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A technique for the measurement of organic aerosol hygroscopicity, oxidation level, and volatility distributions

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1. TD loss fraction

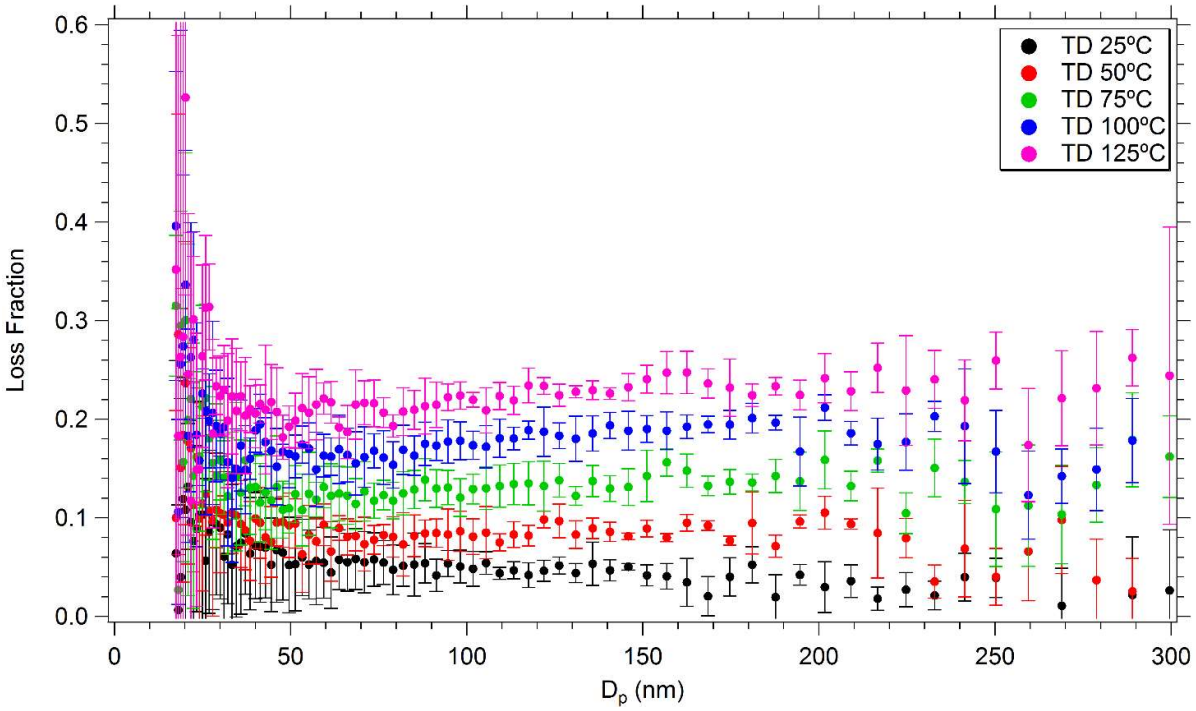

Figure S1. Loss fraction in the TD as a function of particle size and temperature. The colors represent different TD temperatures. The error bars represent one standard deviation of the mean.

2. Results and analysis of Experiment 2

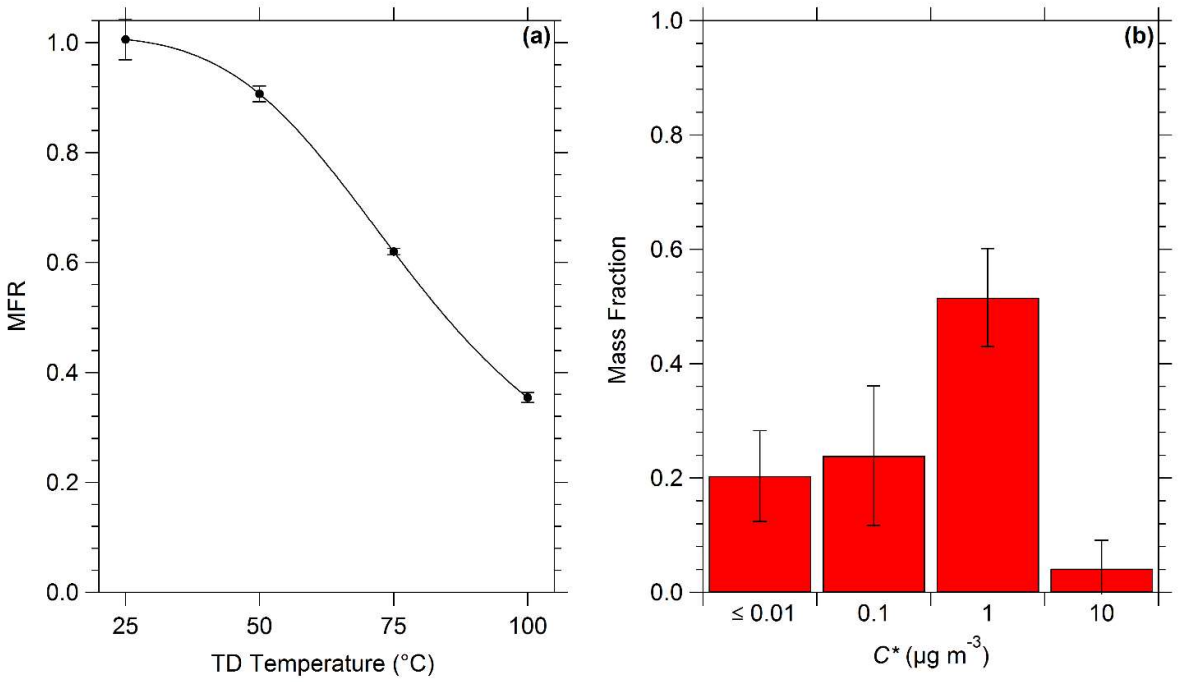

Figure S2. (a) Thermogram, corrected for losses in the TD, for Experiment 2 with the fit from the TD model. The error bars represent one standard deviation of the mean. (b) SOA volatility distribution for Experiment 2 using the 1D-VBS framework. The error bars correspond to one standard deviation of the solution calculated by the model.

