Response to Reviewers' comments

We thank the reviewers for their thoughtful and constructive comments that help us improve the manuscript substantially. We have revised the manuscript accordingly. Listed below is our point-to-point response in blue to each comment that was offered by the reviewers. We hope that our revised manuscript will now be suitable for publication in ACP.

Response to Reviewer #1

The manuscript is presents volatility and hygroscopicity data from urban ambient measurements in a clear manner and with good scientific quality. I would like to propose that this manuscript would be accepted with minor revisions. The first comment is related to the volatility measurement temperature that was chosen to be 300 Celsius. All the references given in the introduction are from measurements using 270 Celsius temperature. What lead to this decision? How to compare results with pre-existing data I there is a clear difference in the temperature used? Please add some text about this issue / decision. Second comment is about the experimental setup used: did you use $PM_{2.5}$ cut for the sampling, or a cyclone?

R: The authors thank the reviewer's positive comments. The heating temperature of 270 °C for ambient aerosol particles was selected based on the volatility characteristics of relevant inorganic salts, organic compounds, black carbon, soot, and sea salt. At this temperature, atmospheric sulfates, nitrates, and most organic compounds are typically volatile, while soot, sea salt, mineral dust and certain organic polymers remain refractory (Enroth et al., 2018; Johnson et al., 2005). Previous studies have shown that the major inorganic compounds in the atmosphere, such as ammonium nitrate and ammonium chloride, completely volatilize below 150 °C, and ammonium sulfate volatilizes completely between 180 °C and 230 °C (Huffman et al., 2008; Feng et al., 2023). Most organic compounds evaporate at relatively lower temperatures (Tritscher et al., 2011; An et al., 2007). Villani et al. (2007) pointed out thermo-desorption at 250 to 300 °C appeared to be the optimum temperature to avoid size dependent effect. We take 270 °C as the heating temperature, which is just in the middle the optimum range of 250-300 °C recommended by Villani et al. (2007). In fact, previous research using different temperature in the range of 250-300 °C, for examples, 270 °C at Budapest, Hungary (Enroth et al., 2018), 300 °C at Athens, Greece (Mendes et al., 2018), 280 °C at Hyytiälä, Finland (Häkkinen et al., 2012), and 250°C at Nanjing, China (Cui et al., 2021), which we did not express clearly in the original manuscript.

We have reorganized the section "Sampling site and experimental setup" thoroughly. We added more information about this campaign, including sampling site, the configuration of instruments, the aerosol inlet, instrument model, the operation parameter, and so on. Please see Lines 94-169 in the revised manuscript for detail. The information about sampling was just shown briefly:

The particle number size distribution and mass concentrations of the main chemical composition of non-refractory PM_1 were simultaneously measured on the observation platform located on the roof of the CAMS building, where ambient aerosols were pumped through a PM_{10} impactor (URG Corporation at a flow rate of 16.7 L/min) and were then dried to less than 30 % RH using an automatic aerosol dryer. The dried sample was then split through a manifold to different instruments, including the Tandem Scanning Mobility Particle Sizer (TSMPS, TROPOS, Germany) and a High Resolution Time-of-Flight Aerosol Mass Spectrometer (HR-ToF-AMS, Aerodyne Research, Inc., USA). For the VH-TDMA system, a silica dryer and a Nafion dryer in series were used to dry the sample air to less than 30 % RH.

A couple of typos or inaccurate phrases:

- First sentence: replace "aerosols" with ambient aerosol particles

R: We have replaced “aerosols” by “ambient aerosol particles” in the revised manuscript as suggested.

- 3 Data analysis, first sentence: add "electrical" before "mobility"

R: We have add "electrical" before "mobility" in the revised manuscript as suggested.

- Page 14 row 332: "peaked" should be "peak" right?

R: Yes, we changed it as suggested.

References.

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