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Chemical composition and hydrolysis of organic nitrate aerosol formed from hydroxyl and nitrate radical oxidation of α-pinene and β-pinene

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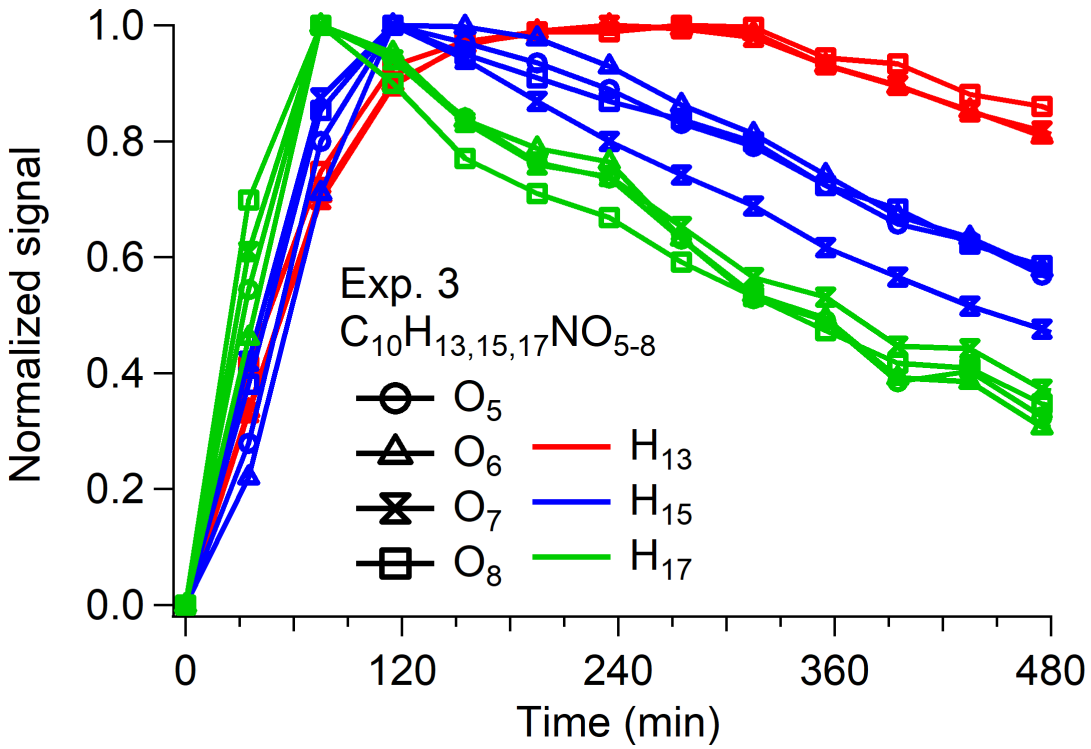

Figure S1. FIGAERO-HR-ToF-I-CIMS time-series data of select organic nitrate aerosol. All combinations of $C_{10}H_{13,15,17}NO_{5-8}$ with different oxygen and nitrogen numbers are shown here. Different symbols correspond to compounds with different oxygen numbers, while different colors correspond to compounds with different nitrogen numbers. Shown are the data from Exp. 3 (α-pinene+OH·), though very similar trends are observed for β-pinene+OH· from Exp. 6.