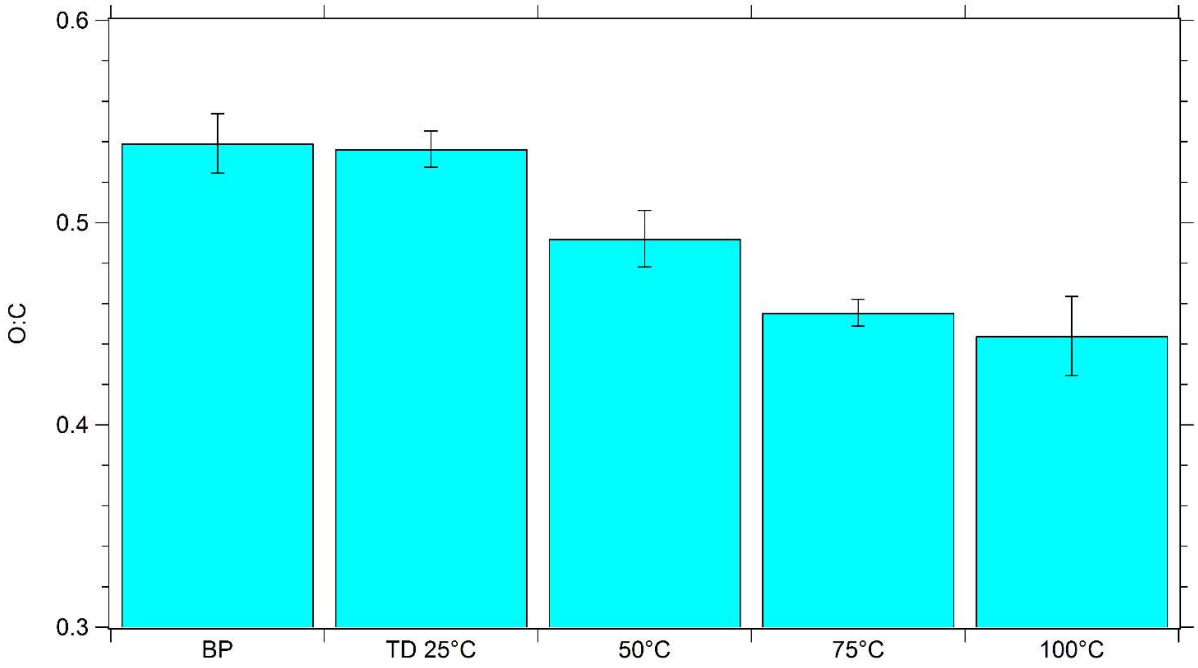

Figure S3. The average O:C ratio observed through the BP and several TD temperatures for Experiment 2. The error bars represent one standard deviation of the mean. The O:C ratios at a TD temperature of 50°C and greater were statistically smaller than the values at the BP and the TD at 25°C.

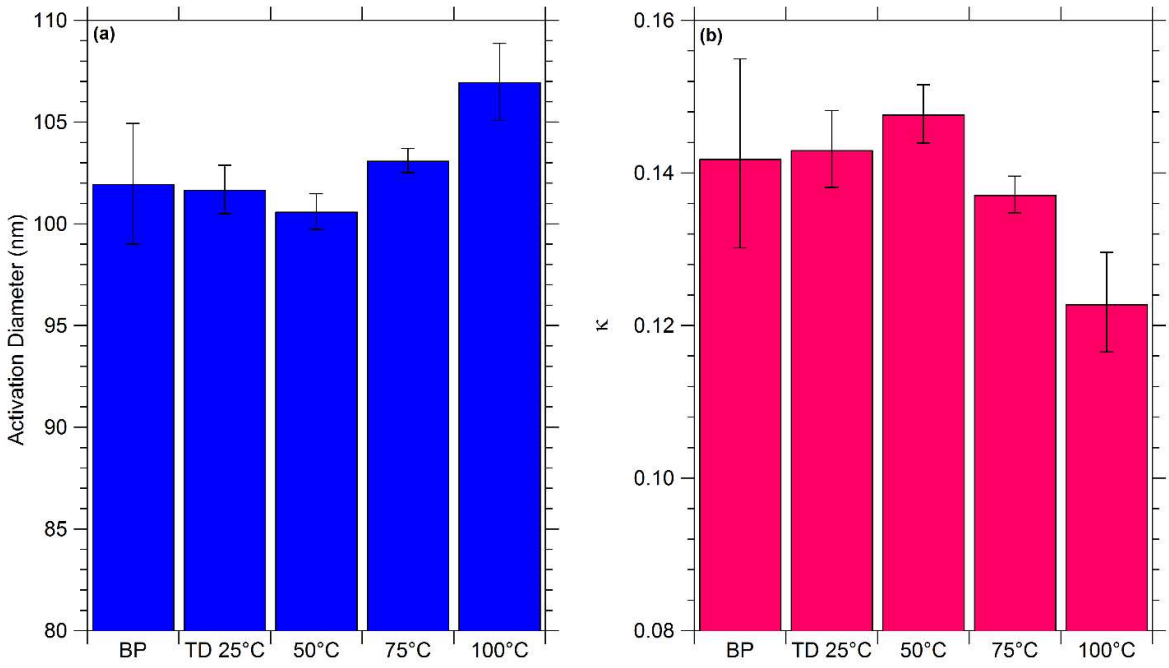

Figure S4. (a) The average activation diameter observed at 0.3 % supersaturation in the CCNC for Experiment 2. The error bars represent one standard deviation of the mean. (b) The estimated κ values for Experiment 2. The error bars were obtained by estimating the κ at +/- one standard deviation of the average activation diameter measured. The values at a TD temperature of 100°C was statistically different from the values at the BP and the TD at 25°C.

