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Atmospheric Measurement Techniques Discussions

Interactive comment on "Multi-scheme chemical ionization inlet (MION) for fast switching of reagent ion chemistry in atmospheric pressure chemical ionization mass spectrometry (CIMS) applications" *by* Matti P. Rissanen et al.

Anonymous Referee #2

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General Comments

The work presents a useful chemical ionization inlet setup that can be used by a growing number of research groups that use CIMS and similar techniques. In general, the manuscript is well written and the results are clearly presented. The results of sulphuric acid calibration and the comparison of the spectra from α-pinene and cyclohexene ozonolysis for both ion modes are promising. However, as a manuscript in AMT, I would expect more technical details offered, as well as more related discussion. I suggest the manuscript can be considered for publication after clarifying following

issues:

1. I am particularly concerned with the performance of Br- CIMS at atmospheric pressure. In both works mentioned (Albrecht et al. and Sanchez et al.), Br- CIMS was conducted at low pressure as opposed to the atmospheric pressure used in this study. The authors compared the HO2 radical concentration detected in this study with the observations from these studies and got the conclusion that the sensitivity is similar (Page 4, line 194-195). Meanwhile, the authors also emphasized the advantages of an atmospheric pressure application. Please explain more about the reaction time, sensitivity, ion-molecule collision frequency, ect. and what the advantages are.

2. The comparison of spectra (Figure 4) was actually impressive. However, I don't think it is very appropriate to cluster peaks using oxygen numbers as did in figure 4. I would expect e.g. C9HyO5 and C10HyO4 are observed by Br- CIMS, but both belong to the same cluster "O4" marked in Figure 4, which is definitely not correct. It is also not clear (for both Figure 4 and Figure S2), are there any (exactly) common compounds? I suggest to label some major compounds or give a list.

Specific comments

1. Page 3, line 132-138: The description of switching between two modes is relative short and too simple. Please give more details. Another question: are there any different settings of APi region for these two modes?

2. Page 7, Figure 5: Since most of the compounds were not exclusively detected in only one mode, add some explanation of e.g. why C10H15O10*Br- was detected in NO3- mode when O3 concentration was changed (?, 16:40-16:45).

3. Overall, I feel some of the necessary experiment description is missing, and it causes difficult to follow the paper. E.g., the description of the experiment for Figure 5 is not clear enough.

Technical Comments

1. Page 2, line 103: “air”, what type of air?
2. Page 4, Figure 2: Use the same colour for Br- signal and the legend.
3. Page 5, line 195: Albrecht et al. (2018) -> (2019).
4. Page 5, Figure 3: Unit is missing.

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