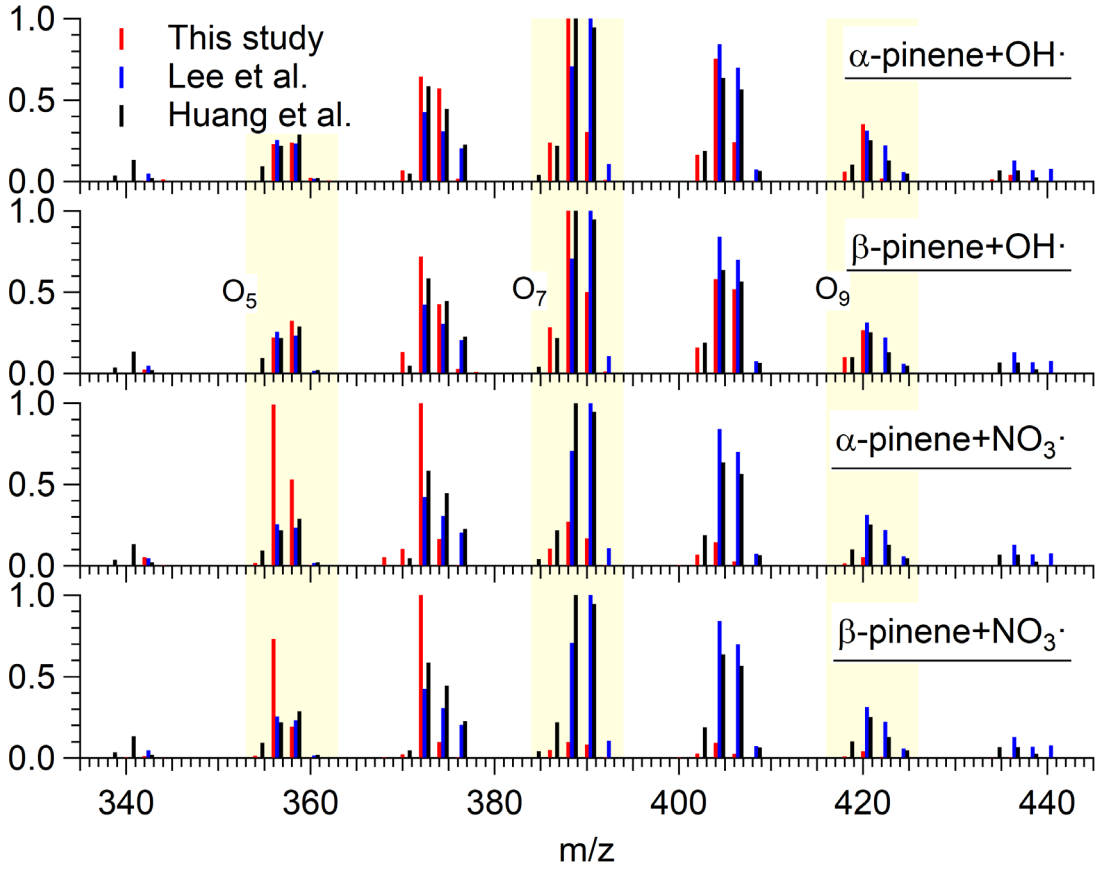

Figure S2. Comparison of FIGAERO-HR-ToF-I-CIMS mass spectra of organic nitrate aerosols (i.e., $C_{10}H_{11,13,15,17,19,21}NO_{4\text{-}11}$) with ambient measurement data (Lee et al., 2016; Huang et al., 2019). All mass spectra are normalized to the maximum signal.

