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Atmospheric Chemistry and Physics Discussions



# *Interactive comment on* "Particle mass yield in secondary organic aerosol formed by the dark ozonolysis of $\alpha$-pinene" *by* J. E. Shilling et al.

**Anonymous Referee #2**

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Summary & General comments

Shilling et al. provide new SOA yield data from dark ozonolysis of a-pinene, collected in both (traditional) batch and (novel) continuous-flow chamber experiments. The continuous-flow technique offers the advantage of longer signal averaging time on a steady-state mixture, to enable measurements of yields at smaller, more atmospherically relevant aerosol loadings. This study finds yields at these low ($<$ 10 ug/m3) particle loadings of up to a factor of 2 higher than previous studies. The paper explores and rejects a series of possible measurement artifacts as explanations for this discrepancy. The authors conclude that there must be factors outside of those understood by the SOA community that influence yield, and suggest that this is in accord with the widely reported discrepancy between measured and modeled SOA loading.

This well-organized paper presents significant, new, and highly relevant data on secondary organic aerosol (SOA) formation from ozonolysis of alpha-pinene. I recommend that it be publishing following consideration of a few comments.

In my opinion, Table 4 is unnecessary. The findings are well-summarized in the text, and I find the table somewhat confusing.

Table 5 adequately describes the modeling done to confirm that gas-phase mixtures should have been similar across experimental modes. I recommend omitting Figure 6, which is a bit busy and confusing, and is used to make the same point.

Specific comments

Page 17941, line 5: Based on Fig. 5, it looks like one can only really claim equivalence of AMS/SMPS mass loading measurements up to 2 ug/m3. Can you comment on the discrepancy already apparent at 4 ug/m3? Is this already the effect of the (unmeasured by SMPS) tail of the size distribution?

Page 17941, line 7: Suggest adding a sentence describing why you chose a different OH scavenger.

Page 17941, line 17: Suggest rewording the first sentence of this paragraph.

Page 17941, line 27: Suggest replacing "the results given" with a more descriptive phrase: maybe, "the relative concentrations of species across different experimental modes"

Technical corrections

Page 17936, line 27: "For example, 1.9 ppbv (10.6 ug/m3) of reacted a-pinene produced 0.9 ug/m3 of SOA particle mass, corresponding to Y=0.09. This example corresponds to the time trace of the data shown in Fig. 1" These cited numbers don't seem to match the data shown in Fig. 1.

Page 17956, last sentence of Table 2 caption: replace "Equations" with "Model fits"



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Page 17959, Table 5 caption: add a bit more description of results, i.e., "Results are shown as concentration difference relative to..." and, if removing Fig. 6, remove line referring to it and add any additional description of simulations here.

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Interactive comment on Atmos. Chem. Phys. Discuss., 7, 17927, 2007.



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Interactive Comment