

# Effects of NO<sub>x</sub> on secondary organic aerosol yields and composition from a biogenic-anthropogenic mixture: Supplementary

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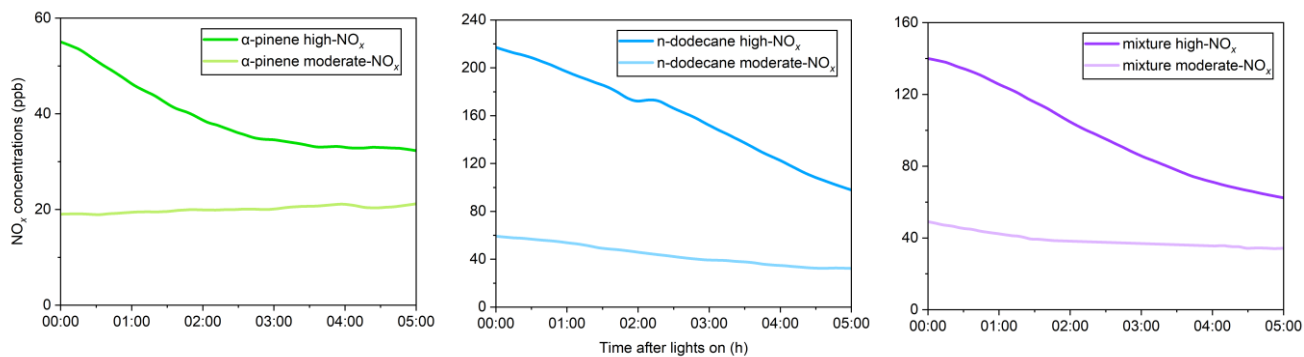
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## 1 OH concentration estimation

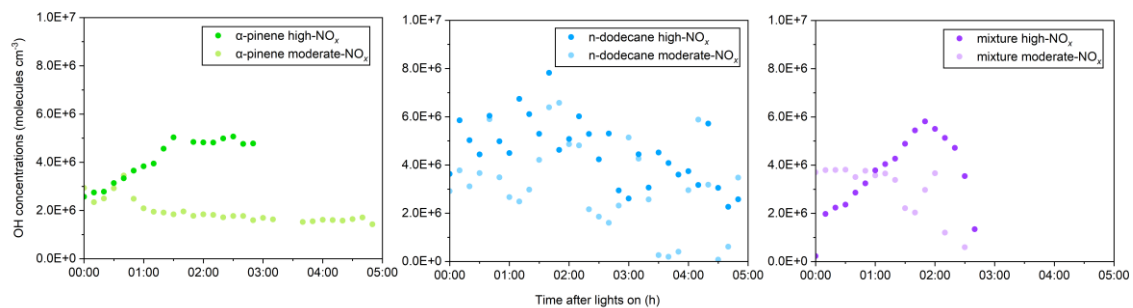
OH concentrations were estimated from the temporal evolution of O<sub>3</sub> and the consumption of SOA precursors.

$$[OH] = \frac{\frac{[VOC]_i - [VOC]_{i+1}}{\Delta t} - k_{VOC+O_3}[VOC]_i[O_3]}{k_{VOC+OH}[VOC]_i}$$

