1 Supplemental information:

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Figures and Tables

- **Figure S1:** Purging the volatile 1,4-dihydroxy-2-methyl-2-butene impurity from *cis* β -IEPOX
- 3 droplets with dry N_2 over a heated bulb (60°C) for several hours. The fraction of impurity to
- 4 IEPOX, as measured by CIMS, was allowed to decay to < 2% before use for experiments.







1 **Figure S3:** Top panel: OA grows in response to IEPOX gas-phase injection, but continues to

2 grow after halting IEPOX injection, an indication that the system is not at equilibrium. Bottom

3 panel: the ratio of the OA to gas-phase IEPOX starts off noisy and levels out as IEPOX is

4 injected. The ratio continues to grow as gas-phase IEPOX stabilizes and OA continues to grow.

5 The shaded panel where the ratio levels out is used in $\Phi_{OA/IEPOX}$ calculations.



1 Figure S4: Typical behavior of the ratio of organic aerosol formed (detected by AMS) to gas-



2 phase IEPOX (detected by CIMS) during the course of an experiment.

1 Figure S5: SMPS data showed an increase in particle volume when gas-phase IEPOX is injected

2 onto wet NaCl seeds, which stabilizes over the course of the experiment. ToF-AMS, which

3 sampled dried particles, did not observe OA formation – an indication that the OA is reversibly-

4 formed in the liquid water of NaCl seeds (equilibrium partitioning) and that the un-reacted

5 IEPOX is removed from the particle phase upon drying.

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- 1 **Figure S6:** a) Total ion chromatogram for the IEPOX-derived OA collected onto a filter. The
- 2 sharp peak at 1.36 minutes corresponds to the elution of the IEPOX-derived organosulfate. b)
- 3 The mass spectrum corresponding to the 1.36 minute peak, showing that one peak ($C_5H_{11}SO_7$)
- 4 dominates the spectrum. MSMS fragmentation (c) confirms organosulfates with the m/z 96.9581
- 5 (HSO_4) product ion.



- **Figure S7:** Proposed tracer mass fragments for IEPOX-derived OA correlate well ($R^2 > 0.99$)
- with the formation of OA mass.



- 1 Figure S8: Correlation of four amine (C-N) fragments with the IEPOX tracer fragment
- $(C_5H_6O^+)$ observed in ToF-AMS data for reactive uptake onto AS seeds.

