Supplemental Material

Secondary aerosol formation during the dark oxidation of biomass burning emissions

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Table S1. Simulated pH using the base set of assumptions in a subset of experiments for fresh BB aerosol (defined as the average over hour -1 to hour 0) and aged pH (defined as the average over hour 2 to hour 3).

Experiment	Fresh pH	Aged pH
4	2.9	2.9
5	2.6	2.6
6	3.1	2.9
8	2.5	2.8

Table S2. Assumed reaction rate constants used to calculate typical lifetime of the VOCs with the largest observed decrease. Reaction rate constants are taken from the Master Chemical Mechanism, MCM v3.3.1 (Jenkin et al., 2003, 2015; Boss et al., 2005).

Oxidant	k_{phenol} (molecule^{-1} cm^3 s^{-1})	$k_{isoprene}$ (molecule^{-1} cm^3 s^{-1})	$k_{a\text{-}pinene}$ (molecule^{-1} cm^3 s^{-1})	k_{C6H5O} (molecule^{-1} cm^3 s^{-1})
NO_3	3.8×10^{-13}	7.0×10^{-13}	$2\text{-}4 \times 10^{-12}$	-
O_3	-	$2.5\text{-}3.8 \times 10^{-18}$	$3.8\text{-}5.6 \times 10^{-17}$	2.9×10^{-13}
OH	$1.7\text{-}3.9 \times 10^{-12}$	2.0×10^{-12}	3.9×10^{-12}	-
		2.9×10^{-11}	3.0×10^{-11}	

Table S3. Average concentrations of oxidants and estimated lifetimes for the VOCs with the largest observed decrease in Experiment 1.

Oxidant	Concentration (molecule cm^{-3})	τ_{phenol} (h)	$\tau_{isoprene}$ (h)	$\tau_{a\text{-}pinene}$ (h)	τ_{C6H5O} (h)
NO_3	8.1×10^8	0.9	0.5	0.08-0.16	-
O_3	2.6×10^{12}	-	28-42	1.9-2.9	4×10^{-4}
OH	9.5×10^5	74-173	10-146	9.7-74	-

Table S4. Average concentrations of oxidants and estimated lifetimes for the VOCs with the largest observed decrease in the subset of experiments where NO_3 is above the measured detection limit.

Oxidant	Concentration (molecule cm^{-3})	τ_{phenol} (h)	$\tau_{isoprene}$ (h)	$\tau_{a\text{-}pinene}$ (h)	τ_{C6H5O} (h)
NO_3	3-20 x 10^8	0.4-2.0	0.2-1.3	0.004-0.4	-
O_3	1-3 x 10^{12}	-	22-100	1.4-7	0.0003-0.001
OH	5-15 x 10^5	47-330	6-280	6-140	-

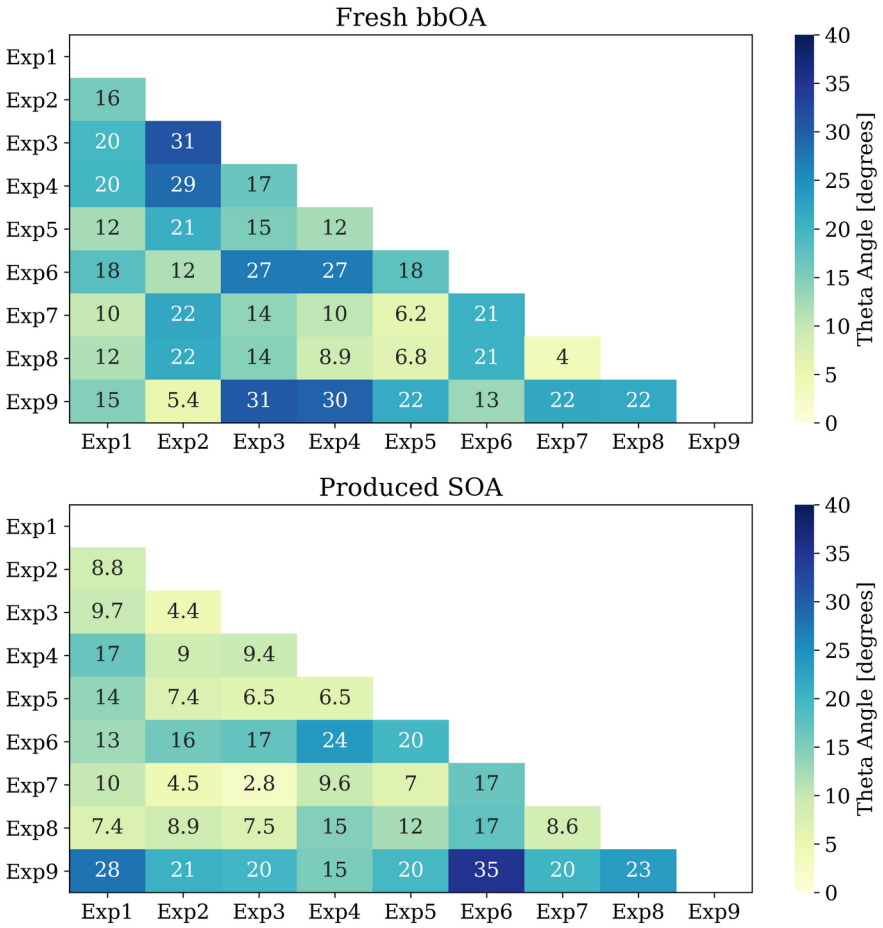

Figure S1. Comparison of theta angle across pairs of experiments for the OA mass spectra corresponding to a) fresh bbOA and b) produced bbSOA.

References

1. Bloss, C. *et al*. Development of a detailed chemical mechanism (MCMv3.1) for the atmospheric oxidation of aromatic hydrocarbons. *Atmos. Chem. Phys.* 5, 641–664 (2005).

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