

Supplementary Materials

Wet Cyclone Sampling for Organic Aerosol Molecular Analysis: Performance Evaluation and Application to Incense Smoke

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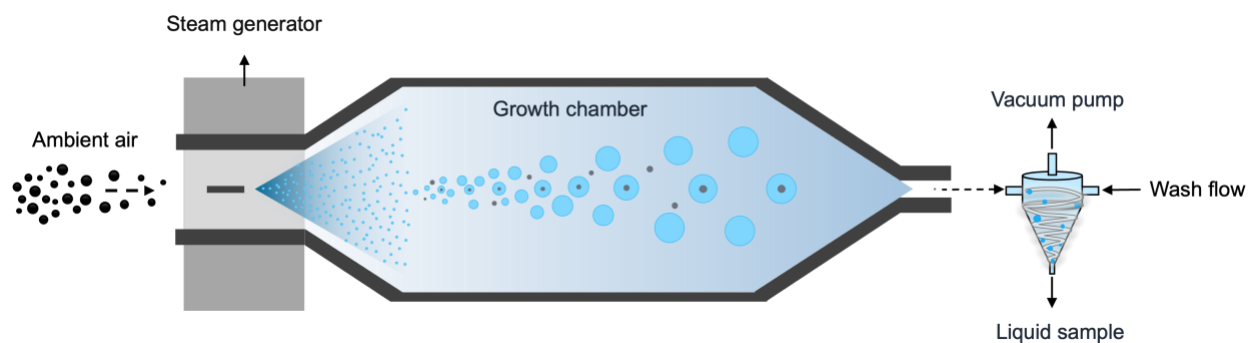


Figure S1. Schematic of the condensational growth wet cyclone sampling system. Aerosol particles are mixed with steam generated at 100 °C to create a supersaturated environment in the growth chamber, where particles undergo condensational growth to form micron-sized droplets. The droplet-laden flow is subsequently directed to the wet cyclone for collection into a continuous liquid phase, while the gas flow is drawn through the system by a downstream vacuum pump.

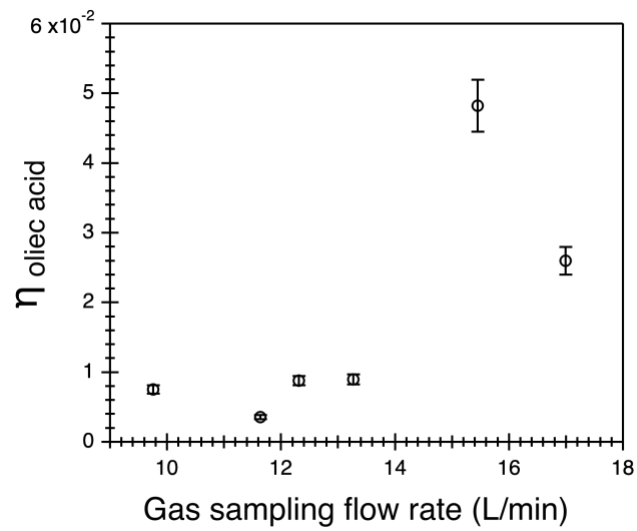


Figure S2. Collection efficiency of oleic acid aerosols as a function of gas sampling flow rate using 100% water as the wash liquid.

