Fatty acids and tracer oxygenated related species present in the atmosphere of four large European cities

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A major problem in most urban areas is the atmospheric pollution caused by road traffic and other anthropogenic activities. In addiction to material damage in buildings and other structures, the high levels of particles and organic contaminants are suspected to cause respiratory and cardiovascular diseases, as well as lung cancer.

Organic acids are an important class of compounds in atmospheric aerosol particles as they are present predominantly in particles rather than in gas phase. Within the European project SAPPHIRE, atmospheric pollutants related to automobile exhaust were monitored in four European cities: Oporto (Portugal), Birmingham (U.K.), Copenhagen (Denmark) and Helsinki (Finland). In each city two sampling sites were selected, one at a roadside impacted directly by fresh car emissions and the other more distant from traffic emissions. Sampling was performed in parallel at both sites, sub-

mitted to the same urban background so that differences in air composition were only due to fresh road emissions. One month sampling campaigns, both in winter and summer were performed to evaluate summer and winter traffic contributions in each city. Particulate matter was collected in two fractions on glass fiber filters using Hi-Vol samplers (coarse fraction, $2.5\mu m < Dp < 10\mu m$ and fine fraction, $Dp < 2.5\mu m$). Filters were extracted with dichloromethane before and after sampling by using ASE (Accelerated Solvent Extraction), and the acidic fractions were obtained by fractionating the extract by flash chromatography prior to gas chromatography-mass spectrometry (GC-MS) analysis.

Since the chemical composition of aerosols is strongly influenced by their sources, the evaluation of their chemical composition allows the identification of potential sources by monitoring specific markers or tracers characteristic from each source. Within this study were detected high levels of C16 and C18 acids, considered to reflect the influence of anthropogenic sources such as meat cooking operations, as well as high average ratios (C18:0) / (C18:1) reflecting the presence of aged aerosols (monounsaturated acids break down much faster by atmospheric oxidation than the saturated analog). Additionally, significant levels of levoglucosan (tracer for cellulose burning) and dehydroabietic acid (derived from the combustion of resinous woods) were found.

In this communication we will present, compare and discuss the results of GC-MS analysis of fatty acids and some tracer oxygenated organic compounds present in aerosol samples from these four cities.