

## ***Interactive comment on “Evaluating the performance of five different chemical ionization techniques for detecting gaseous oxygenated organic species” by Matthieu Riva et al.***

### **Anonymous Referee #2**

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#### General comments

Five different chemical ionization mass spectrometers were applied to measure simultaneously air samples from chamber experiments of  $\alpha$ -pinene oxidation under varying trace gas concentrations. The authors compare the suitability of the applied CIMS techniques for the detection of different compound classes in the investigated reaction system.

The manuscript is well written and the results are clearly presented. The experimental data are of sufficient quality and the interpretation of the results is expedient. The paper provides valuable new insights in the detection of different compound classes by

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five different CIMS techniques. It therefore gives guidance for the selection of CIMS techniques dependent on the scientific problem to be addressed. I recommend its publication considering the following comments.

#### Specific comments

Chapter 2.3: While for the Nitrate- and with some limitations also for the Amine-CIMS the uncertainty of the concentration estimates are provided, this is lacking for PTRTOFMS, VOCUS and Iodide. At least for the sensitivities mentioned an uncertainty should be provided as this is an essential parameter for an instrument performance, which is stated to be evaluated. The performed calibrations should provide the possibility to derive an accuracy for those instruments.

Page 10, lines 257f: Only data of the Iodide before December 17th was included due to decaying response. What is the reason for addressing data prior to 17th while it becomes invalid afterwards. Has the sensitivity been fallen below a certain threshold or did an abrupt decay of the sensitivity occur? Please specify the reasons for the decision.

Page 11, lines 275f: Please specify what the estimate of a HOM wall loss of 1/300 s<sup>-1</sup> is based on.

Page 16, line 407: Please specify the threshold for an 'abundant' signal to be selected for further analysis.

Page 17, line 449: The lack of dimers measured by VOCUS only suggests a potential limitation of the used setup/instrument parameters. It has not been shown that VOCUS is unable to measure dimers under different instrument conditions. → Replace 'instrument' by 'used setup'.

Page 18, line 462: Referring to the mass to charge ratio for ions measured by Iodide: Does that include the molecular mass of Iodide or has this been removed for comparative reasons?

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Chapter 3.1.2: The authors speculate that the amine CIMS is capable of measuring dimers due to the formation of extremely stable amine-dimer-clusters. However this has been observed under conditions where the reagent ion has been depleted significantly due to high trace gas loadings. Therefore the formation of dimers might be positively biased by the excess amount of uncharged monomers forming dimers by clustering with monomer-amine-clusters. Can this possibility being ruled out?

Technical corrections

Page, 11, Line 273 Change '20 p.p' to 20 %

Page,14, Line 362f; Reference for the studies using permeation sources of perfluorinated carboxylic acids is missing

Page 16, Lines 404 – 408: Splitting the sentence into two would improve its readability

Page 16, Line 423: change '...methods, all ions were not observed...' to '...methods, not all ions were observed...'

Page 16, Line 425: use plural

Page 23, Line 623: Should be 'Figure 7D'

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