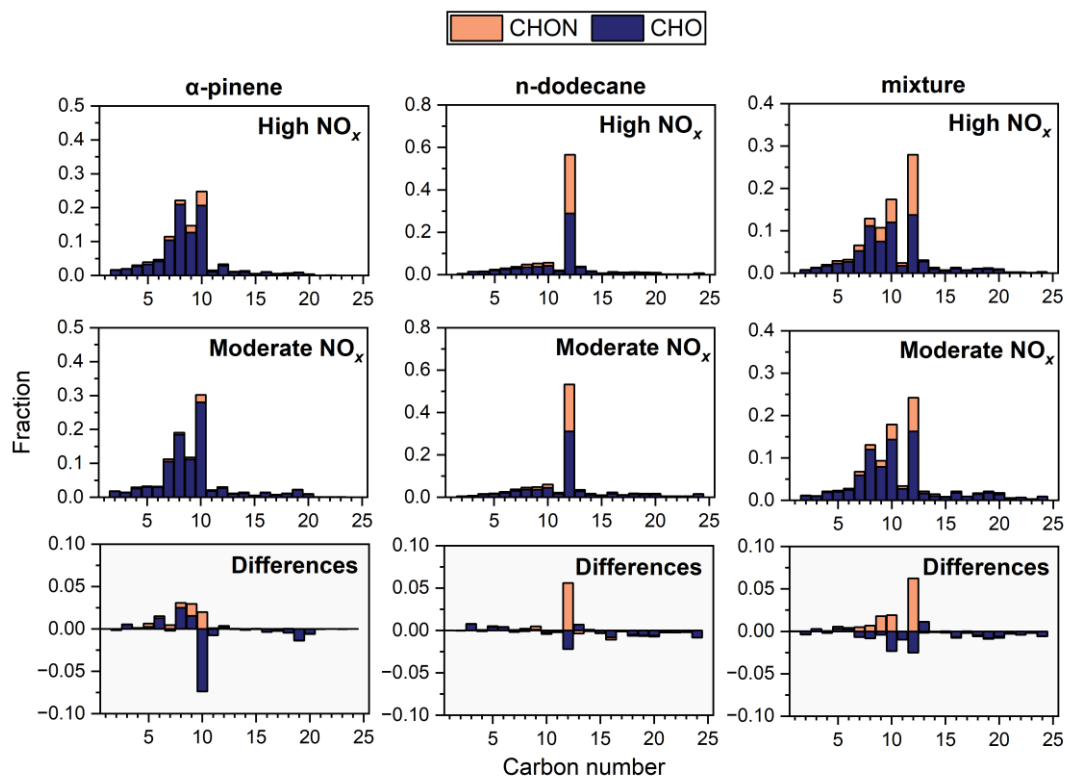
where  $k_{VOC+O_3}$  and  $k_{VOC+OH}$  represent the rate constants for the reactions of VOCs with O<sub>3</sub> and OH, respectively. The OH reaction rate constants for  $\alpha$ -pinene and n-dodecane are  $5.33 \times 10^{-11}$  and  $1.32 \times 10^{-11}$  cm<sup>3</sup> molecule<sup>-1</sup> s<sup>-1</sup>, respectively (Atkinson, 2003; Dash et al., 2014). The O<sub>3</sub> reaction rate constant for  $\alpha$ -pinene is  $9.6 \times 10^{-17}$  cm<sup>3</sup> molecule<sup>-1</sup> s<sup>-1</sup> (Cox et al., 2020).



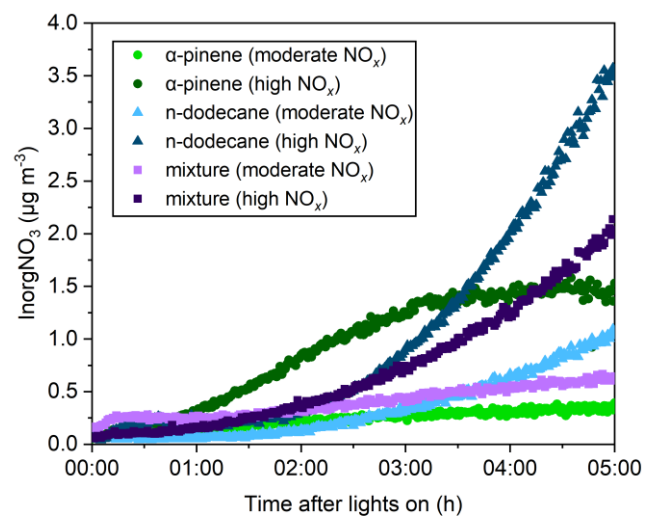
**Figure S1: Time series of NO<sub>x</sub> in α-pinene, n-dodecane, and mixture experiments conducted under high- and moderate-NO<sub>x</sub> conditions.**



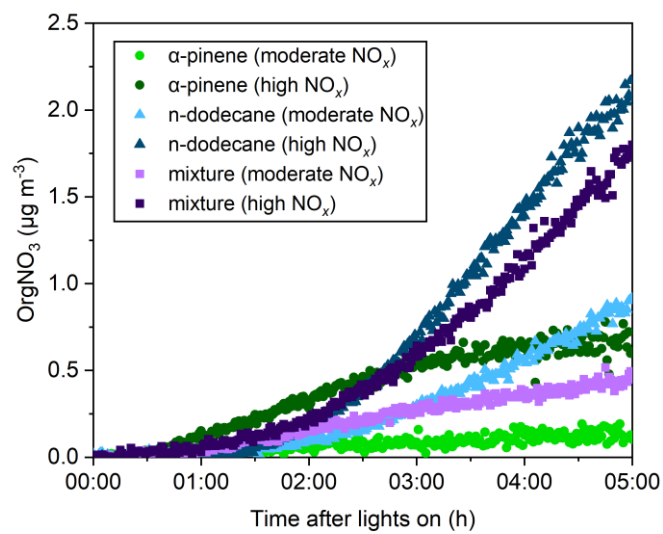
**Figure S2: Estimated OH concentrations in  $\alpha$ -pinene, n-dodecane, and mixture experiments conducted under high- and moderate-NO<sub>x</sub> conditions.**



