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SOA formation in the highly oxidizing environment in the PAM chamber

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The secondary organic aerosol (SOA) formation in the extreme oxidizing environment is studied in the PAM chamber which introduced a new concept, Potential Aerosol Mass (PAM).
PAM can be defined as the maximum aerosol mass that precursor gases can be oxidized to form particulate matter. The PAM measurement consists of passing air containing aerosol-precursor gases through a small chamber that is irradiated with ultraviolet lamps. Rapid and complete oxidation ensues in the extreme oxidizing environment, with measured values of about 10 ppmv of O_3, 100 pptv of OH, and 1 ppbv of HO_2. The amount of oxidant in the chamber can be controlled by varying the UV light exposure and relative humidity. The air flow exiting the chamber is sufficient that a wide range of detection has been used, including a Tapered Element Oscillating Microbalance (TEOM), an Aerosol Mass Spectrometer (AMS), and a variety of particle sizing instruments.
We present the laboratory studies that demonstrate the behavior and completion of SOA formation and subsequent oxidation from the photo-oxidation of biogenic and anthropogenic hydrocarbons in the extreme oxidizing environment. The mass spectra for SOA in the PAM chamber are measured by the AMS and are compared to mass spectra obtained in large environmental chambers with the troposphere oxidant values. The dependence of the formation and aging of SOA on precursor organic amount and, more importantly, on OH is studied by observing the evolution of the chemical composition and the size distribution of SOA in the PAM chamber. We discuss a

model simulation to examine the effects of OH and the precursor organic amount on the oxidation process of SOA formed in the PAM chamber.