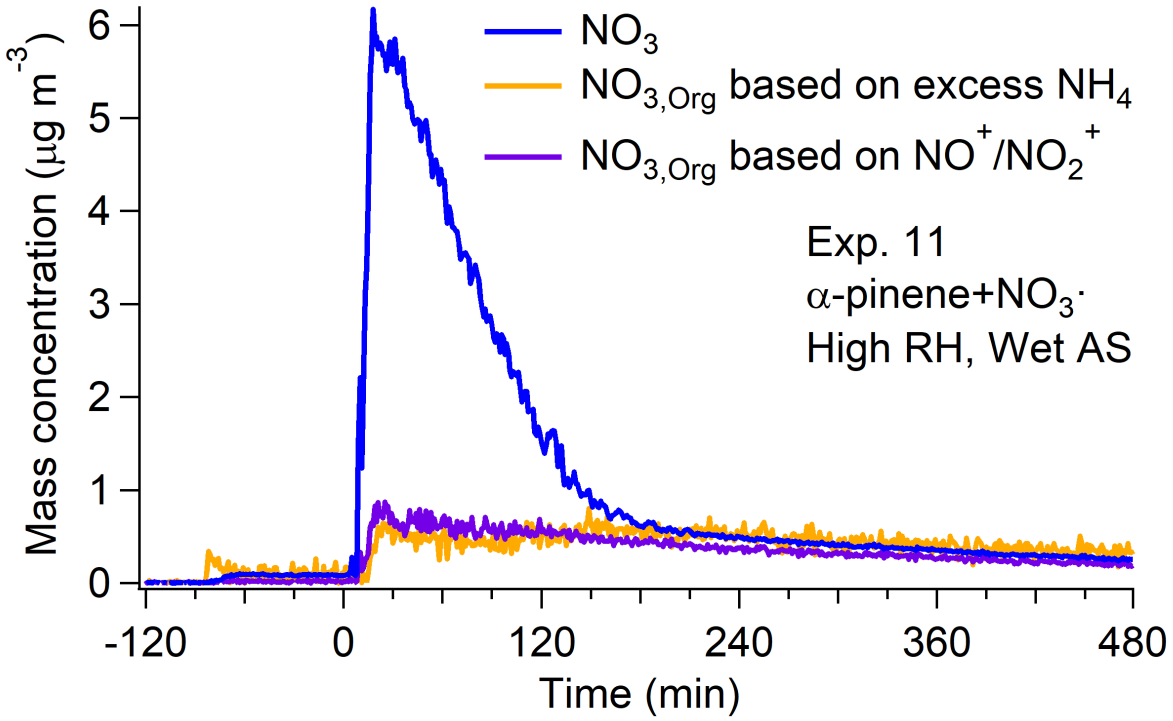

Figure S3. Concentrations of NO_3 and $NO_{3,Org}$ derived from two independent methods. "Excess NH_4" refers to a method to apportion the inorganic nitrate contribution to NO_3 based on the increase in NH_4 and "NO^+/NO_2^+" refers to the method based on its ratio (Farmer et al., 2010).

