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Supplement of

The influence of the addition of isoprene on the volatility of particles formed from the photo-oxidation of anthropogenic–biogenic mixtures

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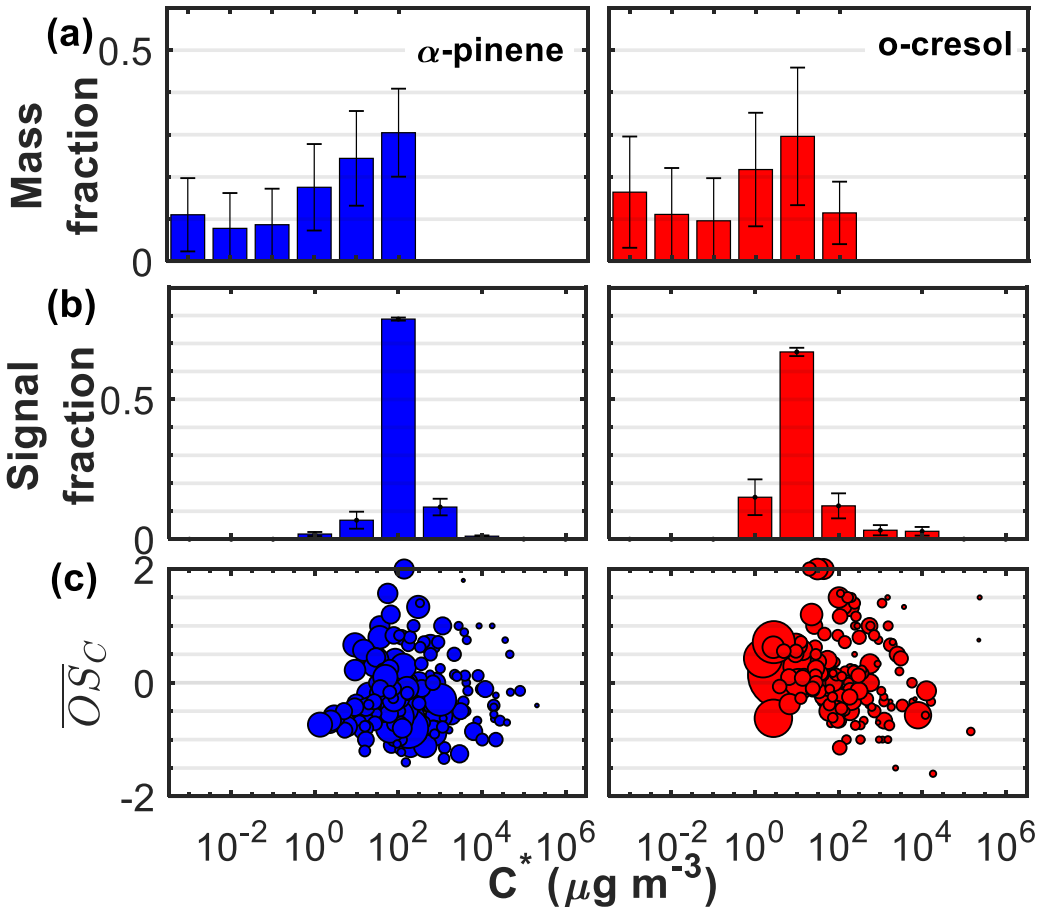

Figure S1: SOA particle volatility distributions from (a) the TD measurements (± retrieval uncertainty) and (b) from the FIGAERO-CIMS measurements (± 1σ) in the α-pinene and o-cresol experiments conducted at full initial reactivity. (c) All the products that identified by the FIGERO-CIMS are shown as a function of their volatility (C^*) and their average carbon oxidation state ($\overline{OSc}$) and are sized by the square root of their particle phase signal.

