

Review of AMT-2018-428

This paper presents an alternative ionization source for the Iodide ion TD-CIMS that does not involve radioactive material, and provides sensitivity for additional species, acetic acid, HCl and SO₂. This is a useful extension of this method, and should be publishable, contingent on the author address several issues, outlined below.

General Comments

This group seems to be the only one operating an iodide ion TD-CIMS that has sensitivity to PAA. Warneke et al, (2016) describe an absence of any additional signal when NO is added to titrate PA radicals in such a TD-CIMS. It would be good to acknowledge this difference and to hear if the authors have any ideas or explanations for this.

Specific Comments

Page 2, Line 17. This would be a good place to discuss the sensitivity to PAA and possible reasons for the differences from other TD-CIMS instruments.

Page 4, Line 14 and Figure 2. It would be good to have some additional details here about the discharge ion source. What is the body of the source made of (shown in light brown in Figure 2)? Also, it is not clear, because of the material, but it is implied that the left hand side electrode is at ground, is that correct?

Page 7, Line 27. Is it true that all the combinations of sources have maximum count rates of 10⁶-10⁷ Hz?

Page 10, Lines 12-23. This section is a repeat of previous material.

Page 11, Lines 1-2. Are you referring to the signal with NO added to titrate PA radicals?

Page 11, Line 3. A factor of 2.5 higher than what?

Page 11, Lines 7-8. Somewhere along here it seems essential that the authors present a timeline for m/z 59 that shows what it looks like when the instrument is switched between modes, e.g. TD, TD + NO added, TD+NO added +both de-clustering modes. That way we can get a sense of how the system really operates.

Page 12, lines 2-5. Do you have a more complete description of this calibration method? How was the oxidation done?

Page 14, Line 13. Don't Lee et al. address the detection of HNO₃ as the iodide cluster?

Page 15, Line 14. In practice, don't you use the signal through the zero catalyst as the instrument background? Is this the background for each mode?

Page 19. Lines 22-23. Doesn't NH_4Cl dissociation happen in the TD inlet? This would seem to be a major interference in the measurement of HCl.

Page 19, Lines 26-27. This combination of PAA and acetic acid signals is only true if NO is being added to titrate PA radicals. This is where it would help to have one timeline figure that has the various modes labeled for the different conditions.

Figure 4. The m/z of the cluster CH_3CO_2 -water cluster should be 77.

Supplemental Material

Figure S6. Why are the y-axes of the PAN and PAA plots so compressed, they could be expanded to maxima of 1.5 ppbv and 0.3 ppbv, respectively.

References

Warneke, C., et al., Instrumentation and Measurement Strategy for the NOAA SENEX Aircraft Campaign as part of the Southeast Atmosphere Study 2013, *Atmos. Meas. Technol.*, 9, 3063-3093, doi:10.5194/amt-9-3063-2016, 2016.