

Supplemental Material

Assessing Toxicant Emissions from E-liquids with DIY Additives Used in Response to a Potential Flavor Ban in E-cigarette Liquids

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Table S1. Emissions from unflavored PG/G liquid, lab-prepared DIY liquids, and commercially available flavored e-cigarette liquids were reported as Average \pm SD per session of 10 puffs.

Flavor	ROS (nmol H ₂ O ₂)	FA (μ g)	AA (μ g)	Ac (μ g)	Acr (μ g)	PA (μ g)	CA (μ g)	MAcr (μ g)	GA (μ g)	MGA (μ g)	Phenol (μ g)	Catechol (μ g)
PG/G	12.90 \pm 1.32	2.29 \pm 1.55	75.62 \pm 2.93	205.18 \pm 4.75	0.39 \pm 0.67	0.48 \pm 0.19	10.34 \pm 0.59	36.71 \pm 0.35	18.35 \pm 2.81	46.12 \pm 6.75	1.65 \pm 0.49	0.68 \pm 0.05
1% Sucralose	13.40 \pm 2.81	1.70 \pm 1.17	90.27 \pm 7.98	108.88 \pm 0.80	1.58 \pm 0.16	1.70 \pm 0.17	7.16 \pm 0.52	21.83 \pm 0.14	18.53 \pm 0.04	50.79 \pm 3.64	0.72 \pm 0.34	ND
1% Sucralose (45 W)	30.81 \pm 17.65	186.61 \pm 150.69	503.87 \pm 94.31	422.43 \pm 11.17	4.28 \pm 3.78	19.43 \pm 11.22	83.88 \pm 31.44	87.39 \pm 0.39	127.66 \pm 78.13	884.67 \pm 469.55	2.80 \pm 0.68	ND
3% Sucralose	14.57 \pm 4.48	2.74 \pm 2.37	94.71 \pm 17.40	201.94 \pm 3.21	0.95 \pm 0.83	0.80 \pm 0.61	10.96 \pm 1.33	36.27 \pm 0.36	20.42 \pm 0.08	81.10 \pm 29.48	1.65 \pm 0.14	0.66 \pm 0.02
3% Sucralose (45 W)	43.76 \pm 9.35	2255.14 \pm 1790.0 6	2970.14 \pm 2879.2 6	615.70 \pm 287.87	221.53 \pm 311.16	268.37 \pm 264.49	193.02 \pm 39.34	103.17 \pm 34.23	499.97 \pm 171.25	3400.96 \pm 690.78	5.56 \pm 1.28	11.74 \pm 9.24
5% Sucralose	12.80 \pm 1.05	0.60 \pm 0.54	77.85 \pm 16.20	97.63 \pm 0.25	0.69 \pm 1.20	1.07 \pm 0.93	6.23 \pm 0.25	19.57 \pm 0.13	17.09 \pm 0.58	46.38 \pm 11.29	0.80 \pm 0.10	ND
5% Sucralose (45 W)	10.07 \pm 2.08	85.30 \pm 105.64	347.47 \pm 68.18	358.26 \pm 5.87	6.96 \pm 3.58	10.69 \pm 7.89	49.61 \pm 31.00	72.30 \pm 0.51	78.46 \pm 19.98	381.09 \pm 276.07	2.14 \pm 0.59	ND
3% CBD	43.44 \pm 15.62	733.11 \pm 1123.90	835.13 \pm 1192.76	207.61 \pm 140.17	110.81 \pm 187.85	105.75 \pm 165.55	31.60 \pm 18.33	45.64 \pm 35.92	108.48 \pm 147.81	1264.65 \pm 1792.1 4	1.60 \pm 0.84	2.96 \pm 2.23
3% Essential Oil	16.04 \pm 3.47	4.30 \pm 0.80	78.16 \pm 14.50	214.61 \pm 1.88	1.74 \pm 1.57	2.10 \pm 1.16	12.33 \pm 0.75	38.87 \pm 0.80	14.92 \pm 5.67	50.59 \pm 18.07	1.09 \pm 0.07	0.67 \pm 0.01
3% Ethyl maltol	20.65 \pm 3.85	2.44 \pm 0.99	82.71 \pm 2.95	109.00 \pm 0.71	ND	1.59 \pm 1.53	7.53 \pm 0.44	21.56 \pm 0.06	18.11 \pm 0.01	63.94 \pm 3.06	0.62 \pm 0.14	ND
3% Tobacco	17.01 \pm 4.83	2.82 \pm 0.26	124.48 \pm 23.83	120.72 \pm 1.54	2.45 \pm 0.51	2.72 \pm 0.24	7.68 \pm 0.11	24.19 \pm 0.34	15.11 \pm 1.30	34.13 \pm 6.00	0.59 \pm 0.24	0.64 \pm 0.01
3% Tobacco/ 3% Sucralose	13.86 \pm 2.85	1.48 \pm 0.27	99.02 \pm 24.13	186.76 \pm 5.28	1.06 \pm 1.01	1.32 \pm 0.17	10.16 \pm 0.35	35.42 \pm 0.41	18.59 \pm 2.85	60.53 \pm 16.11	1.44 \pm 0.20	0.66 \pm 0.01
3% Tobacco/ 3% CBD	45.32 \pm 2.31	17.85 \pm 3.36	163.12 \pm 41.05	121.31 \pm 2.22	2.74 \pm 0.52	5.51 \pm 0.32	10.18 \pm 0.37	24.59 \pm 0.23	16.52 \pm 1.27	71.71 \pm 9.49	1.57 \pm 0.87	ND
3% Tobacco/ 3% Essential Oil	16.71 \pm 1.12	4.36 \pm 2.11	89.71 \pm 15.57	216.05 \pm 1.58	1.77 \pm 0.60	0.51 \pm 0.17	11.69 \pm 1.23	37.91 \pm 0.32	17.43 \pm 3.24	72.91 \pm 10.38	0.82 \pm 0.29	0.72 \pm 0.07
3% Menthol	15.48 \pm 1.02	2.08 \pm 0.20	148.50 \pm 17.68	120.07 \pm 0.38	2.15 \pm 0.03	2.55 \pm 0.10	7.53 \pm 0.16	24.28 \pm 0.10	14.61 \pm 0.73	29.51 \pm 5.80	1.03 \pm 0.43	0.65 \pm 0.01

