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Atmospheric Chemistry and Physics Discussions



# *Interactive comment on* "Atmospheric oxidation of 1,3-butadiene: characterization of gas and aerosol reaction products and implication for $PM_{2.5}$" *by* M. Jaoui et al.

**Anonymous Referee #2**

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General comments

In this manuscript, the authors describe the characterization of particle and gas-phase oxidation products from a series of 1,3-butadiene oxidation experiments performed in a smog chamber. The authors examined the influence of oxidation condition (i.e. NOx/HOx ratios, RH and particle acidity) on product formation using the smog chamber that was operated in either a batch reactor or flow reactor mode. The authors applied appropriate derivatization methods to identify multifunctional gas- and particle phase products. Overall, I found this manuscript meet the scope of the journal and the quality of analytical work is sound. However, I feel that the manuscript is not written in

a clear enough fashion to deliver the message to potential readers. In particular the current version of the manuscript does not highlight the difference between high-NOx and low- (or no) NOx SOA chemistry in the 1,3-butadiene oxidation from the results obtained from the authors' extensive analytical work. This is unfortunate. Nevertheless, the topic the authors dealt with is of great interest to the community and I recommend the publication of the manuscript after the authors address the following comments and the excellent comments made by the other reviewer. In addition, I fully support the other reviewer's comments about missing citation and they should be rectified in a revised manuscript.

Specific comments

Page 14257 "Characterization of SOA products": I suggest moving the descriptions of fragmentation patterns to supporting information (or summarize in a table) and concentrate on the difference in product distributions between high-NOx and low-NOx experiments.

Page 14265 Line 10: I recommend the authors to add a section titled "Summary", "Conclusions" or "Atmospheric Implication" here and highlight the message of this study.

Table 2: I suggest the authors to add information about the experiments that they were found (i.e. high-NOx or low-NOx) and the concentrations for those compounds that the authors quantified.

Figure 6: What are the reasons for the steep increase in the yield when 95% of the 1,3-butadiene is reacted? Is it because later generation oxidation products partition into the particle phase? The authors should this observation in a revised manuscript.

N. L. Ng, J. H. Kroll, M. D. Keywood, R. Bahreini, V. Varutbangkul, R. C. Flagan, J. H. Seinfeld, A. Lee, A. H. Goldstein, Contribution of first- versus second-generation products to secondary organic aerosols formed in the oxidation of biogenic hydrocarbons. Environ. Sci. Technol. 40, 2283-2297 (2006)



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Figure 9: This figure does not add much information to the manuscript. Do the concentrations of these compounds correlate well in ambient samples? Are the ratios of these compounds similar to what the authors found in chamber samples? If so, are they similar to high-NOx or low-NOx experiments?

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Interactive comment on Atmos. Chem. Phys. Discuss., 14, 14245, 2014.