

Interactive comment on “A laboratory flow reactor with gas particle separation and on-line MS/MS for product identification in atmospherically important reactions” by J. F. Bennett et al.

Anonymous Referee #2

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General Comments

This paper describes results from the application of a laboratory flow reactor coupled with on-line chemical analysis for the determination of gas and particle phase products of m-xylene oxidation. The article is well written and the results are presented in a clear and logical manner. The experimental data are of high quality and the interpretation and discussion of the results is generally appropriate. Overall, this is a good paper which shows that the apparatus and analytical method has potential for the identification of gas and particle phase products generated from the atmospheric oxidation of volatile organic compounds (VOCs).

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The research topic is within the scope of AMT and I recommend publication following revision of the manuscript in line with the following comments and suggestions.

Specific Comments

1. Introduction: This section covers many aspects of laboratory studies of VOC oxidation and is well written. However, the area specific to this piece of work, i.e. on-line methods used to monitor gas and particle phase species simultaneously, is in fact not covered in sufficient detail. I think the manuscript could be improved if a few lines (or a short paragraph) describing previous work in this area, e.g., the work of Hoffmann et al. (2002) and Warscheid (2003), were included.
2. Page 1360, lines 4-9: The authors provide an estimate of the amount of particulate material lost by evaporation. Can the authors use this as a correction factor to make quantitative measurements for products present in the particles?
3. Page 1363: What is the residence time of particles in the CFMD?
4. Page 1365, line 3: Why was the particulate phase sample heated to 100°C? As indicated in section 2.2.3, heating to 200°C causes volatilization of nearly all the particle mass. So, why not heat to 200°C? The authors briefly discuss the effect of temperature on the size and number of particles, but do not consider the nature of the material volatilized. I would expect that heating to different temperatures would release material with different volatility. Thus the particulate phase mass spectrum may change with temperature. Was this investigated?
5. Page 1367, line 6: It is mentioned that the gas products only show a single fragment at m/z 43. However the mass spectra in Fig 8b also contain a very large peak at m/z 98. Is this latter peak not considered to be a “fragment peak”?
6. The conclusion is very short and should be expanded. I also think that the performance of the system and the technique should be assessed and compared to other approaches, such as those described by Hoffmann et al. (2002) and Warscheid (2003).

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This would enable the performance of the system to be placed in a better context.

Minor Comments

1. The authors use the words “sulphur” and “sulphate” several times in the manuscript. The chemical names recommended by IUPAC are “sulfur” and “sulfate”.
2. Throughout the manuscript the authors switch between “L” and “l” as the abbreviation for litres. I think “L” is the correct abbreviation.
3. Throughout the manuscript the authors switch between “ppm” and “ppmv”. I suggest that “ppmv” (and “ppbv”, where appropriate) is used in all cases.
4. Page 1353, line 10: The review of Atkinson (1989) has been updated a number of times. Maybe a more recent article should be cited here instead (e.g. Atkinson and Arey, Chem. Rev., 2003).
5. Page 1353, line 29: This is an incomplete sentence. Should it read “...widely applied method for particles.”?
6. Page 1359, line 8: n and n_{in} are not defined in the text. Is n the number of particles?
7. Page 1360, line 4: change “g/mol” to “g mol⁻¹”.
8. Page 1360, line 11: convert “1/4 in” to metric units.
9. Page 1363, line 5: Should “differential mode analyzer” be “differential mobility analyzer”? In addition, the abbreviation DMA should also be introduced at this point.
10. Page 1365, lines 12 and 13: MM has units (in this case g), whilst MW does not.
11. Page 1368, line 24: change “aerodyne” to “Aerodyne”
12. Page 1371, line 24: change “carhonyl” to “carbonyl”
13. Page 1374, fig caption: change “diffusion” to “membrane”

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14. Page 1381, fig caption: It is stated that the gas phase sample was heated to 100°C. Is this correct? Were all other gas phase samples analysed at ambient temperature?

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