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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Rate coefficients for reactions of OH with aromatic and aliphatic volatile organic compounds determined by the Multivariate Relative Rate Technique" *by* Jacob T. Shaw et al.

Anonymous Referee #4

Received and published: 3 June 2020

General comments:

This paper entitled "Rate coefficients for reactions of OH with aromatic and aliphatic volatile organic compounds determined by the Multivariate Relative Rate Technique" by Shaw et al. presents the measurements of 35 rate coefficients at 296 K from the reactions of aromatic and aliphatic volatile organic compounds with OH radicals, using the multivariate relative rate method. This method has been presented for the first time by the same research group in the paper of Shaw et al., ACP, 2018. The experimental work presented in this paper appears to be of very high quality, precise and well-

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presented. The obtained rate coefficients are in good agreement with the evaluated literature, and well supported by SAR. Overall, the paper is well written. I recommend the publication in Atmospheric Chemistry and Physics journal. Before acceptance, I have some comments and corrections to suggest.

Specific comments:

Page 5, line 1: The sentence is too general and is not really specific to the remaining gaps that the present work aims to fill. Please rephrase accordingly.

Page 9, lines 5-6: The statement that the obtained OH rate coefficients for the ten reactions is in agreement with the those from literature within errors, is not entirely correct. The obtained kOH for n-propylbenzene is not in agreement with the evaluated literature within the indicated errors. Please correct the sentence accordingly.

Page 9, lines 31-32: From the Table 4, the comparison between the measured kOH and the evaluated literature k is not evaluated. Please add a comment.

Page 27, Figure 4: In contrast to the other plots, the plot showed in Figure 4 is characterized by a higher Y-intercept which might be statistically significative, which represents more than 10% of the maximum measured depletion factor. How do you explain this observation?

Page 11, lines 24-29, Figure 8: The use of higher concentration of O2 tends to improve the accuracy of the results, as shown in Figure 8 and stated in the manuscript, in particularly in reducing the back decomposition of the OH-aromatic adduct. Based on this observation, I wonder why the use of zero air was not considered in the flow reactor, at least, replacing N2 flowing through MFC 2 (see Figure S1), introducing zero air through the mobile injector. Is there any reason that N2 was chosen preferentially?

Technical corrections:

Page 17, line 13: “www.kinetcus.com” should be replaced by “www.kintecus.com”

Page 21, line 4: “OH reactivity” should be replaced by “OH reactivities”.

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