3% Menthol/ 3% Sucralose	8.72± 1.47	1.09± 0.12	78.19± 1.02	194.64± 2.50	ND	0.37± 0.36	10.28± 0.21	35.49± 0.17	20.28± 0.07	57.37± 20.97	1.39± 0.45	0.66± 0.01
3% Menthol/ 3% CBD	45.23± 12.30	622.44± 940.07	684.50± 935.76	179.61± 94.50	110.05± 185.79	79.48± 123.34	28.85± 14.63	38.30± 23.61	105.15± 140.25	1133.37 ±1543.0 2	2.22± 0.99	1.88± 3.25
3% Menthol/ 3% Essential Oil	18.66± 0.66	3.39± 0.52	85.27± 2.57	209.45± 1.97	1.53± 1.32	2.57± 0.13	12.71± 0.18	39.23± 0.02	11.08± 2.88	37.84± 0.48	0.74± 0.14	0.67± 0.03
3% Essential Oil/ 3% CBD	16.55± 1.74	6.48± 2.41	134.72± 16.28	122.99± 1.33	2.43± 0.34	4.55± 0.85	8.36± 0.35	24.17± 0.28	15.69± 1.45	48.24± 9.87	1.33± 0.29	ND
3% Sucralose/ 3% CBD	12.78± 1.25	11.40± 12.26	115.97± 7.01	122.88± 1.37	1.49± 1.29	4.93± 1.48	12.70± 6.16	24.29± 0.17	16.70± 3.73	143.06± 103.35	2.05± 1.37	ND
3% Sucralose/ 3% Essential Oil	14.49± 2.26	2.03± 0.33	145.87± 15.12	115.64± 2.68	1.65± 1.48	5.15± 4.38	7.05± 0.46	24.10± 0.09	14.86± 1.14	42.47± 15.67	1.02± 0.19	0.65± 0.01
3% Free-base nicotine/ 3% Sucralose	15.94± 3.46	3.54± 0.86	122.12± 6.70	120.98± 0.09	1.46± 1.26	2.44± 0.30	8.16± 0.47	24.22± 0.23	14.78± 0.08	25.57± 1.12	1.68± 0.50	ND
3% Nicotine salt/ 3% Sucralose	8.55± 1.82	5.80± 4.45	142.35± 14.53	116.27± 1.58	2.30± 0.11	3.22± 0.39	11.15± 2.49	23.90± 0.12	15.53± 0.60	55.46± 29.86	0.98± 0.42	ND
DIY Concentrate 1	35.74± 0.62	10.96± 7.75	123.93± 16.24	118.41± 2.82	1.68± 1.51	3.17± 0.35	9.62± 2.22	23.46± 0.41	17.02± 1.34	125.84± 57.67	0.72± 0.27	0.65± 0.01
DIY Concentrate 2	26.54± 1.78	23.05± 20.16	135.04± 25.81	123.05± 1.91	1.46± 1.27	8.97± 2.49	18.35± 4.02	23.80± 0.16	18.10± 1.68	316.32± 39.97	0.64± 0.00	ND
DIY Concentrate 3	14.54± 1.29	31.83± 37.20	122.56± 29.50	119.24± 2.45	1.48± 1.29	4.82± 2.93	12.15± 5.29	23.74± 0.24	22.33± 12.01	177.70± 135.28	0.89± 0.24	0.72± 0.07
DIY Concentrate 4	9.10± 2.37	3.28± 0.66	102.49± 10.30	118.41± 0.27	1.05± 1.49	2.07± 0.22	7.13± 0.32	23.63± 0.07	14.04± 0.04	28.78± 3.37	0.65± 0.06	ND
DIY Concentrate 5	22.96± 1.34	4.91± 1.35	125.22± 11.65	114.77± 2.15	1.46± 1.27	1.93± 1.67	8.16± 0.32	23.91± 0.37	14.51± 0.27	66.85± 4.97	0.92± 0.18	0.76± 0.12
DIY Concentrate 6	9.52± 0.83	6.98± 5.60	94.81± 1.71	119.75± 0.74	2.13± 0.01	2.80± 0.29	9.39± 1.63	23.67± 0.09	14.98± 0.79	43.63± 17.94	0.45± 0.11	0.71± 0.10
DIY Concentrate 7	9.19± 1.40	9.95± 7.55	113.90± 8.07	118.80± 0.30	1.70± 1.51	1.60± 1.39	9.68± 0.69	23.61± 0.21	15.78± 0.23	90.30± 53.54	0.38± 0.04	0.67± 0.01
DIY Concentrate Mix	45.03± 2.38	119.40± 204.12	278.48± 283.42	132.09± 25.36	33.99± 55.11	22.61± 34.28	18.72± 18.48	25.05± 2.53	73.88± 100.62	302.16± 345.06	0.64± 0.27	0.58± 0.51
Virginia Tobacco	4.41± 1.00	1.68± 0.71	115.33± 6.16	110.68± 0.55	3.01± 0.43	2.14± 0.41	6.99± 0.03	21.99± 0.07	19.52± 1.11	39.09± 1.60	0.96± 0.23	1.34± 0.05
Unicorn Milk	6.96± 3.53	6.64± 7.20	102.73± 13.88	108.05± 1.38	1.48± 1.44	2.12± 0.53	9.74± 4.09	22.14± 0.21	19.09± 1.50	40.89± 15.04	0.22± 0.02	0.84± 0.40
Minty Menthol	55.68±	299.90±	551.64±	141.87±	3.24±	76.50±	110.65±	22.29±	19.39±	156.39±	1.65±	1.37±

