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Interactive comment on “Aqueous phase oligomerization of methyl vinyl ketone through photooxidation – Part 1: Aging processes of oligomers” by P. Renard et al.

Anonymous Referee #1

Received and published: 27 June 2014

This manuscript presents laboratory studies on aqueous phase SOA generation from MVK with a special emphasis on oligomerization and aging. The experiments build up on prior work by the authors and appear well executed. The topic is suitable for Atmospheric Chemistry and Physics. The manuscript itself has some minor issues due to a lack of attention to detail, these should be fixed. I would support publication after the following issues are addressed.

General:

In SOA formation and aging there is competition between oligomerization and oxidation

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into smaller/volatile species. The discussion of the latter process is missing in the introduction as there is nearly exclusive discussion of oligomerization. So this should be enhanced by mentioning also the generation of volatile species.

In terms of atmospheric relevance, the authors mention wet aerosols and polluted fogs. The concentrations tested here for MVK are in the mM range. Observations in fogs and clouds tend to be in the μM range for the most abundant carbonyls found, so that relevance should be more discussed. The present results appear to suggest (as other studies) that oligomerization does not actually occur in cloud or fog droplets but only in “wet aerosol” where sufficiently high concentrations can be achieved.

In regards to the concentrations used, it would be interesting if the authors would discuss how these compare to the solubility/volatility of MVK and hence the possibility of MVK losses to the gas phase in their experiments and in actual cloud/aerosol situations.

The manuscript should be able to stand alone and can be. So please no reference to Renard et al in the abstract (references in abstracts are not common). Then in your discussion, please present first your results and then discuss them relative to your group’s earlier work and not start by saying e.g. 15292L16 “In good agreement with our previous results (Renard et al., 2013), after 5 min of reaction (experiment B),” . . . Please first your results, then comparisons otherwise the text does not stand on its own.

The lamp characterization is excessively vague in the experimental section and then in the comparison with Liu. As this seems to matter please provide the actual values you measured as you use a 1000W lamp you get only twice ambient irradiation when many investigators (including Liu et al) use 300W lamps to get ambient irradiation fluxes. The irradiation and its realism should also be mentioned in the section on atmospheric relevance

Details:

Abstract and text: Not everybody is familiar with AMS language, OOA etc. . . would need to be explained at first use, not only later on in the discussion. You use the terms in the abstract and you don't define but you define UWSOC but do not use the abbreviation in the abstract.

The experimental section looks a little sloppy. Please homogenize language and explanations. In some instances instruments are mentioned without the manufacturer, while others have manufacturer and location given in parentheses. Idem for the chemicals used.

15289L13 shouldn't deprotonated molecules be $[M]^-$ or $[M(-H)]^+$ or something different as it looks too similar to $[M-H]^+$

Some text is bizarre in regard to how numbers/ranges are presented: "A yield of $59 \pm 5\%$ (in mass) was obtained with this method at 90 min of reaction, thus statistically similar from the one obtained by the nebulizing method ($7 \pm 50\%$) at t_{max} ." $7 \pm 50\%$? I assume it is $50 \pm 7\%$?

15298L24 again bizarre, please write "50-120%" not 120-50%

15295 first paragraph: use the same notation in the explanation of the terms than in the formula and in the next lines C/O not C:O

15294L9 for the non AMS community it would be good to explain or mention what the correction factors are used for? Please explain its reason of being.

Language:

The manuscript could benefit from English editing. I am not a native speaker and only provide some things that jumped out:

15284L14: "a" similar trend or similar trends

15284L15 allowS or change to analyses

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15287 L21 Xenon (capitalized)

15289L25 “two different retention timeS”

15291L13 “check for the SOA mass yields determinations” please reformulate

15291L14 “capsule”? sounds odd. . . could this be a word not translated from French?

15292L20 with “a” regular pattern

15293L17: “to reach a climax” sounds odd, may be maximum?

15294L5 “what are “higher” fragments please reformulate

15295L12 prior “to” each

Figures:

Figure 1: panels b,c and d do not have the same scale so I see no reason why to have panel b with a scale such that one can hardly see the mass spectrum. Idem panel d. the small peaks would only make sense if all panels had same scale on the y axis
Panel c: hard to see the underlying spectrum with the red over it. Why not prepare a figure like figure 4 or stagger the spectra.

Figure 3: the panels and legends are very small and will end up being hard to read

Figure 5: legend of 5a partly covered by fig 5b
Figure 5: are the units on y axis right?

Figure 6: show MVK consumed in % or mention in the legend how much MVK was present initially? 5mM?

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 15283, 2014.

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