SUPPORTING INFORMATION

Emissions from electronic cigarettes: Key parameters affecting the release of harmful chemicals.

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10 pages, 5 figures, 3 tables

Figure S1: Schematic description of vaporizers ("clearomizers") used in this study

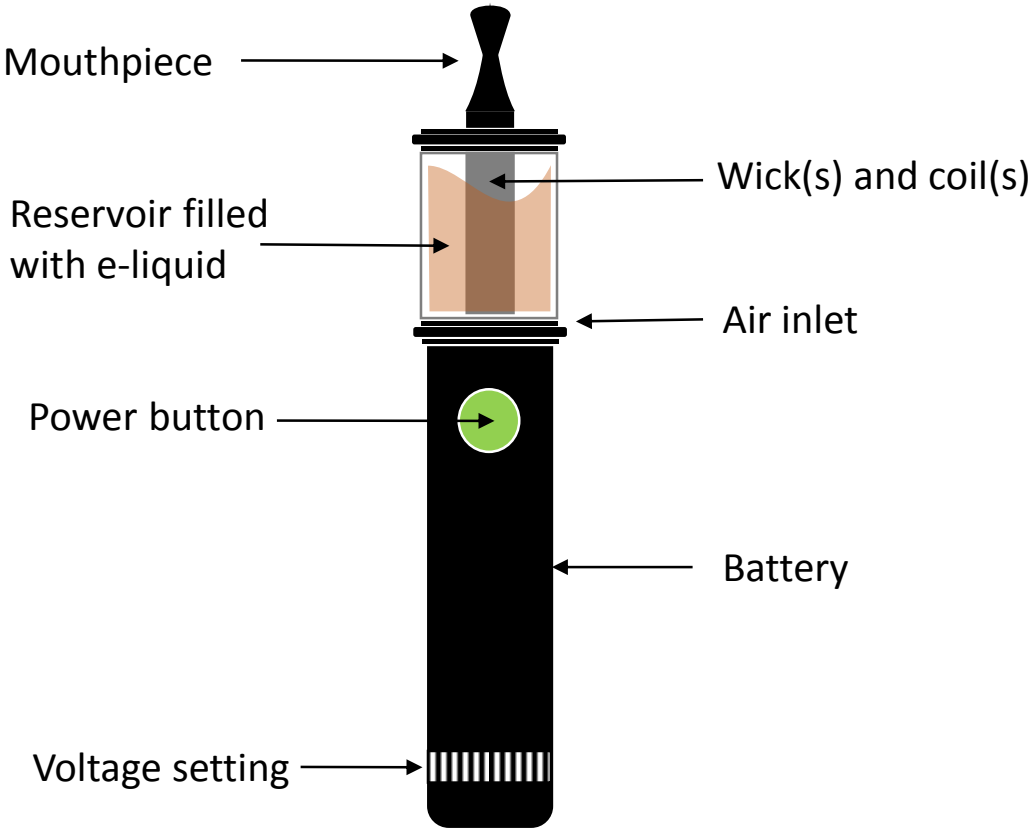
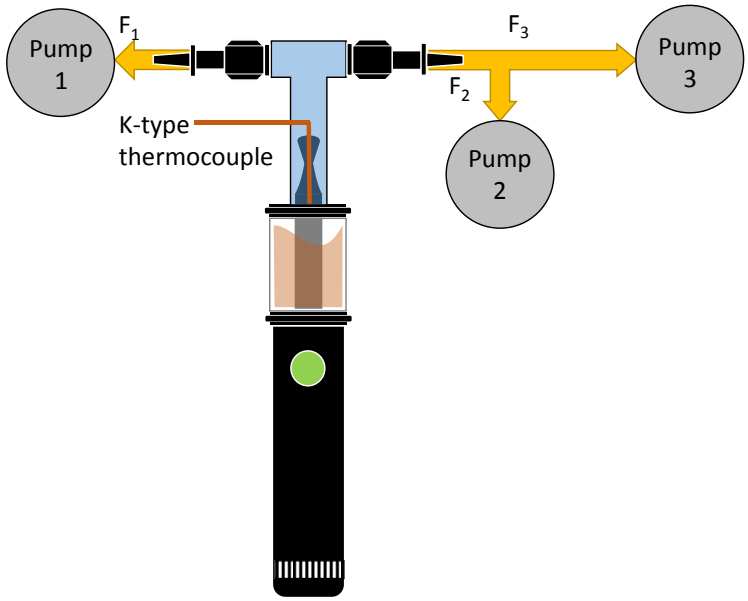