	4.66	363.10	578.53	50.65	2.28	100.36	132.28	1.35	0.41	155.41	0.75	1.23
Strawberry Jam	25.94± 3.31	1.19± 0.29	117.78± 11.88	108.09± 0.86	1.81± 0.54	7.98± 0.53	6.94± 0.08	22.09± 0.21	18.42± 0.32	70.74± 4.42	0.26± 0.10	0.15± 0.25
Blue Slushie	44.33± 4.52	15.14± 11.95	134.50± 13.18	105.69± 3.10	1.63± 0.06	3.21± 0.32	32.11± 2.89	110.86± 9.20	19.02± 0.67	43.15± 10.20	1.68± 0.22	ND
Pink Punch Lemonade	18.30± 9.90	1.84± 0.94	129.47± 14.94	122.47± 6.27	1.86± 0.54	2.42± 0.46	9.03± 1.66	22.20± 0.16	18.35± 0.18	81.36± 60.95	0.48± 0.21	ND
Brain Freeze	22.39± 3.01	2.17± 0.88	159.32± 31.33	106.60± 2.05	2.07± 1.08	5.56± 0.26	7.14± 0.55	22.35± 0.19	23.27± 6.76	54.21± 17.85	0.85± 0.27	ND

FA: formaldehyde, AA: acetaldehyde, Ac: acetone, Acr: acrolein, PA: propionaldehyde, CA: crotonaldehyde, MAcr: methacrolein, GA: glyoxal, MGA: methylglyoxal, ND: not detected.

