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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Measurement of the ambient organic aerosol volatility distribution: application during the Finokalia Aerosol Measurement Experiment (FAME-2008)" *by* B. H. Lee et al.

J.-L. Jimenez

jose.jimenez@colorado.edu

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I have a short comment on the estimation of CE from SMPS-AMS comparisons for the thermally-denuded (heated) aerosols. The authors ignore the potential effect of non-spherical particles in the SMPS volume estimation. As more volatile components evaporate, it is also likely that the particles become less spherical. A small change in the dynamic shape factor (X) of the particles can cause an overestimation of the particle volume calculated from the SMPS number distribution. For example using equation 25 of DeCarlo et al. (2004)

(http://cires.colorado.edu/jimenez/Papers/DeCarlo_AST_2004_Published.pdf) we can estimate that a very small change of X from 1.00 to 1.03 would cause an overestimation of particle volume (calculated from the mobility diameter) of about 10%, comparable to the change which is attributed to a change in AMS CE in this paper. Such shape factors are common (e.g. recent papers by Zelenyuk and co-workers), and for comparison soot particles can have X up to 3. Due to this effect one should be careful to remember that the volume estimated from the SMPS is not the true particle volume but rather an "apparent volume." I am not aware of any evidence to rule out a small change of the shape factor of the order of 0.03 upon particle heating by $\sim$100C.

The topic of possible changes of AMS CE upon heating (first discussed by the TD-AMS publications of Huffman et al., to my knowledge) deserves further study, but a verification of particle sphericity or a measurement of the dynamic shape factor is necessary for a quantitative characterization with an SMPS-AMS method. The authors could have used the beam width probe of Huffman et al. (AS&T 2005) to probe possible changes in particle shape, and such experimental characterization is recommended for future studies. In the absence of evidence of lack of small changes in X, the conclusions about a quantitative measurement of the change of CE are not warranted.

As an unrelated point, I was very surprised to see no mention of the recent paper by Cappa and Jimenez (2010) who also present volatility distributions derived from TD-AMS measurements over a wider range of temperatures than in this study. A comparison of the methods and results of that and this study would seem necessary.

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