Figure S2: Schematic representation of "vaping machine" during (A) puffing only, and (B) puffing and sampling.

The air flows represented in both figures are: F_1 = 200 mL min^{-1}; F_2 = 70 mL min^{-1}; and F_3 = 330 mL min^{-1}.

(A)



(B)

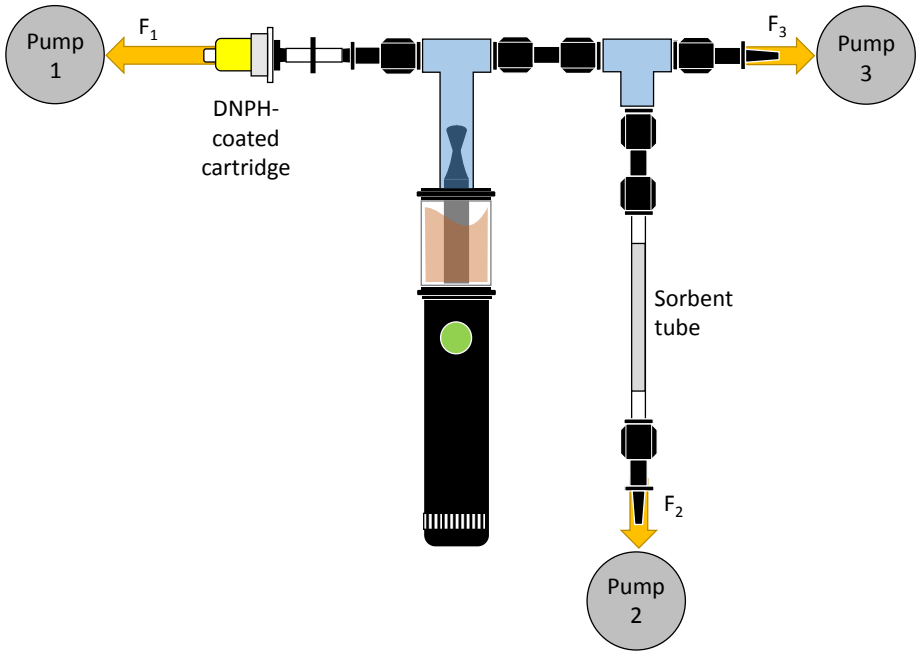


Figure S3: Trace constituents in e-liquids by (A) TD-GC/MS and (B) DNPH/HPLC

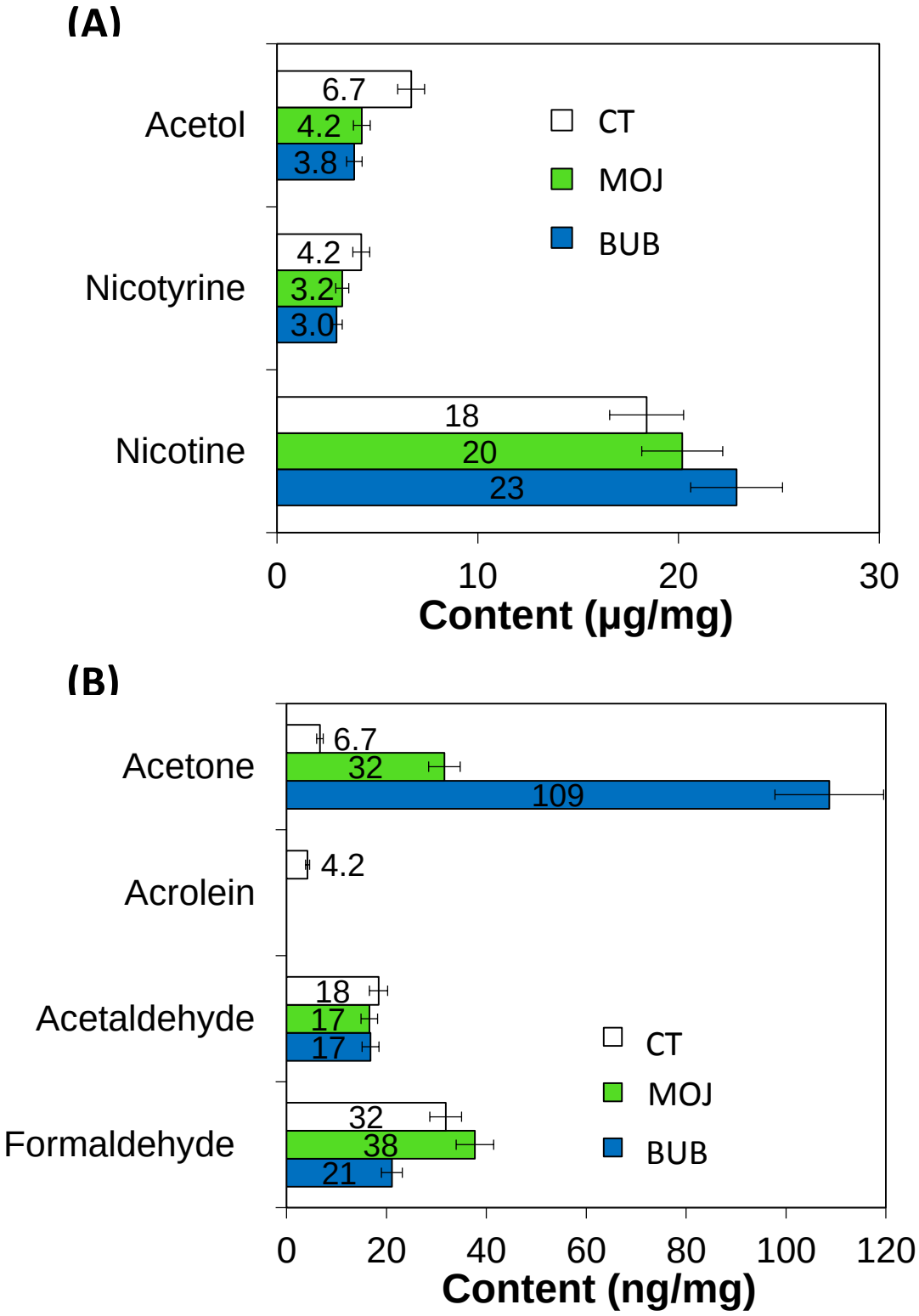


Table S1: Summary of emission factors of analytes found in mainstream vapor, and mass of e-liquid consumed per puff

