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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Characterization of non-photochemically formed oligomers from methylglyoxal: a pathway to produce secondary organic aerosol through cloud processing during night-time" *by* F. Yasmeen et al.

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We thank Dr. Guzman for constructive comments, which were highly appreciated and helped to improve the manuscript. The comments have been/will be addressed as outlined below:

General Comments The manuscript presents ESI-MS results for laboratory simulations of dark cloud chemistry of methylglyoxal in the presence of mixtures of ammonium

sulfate, sodium sulfate, and sulfuric acid. A key finding is that they only observed dark aldol condensations at pH=3.5 and below. For this reason I would substitute the world “non-photochemicallly” in the title with the term "dark" or "thermal." The results are of high relevance to the readers of ACP and should be published but some minor corrections are needed. I think it is critically to confirm that the observed oligomers are real, and not an artifact produced during the electrospray ionization because there was no chromatographic separation. Perhaps, a future similar study using acetonitrile instead of methanol would ensure there is no incorrect peak assignment due to cluster formation with the solvent.

Response: We will slightly change the title as follows: “Characterization of oligomers from methylglyoxal under dark conditions: A pathway to produce secondary organic aerosol through cloud processing during nighttime”. With regard to methanol causing artifacts in electrospray ionization, we have also performed experiments with other solvents, i.e., acetonitrile and acetone, and have observed a similar oligomerization pattern as with methanol. Hence, we are quite confident that the observed oligomers are real.

Page 22995, lines 16-18: This issue has been recently touched in the literature by Rincon et al., 2009 and 2010) for another related dicarbonyl compound (pyruvic acid) in relation to the cycling of model organic aerosol matter during daytime and nighttime.

Response: The mentioned articles are most relevant and will be properly cited in the revised manuscript.

Page 22996, line 18 to Page 22997, line 2: Actually, there is also a pathway that has not being mentioned here, and should be considered for the final version of the paper: The direct photochemistry in the condensed pha0 se as exemplified in Guzman at al. (2006).

Response: The suggested pathway corresponding to direct photochemistry in the condensed phase will be considered in the revised manuscript.

ACPD

9, C11010–C11012, 2010

Page 22999, lines 4-11: Rincon et al., (2010) shows that different ions have catalytic properties to promote aerosol formation in the condensed phase.

Response: Rincon et al. (2010) will be properly cited in the revised manuscript.

Figures 1, 2, and 6: These figures should include a blank for comparison (located, e.g., above each spectrum). Otherwise, it is impossible to visualize the changes observed before and after the reaction.

Response: Blank spectra for comparison will be provided in the supporting information of the revised manuscript.

Additional References (to be included in the revised manuscript):

Rincon, A. G., Guzman, M. I., Hoffmann, M. R., and Colussi, A. J.: Thermochromism of model organic aerosol matter. J. Phys. Chem. Lett. 1, 368-373, 2010.

Rincon, A. G., Guzman, M. I., Hoffmann, M. R., and Colussi, A. J.: Optical absorptivity versus molecular composition of model organic aerosol matter. J. Phys. Chem. A, 113, 10512-10520, 2009.

Guzman, M. I., Hoffmann, M. R., and Colussi, A. J.: Photoinduced oligomerization of aqueous pyruvic acid. J. Phys. Chem. A, 110, 3619-3626, 2006.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 22993, 2009.