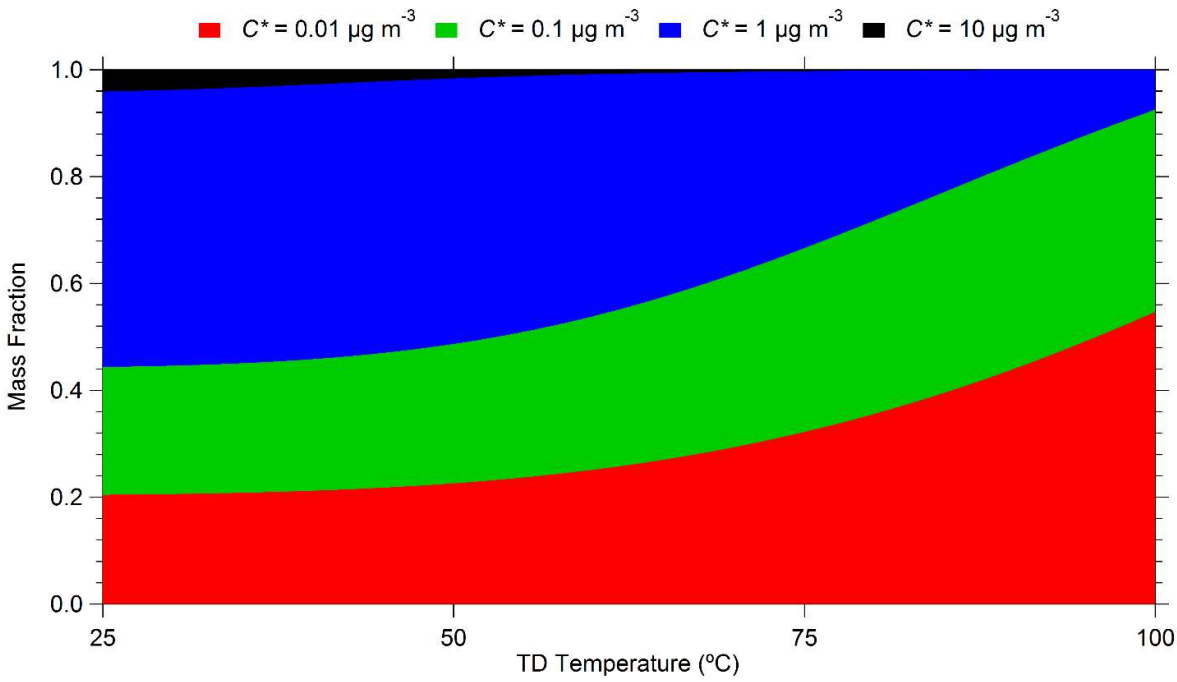

Figure S5. The estimated mass fractions for each volatility bin as a function of TD temperature for Experiment 2. Red represents the C^* = 0.01 µg m^{-3} bin, green the C^* = 0.1 µg m^{-3} bin, blue the C^* = 1 µg m^{-3} bin, and black the C^* = 10 µg m^{-3} bin.