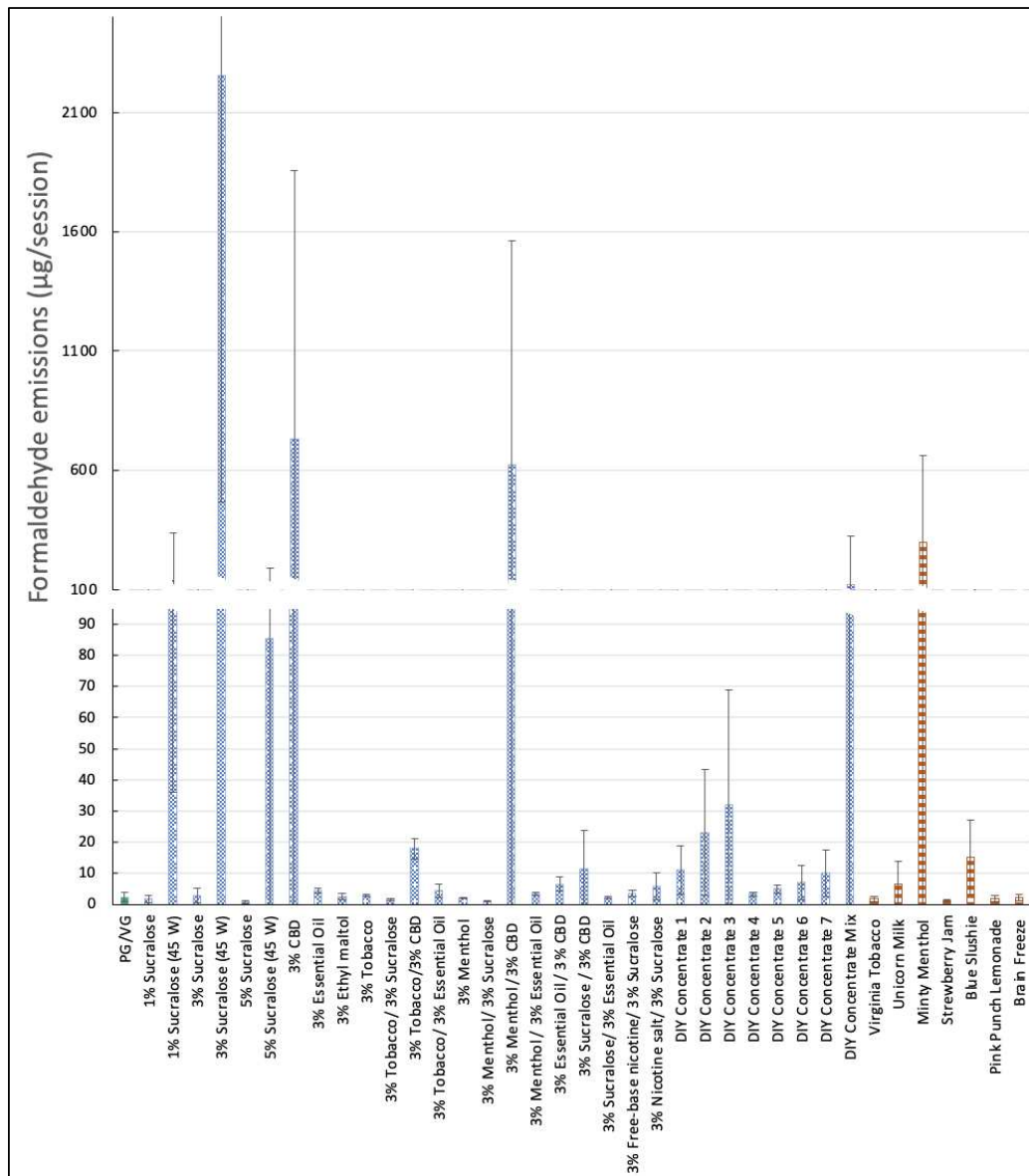


Figure S1. Formaldehyde emissions from 27 lab-prepared DIY e-cigarette liquids (dotted fill) in comparison to unflavored PG/VG liquid (solid fill) and 7 commercially available flavored e-liquids (horizontal stripes), all generated at 30W. Emissions from e-liquids with different levels of sucralose at 45W were added for comparison.

