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Interactive comment on "Calibration and measurement uncertainties of a continuous-flow cloud condensation nuclei counter (DMT-CCNC): CCN activation of ammonium sulfate and sodium chloride aerosol particles in theory and experiment" *by* D. Rose et al.

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We would like to thank George Biskos for his positive remarks, constructive comments, and valuable suggestions, which are highly appreciated and will be taken into account upon revision of our manuscript. Responses to individual comments are given below.

As highlighted by George Biskos, we had already indicated that shape corrections may be required not only for sodium chloride but also for ammonium sulfate particles (section 3.6), and that the effective supersaturation in the CCNC might be underestimated

by a few percent when shape issues are not taken into account (section 4.7). For ammonium sulfate particles, a shape factor of chi = 1.02 as suggested by Biskos et al. (2006a) leads to an increase of the calculated critical supersaturations (Tab. 8 and Fig. 9 and 11) by about 3% (relative), which is a small but not negligible difference.

Much larger differences are the consequence of using a size dependent shape factor for sodium chloride particles as suggested by Biskos et al. (2006b) and references therein instead of a constant factor of chi = 1.08 as used in our discussion paper. When we apply the method of Biskos et al. (2006b) in our diameter range of interest (200-20 nm), we obtain shape factors in the range of 1.16-1.23, which lead to an increase of the calculated critical supersaturations (Tab. 8 and Fig. 9 and 11) by 7-11% (relative).

These additional shape corrections have important implications for section 4.7 of our discussion paper. There we compared different Köhler models and thermodynamic parameterizations for ammonium sulfate and sodium chloride by calibrating the CCN counter with both substances in laboratory experiments under identical conditions. Our results indicated inconsistencies between widely used water activity parameterizations. The additional shape corrections, however, would fully compensate the differences between Köhler models based on water activity parameterizations from electrodynamic balance (EDB) experiments (AP1.1 model deviations $<$ 1%). In contrast, the differences between Köhler models based on semiempirical parameterizations of osmotic coefficients (OS models) or on water activity calculations with the Aerosol Inorganics Model (AIM) would increase the deviations in water vapor supersaturation from 6-18% to 14-23%. Further information on the model intercomparison is given in the response to the short comment of David Topping (ACPD, 7, S4119-S4123, 2007). The new findings and the additional references will be included in the revised manuscript.

References:

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