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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 α-pinene" *by* J. E. Shilling et al.

Anonymous Referee #1

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General Comments:

The authors describe the results of laboratory measurements of the yields of secondary organic aerosol (SOA) formed from the reaction of alpha-pinene with ozone. The experiments were carried out in a large-volume, continuous flow reactor and aerosol mass was measured with an SMPS and an AMS and alpha-pinene was measured with a PTR-MS. An important feature of these experiments is that they could be carried out down to very low aerosol mass concentrations representative of atmospheric conditions because of the ability to integrate aerosol mass measurements over long times under steady-state conditions. The experiments are well done and the results and interpretation seem to be quite straightforward. The major result is that the yields measured here are significantly higher (up to about a factor of 2) than those measured

in previous studies. Possible reasons for the differences are explored and discussed (and in some cases corrected for, in order to make comparisons), including factors such as the OH radical scavenger, continuous vs. batch reactor, seed particles, RH, ozone concentration, alpha-pinene concentration, temperature, and wall effects, but none provide an clear explanation. The authors have done a thorough job searching for explanations for the differences and I do not have any additional ideas as to what might be responsible. The results are important, considering the large discrepancies that have been documented between measured and modeled SOA mass loading in the atmosphere, and for which no explanations are yet available.

The manuscript is well written and is a good length, and the figures, tables and references seem appropriate. In general, I think it is a very good paper and I recommend that it be published. I have a few minor comments.

Specific Comments:

1. Page 17940, 25-26 and Page 17945, lines 20-25: I was under the impression that it is standard practice to correct AMS field data using a collection efficiency of 0.5 due to bounce. Why should it be different here, especially considering that these particles are a mix of organics and ammonium sulfate, as in the atmosphere?

2. Although the discrepancy between the SOA yields from these and other experiments is probably not due to OH radical scavengers, since many use the same scavenger, butanol, it would be worthwhile for someone to look at possible SOA formation from the OH scavenging reaction. For example, one could react butanol with OH radicals formed from the ozonolysis of a small alkene such as dimethyl butene that has a high OH yield and probably does not make aerosol itself. Also, it would be worthwhile to run this alpha-pinene experiment with methanol, with is a lighter alcohol with simpler OH chemistry and usually has fewer impurities than butanol.

Technical Comments:

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1. Page 17934, line 22: I believe this should be x 10(9) not x 10(-9).

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

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Interactive Comment

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