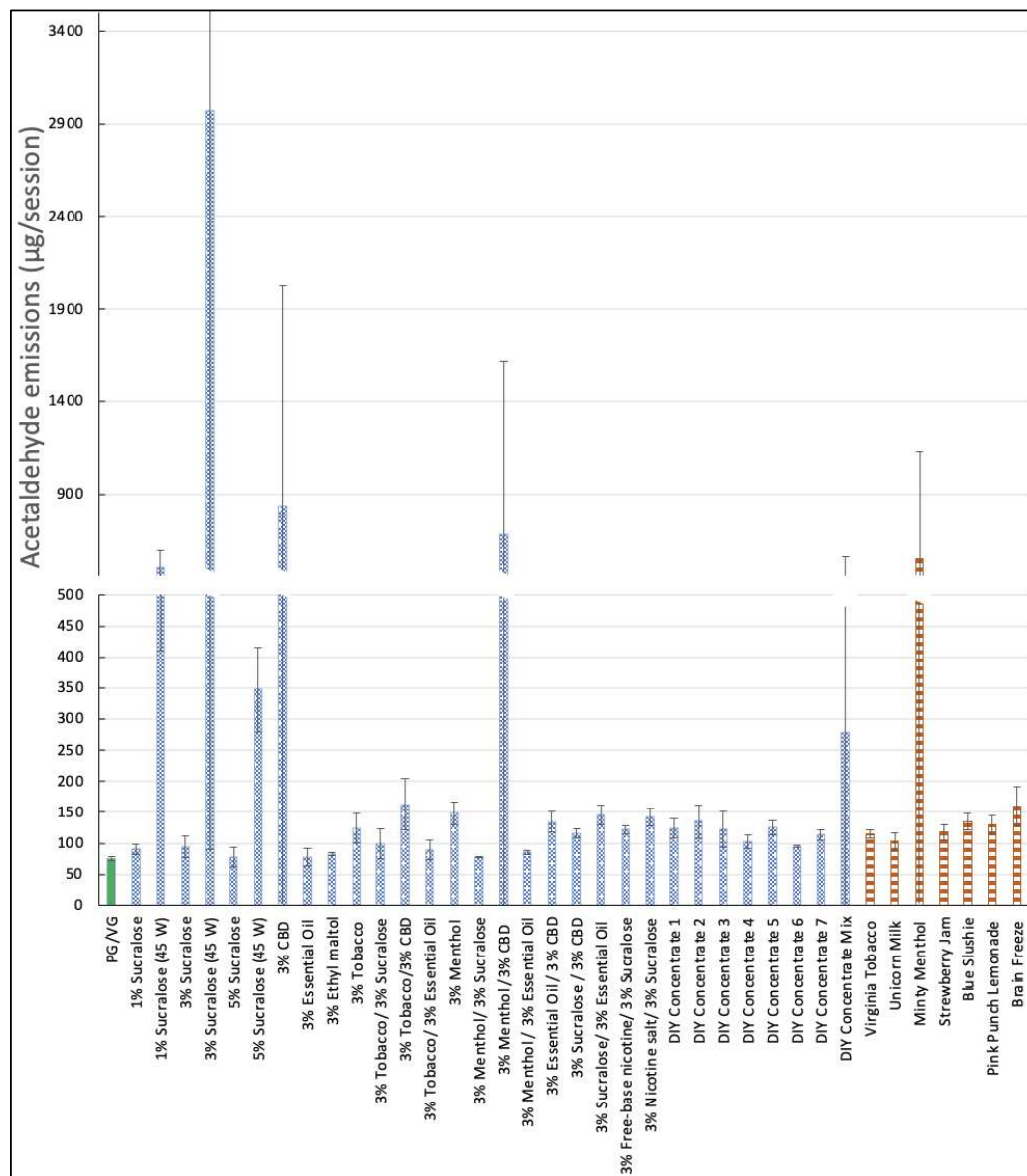


Figure S2. Acetaldehyde emissions from 27 lab-prepared DIY e-cigarette liquids (dotted fill) in comparison to unflavored PG/VG liquid (solid fill) and 7 commercially available flavored e-liquids (horizontal stripes), all generated at 30W. Emissions from e-liquids with different levels of sucralose at 45W were added for comparison.

