

CONTINUOUS MONITORING OF BTEX AND PAH 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, including benzene, toluene, ethylbenzene, m&p-xylene and o-xylene (BTEX). The main goal of this work was to implement a new and simple method for sampling and determination of BTEX and PAHs in gas and solid phase in ambient 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 certified cylinders for BTEX and liquid standards for the 16 PAHs. Then the applicability of the novel methodology was tested in real environment, namely, at 200 meters from a highway analyzing BTEX and PAH.

Keywords: Polycyclic Aromatic Hydrocarbons, Gas Chromatography, Continuous analysis, Thermal Desorption, BTEX