Electronic Supplementary Material (ESI) for Environmental Science: Processes & Impacts.

Supplementary Information

Kinetics of Oligomer-Forming Reactions Involving the Major Functional Groups Present in Atmospheric Secondary Organic Aerosol Particles

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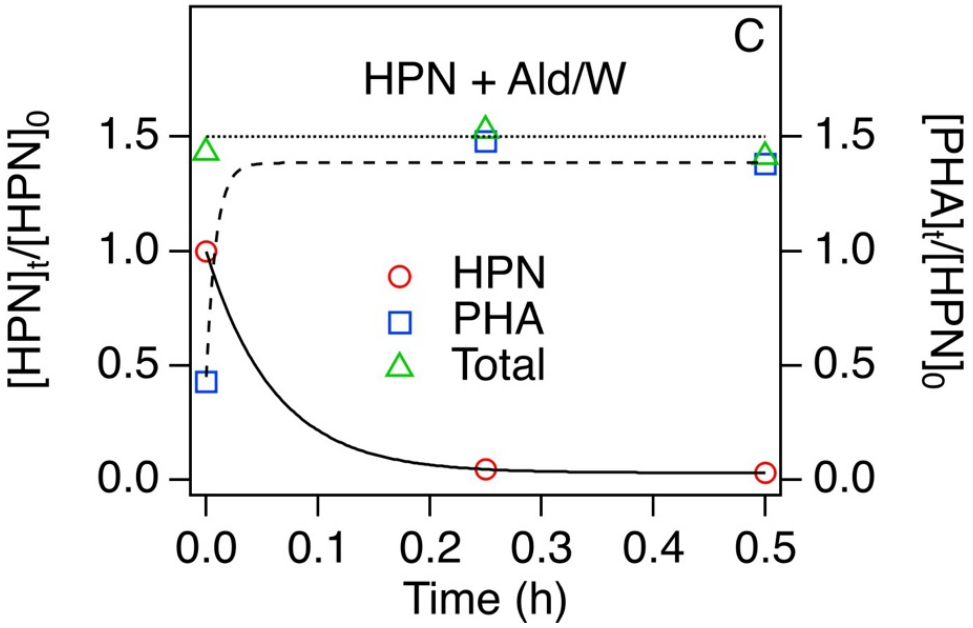

Figure S1. Time profile of the ratio $[HPN]_t/[HPN]_0$, the ratio of the PHA product $[PHA]_t/[HPN]_0$, and the sum of the ratios, for reaction of HPN with nonanal (Ald) in a phase-separated organic/aqueous mixture with the aqueous phase being water (W). The time period has to narrowed to 0 to 0.5 h from the 0 to 24 h time period shown in Figure 4B.

Table S1. Summary of results from all experiments with the four different probe molecules.

Probe	Excess reactant	Catalyst	Major product	Equilibrium constant (Keq)	Forward rate constant (k_f)	Reverse rate constant (k_r)
HPN	3-decanone	none	peroxyhemiketal	no reaction	no reaction	no reaction
HPN	3-decanone	3.0 M H_2SO_4	peroxyhemiketal	no reaction	no reaction	no reaction
HPN	nonanal	none	peroxyhemiacetal	4 M^{-1}	>1.5 $M^{-1}h^{-1}$	>0.24 $M^{-1}h^{-1}$
CN	1-octanol	none	ester	no reaction	no reaction	no reaction
CN	1-octanol	0.005 M H_2SO_4	ester	n/a	5.9 $M^{-2}h^{-1}$	no reaction
CN	1-octanol	3.0 M H_2SO_4	ester	2.9	0.068 $M^{-2}h^{-1}$	0.023 $M^{-2}h^{-1}$
HN	5-hydroxy-2-pentanone	none	acetal	no reaction	no reaction	no reaction
HN	5-hydroxy-2-pentanone	3.0 M H_2SO_4	acetal	no reaction	no reaction	no reaction
HN	6-hydroxy-5-decanone	none	hemiketal	no reaction	no reaction	no reaction
HN	6-hydroxy-5-decanone	3.0 M H_2SO_4	hemiketal	no reaction	no reaction	no reaction
HN	1-octanol	3.0 M H_2SO_4	ether	no reaction	no reaction	no reaction
HN	HN	3.0 M H_2SO_4	ether	no reaction	no reaction	no reaction
βHN	βCN	none	hemiketal	no reaction	no reaction	no reaction
βHN	βCN	3.0 M H_2SO_4	hemiketal	no reaction	no reaction	no reaction
βCN	1,2-octanediol	none	hemiketal	no reaction	no reaction	no reaction
βCN	1,2-octanediol	3.0 M H_2SO_4	hemiketal	no reaction	no reaction	no reaction
βCN	1-octanol	none	hemiketal	no reaction	no reaction	no reaction
βCN	1-octanol	3.0 M H_2SO_4	hemiketal	no reaction	no reaction	no reaction
βCN	α-pinene SOA	none	hemiketal	no reaction	no reaction	no reaction
βCN	α-pinene SOA	3.0 M H_2SO_4	hemiketal	no reaction	no reaction	no reaction
CN	α-pinene SOA	none	Ester	no reaction	no reaction	no reaction
CN	α-pinene SOA	3.0 M H_2SO_4	Ester	no reaction	no reaction	no reaction