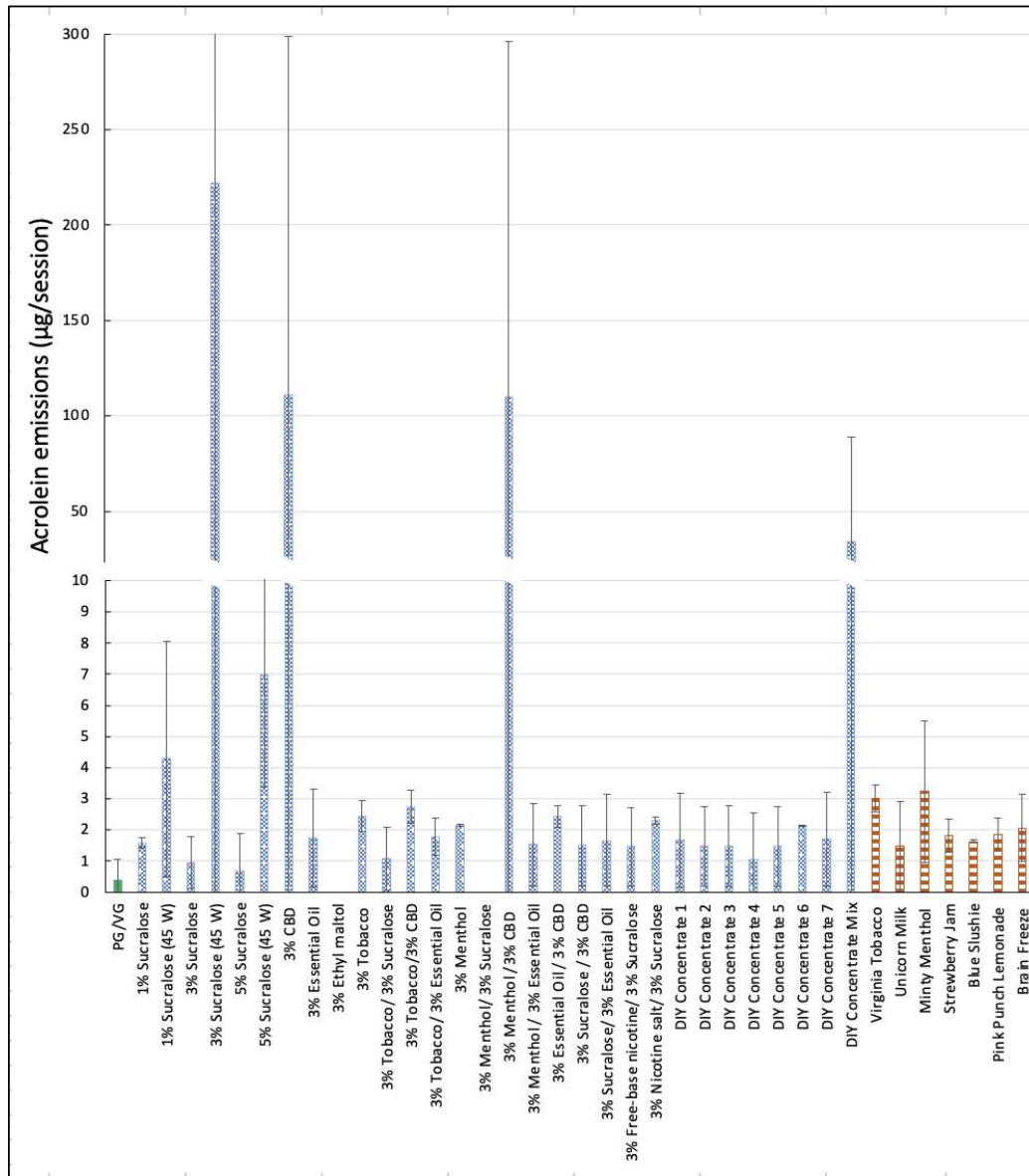


Figure S3. Acrolein emissions from 27 lab-prepared DIY e-cigarette liquids (dotted fill) in comparison to unflavored PG/VG liquid (solid fill) and 7 commercially available flavored e-liquids (horizontal stripes), all generated at 30W. Emissions from e-liquids with different levels of sucralose at 45W were added for comparison.