3. Results and analysis of Experiment 3

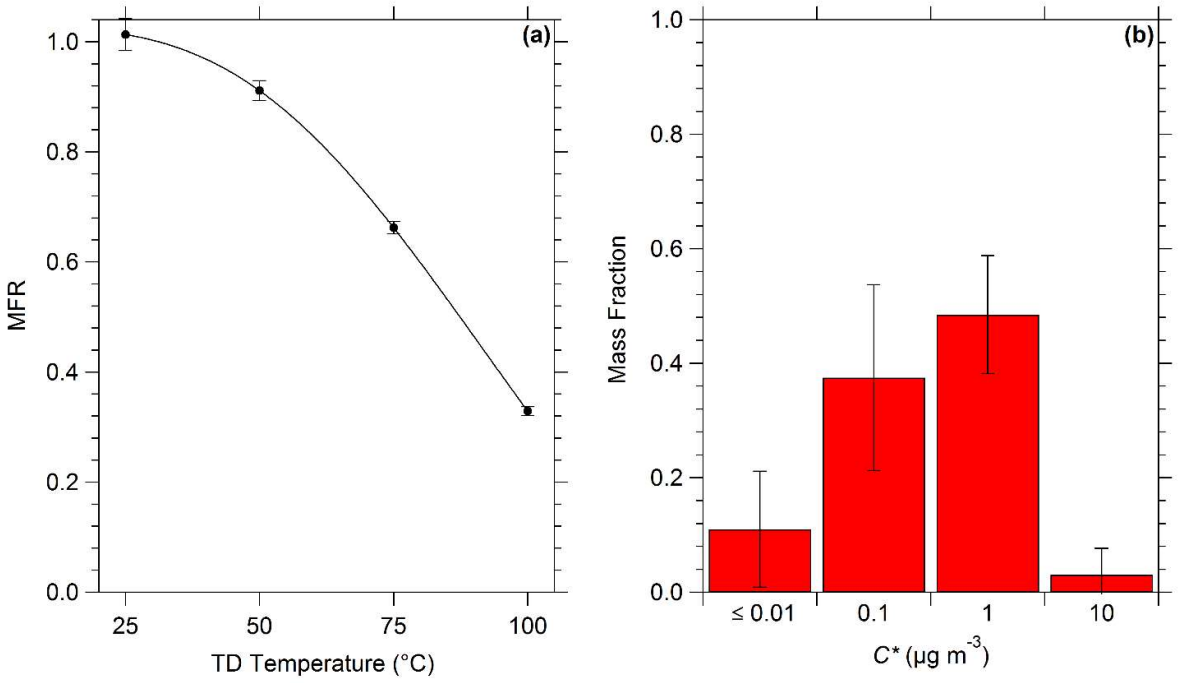

Figure S6. (a) Thermogram, corrected for losses in the TD, for Experiment 3 with the fit from the TD model. The error bars represent one standard deviation of the mean. (b) SOA volatility distribution for Experiment 3 using the 1D-VBS framework. The error bars correspond to one standard deviation of the solution calculated by the model.

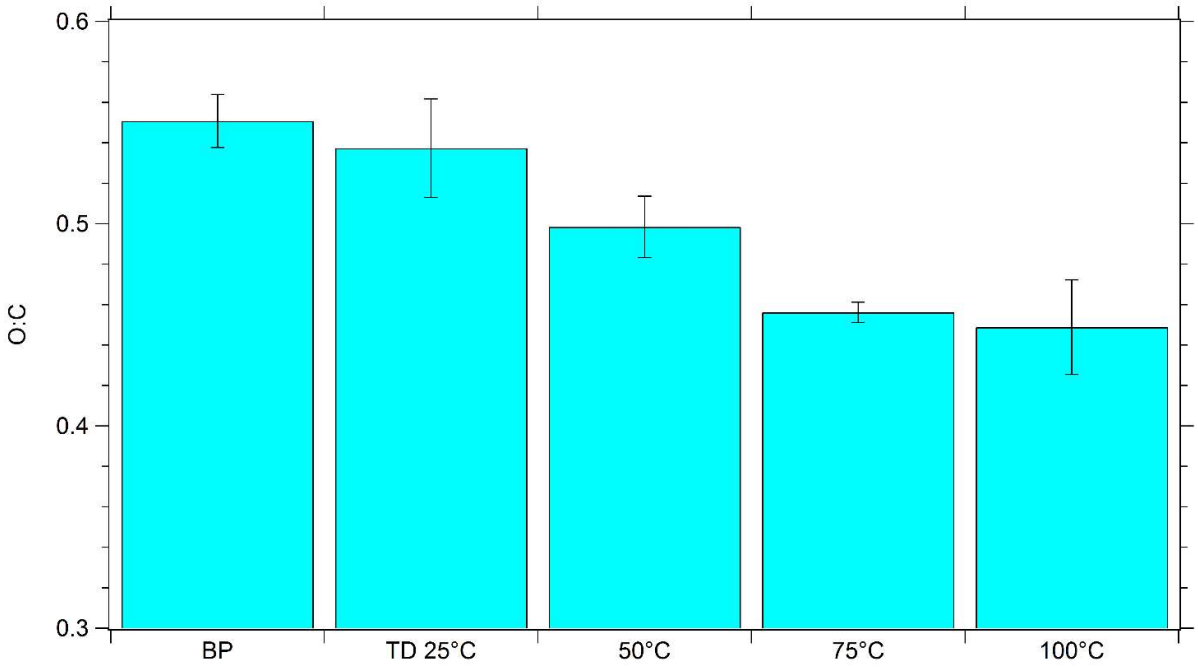

Figure S7. The average O:C ratio observed through the BP and several TD temperatures for Experiment 3. The error bars represent one standard deviation of the mean. The O:C ratios at a TD temperature of 50°C and greater were statistically smaller than the values at the BP and the TD at 25°C.