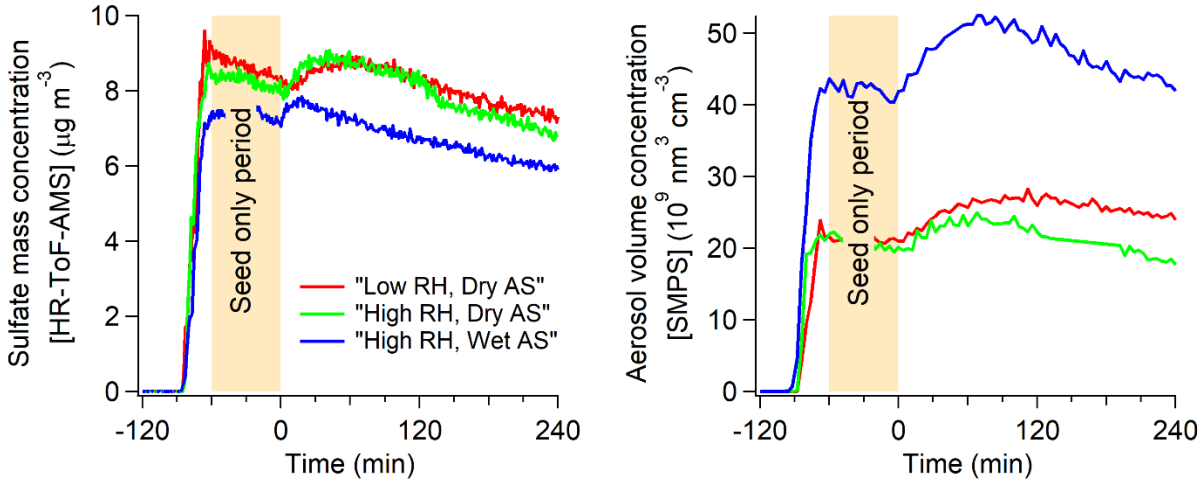

Figure S4. HR-ToF-AMS time-series data of SO_4 and SMPS aerosol volume concentration in Exp. 3 (low RH, dry AS), Exp. 4 (high RH, dry AS), and Exp. 5 (high RH, wet AS). A significant difference in the volume concentration among the experiments indicates the deliquesced nature in Exp. 5 (high RH, wet AS) and the effloresced nature of seed particles in Exp. 4 (high RH, dry AS).

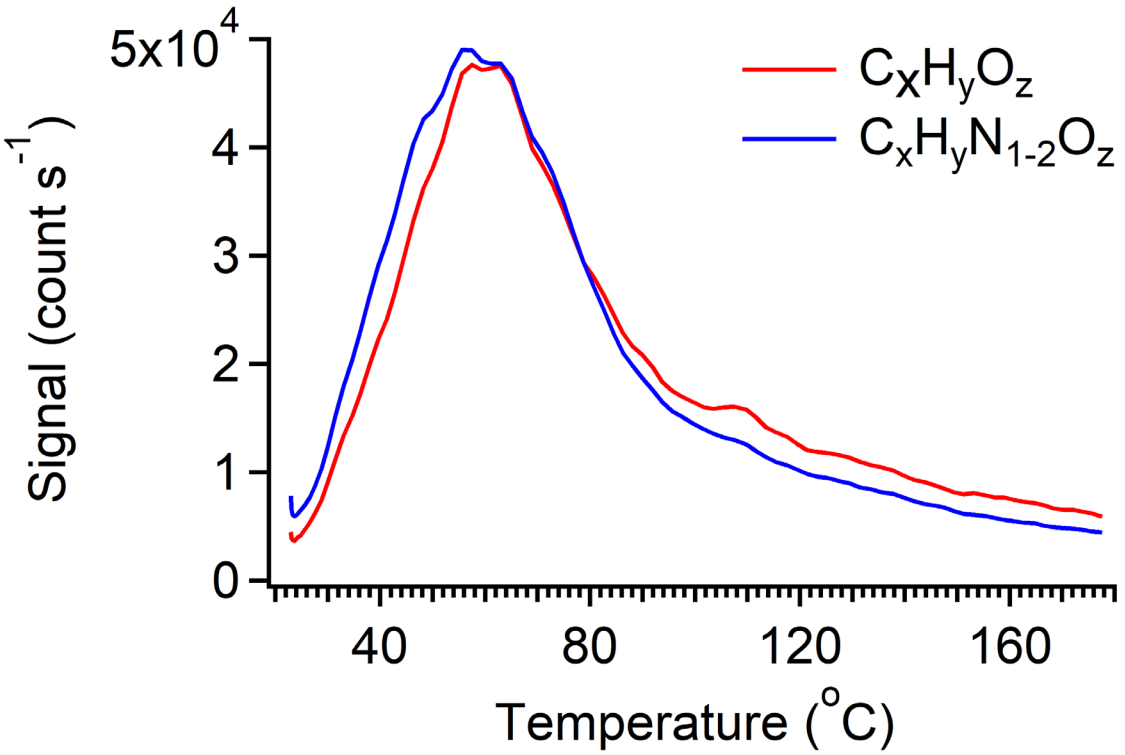

Figure S5. Thermal desorption profiles of $C_xH_yO_z$ and $C_xH_yN_{1\text{-}2}O_z$ in FIGAERO-HR-ToF-I-CIMS from Exp. 3. Data points are averages of three desorption cycles around the peak SOA growth.

