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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Influence of Seed Aerosol Surface Area and Oxidation Rate on Vapor-Wall Deposition and SOA Mass Yields: A case study with α-pinene Ozonolysis" *by* T. Nah et la.

Anonymous Referee #2

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General Comments

In this paper the authors describe results of a combined experimental and modeling study of the effects of particle surface area and VOC oxidation rate on the formation of SOA from the reaction of a-pinene + O3. SOA yields are measured for a series of experiments conducted for a range of these parameters, and the results are interpreted using an SOA formation model that includes oxidation, SOA volatility, oligomerization, and particle and vapor wall loss. It is observed that SOA yields tend to increase with oxidation rate, which from the modeling analysis is consistent with an increased rate

of condensation that reduces losses of vapor to the walls. The experiments and modeling are well done and the interpretation is reasonable. The paper is well written and represents a significant contribution to the literature. Because of the widespread use of SOA yields in atmospheric models it is important to better understand the factors that affect values measured in the laboratory so that more accurate values can be obtained. I think the manuscript is suitable for publication in ACP. I have just a few important comments that should be addressed.

Specific Comments

1. Lines 674-677. This sentence does not include any mention of vapor loss to Teflon walls, only to organic matter deposited on the walls. Studies indicate that the loss to Teflon is more important.

2. The discussion about kinetically-limited vs. quasi-equilibrium controlled SOA formation does not mention the effect of the time constant for oligomer formation. I would think that this has a significant affect on the growth regime, and so should be discussed.

3. It appears that the time constant for wall loss is much smaller that the values inferred from previous measurements of wall loss for products of a-pinene photooxidation by Zhang et al. in the Caltech chamber. Do the authors have any comments on why?

4. For reactions conducted under low NOx conditions the oxidation rate will affect the chemistry of RO2 radicals. In the O3 reaction, where it has been previously observed that products of both RO2 + RO2 (such as pinic acid) and RO2 + HO2 (organic peroxides) are formed, it is to be expected that at higher oxidation rates the system will shift more towards RO2 + RO2 reactions. This can have a significant affect on SOA yields. This is also true for the referenced studies on monoterpene + NO3 reactions. The authors should discuss this effect and how it might alter the interpretation of their results.

5. Similar to the comments made in #4, when comparing studies the authors should

consider the fact that oxidation rate is unlikely to affect RO2 chemistry under high NOx conditions, such as in aromatic VOC experiments.

Technical Comments

1. Line 592: Should add “of” after “regardless”.

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