

Interactive comment on “The Caltech Photooxidation Flow Tube Reactor – I: Design and Fluid Dynamics” by Y. Huang et al.

Anonymous Referee #3

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The Caltech Photooxidation Flow Tube Reactor – I: Design and Fluid Dynamics Y. Huang et al., Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2016-282, 2016

The authors present a detailed description of the design and characterisation of the new Caltech photooxidation flow tube (CPOT) reactor, using a combination of fluid dynamics calculations to determine the ideal flow behavior within the reactor and experimental characterisations to assess deviations from ideal conditions. The manuscript is well written and the design and results are presented in a clear and logical manner. The manuscript is suitable for publication in AMT. I have only minor comments listed below:

In general the introduction is quite short, and would benefit from a discussion of the various types of flow tubes currently in operation. The authors comment that flow tube

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reactors are an alternative to the batch chamber, but do not comment on the different timescales of processes that are often studied with flow tubes or batch reactors – they are often quite different.

The introduction would also benefit from a discussion of the limitations of previous flow tube designs, and any evidence that the fluid dynamics in previous flow tube designs are not well represented by simple models.

Page 2, line 33: Please indicate the section number where the temperature control of the inlet diffuser is described. Page 3, line 9: ‘irradiate’ to ‘irradiation’. Page 3, line 17: Please quantify ‘substantial amount of energy’. Page 3, line 30: ‘condition’ to ‘conditions’. Page 4, lines 9-11: Mixture of numbers given as ‘two’ and ‘2’. Please be consistent. Page 5, line 8: Please move the references to after ‘PAM reactor’. Page 5, line 19 (and elsewhere): ‘reactor’ should be included wherever ‘PAM’ is mentioned. Page 6, line 4: Although it is defined in the abstract, please also define ‘RTD’ here. Page 10, equation 8: Please provide some explanation for the ellipsis in the equation. Page 10, line 11: Please provide some typical values to give a reference point for small values being less than 0.02. Page 15, line 18: Please change ‘minute’ to ‘small’. Page 16, line 5: ‘An idealized...’. Page 26, Figure 3: The photograph is not particularly clear. Page 32, Figure 9 caption (end): ‘non-diffusion’ to ‘non-diffusing’.

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