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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Towards closing the gap between hygroscopic growth and CCN activation for secondary organic aerosols – Part 3: Influence of the chemical composition on the hygroscopic properties and volatile fractions of aerosols" *by* L. Poulain et al.

Anonymous Referee #1

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General comments The present manuscript discusses how relative humidity affects hygroscopicity and SOA chemical composition. The authors found that hygroscopicity (κ value) of SOA particles increases linearly with the increase in water mixing ratio. The change in κ values was related with AMS signals. This result demonstrates that hygroscopicity of SOA particles can be related with SOA chemical compositions using currently available techniques. I think that this result stimulates further investigations on the topic. The manuscript seems to be well written. I have some comments.

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Specific comments P16687 Section 2.1 I could not find the descriptions on chamber temperature and VOC concentration in the chamber. As these values may affect the chemical composition and hygroscopicty of SOA particles, please mention them.

P16688L2 According to the text, it is likely that 2-butanol was used as OH scavenger. However, Figure 1 indicates that 1-butanol was employed. Which compound was used in the experiment?

P16689L15 Is it confirmed that TD-Bypassed data are identical to the data obtained at thermodenuder operated at the room temperature? Gas/particle partitioning of semivolatile compounds may change in the thermodenuder because charcoal absorbs volatile gas compounds.

P16690L16 Does this mean that the DMA for LACIS was scanned as a DMPS? It is worth to mention which diameter(s) was selected.

P16690L21 Is Kelvin effect considered in this calculation? Is it possible to describe briefly how water activity is calculated?

P16712 (Figure 7) It seems that data of experiment 9 are different from that of experiment 10. It is pronounced for CO2+ and CHO. Can the authors give the possible explanations for this difference? Although, the authors are trying to relate the oxidation levels with κ value in this figure, this point is not discussed in detail. κ value is affected by various factors (e.g., Molecular weight, soluble fraction, non-ideality of solution, density). It is not obvious which factor is influenced by the fraction of CO2+ or CHO+. Can the authors add some discussion regarding this point?

Technical comments Abbreviations Abbreviations should be shown after the word is shown in full form. e.g., Leipzig Aerosol Cloud Interaction Simulator (LACIS) (P16685L6)

P16695L9 “Fig 6” in the text likely corresponds to Figure 7.

Fugures In some figures (Figure 2,4,6,and 7), markers for data are too small, and I

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could not see them well. Would you make them larger?

Figure5-7(y-axis) It seems that “ratio mz44/organic” and “contribution of m/z44 to organic signal” are the same. If so, please use only one notation.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 16683, 2009.