

Interactive comment on “On the calibration of FIGAERO-ToF-CIMS: importance and impact of calibrant delivery for the particle phase calibration” by Arttu Ylisirniö et al.

Anonymous Referee #3

Received and published: 3 September 2020

OVERALL

The authors have studied the how the means of administering calibrant compounds affects the calibration of the FIGAERO-CIMS desorption temperature vs the compound saturation pressure. The authors find that there is a possible source of error when administering the calibrate solution directly the FIGAERO filter via a syringe. They propose an alternative method based on aerosolizing the calibrant.

Because of the increasing use of the FIGAERO, the findings of the paper are important. The alternative methodology is useful and easy to apply for most of the users. The methodology appears solid and the overall clarity of the paper good, conveying the

Printer-friendly version

Discussion paper



message. I have some comments below, but overall, I recommend publication.

GENERAL

Modeling (Page 6, 3rd paragraph; page 7 last lines; page 8, 3rd and last paragraphs, page 11 1st paragraph): The model brings enough insight to justify itself for the paper, but I think it could be better tied to the results. As the model predicts the effect of particle diameter, maybe this aspect could be dealt with first. One could estimate the surface to volume ratio of the residue to that of the fitted 11 μm diameter particles. It seems that an order of magnitude agreement would be achieved with a reasonable residue thickness estimate. Another thing: why is the model insensitive to particle diameter for PEG-8?

The authors might like to check for papers that have come out after preparing the manuscript.

SPECIFIC COMMENTS

Abstract:

There would be room for specific numbers on the effects of the methods on peak temperature, pressure and concentration.

Methods:

Page 4 and onwards: I understand the concentration probably affects the residual ring pattern, but it would be nice to also show the deposited solute mass.

Eq (3) and related texts: C^* -space is referred to later in the text several times, as is customary to the field. On the other hand, this paper (or the supplement) does not provide the physical properties of the compounds needed to convert the saturation pressure values to concentrations. Including the equation is therefore of limited value. Maybe the properties could be listed in the supplement? Or then just point out here that this is a linear function. BTW: molecular weight/mass should be changed to molar

here, and later when appropriate.

Results and discussion

Figure 3 and related texts: Overall this is a nice set, conveying the message. I have some minor points: -Please harmonize the two panes for marker and text sizes -There would be more room to spell out the Saturation vapor pressure within the caption than on the axis. This is shortened to Saturation pressure elsewhere in the text. -I guess the lines are just to guide the eye. Why are they missing from the b) and why is the PEG atomizer data included? -I propose checking (dashed) horizontal lines to the Psat values -Please refer to supplement here for the Psat values -I did not find mention of the sources of the carboxylic acid Psat values. These should be added.

Figure 5: The scale bar text is too small. Although is implicitly clear, maybe the caption should spell out that this is after solvent evaporation. Maybe use the word residue?

Figure 6: I know there is little that can be done here, but it is practically impossible to tell the particles apart from the filter. The marked particles are approximately one micrometer in diameter, not 300 nm. Any explanation?

Page 8, last paragraph and figure 7: Explain what the difference in the inlet was, and why it affects the Tmax values.

Figure 8: Nice result, but as this is calibration, should there not be an error estimate?

Page 10, 2nd paragraph: "Note that the heating ramp rates in these calibrations were done with faster heating ramp rate..." This sentence can be shortened quite a bit. Apart from that, maybe the authors would like to discuss the effect of the ramp rate in the light of this paper. . .

Interactive comment on Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2020-254, 2020.