

Interactive comment on “Ion Mobility Spectrometry-Mass Spectrometry (IMS-MS) for on- and off-line analysis of atmospheric gas and aerosol species” by Jordan E. Krechmer et al.

Anonymous Referee #1

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The paper introduces the application of ion mobility spectrometry-mass spectrometry (IMS-MS) to gas and particle analysis in atmospheric science. Two methods are presented. In one case the gas phase is aspirated, ionized and measured during a field campaign as well as in the laboratory behind a PAM chamber to characterize highly oxidized species. In a second approach aerosols were collected on filters, extracted and directly injected via an ESI source. The authors demonstrate the great analytical potential of IMS-MS. Using ESI-IMS-MS it is possible to separate efficiently complex mixtures and analyze polar compounds without derivatization. This method has clear advantages compared to LC-MS and also avoids thermal decomposition as expected in thermal-desorption techniques. The instrument has a high mobility resolution and is

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able to separate isobars and even isomers. With a few examples the authors present these features. They demonstrate that different chemical oxidation pathways of precursors can be identified even in an ambient sample. With the help of collisional induced dissociation it is confirmed that highly oxidized C₂₀ molecules from α -pinene ozonolysis are covalently bound molecules and not clusters. The paper is well written. The various features of the instrument and the exemplary experiments are well presented and explained. This paper shows that IMS-MS has a great potential in the chemical analysis of gas and particle phase. I recommend publication of this paper after some minor revisions.

Line 224: “can be readily separated from each other with IMS-MS”. What do you mean here. The peaks 133/155 and 183/199 are not separated on the mobility scale. How are you sure that the lower mass is not a fragment? Please elaborate.

Line 260ff: The peak at 41.82ms is attributed to both cis-b and trans-b-IEPOX. Considering the resolution of the instrument I would expect a double peak, although not fully resolved. The HWHM of this peak is not much wider than those of the pure compounds. Could it be that the mobility scale was shifted in the SOAS filter experiment? Please comment.

Line 412ff: It is claimed that the hydroxy termination product from C₁₀H₁₅O₉ and the hydroperoxy termination product of C₁₀H₁₅O₈ overlap at C₁₀H₁₆O₈. Given the potential of IMS-MS, why are these two different products not mobility separated? What indication do the authors have that there are two products overlapping? Could this not indicate that only one of these is formed?

Line 419: What kind of ring-closure reactions do you expect?

Figure 10: The dimer region m/z 500-600 in Figure 6 corresponds to a drift time of about 45-50 ms. In the Figure legend it says 52-55 ms. Is this a different experiment taken under different instrument settings?

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