

Secondary Organic Aerosol Composition Measured during the MS-CHAOS Campaign

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Secondary organic aerosol (SOA) formation from the photooxidation of three hydrocarbon precursors (1,3,5 tri-methylbenzene, α -pinene, and isoprene) was studied in the MS-CHAOS (Mass Spectrometers for the Chemical Analysis of Organic Substances in the Gas-and Aerosol-Phase) campaign in November 2005 at the PSI chamber. Seven research groups with different mass spectrometers (for both gas- and particle-phase measurements) were involved in this campaign. The goal of this study was to characterize the chemical composition of the SOA. Aerosol Time-of-Flight Mass Spectrometer (ATOFMS) results showed ions up to 750 Da in the α -pinene and 1,3,5 tri-methylbenzene photooxidation experiments. These high-mass ions occurred with characteristic spacing of 14 and 16 Da, indicative of oligomeric species. The Aerodyne High Resolution Aerosol Mass Spectrometer (HR-ToF-AMS) allowed for quantification of the elemental composition of the aerosols. The oxidation state of the aerosols can be characterized by the oxygen-to-carbon (O/C) ratio; the O/C ratios observed in these experiments are in general agreement with ambient measurements. It is found that the fraction of the mass signal at m/z 44 (CO_2^+ , a signature of highly oxidized species) is strongly correlated with the hygroscopicity of the aerosols, as measured by a hygroscopicity tandem differential mobility analyzer (HTDMA). Different ionization sources in the Aerodyne AMS were also evaluated during this campaign and results will be discussed.