Atmospheric Measurement Techniques Discussions

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Comment on amt-2021-184

Anonymous Referee #3

Referee comment on "A study on the fragmentation of sulfuric acid and dimethylamine clusters inside an atmospheric pressure interface time-of-flight mass spectrometer" by Dina Alfaouri et al., Atmos. Meas. Tech. Discuss., https://doi.org/10.5194/amt-2021-184-RC3, 2021

Review to "A study on the fragmentation of sulfuric acid and dimethylamine clusters inside an Atmospheric Pressure interface Time Of Flight Mass Spectrometer " by Alfaouri et al., AMTD 2021

This manuscript describes the study of collision induced cluster fragmentation inside an API-ToF. The authors chose negatively charged clusters of dimethylamine and sulfuric acid produced in an electrospray ion source and selected clusters using a differential mobility analyzer. The results are used identify cluster fragmentation degrees and pathways and to correct the abundance of ion clusters measured by the API-ToF. The paper is short and concise. It fits into the scope of AMT and I recommend publication after my comments listed below have been addressed.

General comments:

Section 2.1:

What makes the planar-DMA special here? I assume the selection for mobility diameter would work with any DMA model? Thus, I suggest to introduce the planar DMA only at the beginning of the experimental section and after that use simply "DMA", as you do later.

Section 3:

How do I relate the information from Figure 2 to the selection of clusters in Figure 3? Here

an important piece of information is missing. A table showing the DMA voltages and the selected cluster(s) belonging to that voltage might help. Are the clusters shown in Figure 3 all clusters that are found in the experiment? If so, it follows that the same amount of clusters is displayed in Figure 2. But it appears as if there a a lot more in Figure 2. This deserves a more detailed explanation. See also the technical comment to Fig. 2 below.

Lines 178-191: If cluster size plays a role, then why is the discrepancy highest for the 2D3S1B cluster? For 3D3S1B you find good agreement.

Technical comments:

line 53: acronym planar-DMA has already been introduced two lines above

line 73-74: this sentence "The planar-DMA is in turn connected to an electrometer and finally to the APi-TOF MS" is repeated later in line 81.

line 76: Is "SEADM" the manufacturer and P5 the model type of the DMA?

Fig 2: This is a nice overview on the experimental results, but in the present form it is hard to read, it looks like "raw data" and is not very informative. In the present form it can be moved to the supplement. What the reader would like to know is how you find the H_2SO_4-DMA clusters from Fig 2 that were selected for further analysis. What information does the DMA voltage give us? I think that the voltage can be converted to a mobility diameter in nm.

Supplement:

Line 20 and 22: please give also city and country for SEADM, as you did for Tofwerk in line 23

Line 26: “The first two...”

Line 78: “arise”

Line 83: what is a “Herrmann-DMA”?