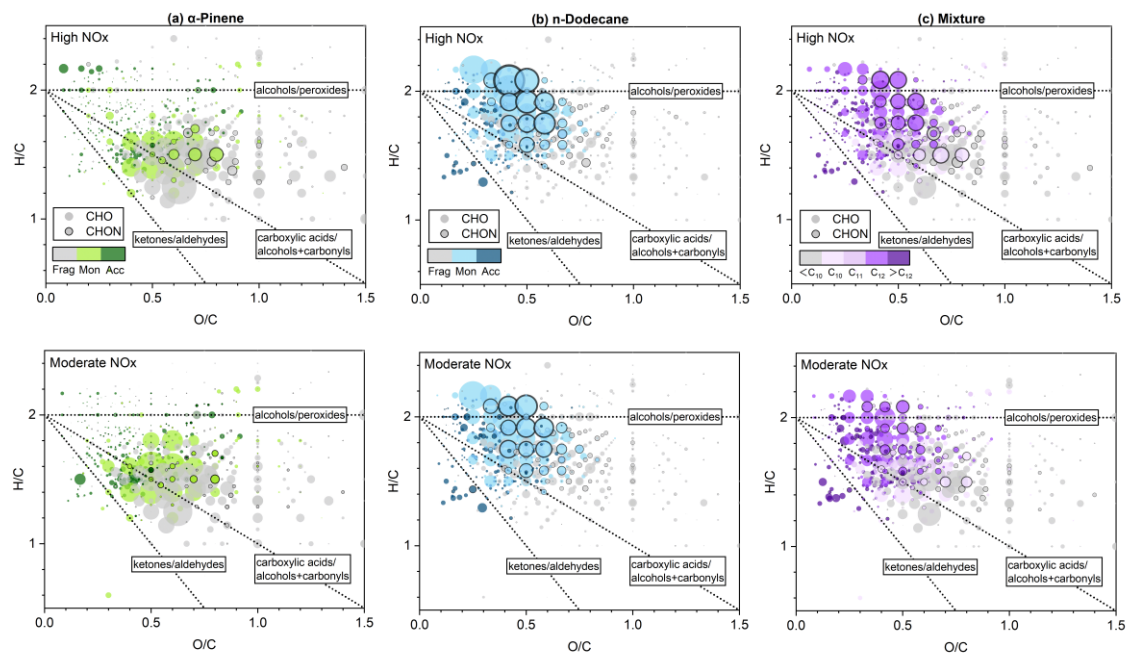
**Figure S3: Carbon number distributions of particle-phase SOA compounds from  $\alpha$ -pinene, n-dodecane, and their mixture, under moderate- and high- $\text{NO}_x$  conditions. The bottom panels show the differences between the moderate- and high- $\text{NO}_x$  experiments (high- $\text{NO}_x$  minus moderate- $\text{NO}_x$ ).**



**Figure S4: Time series of inorganic nitrate concentrations within the measured total nitrate in  $\alpha$ -pinene, n-dodecane, and mixture experiments conducted under high- and moderate-NO<sub>x</sub> conditions.**



**Figure S5: Time series of organic nitrate concentrations within the measured total nitrate in  $\alpha$ -pinene, n-dodecane, and mixture experiments conducted under high- and moderate-NO<sub>x</sub> conditions.**



**Figure S6: Van Krevelen diagrams of SOA particles formed under high- and moderate-NO<sub>x</sub> conditions for  $\alpha$ -pinene, n-dodecane, and mixture systems. Marker size represents the fraction of each species, with the total signal of all detected species normalised to 1. Markers with black outlines represent CHON compounds, whereas those without outlines correspond to CHO compounds. Colours indicate the carbon-number grouping of the detected species.**

## References

- Atkinson, R.: Kinetics of the gas-phase reactions of OH radicals with alkanes and cycloalkanes, *Atmos. Chem. Phys.*, 3, 2233-2307, <http://doi.org/10.5194/acp-3-2233-2003>, 2003.
- Cox, R.A., Ammann, M., Crowley, J.N., Herrmann, H., Jenkin, M.E., McNeill, V.F., Mellouki, A., Troe, J. and Wallington, T.J.: Evaluated kinetic and photochemical data for atmospheric chemistry: Volume VII – Criegee intermediates, *Atmos. Chem. Phys.*, 20, 13497-13519, <http://doi.org/10.5194/acp-20-13497-2020>, 2020.
- Dash, M.R., Balaganesh, M. and Rajakumar, B.: Rate coefficients for the gas-phase reaction of OH radical with  $\alpha$ -pinene: an experimental and computational study, *Mol. Phys.*, 112, 1495-1511, <http://doi.org/10.1080/00268976.2013.840395>, 2014.