

Interactive comment on “Cloud condensation nuclei properties of model and atmospheric HULIS” by E. Dinar et al.

Anonymous Referee #3

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This paper addresses the ability of model and atmospheric HULIS to act as cloud condensation nuclei. It is a timely and relevant scientific paper within the scope of ACP. CCN abilities of different molecular weight fractions of Suwannee River fulvic acid along with humic like substances extracted from atmospheric samples have been measured. The measured results are compared with predictions using classical Kohler theory and discussed in the context of atmospheric science. Efforts have been taken to address the effect of surface tension, molecular weight and dissociation factor. Some issues should however be addressed:

1) Solubility and particle phase. As also pointed out by referees 1 and 2 the number of moles of dissolved organic material in the droplet is determined by both molecular

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weight and water solubility. It seems an underlying assumption that activation is not limited by solubility. It should be possible to calculate the solubility limits for a solid phase to be important - based on back calculations using the parameters discussed in section 4.2 and the observed critical diameters. Could a solid core explain why the observed critical diameters are larger than the calculated values (using measured surface tension) in Figure 6c?

2) The dependence of surface tension on concentration have already been pointed out by referees 1 and 2 and should be addressed. Concentrations of organic material at activation could be estimated from Köhler theory using the parameters in tables 2 and 5.

Minor comments/questions

3) Page 1080: What is the effect of the conditioning bulb? Are the results without the bulb different?

4) Page 1082 In lines 1-2 it says that the residence time of particles in the chamber were varied - what were the residence times in chamber?

5) Please indicate which van't Hoff factor was used for ammonium sulfate

6) Table 1: Are each of the points in figures 2 and 3 averages of 5-7 data points? This should be made clear

7) Partitioning of surfactants is not taken into account in this work - this should be stated in the text.

8) Page 1085 line 11: please define "apparent equilibrium".

Minor technical comments 9) Page 1080, line 18 The sentence about the two DMAs should be rewritten - it says that the second DMA was used in scanning mode as an additional size selection step - it can not select size when used in scanning mode.

10) The number of abbreviations used is quite large, To make the text easier to read I

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suggest that some of these words are written in full in the text (e.g. IOS, SubS, ST, HA)

11) The use of MW and Mw (W as subscript in some cases) is a bit confusing, and it seems to me that it is not quite consistent; for example, Page 1086: MW is used in the sentence “is dominated by relatively small MW species” - I would assume that MW here would mean molecular weight? Page 1091: Mw is defined as the molar weight of the absorbing species, Page 1083 Mw is defined as the weight-averaged molecular weight, Page 1079 MW is introduced as the mean molecular weight, Page 1090 MW is used as integration parameter in an integration over the size distribution (the word size may be confusing)? Page 1085 it says that “there is no clear relationship between ST90 and MW” in Table 2 it says Mw?

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 1073, 2006.

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