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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Elemental analysis of chamber organic aerosol using an aerodyne high-resolution aerosol mass spectrometer" *by* P. S. Chhabra et al.

Anonymous Referee #4

Received and published: 14 February 2010

In this paper Chhabra et al. analyze a number of laboratory chamber experiments, and presents the results of elemental analysis on the secondary organic aerosol produced during these experiments. The authors place their work in the context of ambient observations, and compare the AMS derived elemental ratios to other methods of determining these ratios. The paper is very well written, and is appropriate for ACP. Before publication, however, I would like to see some additional analysis presented as detailed below.

General Comments:

Why was V-Mode data not analyzed as well for the O/C and H/C ratios? In other

studies V-Mode only data is often used for chemical characterization of OA at low concentrations, and a comparison of the two different modes of the HR-ToF-AMS would be beneficial for at least some of the cases presented in this manuscript.

The authors have chosen to use the f44 ratio determined from V-mode to compare the O/C ratio determined from W-mode of the HR-ToF-AMS. It would make more sense to compare the f44 from W-mode with the O/C ratio from W-mode, and similarly with V-mode f44 to O/C from V-mode. As suggested in the previous comment, an analysis of V-mode elemental ratios is very important to present in addition to the W-mode values, at the very least for a few cases to demonstrate the reproducibility of the analysis amoung the different operation modes.

For high-NOx chamber experiments the authors have included NO+ and NO2+ as ions in the calculation of the elemental ratios. As noted by the authors in ambient datasets these ions are excluded from this analysis as they are typically attributed to inorganic nitrate. It would be of interest to compare the O/C ratios determined in these experiments when NO+/NO2+ are excluded from the EA calculation to the O/C ratio when they are included. The impact on the O/C ratio from the inclusion of these ions for organic nitrate species is extremely useful information for interpreting field data where organic nitrate species may make up a fraction of the organic aerosol.

As noted by several other reviewers, a more complete discussion and presentation of errors is warranted in this paper before publication in ACP. A comparison of the V-mode derived O/C ratios with the W-mode O/C ratios may also shed some light on this topic in terms of the repeatability of the ratios for the two operating modes of the instrument.

Specific Comments:

27486/L6: Change "glyoxal" to "glyoxal uptake experiments" so that the reader does not get the impression that this is the O/C ratio of glyoxal itself.

P27489/L6: O/C ratios for LV-OOA from Aiken et al. 2008 show a range from 0.8 to 1

for the O/C ratio. Please correct text.

P27490/L7: units incorrect. should be micrometer3 centimeter-3

P27492/L3-4: m_i is the mass of the ion fragment assuming that the ion is singly charged. Suggest rewording this line to reflect that.

P27497/L1: This line reads as though the ammonium reactions are responsible for the decrease in the O/C ratio. Are the authors implying that the decrease in the O/C ratio is due only to this? Perhaps the authors could estimate the decrease in the O/C ratio due to this based on the increase in the N/C ratio.

P27503/L1: sentence incomplete.

Section 4.3: This section reads as part of the methods, it is recommended that the authors move this section there.

P27513/L11: suggest adding: "to a significant extent" to the discussion of glyoxal uptake in the ambient atmosphere.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 27485, 2009.