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Atmospheric Chemistry and Physics Discussions



# *Interactive comment on* "Secondary organic material formed by methylglyoxal in aqueous aerosol mimics – Part 1: Surface tension depression and light-absorbing products" *by* A. N. Schwier et al.

**Anonymous Referee #3**

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The paper is of relevance to the ACP community. The reaction pathways and abundance of methylglyoxal secondary organic aerosol (SOA) formation are important. The authors present UV-Vis and surface tension measurements of bulk aqueous solutions and suggest that a) methylglyoxal undergoes aldol condensation reactions in ammonium but not sodium salt solutions and b) methylglyoxal solutions are surface active and that the presence of salts can significantly lower droplet surface tension. However, the authors make somewhat of a stretch linking their surface tension findings to CCN activity. The reviewers concerns are listed below:

The authors suggest that their surface tension depression is consistent with previous studies and this is true for bulk measurements. However, if the results are to be related to CCN activity, the authors must compare their bulk measurements to particle concentrations at activation. The amounts of dissolved methylglyoxal material at droplet activation will affect the effective surface tension decrease and must be accounted for (Sorjmaa et al, 2008). For a simple calculation, the authors can use Kohler Theory to estimate the concentrations of a completely soluble (Kappa=0.6) and slightly soluble compounds (Kappa =0.3, 0.2, 0.1) mixtures at droplet activiation and compare these concentrations to concentrations used in their bulk aqueous measurements.

Why did the authors not use similar molarities for NaCl and (NH4)2SO4 in their surface tension measurements? The presented concentrations appear arbitrary.

P 15549. The authors should add a few words as to why the sodium solutions had little effect on the methylglyoxal solutions. NaCl solutions are neutral and would not facilitate aldol condensation. It is not explicitly stated but would aid non-chemistry minded readers and help support the conclusions. It should be also mentioned that film forming compounds can affect cloud droplet growth rated and cloud droplet number (Feingold and Chuang, 2002).

Specific Comments. P 15542 L19: Engelhart et al., 2008 is misspelled P 15545 L11: HOMO-LUMO is not defined nor explained.

Figure 2 and P 15543. Why show data for 282 nm and 550 nm? Do these wavelengths have any significance?

Figure 4. Which equation is used to fit the data points? Is it equation 2? It is not clear in the text or from the figure caption.

References.

Sorjamaa, R., Svenningsson, B., Raatikainen, T., Henning, S., Bilde, M., and Laaksonen, A.: The role of surfactants in Köhler theory reconsidered, Atmos. Chem. Phys.,



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Feingold, G., and Chuang, P. Y.: Analysis of the Influence of Film-Forming Compounds on droplet Growth: Implications for Cloud Microphysical Processes and Climate, J. Atmos. Sci., 59, 2006-2018, 2002.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 15541, 2009.