

Interactive comment on “Loading-dependent elemental composition of α -pinene SOA particles” by J. E. Shilling et al.

Anonymous Referee #2

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This study reports the characterization of SOA particles formed by the dark ozonolysis of α -pinene using a high resolution AMS. The mass spectra, O/C ratios, and densities of the SOA products are compared for different organic particle mass loadings. A major finding is that the SOA mixture produced in the chamber is increasingly oxidized and shows mass spectrum progressively more resemble to ambient OOA spectra at lower organic particle mass loading. This work gives information useful for understanding the differences between SOA production in chamber settings and in the atmosphere. This work also has significant implications for the interpretation of chamber study results and the application of these results for parameterizations to be used in models. This work is of good quality and fits within the scope of ACP. The manuscript is also very well written. I highly recommend its publication on ACP.

It was discussed in the introduction that SOA was substantially underestimated in models, which usually use parameterizations that were derived based on yields determined in chamber studies conducted under high SOA loadings. In this study, Fig. 4 clearly shows an increase trend of yields vs. SOA particle mass loadings, which may suggest that the model prediction of SOA will be lower even more if yields from the low OA loading experiments are used. Comments on this point will be interesting.

Regarding the discussions on the similarities in the mass spectra, it needs to be stressed that the SOA from this study was produced from one VOC while ambient OOA/SOA is the product of hundreds or thousands of VOCs involving more reactions. In addition, ambient OOA/SOA is probably more aged than the SOA mixtures obtained from this study. It will be interesting to see how the SOA mass spectra change as a function of reaction time, for instance the evolution pattern of the 4 base sets similar to that displayed in Fig. 4.

A few detailed comments: 1) The tag lines of the peak labels in Fig. 1 and 2 are sometimes hard to differentiate from the peaks. Please either remove the tag lines or make them more distinguishable from the peaks.

2) Why Fig. 5 shows the effective density data only up to 40 $\mu\text{g m}^{-3}$ of SOA loading? What at the densities for SOA at higher mass loadings?

3) No H₂O peaks are shown in Fig. 1, 2 and 6i. Were they included in O/C ratio analysis?

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 15343, 2008.

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