

Atmos. Chem. Phys. Discuss., referee comment RC1  
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## Comment on acp-2021-528

Anonymous Referee #1

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Referee comment on "Influence of organic aerosol molecular composition on particle absorptive properties in autumn Beijing" by Jing Cai et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2021-528-RC1>, 2021

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In this study, authors investigate chemical composition of particulate matter in Beijing, China and contrast these results with the measured aerosol optical parameters. The results of the manuscripts shed new light on how chemical composition influences the optical properties of the aerosol particles and introduces a new method for analysing the collected particulate matter. The paper is overall well written and in scope of Atmospheric Chemistry and Physics journal but needs some corrections before publication.

### Major comments:

Section 2.2 (Offline FIGAERO-CIMS analysis): Major part of this section is left out to be detailed in future publication. Even though I understand the reasoning behind the decision, I feel that too many details are missing. In this state I feel that I cannot assess the credibility of the method and hence the results shown in the paper. The authors should present the draft of this future publication showing the main details of the methodology, or the used methodology should be presented in more detail in the current manuscript or in its supplement.

Line 346: Recent paper (Yang et al., 2021) showed that many compounds with high DBE (>2) and oxygen number (>4) are prone to thermal decomposition during FIGAERO heating. Lot of compounds shown in Figure 4 fall into this category, and I would not be surprised that some of the observed compounds could be thermal decomposition products. Authors should consider this possibility and discuss its implications to their results and conclusions.

### Minor comments:

Section 2: The information about the used CIMS should be more detailed, for example the model, mass resolving power, ect should be presented. Also details of the used I- nitrogen

flow and IMR pressure are missing.

Line 95: Some estimation of collected particulate mass on the filters should be presented.

Line 96: Sampling dates for the three blanks are missing from the Figure 1 and Table S1.

Line 97: How long was the time between measurement and off-line analysis? Chemical reactions are possible overtime, even if the filters have been stored in freezer. Was the FIGAERO-CIMS analysis done in the same location as the measurements?

Line 101: Elaborate what does "pre-baked" mean.

Line 198: Episode periods could be marked more visibly in the Figure 1 plots, now its a bit guessing about the correct time periods.

Line 363: Indicate which panel of the Figure S4 is in question.

Line 364-366: This comparison could be more illustrative in a Table. Now it's somewhat hard to follow.

Line 369: Indicate which panel is in question in Figure 4.

Line 398: Is there reference to a wrong figure here?

Line 401: Is the data shown in Figure S12 from the whole campaign? If so, it should be clarified in the caption so that reader does not think that different panels represent different episodes

Line 401: Acronym "POA" is not defined in the text.

References:

Yang, L. H., Takeuchi, M., Chen, Y. and Ng, N. L.: Characterization of thermal decomposition of oxygenated organic compounds in FIGAERO-CIMS, *Aerosol Sci. Technol.*, 1–22, doi:10.1080/02786826.2021.1945529, 2021.