

***Interactive comment on “A mass spectrometric study of secondary organic aerosols formed from the photooxidation of anthropogenic and biogenic precursors in a reaction chamber” by M. R. Alfarra et al.***

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Three chamber photooxidation experiments were carried out for each of 1,3,5-TMB and  $\alpha$ -pinene, the aim of which is to study changes in the AMS spectral signatures of the SOA from each and to compare those of each precursor to each other and to ambient SOA spectra. A primary finding is that the overall fragmentation patterns did not change appreciably over the duration of the experiments, although certain individual fragments do exhibit changes over time.

A recent finding of significant importance in SOA formation chemistry is the profound role of the NO level on the nature of the process. This has been demonstrated for SOA formation from isoprene [Kroll et al., 2005b, 2006]. In addition, recent work in our laboratory on SOA formation from the photooxidation of toluene and m- xylene, to be published, confirms this dependence in aromatic SOA formation. What this work shows is that once NO levels reach  $\sim 1$  ppb or less the nature of the SOA products, and indeed the SOA yield itself, change rather dramatically. Therefore, my major comment relative to the present paper is the need to provide information on the behavior of NO and NO<sub>x</sub> over the course of the experiments so that one can assess the extent to which “low and high NO regimes” are being studied. For example, the comment on line 5 and following on page 7759 may bear upon the NO level in the chamber. With the possible exception of experiment 1 in Table 1, all the experiments may have been performed in a high NO regime. If so, this would explain the observation of little change in the mass spectra over the duration of the experiments.

Specific recommendations and questions, in addition, are:

1. Present plots of NO, NO<sub>2</sub> versus time for the six experiments.
2. State which experiment Figure 2 represents.
3. On page 7762, line 7, what is meant by “once the NO<sub>x</sub> has been consumed?” Do both NO and NO<sub>2</sub> disappear? Was NO<sub>y</sub> monitored in the chamber?
4. Page 7763, line 22, cite also Kroll et al. [2005a].

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## References

1. Kroll, J.H., N.L. Nga, S.M. Murphy, V. Varutbangkul, R.C. Flagan, and J.H. Seinfeld, 2006, S2677

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2. Kroll, J.H., N.L. Ng, S.M. Murphy, R.C. Flagan, and J.H. Seinfeld, Secondary Organic Aerosol Formation from Isoprene Photooxidation under High-NO<sub>x</sub> Conditions, *Geophys. Res. Letters*, **32**, L18808, doi:10.1029/2005GL023637, 2005b.
  3. Kroll, J.H., N.L. Ng, S.M. Murphy, R.C. Flagan, and J.H. Seinfeld, Secondary Organic Aerosol Formation from Isoprene Photooxidation, *Environ. Sci. Technol.*, **40**, 1869-1877 (2006).

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