Battery setting	3.8 V								4.8 V					
Clearomizer	EGO		AERO		EGO		EGO		EGO		EGO		EGO	
E-liquid	CT		CT		VG		PG		CT		MOJ		BUB	
Regime	initial	st-state	initial	st-state	initial	st-state	initial	st-state	initial	st-state	initial	st-state	initial	st-state
Emission rates, expressed in mass of compound emitted per mass of e-liquid consumed (ng mg^{-1})														
Formaldehyde	2900	8950	2440	1300	61	13078	230	4660	7250	48200	6510	23490	2180	18860
Acetaldehyde	230	1820	270	260	13	1707	70	6360	740	19080	2130	9900	310	9260
Acrolein	90	1700	40	120	4	1299	nd	130	400	10060	1140	5370	130	4240
Acetone	30	410	70	70	22	108	30	310	80	1410	160	420	60	490
Propanal	10	50	30	30	nd	105	20	1600	60	3200	270	1270	40	1490
Crotonaldehyde	10	20	20	10	nd	195	nd	nd	60	720	150	340	40	370
Methacrolein	10	30	30	50	6	257	nd	120	80	50	220	510	20	460
Butyraldehyde	nd	30	30	40	nd	28	10	nd	20	nd	nd	40	20	40
2-Butanone	50	660	20	50	3	15	10	30	10	1890	60	790	nd	710
Benzaldehyde	2	20	40	50	9	30	10	50	10	110	nd	40	10	20
Valeraldehyde	1	10	20	30	20	131	nd	150	10	530	40	230	10	130
p-Tolualdehyde	10	180	50	20	8	448	40	nd	10	6260	560	2660	10	1810
Hexaldehyde	70	870	70	90	17	1032	20	270	490	4450	800	530	160	2060
Furan, 2 methyl	12	258	3	6	nd	nd	nd	nd	8	nd	20	nd	64	131
2-propen-1-ol	101	326	51	54	17	54	15	821	84	nd	281	612	86	591
Diacetyl	167	438	70	92	7	28	18	93	293	433	220	404	27	267
Benzene	151	362	21	34	68	110	54	78	133	412	198	440	112	390
Acetol	1444	1371	503	297	87	285	198	1286	1170	2969	727	3030	152	2394
Glycidol	203	380	35	49	32	353	nd	nd	138	530	152	758	205	485
Nicotine	13144	23890	7919	19765	nd	nd	nd	nd	7575	22650	5303	23390	4941	13895
Nicotyrine	3459	6287	2084	2833	nd	nd	nd	nd	1953	6074	1580	6969	1934	5439
Methyl glyoxal										131		181		126
Methyl ethyl ketone										119		67	20	56

3-ethenyl pyridine										701		320		217
Vanilin										195				
D-Limonene												663		430
Eucalyptol												136		
Butanoic acid, ethyl ester													1622	469
α-cetone													355	353
Hydrocoumarin													227	172
Butanoic acid, 3-methyl butyl ester													1515	576
Mass per puff (mg)														
	5.1		8.2		6.4		6.3		7.1		7.9		8.3	

nd: not detected

Table S2: Duplicate determinations of analyte concentrations in the vapor generated by an EGO device filled with CT e-liquid

		Battery setting			
		3.3 V	**3.8 V**	**4.3 V**	**4.8 V**
Formaldehyde	Measurement #1 (µg per puff)	46	45.4	34.9	93
	Measurement #2 (µg per puff)	61	45.9	35.0	101
	Mean (µg per puff)	53	45.7	35.0	97
	Diference (µg per puff)	15	0.5	0.1	8
	Relative difference (%)	*28*	*1.1*	*0.3*	*7.8*
Acetaldehyde	Measurement #1 (µg per puff)	6	9.2	30.8	52
	Measurement #2 (µg per puff)	14	9.2	32.7	48
	Mean (µg per puff)	10	9.2	31.8	50
	Diference (µg per puff)	8	0.0	1.9	4
	Relative difference (%)	*85*	*0.0*	*6.0*	*7.4*
Acrolein	Measurement #1 (µg per puff)	2	8.6	16.5	23
	Measurement #2 (µg per puff)	4	8.4	15.0	20
	Mean (µg per puff)	3	8.5	15.8	21.5
	Diference (µg per puff)	2	0.2	1.5	3
	Relative difference (%)	*60*	*2.4*	*9.5*	*13*
Nicotyrine	Measurement #1 (µg per puff)		32		
	Measurement #2 (µg per puff)		31		
	Mean (µg per puff)		31.5		
	Diference (µg per puff)		1		
	Relative difference (%)		*3.5*		
Glycidol	Measurement #1 (µg per puff)		1.9		
	Measurement #2 (µg per puff)		2.2		
	Mean (µg per puff)		2.1		
	Diference (µg per puff)		0.3		
	Relative difference (%)		*13*		
Acetol	Measurement #1 (µg per puff)		6.9		
	Measurement #2 (µg per puff)		8.3		
	Mean (µg per puff)		7.6		
	Diference (µg per puff)		1.3		
	Relative difference (%)		*17*		
Diacetyl	Measurement #1 (µg per puff)		2.2		
	Measurement #2 (µg per puff)		2.2		
	Mean (µg per puff)		2.2		
	Diference (µg per puff)		0		
	Relative difference (%)		*1.2*		