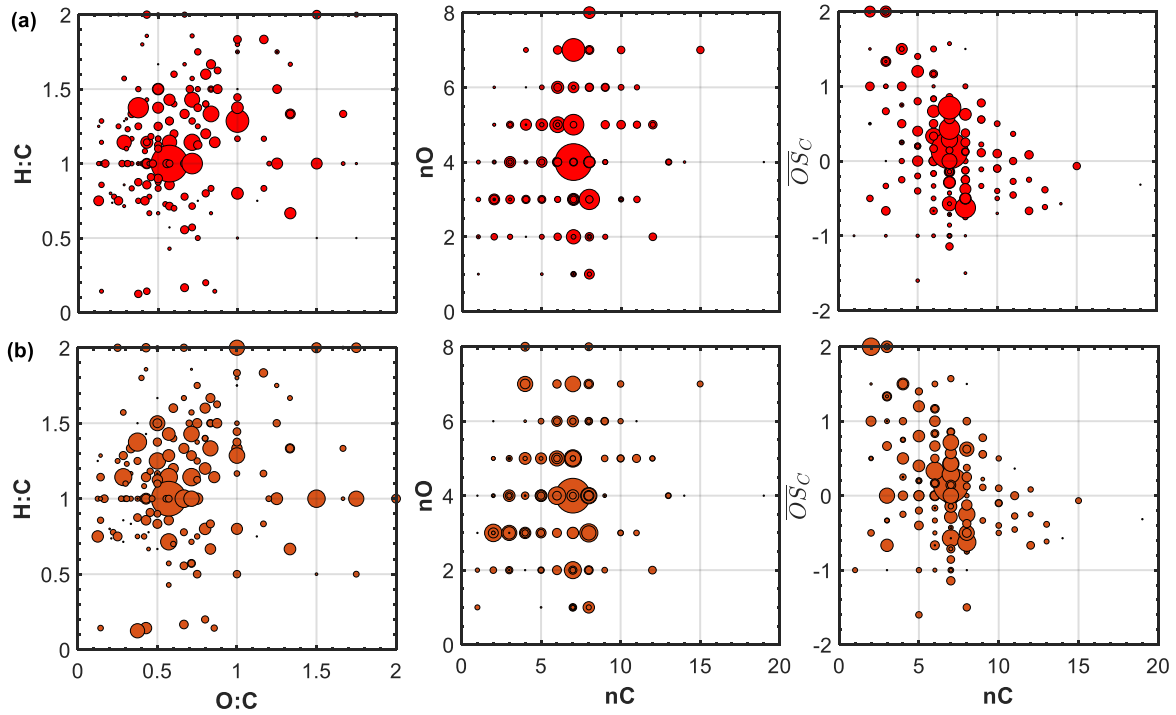

Figure S2: Hydrogen to carbon (H:C) by oxygen to carbon (O:C), number of carbon atoms (nC) by number of oxygen atoms (nO) and carbon oxidation state (OSc) by nC of all the individual products identified in the *o*-cresol experiments at (a) full and (b) half initial reactivity. All the symbols are sized based on the square root of their particle phase signal.

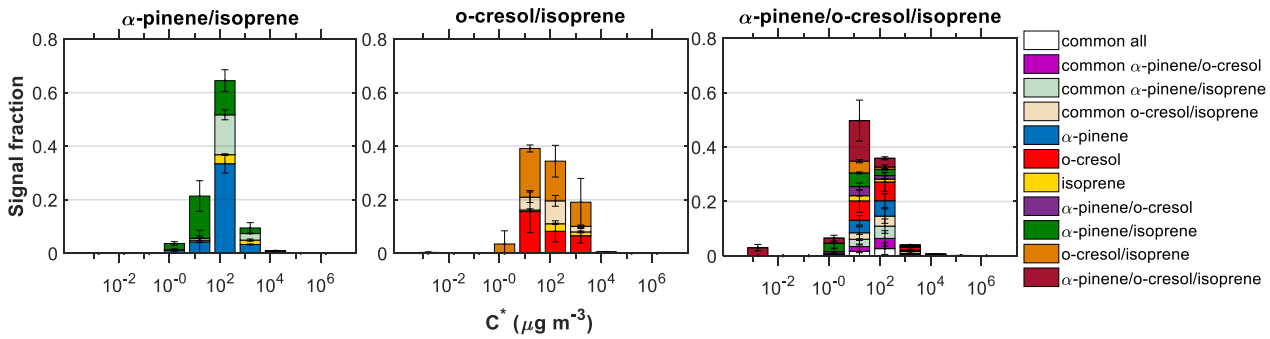

Figure S3: Measured volatility distributions from the FIGAERO-CIMS measurements (±1σ). The coloured bars in the top and bottom panels represent the measurements and the black bars the predictions. The coloured bars in bottom panels are separated to show the signal contributions of the products in each volatility bin. "Common" were classified as the products that were identified in each mixture as well as at the respective single precursor experiments of that mixture. The remaining products had elemental formulas that were unique to each single precursor or mixture system.

