

Interactive comment on “Water activity and activation diameters from hygroscopicity data – Part II: Application to organic species” by K. A. Koehler et al.

K. A. Koehler et al.

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We would like to thank the referee for the positive critique of the paper. We will address the numbered issues below:

1. The description of the Tandem DMA system is too short, especially with the respect of the experimental difficulties with volatile and non-drying particles, and dry reference state of the particles.

We did not want to be too repetitive of Part I (Kreidenweis et al., 2005) as far as the basics of how the HTDMA works and thus we kept the discussion brief. At the request of Referee #1 we have added a little to the discussion of the HTDMA system including

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the flow ratio in the DMAs and the fact that a dilution chamber was used in an attempt to remove any remaining water on the organic particles. The discussion of the evaporation of the organics encompasses our present understanding. Several other groups have also found anomalous behavior and attributed it to evaporation of the particles (Peng et al., 2001), or fragmentation / restructuring (Kumar et al., 2003). In response to Referee #1 we also did a calculation of the evaporation rate using the vapor pressures listed in Table 1. We found these computed rates were much lower than the observed evaporation rates. Therefore we have hypothesized that since the particles are not crystalline, instead extremely supersaturated solution droplets, the vapor pressure of the organics in the solution could be considerably different, possibly much higher; we will add this to the paper. If the referee has specific additional questions regarding the experimental method, we would be happy to answer these and to revise the manuscript accordingly.

2. Since it is explicitly discussed later that the attribution of hygroscopic growth to the addition of "pure" water is an approximation, it should be stated also clearly in eq (2)/(3) that the partial molar volume of water in the solution should be taken into account and that the mean molar volume (MW/ρ) as given is also an (the same) approximation.

This approximation was noted in Part I, but we will add it to this paper as well.

3. I wonder how the corrections applied to malonic acid (Fig. 5) look like for glutaric acid (Fig. 4).

We left off the case where evaporation was not accounted for in Figure 4 because the shift is approximately the same as for Figure 5 and because with so many series on the plots, it becomes difficult to differentiate between them. In the manuscript, we indicate the correction is of similar magnitude.

4. Malonic acid HTDMA prediction is not within the uncertainty of the experimental data (p. 10896 and Fig. 10)

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The referee is correct that the predictions do not work very well for the malonic acid. We do note in the text, however, that if the evaporation is not accounted for that the predicted critical dry diameters are in line with the predictions found using the water activity estimates from Wise et al. (2003). We expect these values to be more realistic. We also believe, as noted in the text, that since the CCN counter experiments do not take evaporation into account their sizes are likely overestimated in these plots.

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