

ORGANIC COMPOUNDS IN SECONDARY ORGANIC AEROSOL

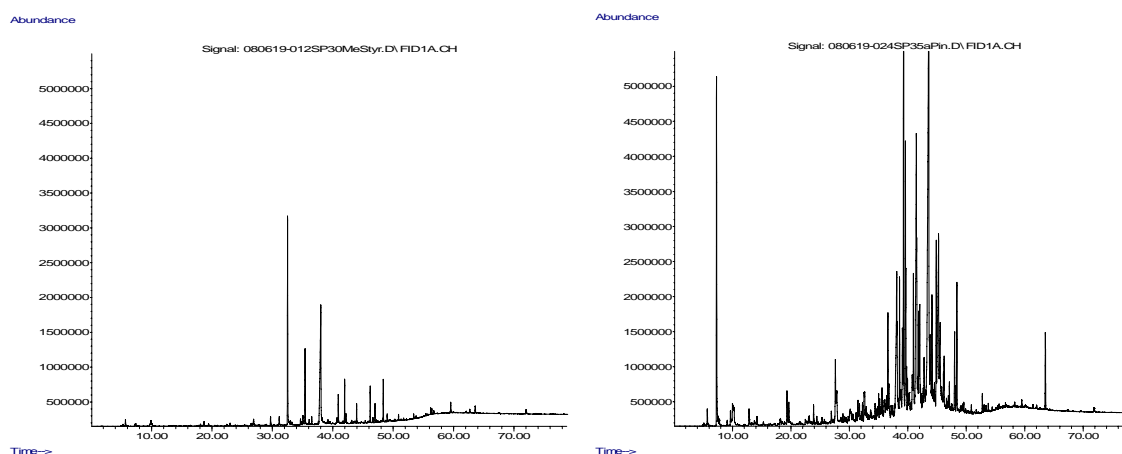
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Atmospheric aerosols play a key role in many environmental processes. Detailed information on the organic content of atmospheric aerosol is thus required in order to fully understand its impact on climate and human health.

Here we will present the Direct Thermal Extraction – Gas Chromatography/Mass Spectrometry/Flame Ionization Detection (DTE-GC/MS/FID) as a useful off-line technique for characterization of organic compounds present in atmospheric aerosol. A known amount of the sample is placed in an empty glass thermodesorption tube stopped on both sides by glass wool. The tube is subjected to two-stage thermal desorption process (Perkin-Elmer ATD 400). The components are first swept onto a cold trap packed with an adsorbent, which is held at -30°C and then the cold trap is flash-heated to transfer the components to the GC/MS/FID system. The FID is normally used for calculation of the total organic content in the aerosols and the results are expressed as toluene equivalents. The MS is used for both identification and quantification of the organic compounds. For quantification of identified compounds, calibration using authentic standards may be performed if they are commercially or in other way available.

The method was first tested and validated using the NIST Standard Reference Material 1649a “Urban Dust (Organics)” which is certified for many species, among other for some selected Polycyclic Aromatic Hydrocarbons.

The method has then been used for analysis of organic compounds in the particles formed in ozonolysis of some terpenes (biogenics) such as sabinene, α -pinene, and 2-methyl styrene (representative for anthropogenic compounds). The particles have been collected in environmental (smog) chambers (LISA-Paris, UCC, UBAY and SP) on glass-fibre filters. A large number of chromatographic peaks were observed in each chromatogram. However, not all the compounds could be identified using the NIST 98 Mass Spectral Library. The presentation will summarize the advantages and disadvantages of the technique. The analyses of particles from the other chambers will be also presented for attemptive comparison of the chambers.



Figures: Left: FID chromatogram of SP-particles from O_3 /2-Methylstyrene
Right: FID chromatogram of SP-particles from O_3 / α -pinene reaction