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Atmospheric Chemistry and Physics Discussions

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.

M. R. Alfarra et al.

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Specific Comments:

Page 7756, line 7: We agree with the reviewer and we will add the pearson's R value for the correlation of the averaged mass spectra of the two high concentration experiments for each precursor. We will modify this part of the manuscript to read as follow:

The two "high" concentration experiments for 1,3,5-TMB (experiments 2 and 3, Table 1) resulted in similar SOA concentrations and reproducible mass spectra (R = 1.00 for a comparison of the averaged mass spectra for the two experiments). This was also

true for the two high concentration experiments for alpha-pinene (experiments 4 and 6, Table 1), which also showed an R value of 1.00 for the averaged spectra. On the other hand, low signal to noise levels in the 'low' concentration 1,3,5-TMB and alpha-pinene cases (experiments 1 and 5, respectively, Table 1) did not allow a useful comparison with the "high" concentration experiments.

Page 7757, line15 and following: The interference at m/z 18 includes possible signal from gas phase water and gaseous organic molecules as well as particulate phase water. It would be possible to correct for the gas phase water and organics using zero particle filter measurements, but the interference from particulate water is problematic. Unpublished laboratory results showed that the oxygenated molecules that produce substantial signal of m/z 44 produce at least the same amount of m/z 18 and as a result setting the organic contribution at m/z 18 equal to that of m/z 44 provides a lower limit for the organic signal at m/z 18. We agree with the reviewer that sulphate is not expected to cause interference in this study since the experiments were all performed without the use of ammonium sulphate seed particles or SO2. We will modify this part of the manuscript to read as follow:

In many cases however, the mass fragment 18 also contains large contributions from gas phase water and gaseous organic molecules as well as from particulate water. To retrieve the total organic mass loading, the contribution of water resulting from decarboxylation at m/z 18 is set equal to m/z 44 based on laboratory results with pure compounds performed in argon, where the interferences to m/z 18 are eliminated (Aerodyne Research Inc., unpublished laboratory results).

Page 7759, line12: The ratio of the mass concentration measured by the AMS and the volume concentration measured by the SMPS can, in principle, be used to calculate the effective density of the aerosol. However, this requires that the collection efficiency of the AMS (including the aerodynamic lens transmission and the bouncing losses) is known. This was not determined during this study. The SOA densities reported in this study were calculated using the ratio of the AMS vacuum aerodynamic diameter to the

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mobility diameter of monodisperse particles selected by a DMA, which is independent of the AMS collection efficiency.

Page 7762, line 26: Nitro- and/or nitrate-containing compounds are the possible candidates that yield m/z 30 and 46 in these systems. They are most likely to be NO+ and NO2+ fragments, respectively, but it is not possible from the available data to speculate on the possible identities of the parent organic species. More information on the possible identities of m/z 30 and 46 would be possible to obtain in the near future using the newly developed high resolution time of flight mass spectrometer (HR-ToF-AMS).

Page 7766, line 17: The error bars for the effective densities will be added in the revised manuscript.

Technical corrections:

Reference Paulsen et al. 2006 will be updated in the revised manuscript.

Page 7753, line 21: “and” will be removed in the revised manuscript.

Figure 5: m/z 59 will be labelled in the revised manuscript.

References: an “a” will be added to the year in Allan et al., 2003 in the revised manuscript.

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 7747, 2006.