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Atmospheric Measurement Techniques Discussions

Interactive comment on "Comparison of three aerosol chemical characterization techniques utilizing PTR-ToF-MS: A study on freshly formed and aged biogenic SOA" *by* Georgios I. Gkatzelis et al.

Anonymous Referee #2

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"Comparison of three aerosol chemical characterization techniques utilizing PTR-ToF-MS: A study on freshly formed and aged biogenic SOA" by Gkatzelis et al. Atmospheric Measurements Techniques Discussions

PTR-ToF-MS provides real-time, robust measurements of ambient VOCs. This manuscript expands the use of PTR-ToF-MS applications to include particulate bound organics and compares performances of three different aerosol sampling techniques, aerosol collection module (ACM), the chemical analysis of aerosol online (CHARON), and the thermal desorption (TD) to evaluate their ability to provide chemical details of

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organic aerosol when coupled with PTR-ToF-MS. It also examines their ability to provide additional information relevant to the organic aerosol such as aging, O:C ratios, and volatility patterns. The authors performed carefully designed experiments to replicate the formation and aging of biogenic SOA and did careful analyses and interpretation of the results considering different factors that can affect the experimental results as E/N. Considering the importance of organic aerosols in the atmosphere and the difficulties associated with the chemical characterization of organic aerosols, this work is valuable as it expands and improves the atmospheric measurements techniques for organic aerosol speciation. Therefore, I recommend this work for publication in AMTD after minor revisions. 1) Although this work aimed to compare performances of different aerosol sampling technique, the operating conditions and PTR-ToF-MS setups were not the same for three aerosol samplers, which affected the measured collected efficiency. The authors discusses the effect of E/N on the ionic fragmentation in the drift tube at the end of this discussion. I would move this fact to the beginning of the discussion in section 3 so there is no suspense and modify the figure captions to include the different operating conditions. 2) The authors compare the organic mass concentration corresponding to different aerosol samplers and AMS to that of SMPS. These instruments measure particles with different size ranges. There is no discussion of aerosol size distribution. It is worth to include a short discussion on measured particle size distribution and samplers' size range. Also it is not certain why the authors compared the organic mass measurements by the three samplers to that of SMPS, which is derived using a density correction. Would not this be more reliable to compare those to AMS derived mass concentration? Also this comparison implies that the aerosol volume measured by SMPS is 100% OC. Is it correct assumption? 3) As the organic aerosol age, more volatile smaller chain oxygenates can gas off the aerosol surface, thus affecting the O:C ratio and volatility. The authors discussed effect of PTR measurement conditions on the fragmentation, but not much about the fragmentation/ gassing off due to oxidation of OA. Can the authors comment or include a discussion? 4) Although the manuscript is structured well, the language and writing could be improved. It is

recommended the authors do a thorough proofreading and improve the fluency. Few examples include: Page 5 line 147: replace “where” with “was” Page 12 line 435: . . . ratios were lower that . . . instead of “. . .. . .ratios was lower that. . .. .” Page 15 line 527-530: consider re-phrasing. Page 17 line 610: “aging” instead of “ageing”

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