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Atmospheric
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Discussions

Interactive comment on “Temperature and humidity dependence of secondary organic aerosol yield from the ozonolysis of β-pinene” *by* C. Stenby et al.

C. Stenby et al.

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Author comment in response to interactive comment of 20 May 2007 by anonymous referee #1

We apologize for the late response (due to job changes and re-location of the lead authors) and would like to thank the referee for the very useful comments and suggestions, which are addressed below.

Section 2.1: The concentration measurements for beta-pinene will be described in more detail in the revised manuscript: The gas mix of beta-pinene in nitrogen was prepared by evaporating pure beta-pinene into an evacuated steel vessel (V=14.67 l) and adding nitrogen to a pressure of about 6000 hPa. Experiments were performed two hours or more after the mixture was prepared. The concentration was measured with long-path FTIR spectroscopy. The concentration was found from the area of two distinct peaks at ca. 3000 cm-1 and 1650 cm-1. For each measurement 128 scans were made, and for each of the peaks nine measurements were made alternating in groups of three measurements. The relative standard deviation of the measurements was less than 3%. The concentration was found as the mean value of all measurements.

Section 2.4, equation 4): In our data analysis we had indeed assumed that the hygroscopicity and growth factor (GF) do not significantly vary with temperature and related changes of SOA yield and composition. To our knowledge no studies have investigated GF for SOA particles from beta-pinene ozonolysis at experimental conditions closer to the ones in our study than the study by Varutbangkul et al. (2006). Thus the parameterisation presented by Varutbangkul et al. (2006) is the best available approximation. The correction of our data was relatively small (5%-11% v/v). This will be stated in the revised manuscript.

Section 3.1, Figure 3: The 273 K volume size distribution shown in Fig 3b exhibits two modes of similar intensity (one at 50 nm and one at 90 nm), as the referee points out. In the original manuscript it is stated that the size distributions in Figure 3b were typical. In the case of 273 K this is wrong and will be corrected in the manuscript. The bimodal size distribution is an exception; the average volume size distributions obtained at the other concentrations of ozone and beta-pinene applied at 273 K (not shown) were monomodal. The reason for the single occurrence of the second mode at 273 K is unclear; it does not substantially change the observed decrease of aerosol particle volume with decreasing temperature.

We agree that it would be interesting to investigate and discuss the geometric standard deviation of the SOA size distributions, but we think that this would require a larger dataset and go beyond the scope of the present study.

Page 2105: Hoffmann et al. (1997) have only measured yields for Mo up to ca. 100

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microgramme per cubicmeter. In this range the ratio of the yields of Hoffmann et al. (1997) to our results is roughly 1.25. At 293 K we used a kO3-value of 1.4*1E-17 ccm per molecule per second; using a kO3 of 1.1*1E-17 ccm per molecule per second instead would make our yields agree with the results from Hoffmann et al. (1997). This value is within the uncertainty range of kO3 (1.06*1E-17 - 1.90*1E-17 ccm per molecule per second) (Khamaganov and Hites, 2001; Atkinson and Arey, 2003).

All technical corrections will be taken care of.

Hoffmann, T., Odum, J., Bowman, F., Collins, D., Klockow, D., Flagan, R. C. and Seinfeld, J. H.: Formation of organic aerosols from the oxidation of biogenic hydrocarbons, J. Atmos. Chem., 26, 189-222, 1997. Varutbangkul, V., Brechtel, F. J., Bahreini, R., Ng, N. L., Keywood, M. D., Kroll, J. H., Flagan, R. C., Seinfeld, J. H., Lee, A. and Goldstein, A. H.: Hygroscopicity of secondary organic aerosols formed by oxidation of cycloalkenes, monoterpenes, sesquiterpenes, and related compounds, Atmos. Chem. Phys., 6, 2367-2388, 2006.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 2091, 2007.