

Interactive comment on “Particle Size Dependence of Biogenic Secondary Organic Aerosol Molecular Composition” by Peijun Tu and Murray V. Johnston

Anonymous Referee #1

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General comments: The authors report on the use of nano-aerosol mass spectrometry (NAMS) to elucidate the oxidative extent and oligomeric content of SOA. By measuring these two parameters as a function of particle size, they were able to elucidate the relative contributions of condensation and particle phase reaction to particle growth. Their main conclusion is that accretion reactions become more important for larger particle sizes, as one might expect as the surface-to-volume ratio of the particle decreases. Using NAMS data for a number of particle sizes and chemical systems, the authors present a very convincing case that particle phase chemistry can have a substantial impact on the lifecycle (i.e., formation and aging) of biogenic SOA.

Specific comments: Table S1: The authors show the average mode diameter of the

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aerosol to be 76 nm for "Polydisperse a" and 240 nm for "Polydisperse d." These are not "close" in my opinion. Figure S1 seems to support my comment. Distributions from atomization are dramatically different from those of the FTR. Actually, I wonder why this is important. Perhaps a bit more discussion would be helpful. Table S3: What do the errors in the "Unique Molecular Formulas" column of Table S3 indicate if molecular formulas had to be detected and assigned in all five replicates in order to be considered? Page 7, Lines 4-11: This entire paragraph is very confusing. The authors should add some guidance to the reader to ensure that the reader is evaluating the correct data (i.e., state specifically what symbol, or line, is used to represent each of the data sets. So, perhaps write "The O/C ratio for positive ion mode of the control aerosol (black solid line) in Fig. 2b is somewhat higher than the average O/C ratio for polydisperse aerosol (black dashed line) in Fig. 2a" I'm not even sure I got those representations correct. Page 9, Lines 10-13: The authors state that "the lack of composition dependence is not surprising. . ." I don't understand why this would not be surprising. It may be obvious to the authors, but some clarity and, if possible literature references, should be provided to substantiate their statement. Figure S2: Caption should include particle diameter, assuming these particles have been size selected for 60 nm (as stated in manuscript, Page 12, Line 6) Figure S3: Please provide absolute mass loading for high and low case in caption.

Small typo errors: Page 2, Line 27: "...associated with particle growth and its impact. . ." Page 3, Line 8: "...as would be expected from a condensation-driven process." Page 5, Line 8: "Depending on aerosol mass concentrations, 2-93 hours were required. . ." according to Table S1). Page 5, Line 26: "...criteria to help filter the unreasonable. . ."

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