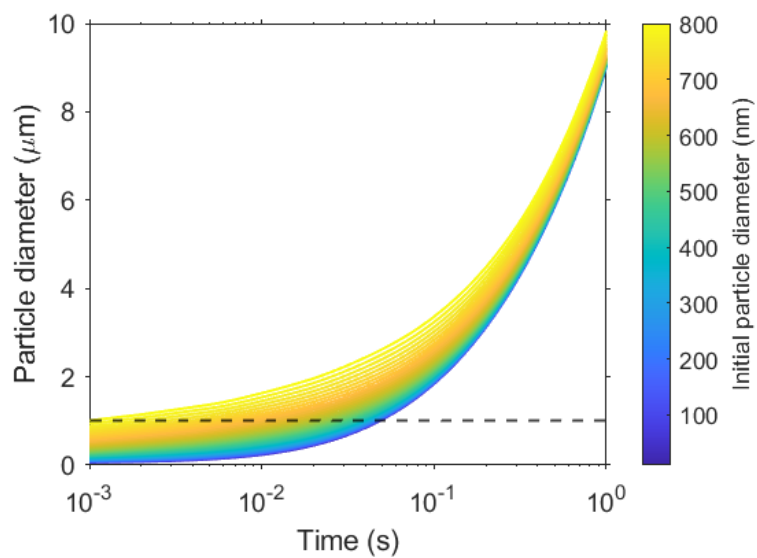


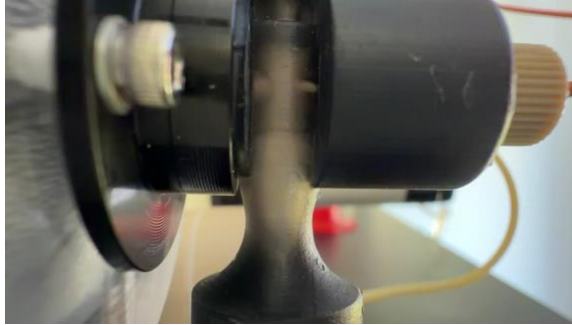
Figure S3. Simulated condensational growth of particles with initial diameters ranging from 10 to 800 nm under dry conditions, assuming a water-vapor accommodation coefficient of 0.1. Line color indicates the initial particle diameter. The dashed horizontal line marks a particle diameter of 1 μm .

Table S1. Molecular features detected in incense-burning aerosol collected by the wet cyclone, with ion peak areas normalized to the total collected PM_{2.5} mass.

NO.	Formula	Norm. Area	Exact Mass	MW
1	C10H16O3	7.69E+04	184.11	184
2	C10H20O2	9.75E+04	172.15	172
3	C11H14O3	1.80E+05	194.09	194
4	C12H14O4	5.10E+06	222.09	222
5	C12H17N3O4	1.24E+06	267.12	267
6	C13H22O3	1.02E+06	226.16	226
7	C14H18N2O5	2.05E+06	294.12	294
8	C14H23NOS	6.16E+04	253.15	253
9	C18H26O	7.49E+06	258.20	258
10	C19H24O6	2.61E+05	348.16	348
11	C23H32O	2.20E+05	324.25	324
12	C23H40	9.09E+04	316.31	316
13	C24H32O6	6.78E+04	416.22	416
14	C25H32O8	1.43E+05	460.21	460
15	C25H34O7	2.48E+06	446.23	446
16	C26H33NO2	2.07E+05	391.25	391
17	C26H38O5	7.44E+05	430.27	430
18	C26H44O5	9.55E+04	436.32	436
19	C27H44O3	1.44E+06	416.33	416
20	C30H44O11	8.06E+05	580.29	580
21	C30H48O2	8.35E+05	440.37	440
22	C6H6O3	1.53E+06	126.03	126
23	C8H10O3	6.18E+04	154.06	154
24	C8H8O3	1.37E+06	152.05	152
25	C9H6O2	4.02E+05	146.04	146

Table S2. Molecular features detected in incense-burning aerosol collected on the quartz filter, with ion peak areas normalized to the total collected PM_{2.5} mass.

NO.	Formula	Norm. Area	Exact Mass	MW
1	C10H20O2	8.01E+04	172.15	172
2	C11H14O3	2.96E+05	194.09	194
3	C12H14O4	2.90E+06	222.09	222
4	C12H17N3O4	6.86E+05	267.12	267
5	C13H21NO2	2.45E+05	223.16	223
6	C14H18N2O5	2.07E+06	294.12	294
7	C15H18	3.24E+05	198.14	198
8	C15H18O5	2.27E+05	278.12	278
9	C15H24O3	4.95E+05	252.17	252
10	C18H26O	7.76E+06	258.20	258
11	C18H28O4	1.48E+06	308.20	308
12	C19H22O7	4.58E+05	362.14	362
13	C19H26O6	5.26E+05	350.17	350
14	C19H30O2	1.26E+06	290.22	290
15	C20H24O7	1.35E+06	376.15	376
16	C20H28O3	5.29E+06	316.20	316
17	C20H28O4	4.18E+05	332.20	332
18	C20H30O5	5.92E+05	350.21	350
19	C20H32O	5.89E+05	288.25	288
20	C21H30O3	1.27E+06	330.22	330
21	C21H34O2	1.10E+06	318.26	318
22	C21H36	1.07E+06	288.28	288
23	C22H30O7	8.03E+05	406.20	406
24	C23H32O	3.80E+05	324.25	324
25	C23H32O8	1.01E+06	436.21	436
26	C23H40	4.70E+05	316.31	316
27	C27H44O2	1.54E+06	400.33	400
28	C30H44O11	6.42E+05	580.29	580
29	C30H50O2	5.12E+05	442.38	442
30	C6H4O3	2.04E+05	124.02	124
31	C6H6O3	1.86E+06	126.03	126
32	C8H10O3	9.17E+04	154.06	154
33	C8H8O3	1.26E+06	152.05	152
34	C9H10O4	2.03E+05	182.06	182
35	C9H6O2	8.73E+05	146.04	146



Video S1. Visualization of the liquid vortex formed within the wet cyclone during operation. The tangential gas flow drives the washing liquid along the inner cyclone wall, producing a rotating liquid film that serves as the collection surface for condensationally grown aerosol droplets.