

CONTINUOUS MONITORING OF POLYCYCLIC AROMATIC HYDROCARBONS USING AUTOMATIC THERMAL DESORPTION-GAS CHROMATOGRAPHY

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Polycyclic Aromatic Hydrocarbons (PAHs) are a group of over 100 different chemicals that are known to be formed typically during incomplete combustion of organic matter at high temperature. Their major sources in the atmosphere include industrial processes, vehicle exhausts, waste incinerations, and domestic heating emissions. Due to their carcinogenic/mutagenic effects, 16 PAHs are currently listed as priority air pollutants. Actual analytical methods dedicated to monitor PAHs require multistep sampling preparations and are not suited for continuous monitoring. Automatic Thermal Desorption-Gas chromatography equipped with flame ionization detector (AUTO-TD-GC-FID) is the standard method for the monitoring of volatile and semi-volatile hydrocarbons. This technique allows for identifying and quantifying continuously hydrocarbons from ethane to naphthalene. The main goal of this work was to implement a new and simple method for sampling and determination of PAHs in gas and solid phase in air by using thermal desorption technique followed by gas chromatography equipped with two detectors: a flame ionization detector and a Mass spectrometer. A detailed study was carried out to optimize the experimental method in each of its phases, including sampling, thermal desorption, analytical separation, and detection. First, the limits of use of the analytical system were determined during the laboratory phase using liquid standards of the 16 PAHs. Then the applicability of the novel methodology was tested in real environment, namely, at 200 meters from a highway.

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