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Atmospheric Measurement Techniques Discussions

Interactive comment on "HO_x radical chemistry in oxidation flow reactors with low-pressure mercury lamps systematically examined by modeling" *by* Z. Peng et al.

Anonymous Referee #1

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The manuscript entitled, "HOx radical chemistry in oxidation flow reactors with low pressure mercury lamps systematically examined by modeling," by Peng et al. describes an extensive set of kinetics calculations on the oxidative environment of the Potential Aerosol Mass (PAM) flow reactor. A standard chemical kinetic plug flow model is used to characterize the chemical environment of the PAM reactor, which could ultimately lead to a more robust interpretation and design of both field and laboratory based experiments. The model is clearly presented and differences between 185 nm and 254 nm photolysis is compared and evaluated in nice detail. I applaud the authors for undertaking what is clearly a comprehensive and very time consuming study, which

hopefully will be valued by the community of users (which is quite extensive) of the PAM reactor.

I have only a few minor issues that the authors should address:

1. One of the main "outputs" of this detailed mechanistic study appears to be simple analytical expressions (eq. 5 and 6) that allows one to compute the OH exposure directly from H2O, UV, O3, etc. In particular eq. 6 relates the exposure to measurements of ozone before and after the reactor. This equation seems to distill much of the detailed work presented in the paper and also may be of most interest to current research groups that use the PAM. The authors should better clarify for the community the assumptions of using this equation in practice. For example, this parametrization (derived from the modeling) assumes plug flow conditionsâĂŤwhich in reality the PAM reactor is clearly not. What errors are incurred if this equation is directly used for the real device?

2. Related to point 1. What differences would be expected for OFR's that are not plug flow (e.g. PAM). A paragraph should be included to address this point so it is clear to the reader that the kinetic modeling, error analysis and estimation presented in the manuscript are for an "idealized" system and not a direct simulation of PAM.

3. Figures 2-4, 6-7 are multi-paneled, extremely complex, small font and of low image quality. I would highly recommend removing many of the panels to simplify the figure presentation. The panels that are removed can be placed in the supporting information. For example it doesn't seem necessary to include 3 OH reactivity panels (perhaps only 0 and 100 s-1). It is simple too difficult for the reader to wade through these complex figures in any detail as she is reading the paper. At the very least higher resolution images and bigger fonts are needed.

4. I would also recommend a table of symbols and their definitions to make it easier for the reader to understand the short hand nomenclature used throughout the manuscript.

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