A point-by-point response to editor

Dear Editor,

We greatly appreciate your effort and time on handling this paper. The further comments have been considered carefully during the revision (a point-by-point response to editor as follows).

Yours sincerely,

Fang Zhang

On behalf of all authors

Comments from the editor:

Abstract: Although the new particle formation (NPF) process requires low-volatile vapors to form molecular clusters and nuclei, there was a significant high-volatile mode around noontime on NPF days. This indicates partitioning of volatile substances into the growing particles during summer.

Re: This statement in the abstract and Section 3.3 has been revised, as follows:

"…the significant high-volatile mode around noontime on NPF days indicates partitioning of volatile substances into the growing particles during summer."

line 125: regarding RH verification with deliquescence: I suggest to use the word "verified" instead of "calibrated" here. Furthermore, the next sentence should state that you verified the humidity conditions, not that it can be done. What was the result of the verification? How much RH varied?

Re: Thanks for the editor's suggestion, which has been revised in lines 124-127, or as follows:

"…The result of the verification is shown in Fig. S2. It shows that the deliquescence RH of ammonium sulfate measured by H/V-TDMA is ~78 %, which is consistent with the results reported by Badger et al (2006) and Tan et al (2013), indicating the RH measurement of this system is accurate."

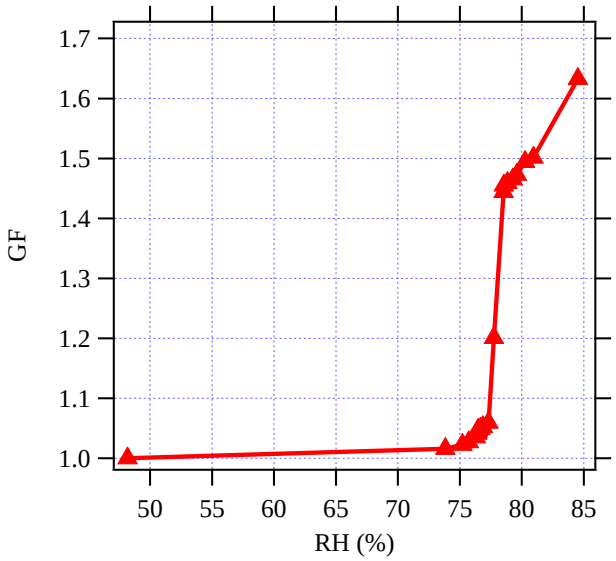

Figure R1. The hygroscopic growth factor (GF) of 150 nm $(NH_4)_2SO_4$ particles in different relative humidities (RH). The sudden jump in the GFs near RH 80% denotes the deliquescence RH.

line 145. You did not address my question regarding the shape factor of NaCl in your response. It seems to me that the cubic shape of sodium chloride was not taken into account. Laboratory generated NaCl particles have a cubic shape with a shape factor of 1.08 while the typical assumption is that the non-volatile residual particles are spherical.

Re: Thanks for the editor's reminding. After checking the calibration process, the cubic shape factor 1.08 of NaCl particles has been considered in the Igor software. A statement has been included in lines 147-148, or as follows:

"…Due to the cubic shape of NaCl particles, a shape factor of 1.08 was used in the calibration process (Park et al., 2009; Hakala et al., 2017)."

Badger, C. L., George, I., Griffiths, P. T., Braban, C. F., Cox, R. A., and Abbatt, J. P. D.: Phase transitions and hygroscopic growth of aerosol particles containing humic acid and mixtures of humic acid and ammonium sulphate, Atmos. Chem. Phys., 6, 755-768, 10.5194/acp-6-755-2006, 2006.

Hakala, J., Mikkilä, J., Hong, J., Ehn, M., and Petäjä, T.: VH-TDMA: A description and verification of an instrument to measure aerosol particle hygroscopicity and volatility, Aerosol Science and Technology, 51, 97-107, 10.1080/02786826.2016.1255712, 2017.

Park, K., Kim, J.-S., and Miller, A. L.: A study on effects of size and structure on hygroscopicity of nanoparticles using a tandem differential mobility analyzer and TEM, Journal of Nanoparticle Research, 11, 175-183, 10.1007/s11051-008-9462-4, 2009.

Tan, H., Xu, H., Wan, Q., Li, F., Deng, X., Chan, P. W., Xia, D., and Yin, Y.: Design and Application of an Unattended Multifunctional H-TDMA System, Journal of Atmospheric and Oceanic Technology, 30, 1136-1148, 10.1175/jtech-d-12-00129.1, 2013.