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Atmospheric Measurement Techniques Discussions

Interactive comment on "Investigation of a potential HCHO measurement artifact from ISOPOOH" *by* Jason M. St. Clair et al.

Anonymous Referee #1

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This is a very straightforward and useful study to constrain the unwanted conversion of ISOPOOH to formaldehyde in an instrument that is commonly used for formaldehyde measurements from a variety of platforms. ISOPOOH is a low-NOx oxidation product from isoprene, and has been shown to convert to methyl vinyl ketone and methacrolein in several different instruments that are used to measure these latter species. Any unwanted conversion of ISOPOOH into other isoprene products obviously confuses atmospheric studies of isoprene oxidation. Instrumental studies are therefore needed to characterize ISOPOOH conversion in more detail. This paper focuses on the conversion of ISOPOOH into formaldehyde and can be published after consideration of the comments below. It is a little bit unfortunate that no measurements of methyl vinyl ketone and methacrolein were included with these experiments, as the work could have resulted in a more complete and definitive study of the ISOPOOH conversion issue.

Detailed comments:

Page 1, lines 25-27: At this point in the abstract, it is not clear what the difference is between prompt and time-delayed conversion of ISOPOOH to formaldehyde. I suggest adding a brief explanation.

Page 2, lines 10-19: A figure to illustrate the reaction pathways that form MVK, methacrolein and formaldehyde from different ISOPOOH isomers would be helpful to better understand this part of the paper without going back right away to some of the cited references.

Page 4, lines 29-30 and page 5, line: Several choices that constrain the fit parameters in Equation (1) are described here, without much explanation. Probably the exact values do not matter much, as long as the data are described well by the fit function? If that is the case, I suggest adding a sentence to that extent.

Figure 2, top panel: The graph might be clearer if the different conditions that gave rise to these steps in formaldehyde were added. The same applies to Figs. S2-S4.

Section 3.4: These experiments leave the reader with some questions. Figure 3 shows low conversion fractions for the standard inlet at temperatures between 20-60 C, and higher conversion fractions on a bare stainless inlet at temperatures between 80-160 C. The temperature obviously plays a role in the conversion, but to what extent does inlet material matter? It seems that all the data can be well explained by a single curve that is relatively insensitive to temperature until 60 C and then starts to rise with temperature. If that is the case, then inlet material does not appear to matter. It is an important question, as it tells experimentalists how to minimize the unwanted conversion of ISOPOOH in their instruments. It seems that a few experiments with a bare stainless inlet at lower temperature would have been helpful.

Figures 4 and 5, top panel: The color for the formaldehyde from ISOPOOH conversion data is not easy to see.

Page 8, lines 24-26: Is this sentence really supported by the results of this study? Again, some measurements on different inlet materials at the same temperature would have been helpful.

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