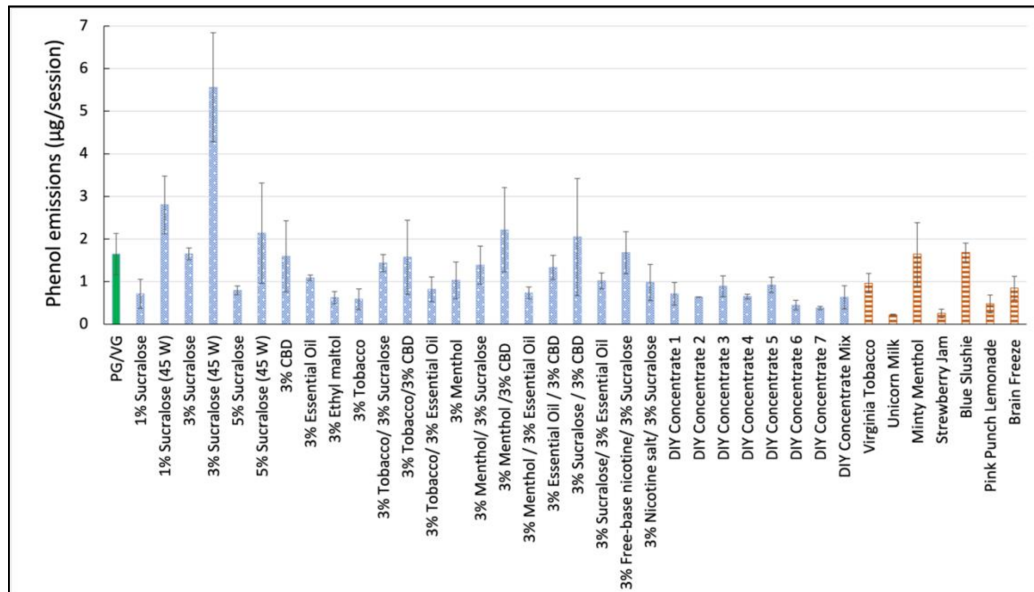


Figure S4. Phenol emissions from 27 lab-prepared DIY e-cigarette liquids (dotted fill) in comparison to unflavored PG/VG liquid (solid fill) and 7 commercially available flavored e-liquids (horizontal stripes), all generated at 30W. Emissions from e-liquids with different levels of sucralose at 45W were added for comparison.