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Multiphase chemical analysis of terpene oxidation products

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A new technique was developed for multiphase monitoring of organic species in the gasphase and on aerosols with a Proton Transfer Reaction Mass Spectrometer (PTRMS) as the detector. An advantage of the soft ionization technique of the PTRMS, is that it is possible to see the ozonolysis products with little fragmentation. When fragmentation does occur, it is limited to the loss of water from a hydroxyl or carboxyl group, thus facilitating identification. This new system gives detailed information on the chemical composition of organic aerosols, and allows the chemical evolution of condensed organics to be monitored. With this new system it is possible to identify specific chemical compounds in both gas and aerosol phases, instead of the “total organics” which have been reported previously.

A series of reactions of ozone with terpenes, beta-caryophyllene and isoprene were preformed in a smog chamber. The secondary organic aerosol and VOCs in the gas phase were measured. Due to the high aerosol concentrations in the smog chamber experiments, air samples could be collected at high time resolution, and it is possible to observe the aging of the aerosol and the gas phase.