

# **POLYCYCLIC AROMATIC AEROSOL COMPONENTS: CHEMICAL ANALYSIS AND REACTIVITY**

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Polycyclic aromatic hydrocarbons (PAHs) are ubiquitous environmental pollutants in the atmosphere and originate primarily from incomplete combustion of organic matter and fossil fuels. Their main sources are anthropogenic (e.g. vehicle emissions, domestic heating or tobacco smoke), and PAHs consisting of more than four fused aromatic rings reside mostly on combustion aerosol particles, where they can react with atmospheric trace gases like O<sub>3</sub>, NO<sub>x</sub> or OH radicals leading to a wide variety of partially oxidized and nitrated derivatives. Such chemical transformations can strongly affect the activity of the aerosol particles as condensation nuclei, their atmospheric residence times, and consequently their direct and indirect climatic effects. Moreover some polycyclic aromatic compounds (PACs = PAHs + derivatives) are known to have a high carcinogenic, mutagenic and allergenic potential, and are thus of major importance in air pollution control. Furthermore PACs can be used as well defined soot model substances, since the basic structure of soot can be regarded as an agglomerate of highly polymerized PAC-layers.

For the chemical analysis of polycyclic aromatic aerosol components a new analytical method based on LC-APCI-MS has been developed, and a data base comprising PAHs, Oxy-PAHs and Nitro-PAHs has been established. Together with a GC-HRMS method it will be applied to identify and quantify PAHs and Nitro-PAHs in atmospheric aerosol samples, diesel exhaust particle samples and model soot samples from laboratory reaction kinetics and product studies.

As reported before, the adsorption and surface reaction rate of ozone on soot and PAH-like particle surfaces is reduced by competitive adsorption of water vapor at low relative humidity (< 25 %). Recent results at higher relative humidities (ca. 50 %), however, indicate re-enhanced gas phase ozone loss, which may be due to absorption of ozone into an aqueous surface layer. The interaction of ozone and nitrogen dioxide with coated and uncoated spark-discharge soot aerosol particles was found to proceed via competitive adsorption of O<sub>3</sub> and NO<sub>2</sub>, and the degradation of benzo[a]pyrene on soot particles was faster with O<sub>3</sub> and NO<sub>2</sub> than only with O<sub>3</sub>. Additional experiments and the development of a formal mechanistic description of the investigated processes are currently under way.