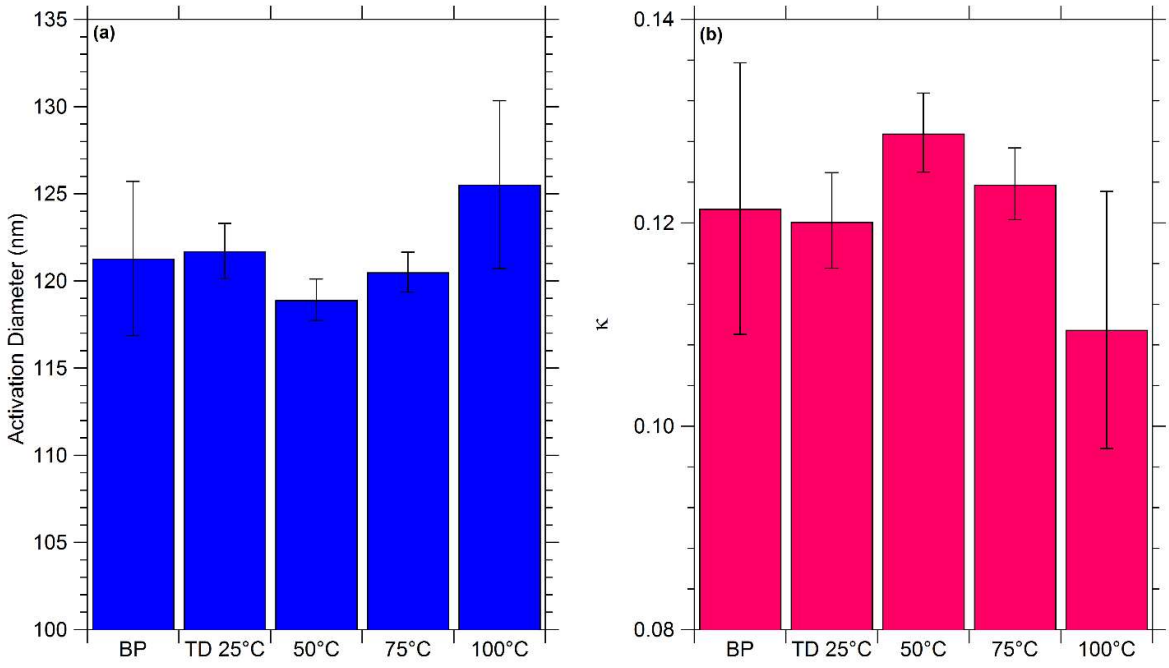

Figure S8. (a) The average activation diameter observed at 0.25 % supersaturation in the CCNC for Experiment 3. The error bars represent one standard deviation of the mean. (b) The estimated κ values for Experiment 3. The error bars were obtained by estimating the κ at +/- one standard deviation of the average activation diameter measured.

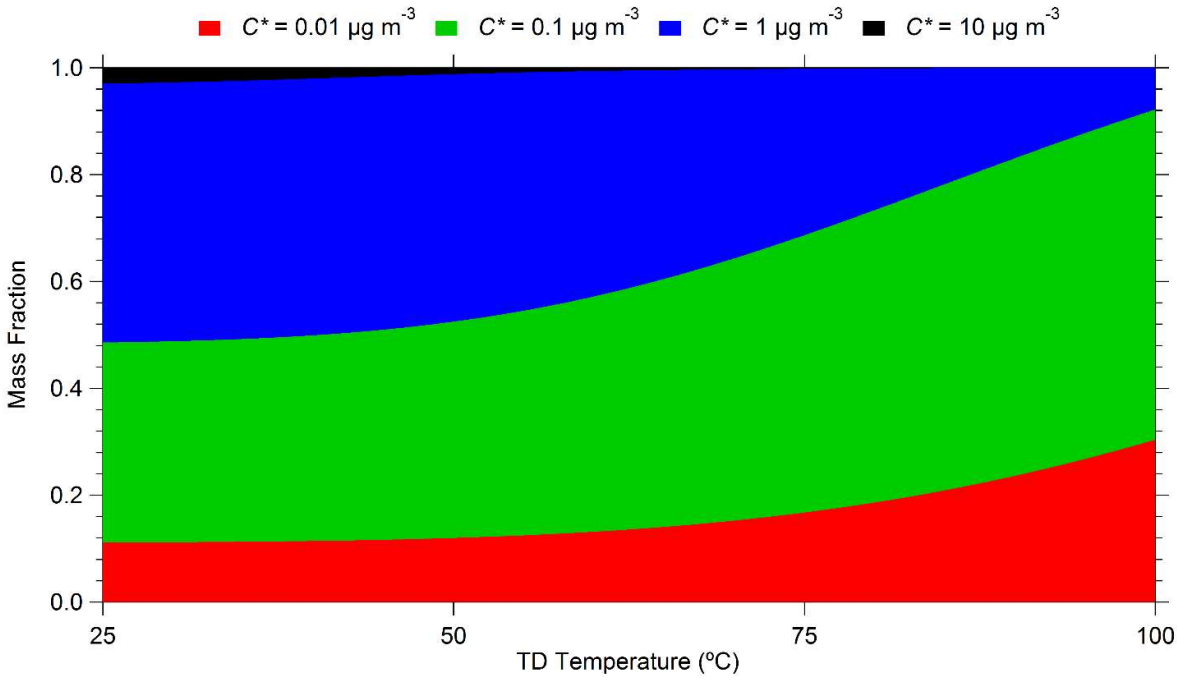

Figure S9. The estimated mass fractions for each volatility bin as a function of TD temperature for Experiment 3. Red represents the C^* = 0.01 µg m^{-3} bin, green the C^* = 0.1 µg m^{-3} bin, blue the C^* = 1 µg m^{-3} bin, and black the C^* = 10 µg m^{-3} bin.

