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Temperature dependent Investigations of the Densities of Secondary Organic Aerosols

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The formation of secondary organic aerosols through the reaction of α-Pinene, Limonene and Isoprene with ozone was investigated in the temperature controlled aerosol chamber AIDA. The oxidation was done with an excess of 100 - 300 ppb ozone in the presence of 500 ppm cyclohexane which served as an OH scavenger. The gas phase concentration of precursors and products was measured with a PTR-MS (proton transfer mass spectrometer). To investigate the density of the resulting secondary organic aerosol the size distribution was measured with SMPS (scanning mobility particle sizer) and the chemical composition as function of particle size was measured with an Aerodyne AMS (aerosol mass spectrometer). Particle densities can be derived from the comparison of mobility diameter and vacuum aerodynamic diameter as measured by SMPS and AMS respectively. In addition the density can also be derived from a comparison of the total volume and total mass measured by SMPS and AMS respectively. In general good agreement between these two approaches was found. For α-pinene oxidation at 293 K a density of 1.3 g/cm^3 was obtained. The effect of aerosol aging for up to 30 hours on aerosol chemical composition and density will be discussed. A detailed comparison of densities found as a function of temperature and relative humidity will be presented.