Atmos. Chem. Phys. Discuss., 8, S10291–S10292, 2009
www.atmos-chem-phys-discuss.net/8/S10291/2009/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Towards closing the gap between hygroscopic growth and activation for secondary organic aerosol – Part 2: Theoretical approaches" *by* M. D. Petters et al.

Anonymous Referee #1

Received and published: 8 January 2009

General comments

In this manuscript, the authors have investigated when information on the hygroscopic growth of secondary organic aerosol (SOA) at RH$<$100% can be used to predict the cloud condensation nucleation properties of the particles accurately. The motivation for the work lies in previous studies where contrasting results were obtained in this respect. The authors present two theoretical models to explore the phenomena and through performing model calculations, are able to give a sound explanation for the observations.

The manuscript clearly fulfills the criteria for publication in Atmospheric Chemistry and

Physics, and therefore I recommend the manuscript for publication after the authors have considered the following minor remarks.

Specific comments

1. Regarding atmospheric implications of the work. The results suggest that the cloud condensation nucleation properties of atmospheric SOA can be parameterized using a single parameter, the so-called kappa parameter, of which value varies over a relatively narrow range (the last paragraph of Section 4). However, the conclusion is based on laboratory studies employing only a few aerosol precursors and oxidation mechanisms that represent only a small fraction of conditions met in the atmosphere. Therefore, I'd be more careful about making such a conclusion. The authors could elaborate this point a little bit further.

Technical comments

1. Equation 11. The order of square brackets and brackets should be reversed in the right-hand side of the equation.

2. Page 20853, line 6. Should be "hygroscopicity", not "hygroscopicy".

3. Page 20854, line 16. Replace "in" with "at".

4. Acknowledgements. Should be "ACCENT", not "ACCNET".

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 20839, 2008.