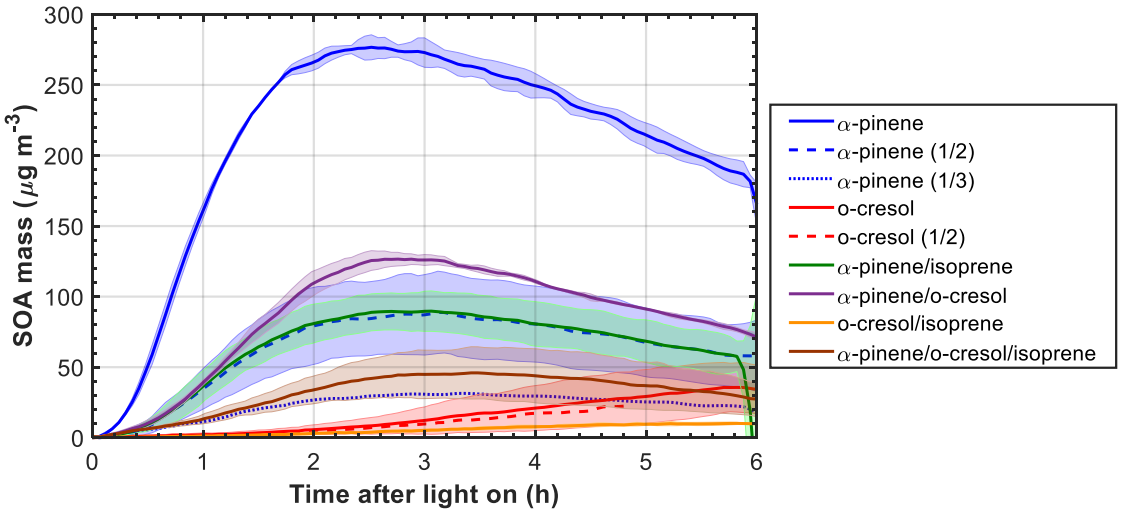

Figure S4: Total organic aerosol mass (± 1σ as shaded areas) measured by HR-AMS in all systems.

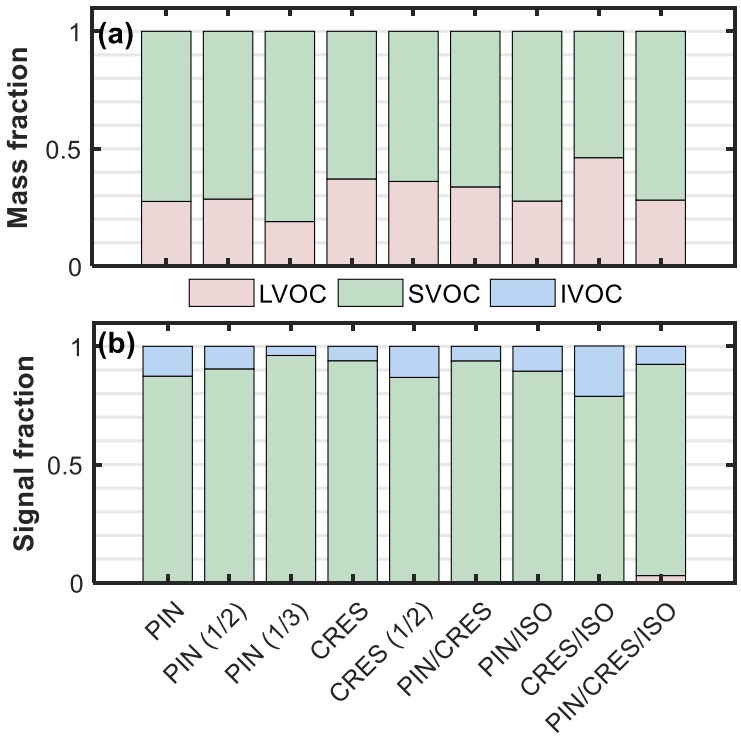

Figure S5: Volatility measured in each of the systems studied in the VBS framework derived from (a) the TD-AMS and (b) the FIGAERO-CIMS. (PIN: α-pinene; PIN (1/2): α-pinene at half reactivity; PIN (1/3): α-pinene at one third reactivity; CRES: o-cresol; CRES (1/2): o-cresol at half reactivity; PIN/CRES: α-pinene/o-cresol; PIN/ISO: α-pinene/isoprene; CRES/ISO: o-cresol/isoprene; PIN/CRES/ISO: α-pinene/o-cresol/isoprene)

