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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.***

**D. Rose et al.**

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We would like to thank Scot Martin for the stimulating comments, which are highly appreciated. Upon revision of our manuscript we will include the recent study of Shilling et al. (2007), which was published (on web) in parallel to our submission. It provides a detailed account of the laboratory calibration of a DMT-CCNC with ammonium sulfate and sodium chloride particles, but did not specify the temperature, solution surface tension, and solution density used for model calculations. The authors recommended

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a laboratory recalibration of the instrument after delivery from the manufacturer but did not discuss the differences between the different available Köhler models and thermodynamic data sets/parameterizations. Shilling et al. calibrated the CCNC at two temperature differences (6.3 K and 17.8 K), and used a Köhler model similar to one of the models described in our paper - the osmotic coefficient (OS) model. Instead of the osmotic coefficient parameterization from Pitzer and Mayorga (1973) applied in our study, however, they used the osmotic coefficient parameterization of Brechtel and Kreidenweis (2000). This model variant will also be included in our revised manuscript (as "OS2"). Moreover, Shilling et al. approximated the solution droplet density with the density of pure water rather than using the parameterizations of Tang and Munkelwitz (1994) and Tang (1996), and they used the surface tension parameterization of Brechtel and Kreidenweis (2000) rather than that of Seinfeld and Pandis (1998) (Scot Martin, personal communication). Nevertheless, our OS model agrees with the model used by Shilling et al. within 1%. This is due to a cancellation of differences between osmotic coefficients (-3%) and solution densities (+2%). Accordingly, the differences between our OS model and the model used by the manufacturer of the CCNC (equivalent to VH4.3 with  $\chi = 1$  and  $\phi = 1$  for  $(\text{NH}_4)_2\text{SO}_4$ ) are practically the same as reported by Shilling et al. for both calibration aerosols (relative deviation of  $S_c$ : 10% and 17% for  $(\text{NH}_4)_2\text{SO}_4$  and 24-25% for NaCl at  $\Delta T$  6.3 K and 17.8 K, respectively; see Fig. 11 in our manuscript).

Recently, also Rissman et al. (2007) have used both  $(\text{NH}_4)_2\text{SO}_4$  and NaCl aerosols for the calibration of a CCN counter (Caltech three-column instrument, CCNC3). Within the relatively large reported uncertainties (approx. 5-20% in critical dry particle diameter and 15-80% in supersaturation), they found no significant differences between the calibrations using different salts. However, it is not obvious to us which Köhler model variants and thermodynamic data/parameterizations exactly have been used in this study.

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