Atmos. Meas. Tech. Discuss., 8, C4101–C4103, 2015
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Atmospheric Measurement Techniques Discussions

Interactive comment on "Characterization of the mass dependent transmission efficiency of a CIMS" *by* M. Heinritzi et al.

Anonymous Referee #2

Received and published: 27 November 2015

This manuscript presents dedicated attempts to quantify the transmission of a chemical ionization mass spectrometer, the CI-APi-TOF. Due to the lack of easy-to-use calibration standards, especially for the newly discovered ELVOC, this transmission characterization is important for improving the quantification capabilities of the instrument.

The paper is mostly well written and clear, and well within the scope of AMT. While I can partly understand the reasoning of Referee # 1, I find this paper to provide very useful information for the (albeit not huge, though still large and quickly growing) CIMS, and especially CI-APi-TOF, scientific community, and therefore I recommend this paper for publication in AMT, following consideration of my comments below.

My only major comment relates to Fig. 5 and the interpretation of the transmission curves:

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The authors provide different fitted curves for the transmission, and seem to only look at those when doing the interpretation. By doing this, they find much worse agreement than the data actually suggests! For example, the authors state that the shapes of all measured transmission curves are different in Fig. 5, but in fact all the measurements peaks in the 500-600 Th range.

Based on the different aspects listed in the introduction that can influence transmission, I would not expect any combination of them to produce curves with the shapes of the fitted curves. For example, I doubt that anyone could tune such a bimodal transmission curve as in Fig. 5a, nor such a sharply changing curve at 600 Th as in Fig. 5b while still retaining a relatively broad overall transmission. I therefore suggest that the authors allow for larger uncertainty in the vertical direction instead of, as now is the case, assuming that the fits have to pass through every data point. In this way, they could allow for some more “reasonable” shapes for the transmission curves. For example, if doing this I think using a shape similar to that of Ehn et al. 2011, Fig 2, would fit the data relatively well, and in the end show a quite consistent shape of the transmission curve in all different experiments.

The reason for allowing variations in the vertical direction could come from the fact that there is fragmentation occurring in the mass spectrometer, which means that ions will have traveled some part through it with one mass, and some part with another. This will inevitably cause variability at the monomers, as they will depend on the transmission of the di/trimers in the initial parts of the instrument. This should in any case be discussed.

Minor comments:

- At the end of the introduction there should typically be a paragraph discussing what the aims/methods/approach of this particular study.

- 11375, line 1: ” larger spatial spread” I do not feel that this effect is described as well as many of the others. At least it is my impression that the point here is that a larger fraction of the small ions will have already exited the extraction region when the next

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extraction takes place. This should be stated more concretely.

- Section 3.1. and Fig 2c: I had to read it several times to understand that the EM correction factor still has nothing directly to do with the transmission, but is only used to account for the different positions of the TOF and EM. Please state this explicitly and clearly somewhere, as this whole (long) section is now a bit hard to follow.

- 11381, line 7: ”permanently depleted completely”, what exactly does this mean? The aim is to deplete the primary ions. . .

- 11383, lines 21-22. ”Here” vs ”this study”?

Interactive comment on Atmos. Meas. Tech. Discuss., 8, 11369, 2015.