

Atmos. Meas. Tech. Discuss., referee comment RC1
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Comment on amt-2021-164

Anonymous Referee #1

Referee comment on "Quantification of isomer-resolved iodide chemical ionization mass spectrometry sensitivity and uncertainty using a voltage-scanning approach" by Chenyang Bi et al., Atmos. Meas. Tech. Discuss., <https://doi.org/10.5194/amt-2021-164-RC1>, 2021

General Comments

The authors investigated the calibration method for the Iodide CIMS with a Thermal desorption aerosol gas chromatograph (TAG) and an FID detector, allowing the determination of isomer-resolved sensitivity. For the same formula, sensitivities for different isomers were found to vary by 1-2 orders of magnitude. The results suggested calibration based on direct air sampling can be biased towards isomers with higher sensitivity. Sensitivity estimation using voltage scanning method after GC separation was compared to direct calibration (without column separation) and showed a high uncertainty by 0.5-1 order of magnitude. They also found that iodide CIMS sensitivity correlates with GC retention time, however, more work is needed for a calibration purpose.

This paper is well written with informative description. Results of the study can be useful for future applications of similar method. I have a few specific comments.

Specific comments:

This study measured particle phase OH and ozone oxidation products. These products are likely heavier and more oxidized/functionalized (thus less volatile) than gas phase compounds. Can the authors comment on the applicability of these calibration techniques to gas phase measurements, especially CIMS is often used for gas phase measurement? Would they expect similar results? Are there any suggestions for future applications?

Can the authors add some discussion on the influence of RH on the different calibration methods? It is known that sensitivity is RH dependent for I-CIMS for many chemicals.

Line 142: "similar" should be "similarly".

Figure 1: This figure is a little complicated to understand. The authors have very thorough method description on line 190-205. However, for audience that are not very familiar with the technique and the concept, it is overly technical, and they may get lost through the text. One suggestion for the authors is to make a plot showing the technique, especially the voltage scanning method coupled to GC separation, and the corresponding data collection and quantification that were used for constructing Figure 1. This can be a cartoon/plot illustration in the supporting information.

Line 327-328: The authors mentioned potential thermal decomposition in desorption and GC analysis, how about potential fragmentation in CIMS?

Figure 3: I suggest the authors add more space between different species on X axis. They are too close from each other in the current version. It would be better to add a legend for the circles, black lines and the boxes for a more straight forward interpretation of the figure.

Line 356: It would be useful if the authors can provide a list of these products in a table in SI. Are they the same chemicals presented in Figure 3?

Line 358: What is the influence of OH level on the formed products or instrument sensitivity? Are there more oxygenated species or fragmentation at high OH? Please add some discussion.

Figure 8 y axis: missing space after 'log'

Figure S1: Why is the baseline higher for OH level 1 in all four panels?