Figure S4: Emission factors for experiments using both devices at 3.8 V and the CT e-liquid, expressed in micrograms per puff

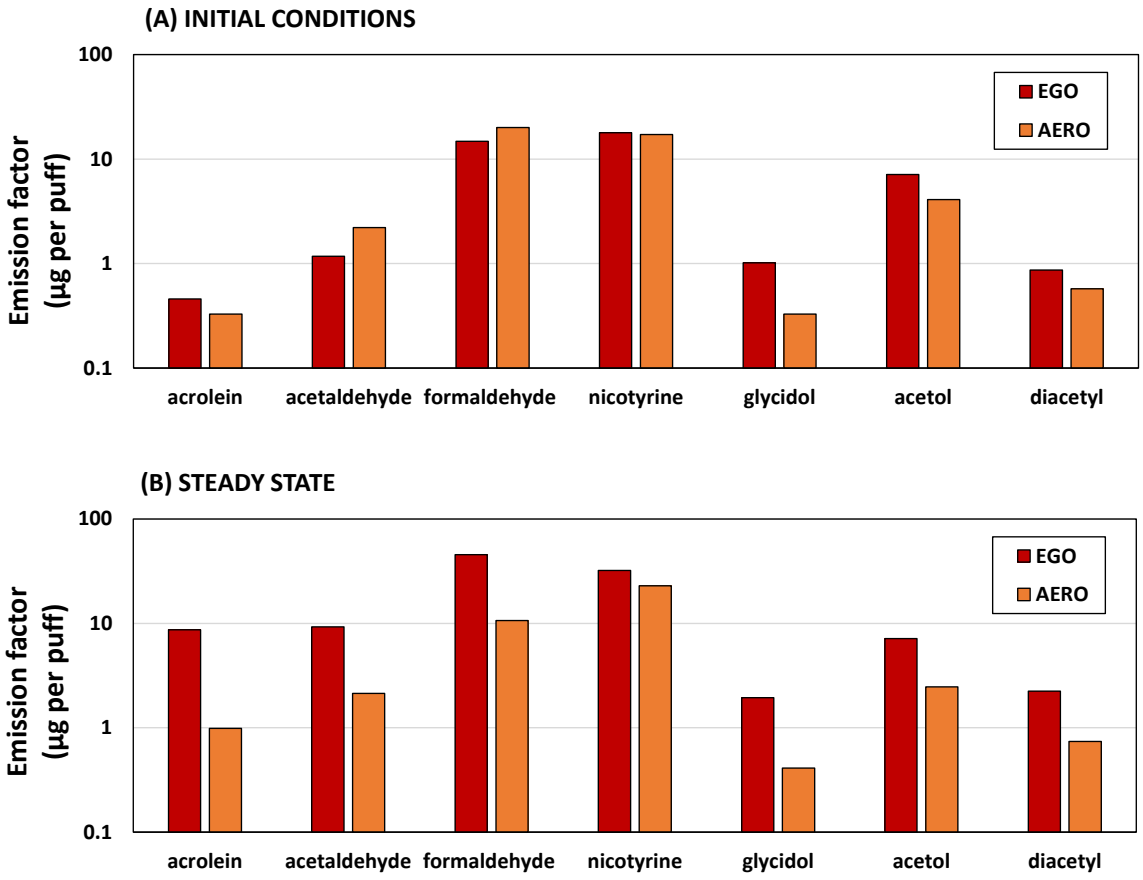


Figure S5: Steady-state emission factors for the three e-liquids consumed in the EGO clearomizer at a voltage of 4.8 V