4. Results and analysis of Experiment 4

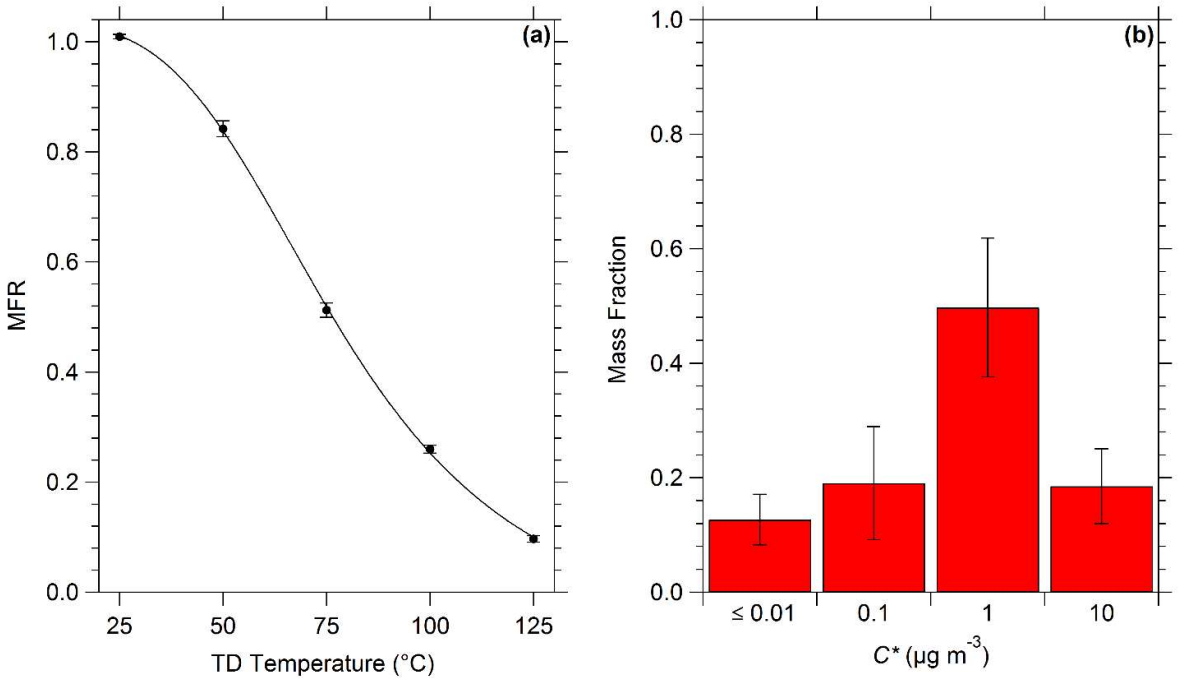

Figure S10. (a) Thermogram, corrected for losses in the TD, for Experiment 4 with the fit from the TD model. The error bars represent one standard deviation of the mean. (b) SOA volatility distribution for Experiment 4 using the 1D-VBS framework. The error bars correspond to one standard deviation of the solution calculated by the model.

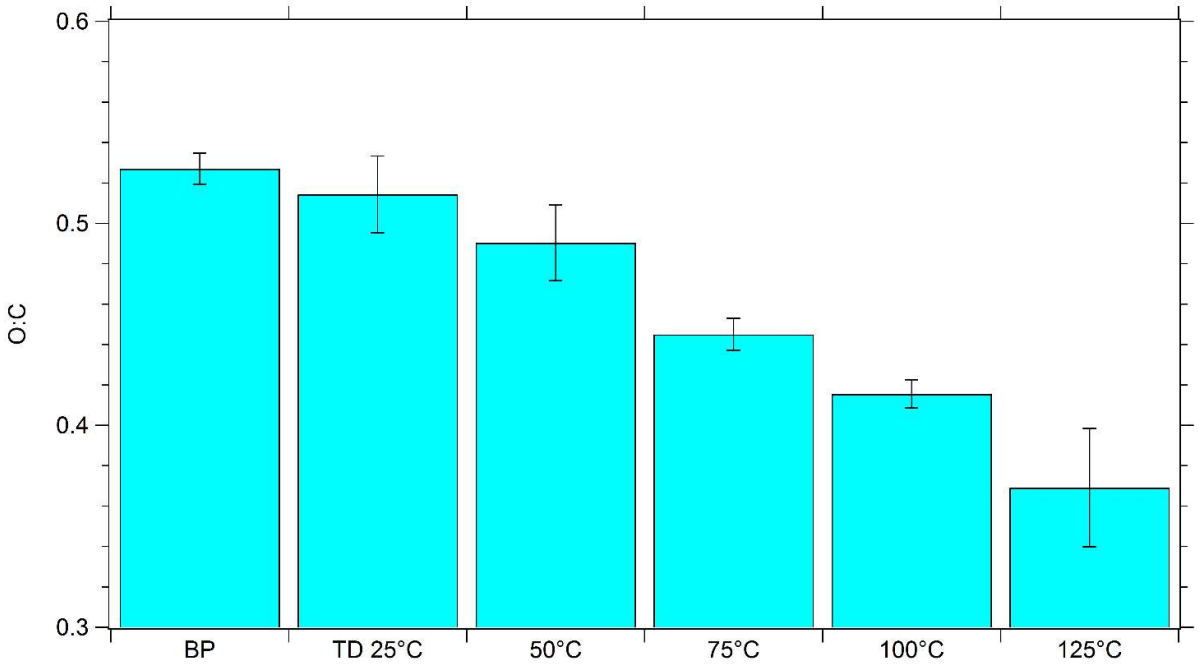

Figure S11. The average O:C ratio observed through the BP and several TD temperatures for Experiment 4. The error bars represent one standard deviation of the mean. The O:C ratios at a TD temperature of 50°C and greater were statistically smaller than the values at the BP and the TD at 25°C.

