

عنوان مقاله:

A Nanocomposite Packed Needle Trap Device for Simultaneous Determination of PAHs and BTEX in Soil Samples and Its Optimization using Box-Behnken Design

محل انتشار:

نهمین سمینار ملی شیمی و محیط زیست ایران (سال: 1398)

تعداد صفحات اصل مقاله: 1

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خلاصه مقاله:

Polyaniline silica (Silica/PANI) organic-inorganic nanocomposite was synthesized by combining electrospinning and in-situ polymerization processes. The composite structure was characterized by Fourier Transfer infrared spectrometry (FT-IR) and scanning electron microscopy (SEM). SiO₂/PANI nanocomposite was packed inside a stainless-steel needle and evaluated for simultaneous NTD sampling of PAHs and BTEX in polluted soil samples, followed by GC-FID measurement. Response surface methodology (RSM) involving Box-Behnken design (BBD) was implemented to determine the optimized effective factors and describe the experimental conditions. To achieve a quantitative extraction in the shortest time, various influential experimental variables including extraction temperature, flow rate of headspace circulation, sample moisture content, and extraction time were optimized by RSM-BBD. The NTD-GC-FID method suggested in this study was validated by obtaining the analytical figures of merit. Therefore, linear dynamic ranges (LDRs), limits of detection (LODs), and relative standard deviations (RSDs) for the simultaneous headspace extraction of PAHs and BTEX from solid samples were investigated. Under the optimal conditions, good linearity of the calibration curves ($R^2 > 0.99$) was obtained (LDR, 0.3-3000 ng g⁻¹ for BTEX and 0.01-3000 ng g⁻¹ PAHs). The limits of detection (LODs, 0.06-0.3 ng g⁻¹ for BTEX and 0.001-0.01 ng g⁻¹ PAHs), and standard deviations were found to be in the ranges 9.3-18.2% ($n = 6$). The proposed NTD-GC-FID method was successfully applied for the extraction and determination of PAHs and BTEX in contaminated soil samples.

کلمات کلیدی:

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