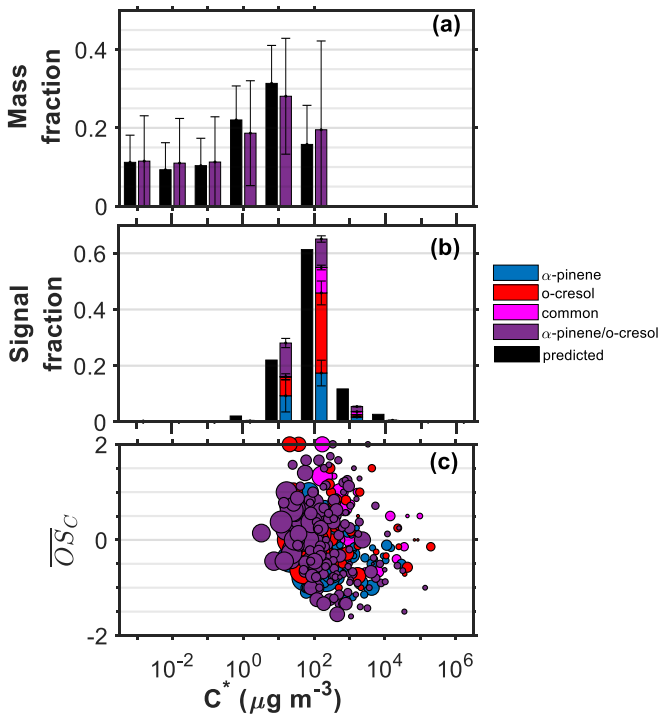

Figure S6: Measured and predicted based on the additivity SOA particle volatility distributions from (a) the TD measurements (±retrieval uncertainty) and (b) from the FIGAERO-CIMS measurements (±1σ) in the *α*-pinene/ *o*-cresol system. The bars in (b) are separated to show the signal contributions of the products that were associated with either precursor and those that were unique-to-the-mixture. (c) All the products that identified by the FIGERO-CIMS are shown as a function of their volatility (C^*) and their average carbon oxidation state ($\overline{OSc}$), sized by the square root of their particle phase signal. In this system, the *α*-pinene SOA was predicted to account for 69 ± 3% of the total SOA mass. According to the TD-based predictions, 30±12% of the SOA in the *α*-pinene/*o*-cresol system was LVOCs, with the remaining 70% being SVOCs. The FIGAERO-CIMS-based predictions gave a different picture: no LVOCs, 85% SVOCs and 15% IVOCs. The measured IVOC fraction in the *α*-pinene/*o*-cresol from the FIGAERO-CIMS measurements was lower by ~10% compared to that measured in that system (16 vs. 6%, respectively). Similar trend was observed in the TD measurements where the predicted SVOC fraction is ~6% higher compared to that measured (70 vs. 65% of the mass, respectively; Fig. 7 and S6), with a corresponding decrease in the LVOC fraction. Therefore, the mixing of these precursors can decrease the overall volatility of the system opposed to the predicted based on the additivity, result that is consistent with the chemical information obtained and discussed in detail in Voliotis et al., 2021.