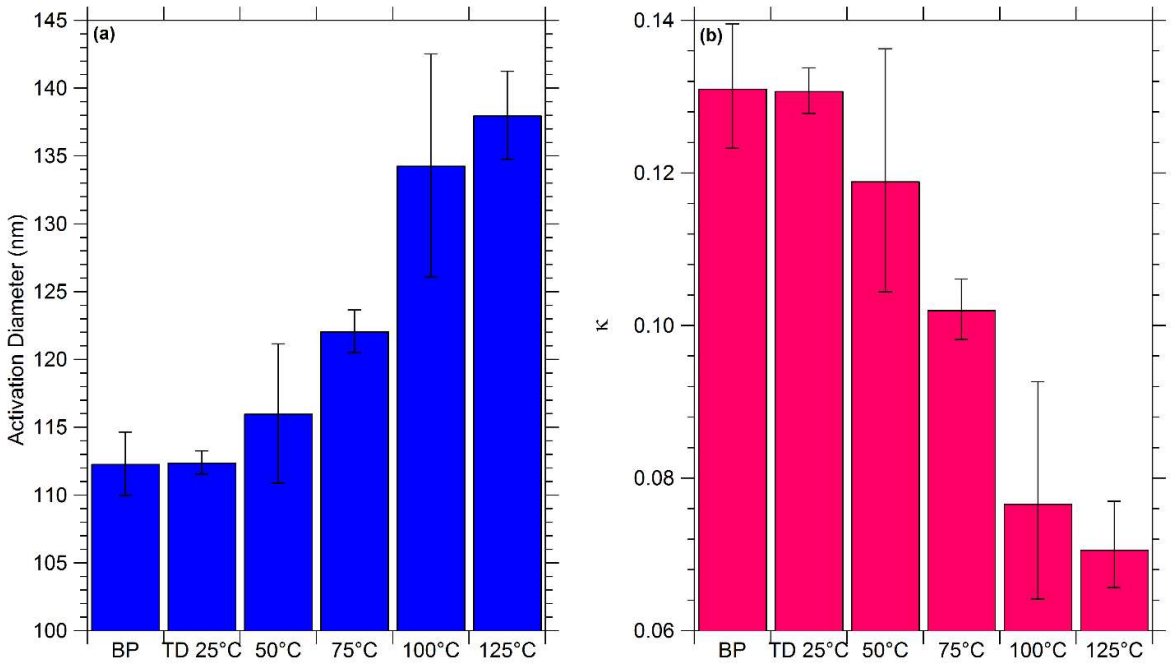

Figure S12. (a) The average activation diameter observed at 0.27 % supersaturation in the CCNC for Experiment 4. The error bars represent one standard deviation of the mean. (b) The estimated κ values for Experiment 4. The error bars were obtained by estimating the κ at +/- one standard deviation of the average activation diameter measured. The values at a TD temperature of 75°C and greater were statistically different from the values at the BP and the TD at 25°C. The SOA through the TD at 125°C did not have large enough particles to reach 50 % activation, so the activation diameter was extrapolated from the particles that activated.

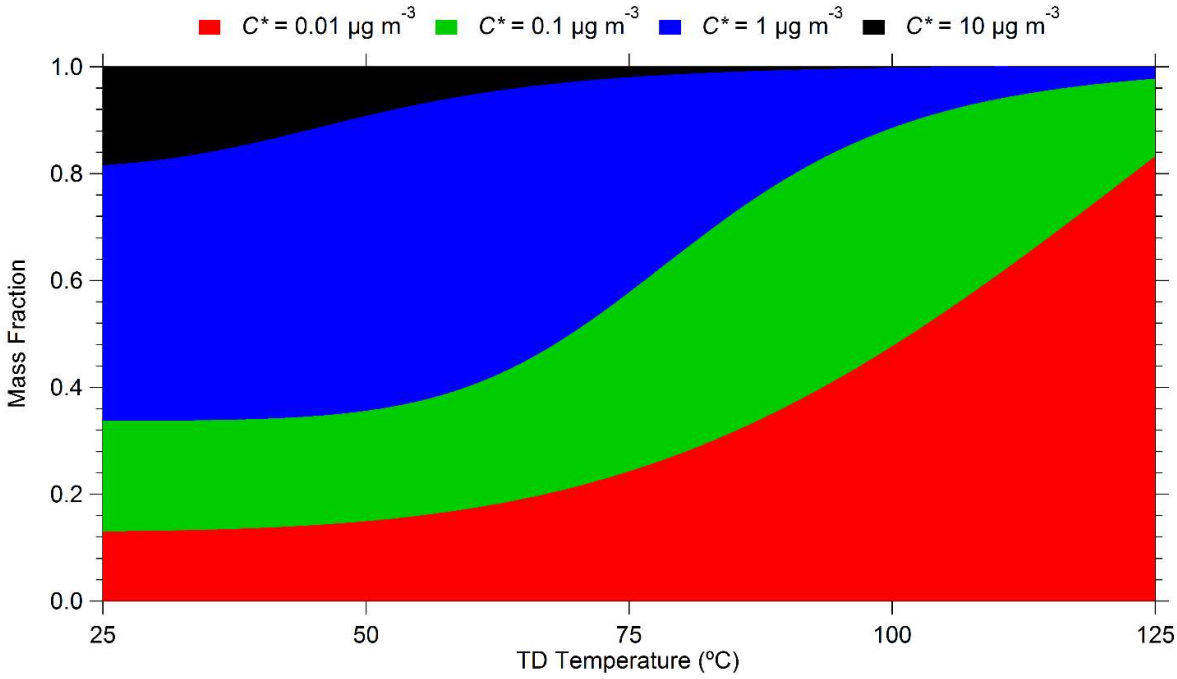

Figure S13. The estimated mass fractions for each volatility bin as a function of TD temperature for Experiment 4. Red represents the C^* = 0.01 µg m^{-3} bin, green the C^* = 0.1 µg m^{-3} bin, blue the C^* = 1 µg m^{-3} bin, and black the C^* = 10 µg m^{-3} bin.

