Atmos. Chem. Phys. Discuss.,
https://doi.org/10.5194/acp-2017-746-RC2, 2017
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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Multi-generation Chemical Aging of α-Pinene Ozonolysis Products by Reactions with OH" *by* Ningxin Wang et al.

Anonymous Referee #2

Received and published: 27 September 2017

General Comments

In this manuscript the authors present results of a laboratory study in which they investigated the chemical aging of SOA formed from the ozonolysis of a-pinene. The aging was conducted by photolyzing HONO (to form OH radicals) that was added at two different times following completion of the ozonolysis reaction. The effects of aging were determined by monitoring the SOA mass using an SMPS and the composition using an AMS. Careful corrections were made for the effects of particle and vapor wall loss on the SOA yields. The results demonstrate that oxidation comparable to a few days of atmospheric aging lead to the formation of a significant amount of additional SOA mass, as well as small changes in composition as measured by the O/C ratio. The results are consistent with previous studies of this type, but are of higher quality with regards

to SOA yield corrections that are important in aging experiments. The experiments and data analysis were carefully done, and the manuscript is well written. I think the manuscript will be suitable for publication in ACP once the following comments have been addressed.

Specific Comments

1. Lines 407–410: It seems that this estimate of the effect of gas-wall partitioning of vapors on SOA formation assumes that all the first-generation products are either fully volatile or non-volatile with respect gas-particle partitioning. But for semi-volatile compounds the 15 min condensation time scale is also the upper limit to the time scale to achieve gas-particle partitioning equilibrium. In this case, some vapor will remain in the gas phase and continue to be lost to the chamber walls throughout the experiment because of the large effective particle mass of the walls. I think the approach used here thus provides only a lower-limit estimate to loss of vapors to the wall.

2. Lines 408–410: It is not clear how the estimated loss of vapors to the walls is converted to an SOA yield correction.

3. Line 435–437: It would be straightforward to estimate the potential increase in O/C ratio due to heterogeneous oxidation by OH radicals and thus test this hypothesis.

4. Line 437: Why can't the observed changes in O/C ratio with aging be the result of gas-phase oxidation of semi-volatile compounds coupled to gas-particle partitioning, as proposed by Robinson et al. (2007), rather than heterogeneous oxidation?

5. The Conclusions section as is really just a brief summary of the results, written solely within the context of these experiments. I suggest the authors provide a broader discussion of the relevance of these results to studies of atmospheric SOA and what they contribute to knowledge of the formation, composition, and properties of SOA.

Technical Comments

None.

Interactive comment on Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2017-746, 2017.