

**Comments:**

I would like to see a more thorough discussion on how the chemistry in the chamber experiments would be expected to be similar to or different from that occurring in the atmosphere. In particular, I would like to see evaporation of POA, loss of gas-phase species to walls, NO<sub>x</sub> concentration, and NO/NO<sub>2</sub> partitioning to be addressed.

Page 7 line 22: A change in the CE would presumably make the AMS vs. SMPS comparison worse. Please revise and expand this section to provide information on how the suggested factors would influence the comparison and what order of magnitude effect would be expected.

Page 9 lines 21-23: There is a significant body of literature regarding heterogeneous oxidation reactions (e.g., Kroll et al. (2015) and references therein). Are the results presented here consistent with previous works in terms of the O:C and H:C changes observed at the levels of oxidant exposure achieved in these experiments? Given the large body of work on heterogeneous oxidation, a more thorough discussion of this here would be prudent.

Page 10 lines 8-10: How different in terms of theta were the aged factors from each other? For the aged factor used later in the paper (particularly in Figure 11), was an average aged factor used, or one from a specific experiment? Was there a noticeable difference in between the ozonolysis only factor and those aged with OH?

Page 11 line 7: Here a theta of 13 degrees is defined as “quite similar” whereas on page 6 line 28 a theta of 11-15 is discussed as having “many similarities though they are not the same” and in Sect. 3.4 a change of 15 degrees is discussed as being significant in terms of the changes observed due to ozonolysis. Likewise, the use of “significantly” on page 11 line 27 in describing a change of 15 degrees should be reconsidered. While I recognize that this analysis is somewhat qualitative, it would be beneficial to maintain more consistent descriptions throughout the manuscript.

**Technical Corrections:**

Page 2 line 32: Suggest change to “..indicate that commercial and residential cooking contribute to...”

Page 3 line 3: Suggest change to “...may significantly alter...”

Page 3 line 7: BC is not a primary organic aerosol component.

Page 3 line 23-24: What is the size of the chamber itself?

Section 2.1: Please clarify if an OH precursor was used.

Page 4 line 8: The voltage difference between the filament and the ion chamber is 70 V.

Page 4 line 21: “P parameter” should be defined here.

Page 4 lines 32-33: Please specify what models of gas monitors.

Page 6 lines 25-31: It may be useful to indicate why theta is used rather than R<sub>2</sub> and advantages/disadvantages.

Please reference the figures in order. Currently Figure 8a is referenced after Figure 1 and before the others (page 7).

Table 1: Please include the total length of each experiment in the table. In the caption, please indicate that the d-butanol tracer was not added in experiment 1.

Page 9 line 19: Please consider adding a figure (perhaps to the supplemental material) that show the OA mass change throughout the experiments both with and without wall loss correction.

Page 11 line 17: Given the nature of the analysis, “similarity” rather than “correlation” may be a better word choice.

Figure 5: Would it be more appropriate to show the natural log of the PTR-MS signal of butanol normalized to the initial value? Also, please remind the reader that m/z 66 is butanol in the caption.

### **References**

Kroll, J. H., Lim, C. Y., Kessler, S. H. and Wilson, K. R.: Heterogeneous Oxidation of Atmospheric Organic Aerosol: Kinetics of Changes to the Amount and Oxidation State of Particle-Phase Organic Carbon, *J. Phys. Chem. A*, 119(44), 10767–10783, doi:10.1021/acs.jpca.5b06946, 2015.