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Interactive comment on "Hygroscopicity of nanoparticles produced from homogeneous nucleation in the CLOUD experiments" *by* J. Kim et al.

Anonymous Referee #2

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Summary: This work demonstrates the application of Nano-HTDMA to measure the hygroscopicity of nanoparticles in the frame of the CLOUD experiments. The manuscript fits well to the scope of ACP and presents valuable results. Thus I recommend it to be published after the following moderate/minor comments listed below have been adequately addressed.

Comments:

1. In the abstract (page 19805, lines 8-9) and introduction (page 19806, lines 9-10), it is not accurate to state: "Water uptake constrains their chemical composition". On the

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contrary, the chemical composition of aerosol particles defines their ability to take up water. Please reconsider this.

2.What does the value refer to in Table 1? Are they peak/mean/median values?

3.Page 19810, lines 4-5, please describe the calibration results in the text / supplementary. How you considered the shape factor in the calibration, especially for sodium chloride nanoparticles?

4.Page 19811, lines 16-20 and Page 19813 lines10-20. The ammonium seems like a significant contaminant, can we simply treat the Exp. A listed in Table 1 as the H2SO4-NH3 nucleation? Also, if the CIMS observed significant sulfate and ammonium signals, maybe the author can compare the HGF (Exp. A) with previous studies (Biskos, G., Paulsen, D., Russell, L. M., Buseck, P. R., and Martin, S. T.: Prompt deliquescence and efflorescence of aerosol nanoparticles, Atmos Chem Phys, 6, 4633-4642, 10.5194/acp-6-4633-2006, 2006.).

5.Page 19811, lines 24-25, which value do you use as the kappa to calculate the DMAS volume fraction in eq.4 for Exp. B-D? For me it seems you use kappa value of ammonium sulfate (0.47) or I misunderstand something. Page 19813, lines 14-15, the ammonium also exists in Exp. A, why the authors only compare the kappa values to sulfuric acid, not the ammonium sulfate as stated in Page 19811, lines 24-25?

6. For Fig.2. I would suggest the authors also plot the kappa of ammonium sulfate.

7.It seems the kappa values used in the calculation mostly refer to the large particles (∼100 nm). Since this work was mainly focus on the 10 nm and 15 nm nanoparticles, are these kappa values still representative? How did the authors consider the uncertainties of kappa values? How much it can influence the results and conclusions?

8.The authors listed the standard deviations of HGF and kappa values in Table 1 and Fig.2. How many scans of each diameter were performed? Have you repeated the experiments?

9.Page 19816, lines 9-11, dose the dimethylamine concentration (like Exp. B) influence this conclusion?

10.Could the authors compare the results with previous studies (Keskinen et al., 2013)? I think they reported kappa values of more particle sizes.

11.Page 19817, lines 12-14, does the CIMS observed more α-pinene oxidation products contributed to the mass?

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 19803, 2015.

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