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Atmospheric Chemistry and Physics Discussions



# *Interactive comment on* "A curved multi-component aerosol hygroscopicity model framework: 1 – Inorganics" *by* D. O. Topping et al.

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General comments: The manuscript under review presenting a thermodynamic modeling framework, which treats the equilibrium behavior of mixed inorganic salt aerosol in humid atmosphere. This paper makes significant contribution to modeling of the hygroscopic growth of atmospheric aerosol. There are some evident advantages which this model provides. Among them : (1) flexible architecture permissive to attract the different techniques to calculate water content, (2) inclusion into equilibrium model the Gibbs energy minimisation algorithm, allowing to use accurate semi-empirical thermodynamics models, and (3) ability to take into account the influence of curvature on aerosol composition. I recommend this manuscript for publication after the authors

have addressed the comments listed below.

Specific comments:

P8636 Eq.(11). Taking into account the dimension of this relation the numerator (Mi ) should be the number of moles.

P8652, line 2. “7.2 Surface tension “ should replace by 7.1.2 Surface tension, and reduce all the following Sections in Chapter 7 in one unit. Correct this shift in the text, where it necessary.

P8639 and P8640. In Eq. (13) and (14) surface tension, solution density, and droplet radius are identical, but have different designations.

P8651, line10. Text is missed.

P8655, line 13. In discussion about the history of the aerosol studied in a HTDMA experiment the authors should also mention the work by Mikhailov et al.[ ACP. 2004. V.4. P 323-350], where the influence of drying process and chemical decomposition of particles on the theory results are considered in detail.

P.8664, Table 1. Too many significant digits in Adj(delta)Gfo. As such, these values obtained based on experimental data, there is no sense to show so many figures. DRH should be express in %.

P.8666, Table 3. Again, it is not necessary to show so many digits to retrace deviation between GFZSR and GThermodynamic . I recommend to reduce subscript “Thermo-dynamic” , the same also in P8647, line 21.

P8667, Table 4. Obtained results based on using 3 density combination rules. As such they are not discussed in the text the corresponding reference(s) should be shown. Growth factor standard deviations may be reduced at least in one order.

P8669, Fig.2. “Tang et al. (1981)” This reference is missed in the list of references.



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P8670, Fig.3. What is the unit on the y-axe? RH should express in % .

P8672, Fig.5. The references Tang et al, (1986) and Hameri et al. (2002) are absent in the list of references.

P.8673, Fig.6. The x-axe has no title.

P.8675, Fig.8. The symbols a), b), c), and d) are not shown in the pictures. The graphs c) and d) are plotted using 3 solution density models. What are they? (see comment to Table 4). Due to part of illustrative material (Table 4, Fig.8) based on 3 density models. I would suggest briefly to treat all of them in the text.

P8676, Fig.9. Again, symbols a), b) are not shown in the pictures. The reference on the Perry's Chemical handbook should be complete and indicated in the list of references.

Technical corrections:

P8638, line 25 " Sect. 6.1, " should read "Sect. 7.1".

P8646, line 12 "Eq. (8) " should change on Eq.(14).

P8649, line 15 "to 88%" should change on to 88% RH

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Interactive comment on Atmos. Chem. Phys. Discuss., 4, 8627, 2004.