

***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.**

**V. F. McNeill**

vfmcneill@columbia.edu

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This discussion paper offers a new characterization of oligomer formation by methylglyoxal in aqueous solutions under various atmospherically relevant conditions. This is interesting work and it adds to the growing body of evidence that methylglyoxal may be a significant precursor for heterogeneous SOA formation.

My primary concern is that the non-photochemical oligomerization of methylglyoxal in

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aqueous systems is already well-established as a potential source of SOA and this work should be placed in that context. It is well-known that methylglyoxal becomes hydrated and forms acetal and hemiacetal oligomers in aqueous solution (Nemet et al., 2004; Loeffler et al., 2006; Zhao et al., 2006; Krizner et al., 2009; Paulsen et al., 2005). The manuscript in its current form does not make it clear that this is not the first demonstration of methylglyoxal oligomerization in aqueous solutions containing ammonium sulfate; my group published two manuscripts on this subject in ACPD in July 2009 (Schwier et al., 2009; Sareen et al., 2009). As pointed out by Anonymous Referee #1, we used aerosol chemical ionization mass spectrometry (Aerosol-CIMS) to obtain mass spectral evidence of aldol condensation and hemiacetal formation by methylglyoxal in atmospherically relevant aqueous systems (Sareen et al., 2009). DeHaan et al. (2009) presented mass spectra of similar oligomers formed by methylglyoxal in evaporating droplets.

Placing this work in the context of the publications I mention here would strengthen the authors' presentation of their data.

- V. Faye McNeill, Columbia University

## REFERENCES

De Haan, D. O., Corrigan, A. L., Tolbert, M. A., Jimenez, J. L., Wood, S. E., and Turley, J. J.: Secondary organic aerosol formation by self-reactions of methylglyoxal and glyoxal in evaporating droplets, *Environ. Sci. Technol.*, 43, 8184-8190, 10.1021/es902152t, 2009.

Krizner, H. E., De Haan, D. O., and Kua, J.: Thermodynamics and Kinetics of Methylglyoxal Dimer Formation: A Computational Study, *J.Phys.Chem.A*, 113 (25), 6994-7001, 2009.

Loeffler, K. W., Koehler, C. A., Paul, N. M., and De Haan, D. O.: Oligomer formation in evaporating aqueous glyoxal and methyl glyoxal solutions, *Environmental Science &*

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Technology, 40 (20), 6318-6323, 2006.

Nemet, I., Vikić-Topić, D., and Varga-Defterdarović, L.: Spectroscopic studies of methylglyoxal in water and dimethylsulfoxide, *Bioorganic Chemistry*, 32 (6), 560-570, 2004.

Paulsen, D., Dommen, J., Kalberer, M., Prevot, A. S. H., Richter, R., Sax, M., Steinbacher, M., Weingartner, E., and Baltensperger, U.: Secondary organic aerosol formation by irradiation of 1,3,5-trimethylbenzene-NO<sub>x</sub>-H<sub>2</sub>O in a new reaction chamber for atmospheric chemistry and physics, *Environmental Science & Technology*, 39 (8), 2668-2678, 2005.

Sareen, N., Shapiro, E. L., Schwier, A. N., and McNeill, V. F.: Secondary organic material formed by methylglyoxal in aqueous aerosol mimics - Part 2: Product identification via Aerosol-CIMS., *Atmos.Chem.Phys.Discuss.*, 9 ( 15567-15594, 2009.

Schwier, A. N., Shapiro, E. L., Sareen, N., and McNeill, V. F.: Secondary organic material formed by methylglyoxal in aqueous aerosol mimics. Part I: surface tension depression and light-absorbing products., *Atmos.Chem.Phys.Discuss.*, 9 ( 15541-15565, 2009.

Zhao, J., Levitt, N. P., Zhang, R. Y., and Chen, J. M.: Heterogeneous reactions of methylglyoxal in acidic media: Implications for secondary organic aerosol formation, *Environmental Science & Technology*, 40 (24), 7682-7687, 2006.

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

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