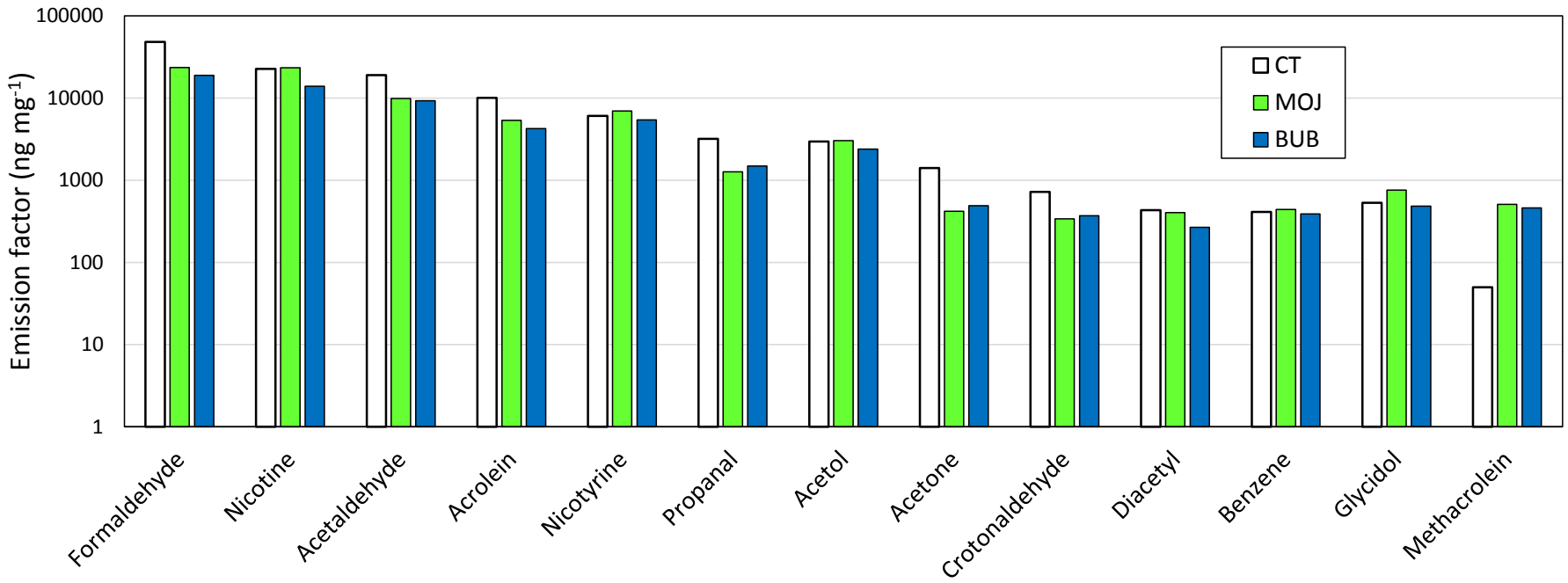


Table S3: Emission factors of analytes found in mainstream vapor operating an EGO clearomizer at 3.8 V

Analyte	PG	5% Glycidol in PG	VG	CT
	mass of compound emitted per mass of liquid consumed (ng mg^{-1})			
Formaldehyde	4660	7328	13078	8950
Acetaldehyde	6360	9492	1707	1820
Acrolein	130	522	1299	1700