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Atmospheric Chemistry and Physics Discussions

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

P. Renard et al.

pascal.renard@etu.univ-amu.fr

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RC C4782: Anonymous Referee #4, 13 Jul 2014

The authors appreciate many important comments raised by Reviewer 4 which have been considered in the new version of the manuscript. The authors' answers to the questions/comments of Reviewer 4 are presented below.

General: Comment 1:

The [MVK]0 / [H2O2]0 ratio is always 20. Recently there has been evidence in the literature that oxidant-limited conditions influence the amount of SOA formed in aqueous phase experiments, both in laboratory (Nguyen et al., ACP, 2014) and modeling (Ervens et al, JGR, 2014) work. Can the authors describe their understanding in this context, with specific reference to how conditions here are not oxidant limited?

Answer : Under our experimental conditions, the decay of MVK concentrations down to 0 shows that our conditions are not oxidant limited. Furthermore, these conditions allow for steady state concentrations of OH radicals of $\sim$10-14 M (see the determinations in Supplementary information 2 of the new version of the manuscript), which fall in the range of the estimated values for cloud and fog droplets (Herrmann et al., 2010; Ervens and Volkamer, 2010 and Arakaki et al., 2013).

Comment 2: Some of the language is awkward. For example, AMS signal climax should be changed to something along the lines of "maximum AMS signal intensity".

Answer : the text has been changed according to this comment, it now reads: "At 50 min the maximum of oligomerization is reached (Figure 2c)."

Comment 3: There are a few mis-matched singular/plural noun/verb combinations that should be corrected.

Answer : Done.

Comment 4: Detailed comments: p.15256, ": : : in particular, in regions with high relative humidity (Carlton and Turpin, 2013)". Please add "and hygroscopic aerosol" after relative humidity.

Answer : Done.

Comment 5: Is it possible to add uncertainty bars to Figures 3, 5 and 10 (like for Figure 6)?

Answer : Done, uncertainty bars can not appear in figure 5.

âĂČ References: Arakaki, T., Anastasio, C., Kuroki, Y., Nakajima, H., Okada, K., Kotani, Y., Handa, D., Azechi, S., Kimura, T., Tsuhako, A. and Miyagi, Y.: A General Scavenging Rate Constant for Reaction of Hydroxyl Radical with Organic Carbon in Atmospheric Waters, Environmental Science & Technology, 130718140737000, doi:10.1021/es401927b, 2013. Carlton, A. G. and Turpin, B. J.: Particle partitioning potential of organic compounds is highest in the Eastern US and driven by anthropogenic water, Atmospheric Chemistry and Physics, 13(20), 10203–10214, doi:10.5194/acp-13-10203-2013, 2013. Ervens, B., Sorooshian, A., Lim, Y. B. and Turpin, B. J.: Key parameters controlling OH-initiated formation of secondary organic aerosol in the aqueous phase (aqSOA): KEY PARAMETERS OF AQSOA FORMATION, Journal of Geophysical Research: Atmospheres, 119(7), 3997–4016, doi:10.1002/2013JD021021, 2014. Ervens, B. and Volkamer, R.: Glyoxal processing by aerosol multiphase chemistry: towards a kinetic modeling framework of secondary organic aerosol formation in aqueous particles, Atmospheric Chemistry and Physics, 10(17), 8219–8244, doi:10.5194/acp-10-8219-2010, 2010. Herrmann, H., Hoffmann, D., Schaefer, T., Bräuer, P. and Tilgner, A.: Tropospheric Aqueous-Phase Free-Radical Chemistry: Radical Sources, Spectra, Reaction Kinetics and Prediction Tools, ChemPhysChem, 11(18), 3796–3822, doi:10.1002/cphc.201000533, 2010. Nguyen, T. K. V., Petters, M. D., Suda, S. R. and Carlton, A. G.: Trends in particle phase liquid water during the Southern Oxidant and Aerosol Study, Atmospheric Chemistry and Physics Discussions, 14(6), 7469–7516, doi:10.5194/acpd-14-7469-2014, 2014.

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