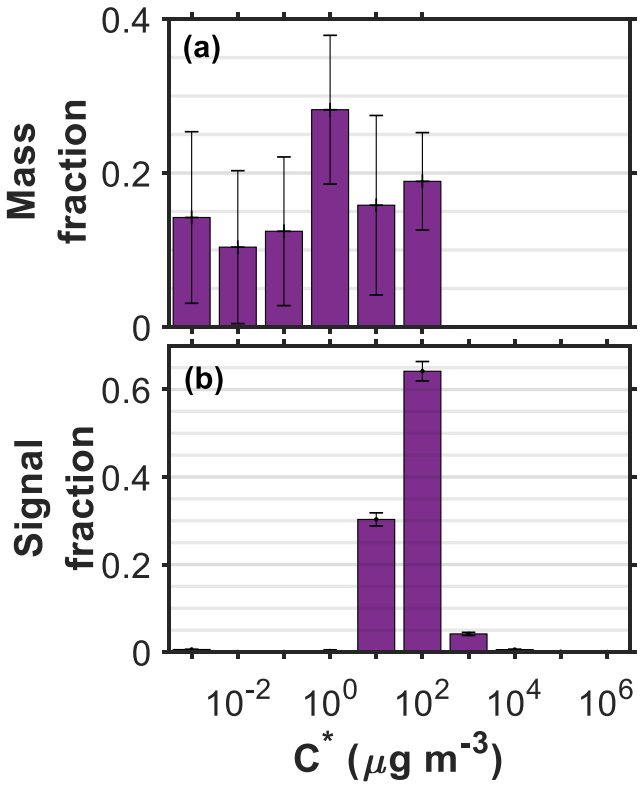

Figure S7: (a) TD (± retrieval uncertainty) and (b) FIGAERO-CIMS (± 1σ) adjusted volatility distributions from the α-pinene/o-cresol system to the same total absorptive mass of the ternary system (i.e., 33 μg m^{-3}).

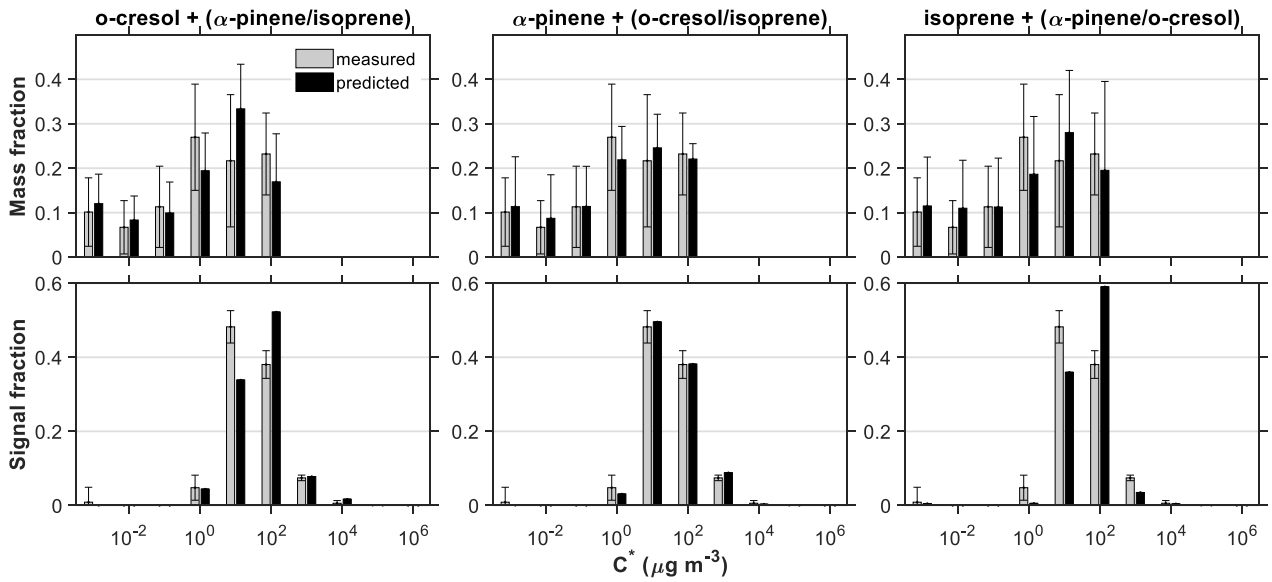

Figure S8: Measured and predicted based on the additivity volatility distributions in the ternary system using the TD (top panels) and the FIGAERO-CIMS measurements (bottom panels). The SOA particle volatility predictions were conducted based on the additivity using the VOC decay measured in the ternary mixture and the SOA yields measured in a single and a binary system in all possible combinations; i.e., *o*-cresol + (*α*-pinene/isoprene), *α*-pinene + (*o*-cresol/isoprene) and isoprene + (*α*-pinene/*o*-cresol).