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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Direct measurements of OH and other product yields from the HO_2+ $CH_3C(O)O_2$ reaction" *by* F. A. F. Winiberg et al.

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The manuscript by Winiberg et al. reports product yields for the title reaction, HO2 + CH3C(O)O2. An overall rate coefficient is derived from the yields using a computer model. In addition to stable product yields, measured by FTIR and GC-FID, levels of OH and HO2 are also measured in situ in the chamber.

The reaction has been the subject of a number of previous studies, but usually not all the product channels have been measured at the same time. This has led to a wide uncertainty in the reported product channels, since one is often derived by difference (both direct and product studies). The present study has the advantage that all channels are measured simultaneously and anchored to a true radical production rate,

which better constrains the branching ratios.

The manuscript can be published subject to minor changes detailed beloow.

28819, 21. "linked to . . .high OH concentrations:, not "linked to an. . . concentrations"

28820, 13. These branching ratios look like those from Hasson, not Jenkin (cf Table 4)

28833-28836. The equation numbers are out of sequence. Reaction numbers 13 and 20 are duplicated. I think the numbering in the text is correct.

28833, 24. Do you really mean removal of CH3CHO? Isn't the primary removal by Cl atoms? Probably meant to be CH3CH(OH)O2.

28834, 1. CH3C(OH)O2 should be CH3CH(OH)O2.

28834, 24. HO2 radicals are initially produced from CH3O radicals (produced by AcO2 + CH3O2); no need to wait for HCHO to build up.

28836, 5. Which branching ratio? Reaction 5?

28842. I think a little extra clarification as to the PAN/NOx is required. I think that the logic is that the faster reaction rate leads to lower CH3C(O)O2, and in turn lower PAN over source regions. Since the PAN is transported to remote regions where it releases NOx , the overall effect in remote regions is less NOx. This is clear from the red and blue colors in Supplemental figure, but not immediately from the text.

28852. Table 2. The rate coefficient for the pressure-independent channel of HO2 + HO2 should have a pre exponential factor of 2.2E-13, not 2.2E-15. As written, the overall rate coefficient is about half the true value. Is this a typo, or was the wrong value used in the model?

28853, Table 2. I think there are two reactions of CH3CH(OH)O2 that ought to give CH3COOH as product (currently written as HCOOH product); the reaction with CH3C(O)O2 and with HOCH2O2.

28856. Figure 1 caption. “Model concentrations. . . was” should be “were”.

28860, Figure 3. Why is the rise of HO2 so slow ($\sim$100 sec)? Don’t the radicals get into steady state quicker than that? Does this reflect the rise of secondary production?

28832-28833. Note that Fittschen and coworkers have studied the reactions HO2 + HCHO and HO2 + CH3CHO near room temperature (Morajkar et al., IJCK 2013).

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 28815, 2015.