5. O:C and κ correlation

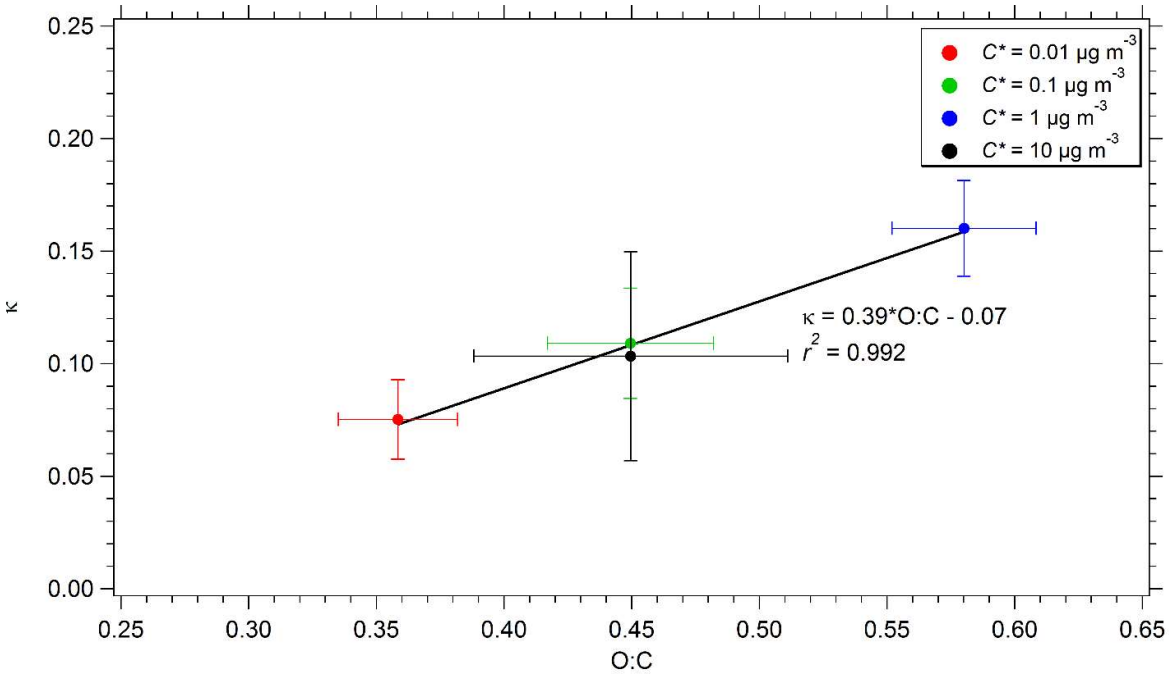

Figure S14. The κ's plotted as a function of their corresponding O:C ratios for each volatility bin in Fig. 7. Red represents the C^* = 0.01 µg m^{-3} bin, green the C^* = 0.1 µg m^{-3} bin, blue the C^* = 1 µg m^{-3} bin, and black the C^* = 10 µg m^{-3} bin.

6. Predicted versus measured κ's for Experiment 2

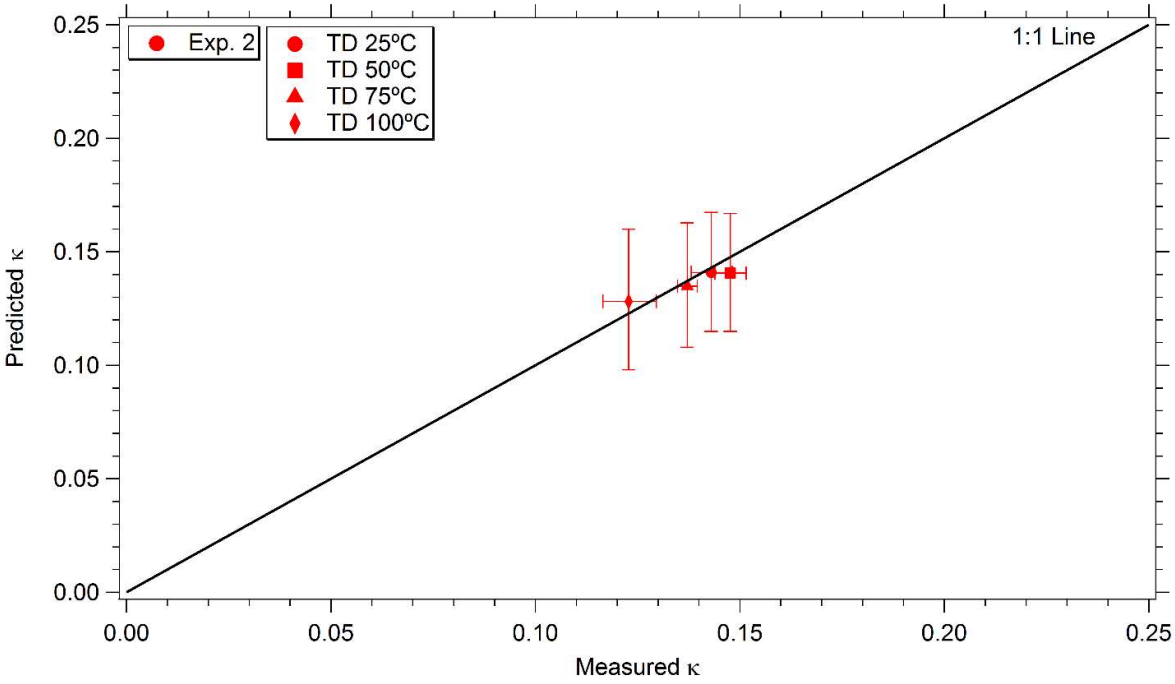

Figure S15. The predicted versus measured κ's for Experiment 2 using the κ distribution in Fig. 7b for the three highest bins and the κ from the C^* = 0.01 μg m^{-3} bin in Fig. 10. The symbol indicates the TD temperature. The error bars for the predicted κ's were obtained by predicting the κ's using the κ distribution at +/- one standard deviation.