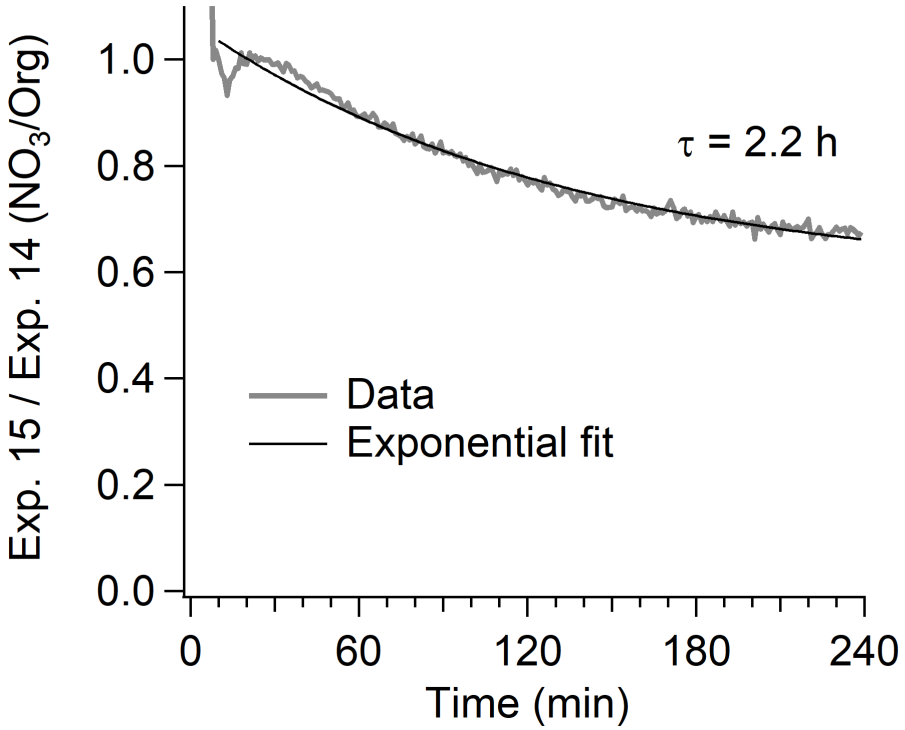

Figure S6. Time-series data of NO_3/Org in Exp. 15 normalized to that in Exp. 14 based on the method present in prior study (Boyd et al., 2015).

