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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Influence of the vapor wall loss on the degradation rate constants in chamber experiments of levoglucosan and other biomass burning markers" *by* Amelie Bertrand et al.

Anonymous Referee #2

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General Comments

In this manuscript the authors present results of an experimental/modeling study aimed at evaluating the effects of gas-wall partitioning on estimates of gas-phase oxidation rate constants for organic compounds, especially levoglucosan, used as atmospheric markers for biomass burning. The approach was to add biomass burning emissions into a Teflon chamber, expose them to OH radicals generated by HONO photolysis, measure the decay of the marker compounds present in particles, and then simulate the decay using a simple first-order model with corrections for particle wall loss and

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Discussion paper

then a more complex model that includes various parameters for partitioning of vapors to the particles, particle wall loss, gas-phase reaction with OH, and gas-wall partitioning. The complex model was run many times using values of parameters that fell within a reasonable range based on previous knowledge and the results were then compared to the measured particle-phase concentrations of levoglucosan and some other markers to determine optimum parameter values. The results demonstrate that vapor wall loss is the major mechanism for loss of markers in the chamber and that one cannot accurately determine the gas-phase OH rate constant for loss of markers in the chamber because of its minor effect on decay. These results are important for interpreting results of chamber aging experiments on biomass burning emissions and also field data on biomass burning markers. I think the manuscript is concise and well written, and the technical aspects and interpretations are reasonable. I recommend it be published in ACP after the following minor comments are addressed.

Specific Comments

1. It seems that the model assumes that the chamber is in steady state. Is that a good approximation, and how might it affect the results?

2. Page 9, lines 1–5: There are some more recent references that give useful estimates for timescales for gas-wall partitioning and accommodation coefficients for gas-particle partitioning (Krechmer et al., Env. Sci. Technol., 2016, 2017).

3. Page 11–12: It is probably worth mentioning that calculation of the OH rate constant using the structure-activity relationships of Atkinson and co-workers (e.g. Ziemann and Atkinson, Chem. Soc. Revs., 2012) yields a value at the gas-kinetic limit (>10(–10) cm3 molecule–1 s–1).

4. How do the optimized C* values compare to those calculated using a method such as SIMPOL.1?

Technical Comments

1. Page 6, line 24: “Fuks” should be “Fuchs”.

2. Page 13, line 19: “makers” should be “markers”.

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