Photochemical Aging of Organic Aerosol Particles

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Secondary Organic Aerosol (SOA) particles are produced in the atmosphere as a result of oxidation of volatile organic compounds (VOC). Primary Organic Aerosol (POA) particles are directly emitted in the atmosphere by their sources. Oxidation of VOC by NO_3 and O_3 plays an important role in night-time generation of SOA and chemical processing of POA. After the SOA and POA particles are produced, they are further processed by day-time heterogeneous chemistry and by direct photochemical processes. The goal of this study is to understand the photochemical aging processes during exposure of model SOA and POA particles to sunlight. The photochemistry of model aerosol particles is investigated with laboratory-based approaches relying on cavity ring-down spectroscopy (CRDS). SOA particles are generated by dark oxidation of Limonene and alpha-Pinene with NO_3 and/or O_3. Particles are then irradiated with wavelength-tunable radiation in the actinic region greater 295 nm. The resulting gas-phase and particle-phase photolysis products are studied by their CRDS spectra and mass-spectrometry, respectively. Detail reaction mechanisms and their implications for photochemical aging of aerosol particles will be discussed.