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Atmospheric Chemistry and Physics Discussions

Interactive comment on "A curved multi-component aerosol hygroscopicity model framework: 2 – Including organics" *by* D. O. Topping et al.

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General comments: Hygroscopic properties of mixed organic/inorganic aerosol are in the focus of the current atmospheric modeling. This manuscript describes the inclusion of organic material within the Aerosol Diameter Dependent Equilibrium Model (ADDEM) framework presented in companion paper (ACPD. 4, 8627-8676, 2004). Due to chemical composition and physical properties of atmospheric organic substances are poorly known any modeling inevitably connected with certain assumptions. In presented model for predicting the water content associated with inorganic/organic aerosol

the two simplifying approaches have been used: (1) ZSR additive mixing rule, and (2) group contribution method UNIFAC used for treating non-ideality of organics in water solution. Under these suppositions a comparison of the model results with available laboratory data and with coupled thermodynamic model by Ming, Y., and L. M. Russell (Aiche J. 48(6), 1331-1348, 2002) reveals that ADDEM framework provides a good agreement for mixed aerosol contained water soluble organic acids and humic-like material. Among the merits of this paper I especially would note careful and very useful work which have been made upon analysis of various models predicting solute surface tension and activity coefficients of atmospherically important organic compounds. In general, it is high quality manuscript and I recommend its for publication after a few remarks have been addressed below.

Specific comments:

Introduction, paragraph1. The authors should also mention the work by Mikhailov et al., [ACP. 4. 323-350, 2004], where HTDMA experiments and different approaches to modeling of mixed aerosol composed of the inorganic salts and water soluble protein are presented.

P8688, line 8. " in Fig. 3b is the mass ratio parameterisation" Someplace should explain the mass ratio m/mo meaning (Fig. 3b). Note, the molality has identical symbol (P8683, Eq.(2)).

P8691, lines 6-10. Comment on Fig.6. "In all cases, as deviations increase with decreasing relative humidity, the model tend to under predict observed water content associated with the mixture". As seen in Figure 6 in three of four cases the model molality positioned lower than experimental values. It means that model over predict observed water content, and so organic-inorganic interactions lead to negative contributions. It should be corrected.

P8697, line 12. " to the choice of A". Symbol A should explain here.

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P8698, line 25. It is desirable to show the values of parameters a and b for succinic and glutaric acid.

P8700. Discussion of ADDEM predictions. Should explain the growth factor (D/D0) meaning. Because of in Figs. 9-12 it used without explanation.

P8702, lines 8-14. The listed values contain excess of significant digits.

P8717, Fig.4. I did not find in the text any mention concerning this figure.

P8719, P8720. Fig.6. The symbols a), b), c), and d) are missed in the pictures. In all pictures the x- axe should express in % RH. In two places the cite on Marcolli et al. is written as marcolli et al.

Technical corrections:

P8691, line 6. “1.02894%” Too many digits.

P8694, line 20 P should read [P]

P8699, lines 14-15. The text in brackets should delete.

Interactive comment on Atmos. Chem. Phys. Discuss., 4, 8677, 2004.