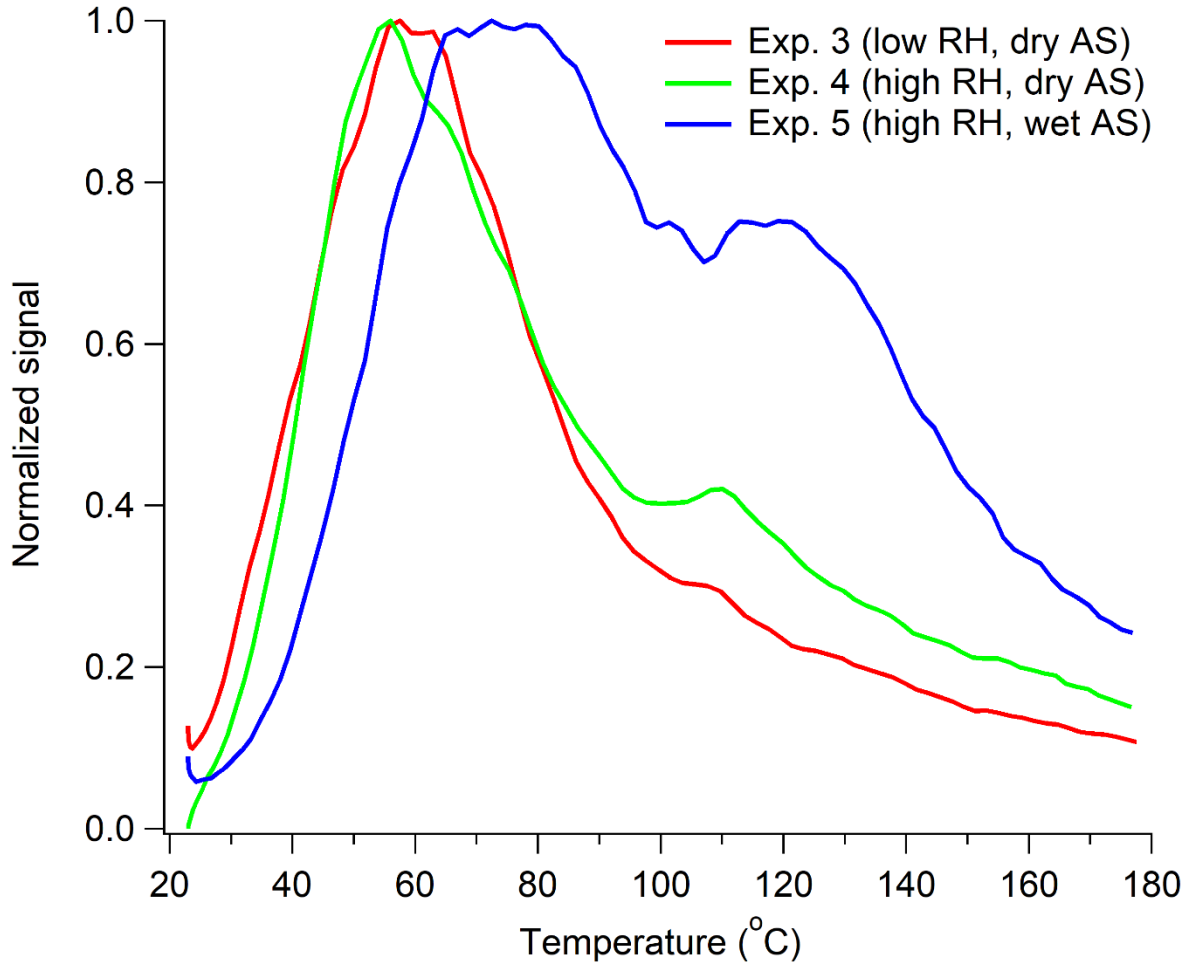

Figure S7. Average thermogram of organic aerosol (i.e., organic nitrate and non-nitrated organic aerosol) at the peak of SOA growth in Exp. 3-5. Signals are normalized to the maximum signal for each experiment.

Table S1. Summary of R_{AN} and R_{ON} applied to derive the concentration of $NO_{3,Org}$. R_{AN} from 300 nm ammonium nitrate particle at the nearest date is used unless noted otherwise. R_{ON}/R_{AN} used for high RH experiments are taken from the same experiment but under low RH experiments.

ID	R_{AN}	R_{ON}	R_{ON}/R_{AN}
1	2.87	6.25	2.18
2	2.87	6.25	2.18
3	2.80	5.75	2.05
4	2.80	5.75	2.05
5	2.88	5.91	2.05
6	3.06	5.02	1.64
7	3.06	5.02	1.64
8	3.24	8.64	2.67
9	2.87	7.66	2.67
10	2.70	8.24	3.05
11	2.80	8.55	3.05
12	2.80	8.60	3.07
13	2.88	8.85	3.07
14	2.87	7.13	2.48
15	2.56[a]	6.36	2.48

[a] R_{AN} is taken from 30-min average of NO^+/NO_2^+ during seed only period as the R_{AN} from the calibration at the nearest date is slightly higher.

Table S2. Fraction of $_{p}$ON based on the number of carbon in each system.

System	$C_{\leq 9}$ $_{p}$ON	C_{10} $_{p}$ON	$C_{11\text{-}19}$ $_{p}$ON	C_{20} $_{p}$ON
α-pinene+OH·	47 %	52 %	1 %	0 %
β-pinene+OH·	58 %	41 %	1 %	0 %
α-pinene+NO_3·	11 %	26 %	8 %	54 %
β-pinene+NO_3·	10 %	58 %	4 %	28 %

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