Atmos. Chem. Phys. Discuss., 7, S1509–S1510, 2007
www.atmos-chem-phys-discuss.net/7/S1509/2007/


Atmospheric Chemistry and Physics Discussions



# *Interactive comment on* "Modelling the cloud condensation nucleus activity of organic acids" *by* Z. Varga et al.

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Received and published: 2 May 2007

The study addresses the ability of various organic acids to act as cloud condensation nuclei. The authors compare effects of water activity (Raoult term) and surface tension (Kelvin term) on the activation behavior for the individual compounds. In order to give a more systematic view on the interpretation of the results, we would like to draw the authors' attention to our recent model study [Ervens et al., 2005]. Figure 8 of our paper shows that at subsaturated conditions, the saturation (S) is dominated by the Raoult term (B/r3) and only as one approaches saturation does the importance of the Kelvin term (A/r) increase. At the critical supersaturation, the growth factor (wet/dry size) is larger than shown in Figure 1, and, thus, any effects by surface active compounds are negligible ($<$ 10% compared to the surface tension of water which translates into an

even smaller change in S). The Raoult term can also be written as the mole ratio of solute/water moles. Since the effects of dissociation (van't Hoff factor) are not significant under conditions typical prior to particle activation (cf our Table 3 that shows that an acid with pKa = 4 does not exhibit a van't Hoff factor greater than ˜1.28), the number of moles is solely determined by the molecular weight (and density) of the organic compounds. Thus, the results depicted in Figure 5 of the present study are not surprising as they just reflect the trend in increasing molecular weight (i.e., decreasing number of dissolved moles). We point out that our study did not address CCN activation as an equilibrium process but the growth of particles under steadily increasing relative humidity followed by formation of cloud drops. In this case, the supersaturation is controlled by both dynamical processes (updraft velocity) and condensation, and, as discussed in our paper, the importance of chemical composition on activation is reduced. However, the general trends in the role of Kelvin and Raoult term with increasing relative humidity also apply to the equilibrium conditions as assumed in the present CCN study.

Ervens, B., G. Feingold, and S. M. Kreidenweis (2005), The influence of water-soluble organic carbon on cloud drop number concentration, J. Geophys. Res., 110, doi: 10.1029/2004JD005634.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 5341, 2007.