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High-Precision GC-MS Analysis of Atmospheric Polycyclic Aromatic Hydrocarbons (PAHs) and Isomer Ratios from Biomass Burning Emissions

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ABSTRACT

This manuscript describes an analytical method for the quantitative determination of 16-polycyclic aromatic hydrocarbons (PAHs) using accelerated solvent extraction (ASE), followed by purification on a silica cartridge, and subsequent measurement by gas chromatograph coupled to a mass spectrometer (GC-MS). The solvent extraction parameters ($T = 100\text{ }^{\circ}\text{C}$, $P = 1500\text{ psi}$, $t = 30\text{ min}$, $V = 30\text{ ml}$) are optimized with dichloromethane (DCM) in order to avoid fractionation effect, thereby achieving quantitative mass recovery of PAHs. The purification of PAHs on silica cartridge eliminates the matrix effect, facilitates their enrichment from extracted solution and quantitative determination in presence of an internal-standard (Pyrene-D10). The analytical protocol has been successfully used for the quantification of 16-PAHs and their isomer ratios in atmospheric aerosols collected from northern India dominated by agricultural-waste (post-harvest paddy and wheat residue) burning emissions. Based on the analysis of ambient aerosols, collected from different sites, the overall recovery efficiency for 2- to 3-ring PAHs is 85% and near 100% recovery for 4- to 6-ring compounds.

KEYWORDS

Agricultural-Waste Burning, PAHs, Accelerated Solvent Extraction, GC-MS

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