

Thermal desorption chamber prototype for the analysis of particulate matter collected at Tenango del Aire during the MILAGRO campaign

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In an effort to reduce the time and expenses associated with solvent extraction, cleanup, and re-concentration, traditionally followed for the characterization of individual organics tentatively present in atmospheric aerosols, we decided to examine an alternative form of pre-treatment of the samples based on the facility for desorption that semi-volatile compounds display when are exposed to high temperatures.

A device that can be use for the introduction of samples collected on filter substrates, to the chromatographic identification system has been developed. The device consists of an aluminum body whose temperature is programmed by a digital temperature controller and four electrical resistances. Inside this metallic body a Pyrex glass chamber is placed. Some punches of a quartz filter where the sample of interest has been collected, can be introduced to the glass chamber to be thermally desorbed. Internal temperatures of up to 200°C can be reached in very short times. At these temperatures we have been able to identify five out of sixteen of the criteria polycyclic aromatic hydrocarbons (PAH's) from samples collected at twenty-four-hour intervals at Tenango del Aire during the MILAGRO campaign.

The thermodesorbed PAH's are immediately transferred to the gas chromatogram-mass spectrometry system using a pneumatic automatic six-port valve. The chromatographic separation is based on the TO-13A EPA method. The spectrometric identification is performed by digital and visual comparison of the individual spectra with the NIST library (v. 2002). The proposed methodology has demonstrated to be suitable for the analysis of semi-volatile compounds. Our device avoids the use of additional cryogenic focusing before the chromatographic separation and the use of a gas flow during the desorption procedure, and above all, it saves from solvent extraction. Work is currently being performed to increase the desorption temperature in order to identify heavier compounds, and to determine recovery values of the identified compounds. We will present all these results during the meeting.