent was synthesized and characterized by X-ray diffraction and scanning electron microscopy. It was used for the first time as an adsorbent for vortex-assisted dispersive solid phase extraction of trace Be(II) from water and street dust samples. The determination of beryllium was made by graphite furnace atomic absorption spectrometry. The effect of different parameters (pH, contact times, centrifuge rate and time, eluent type and volume, sample volume, and interfering ions) was investigated. The optimum pH was found to be 6. The adsorption and elution contact times were 3 min. The quantitative elution was carried out with 2 mL of 1.5 mol L⁻¹ HCl. The preconcentration factor, detection limit and precision (as RSD%) of the method were found to be 125, 0.84 ng L⁻¹, and 2.9%, respectively. The adsorbent showed good selectivity for Be(II) against interfering cations and anions and it was reusable up to 80 cycles. The accuracy of the developed method was confirmed by analyzing certified reference material (TMDA-70 Lake water) and by spiking tap water, wastewater, well water, and street dust samples.

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