

***Interactive comment on* “The effect of temperature and water on secondary organic aerosol formation from ozonolysis of limonene, Δ^3 -carene and α -pinene” by Å. M. Jonsson et al.**

Anonymous Referee #2

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General comments

This paper is generally well written and certainly addresses scientific questions within the scope of this journal (effects of temperature and humidity on formation of secondary organic aerosol from biogenic precursors, as specified in the title). Units and formulae appear correct. While the concepts and techniques used are not novel, the data are. Scientific methods are described at a sufficient level of detail, outside of comments raised specifically below. The manuscript is adequately referenced, and its abstract is mostly appropriate. One section of the paper should either be removed or expanded (see specific comments section below). After some significant revision, this paper

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should be accepted for publication in ACP. In addition to the specific comments below, the authors should strive to provide support for some of their speculations regarding the interpretation of the data. In the current version, it reads as if the authors simply present their data and speculate on what it could mean without really providing any proof.

Specific comments

1. Page 9324, line 19. I disagree with the authors' assertion that this paper adds to the understanding of atmospheric aerosol composition. Without data regarding speciation of the formed aerosol, this paper only suggests a mechanistic change with temperature and humidity. It does not provide any information about the resulting change in the composition. This line in the abstract should be changed accordingly.
2. Page 9325, lines 19-20. The authors state that the use of an OH scavenger can influence SOA formation. I would assert that it is both the use of and the choice of an OH scavenger that will do so. This should be stated explicitly as not all scavengers have the same effect.
3. Page 9325, reference to Jonsson et al. 2008, submitted to EST. Should the information from that paper be included in this one or vice versa? Without seeing the EST paper compared to this one, it is difficult to say how much overlap there is between the two manuscripts. In this regard, sections 3.4 and 3.5 should be expanded or removed depending on the overlap. Depending on what is done, Table 3 may not be needed.
4. Page 9326, lines 24-25. Odum et al., 1996 is probably a better reference for the original two-product model being described (rather than Pankow 1994a).
5. Page 9327, line 18. Again, the authors state that their data can be used for evaluation of chemical mechanistic models. However, I again assert that this will only be true when composition data are included. Why was speciation not included in this study? Speciation of the newly formed aerosol particles would greatly enhance the findings

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and interpretations of this study.

6. Page 9328, lines 25 and 26. How were the values of the reacted terpene ($2.6E11$ molecules per cubic centimeter) and reaction rate ($1.4E9$ molecules per cubic centimeter per second) chosen? What is the basis?

7. Page 9329, line 11. It has been speculated that parameterizations of smog chamber data do not capture observed organic aerosol concentrations in models because experiments in smog chambers typically only last a few hours. In this context, the use of an experimental time of 240 seconds should be defended. While the results are defined as being for this specific length of time, there is no way to know if the trends would become stronger, weaker, or disappear if reaction time were longer. This discussion should be included in the manuscript.

Technical corrections

1. Page 9326, line 23. Is 'hypothetical' a better choice than 'fictional'?

2. Page 9327, lines 12-15. I would suggest changing the wording to something like the following: 'While data from these experiments will be useful for chemical mechanism development, they will also provide input for development of proper model descriptions of aerosol mass and new particle formation.'

3. Page 9332, line 2. I would suggest '...scavengers, there is an increase in the number of new particles formed when going from 298K to 273K.'

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 9323, 2008.

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