Supplementary file

Table S1. Summary of studies included in this review that assess e-liquid constituents. Organized by greatest number of samples indicating presence. Unavailable LOD/LOQ values are not reported.

First Author (Year)	Number of samples	Ranges of identified constituents (samples)	LOD or LOQ
Beauval (2017)	6	**Constituents (mg/mL)** PG: 541 - 639 (6) Glycerol: 302 - 341 (6) Nicotine: 15.8 - 16 (3) **Trace elements (ng/mL)** Aluminum: 10 - 15 (6) Antimony: 1.2 - 1.5 (6) Chromium: 4.1 - 7.7 (6) Arsenic: 1.5 (2) Cobalt: 0.22 - 0.27 (2) Copper: 25 - 32 (2) Manganese: 3.1 - 3.3 (2) Vanadium: 0.44 - 0.64 (2) **Pesticides (pg/mL)** Chlorpyrifos ethyl: 32.1 - 66.3 (3) TrifluralinL 25.3 - 24.7 (2) **PAHs (ng/mL)** Phenanthrene: 2.43 - 3.83 (6) Fluorene: 0.21 - 0.57 (5) Naphthalene: 4.24 - 61.8 (5) Acenaphthylene: 0.03 - 0.05 (4) Acenaphthene: 0.43 - 1.12 (3) Chrysene: 0.02 - 0.03 (3) Fluoranthene: 0.05 - 0.08 (4) Benzo[b]fluoranthene: 0.02 - 0.03 (2) Benzo[a]pyrene: 0.02 (1) Benzo[g,h,i]perylene: 0.07 (1)	**Constituents (mg/mL)** PG: 31.25 Glycerol: 12.5 Nicotine: 2 **Trace elements (ng/mL)** Aluminum: 4 Antimony: 0.1 Chromium: 3.7 Arsenic: 1 Cobalt: 0.1 Copper: 20 Manganese: 1.6 Vanadium: 0.4 **Pesticides (pg/mL)** Chlorpyrifos ethyl: 20 Trifluralin: 20 **PAHs (ng/mL)** Phenanthrene: 0.20 Fluorene: 0.20 Naphthalene: 0.20 Acenaphthylene: 0.02 Acenaphthene: 0.20 Chrysene: 0.02 Fluoranthene: 0.05 Benzo[b]fluoranthene: 0.02 Benzo[a]pyrene: 0.02 Benzo[g,h,i]perylene: 0.05
Czoli (2019)	166	**No ranges given for identified compounds** 1-Methyl naphthalene (115) 2-Methyl naphthalene (104) Isoquinoline (69)	**Tobacco-specific nitrosamines (ng/mL)** NNN: 0.5 NAT: 0.5

		Menthol (41) Ethyl vanillin (37) Benzaldehyde (36) Vanillin (36) Benzyl alcohol (33) Ethyl maltol (31) Terpineol (26) Triacetin (13) Anisaldehyde (11) Valeric anhydride (11) Gamma-decalactone (10) Methyl, 3-hydroxy-hexanoate (10) Cyclotene (3-methyl-1, 2-cyclopentanedione) (10) Creosol (10) Trimethylpyrazine (9) Rheosmin (9)	NAB: 0.5 NNK: 0.5
Famele (2017)	95	**Minor alkaloids; present in all samples with nicotine (n=58); no ranges given for identified compounds** Nicotine-N′-oxides (58) Myosmine (58) Cotinine (58) Anatabine (58) β-nicotyrine (58) Anabasine (58)	**Minor alkaloids (µg/m³)** Nicotine-N′-oxides: 0.1 Myosmine: 0.1 Cotinine: 0.1 Anatabine: 0.2 β-nicotyrine: 0.2 Anabasine: 1.6
Farsalinos, Gillman (2015)	21 (n = 10 conventional liquids) (n = 11 NET liquids)	**Tobacco-specific nitrosamines (ng/mL)** *Conventional Liquids:* NNK: 3.2 - 6.8 (10) NNN: 0.5 - 4.4 (5) *NET Liquids:* NNK: 3.2 - 10.8 (11) NNN: 0.5 - 16.7 (8) **Other Constituents** *Conventional Liquids:* Formaldehyde: 0.73 - 6.21 (9) Acetaldehyde: 0.75 - 20.06 (7) Nitrate: 7.5 - 15.4 (2) o-Cresol: 4.40 - 5.46 (2) m-Cresol: 0.32 - 0.45 (2) Phenol: 1.42 (1)	**Tobacco-specific nitrosamines (ng/mL)** NNN (1) NNK (1) **Other Constituents (µg/mL)** Nitrate (2.5) Catechol (0.05) m-Cresol (0.05) o-Cresol (0.05) p-Cresol (0.05) Phenol (0.05) Acetaldehyde (0.12) Formaldehyde (0.12)

		p-Cresol: 0.69 (1) *NET Liquids:* Formaldehyde: 1.71 - 27.95 (11) Nitrate: 11.5 - 159.9 (9) m-Cresol: 0.13 - 5.31 (4) Phenol: 0.8 - 3.65 (4) o-Cresol: 0.16 - 1.40 (4) Acetaldehyde: 0.45 - 1.73 (3) p-Cresol: 0.22 - 1.03 (3) Catechol: 1.71 (2)	
Farsalinos, Kistler (2015)	159 (n = 113 "ready to use" liquids) (n = 46 concentrated flavors)	**Values in (µg/mL)** Diacetyl: 10-170 (110) Acetyl Propionyl: 7-172 (53)	N/A
Girvalaki (2018)	122	**No ranges given for identified compounds:** Menthol (48) Ethyl maltol (44) Linalool (38) Methyl cyclopentanolone (30) Nonanal (27) oximine-,methoxy-phenyl (26) β-damascone (23) Ethyl vanillin (22) 1-Butanol, 3-methyl-, acetate (20) Phenol, 2,4-bis(1,1-dimethylethyl) (17) 3-Hexen-1-ol, acetate, (Z)- (16) Benzenemethanol (14) b-ionine (13) Phenol, 3,5-bis(1,1-dimethylethyl)- (13) Acetyl pyrazine (12) Cyclohexanol, 5-methyl-2-(1-methyl-ethyl)-, [1S-(1.alpha.,2.alpha.,5.beta.)]- (12)	N/A

		Cyclohexanone, 5-methyl-2-(1-methyl-ethyl)-, cis- (12) a-ionine (11) 1,8-Cineole (eucalyptol) (11) (+)-.alpha.-Terpineol (p-menth-1-en-8-ol) (11) Butanoic acid, 2-methyl-, ethyl ester (11) 1,3-Dioxolance, 4-methyl-2-phenyl (10) Z-Citral (10) Ethyl hexanoate (10) Acetic acid, hexyl ester (9) 2(3H)-Furanone, 5-heptyldihydro- (9) 2,6-Octadienal, 3,7-dimethyl-, (E)- (8)	
Hahn (2014)	54	**Values in (g/100 g)** Glycerol: 0.3 - 95 (54) PG: 0.4 - 98 (54) Nicotine: N/A (34) Ethyl vanillin: N/A (13) 1,3-Propanediol: 3.3 - 10 (7) Thujone: N/A (2) Ethylene glycol N/A (N/A)	**Values in (mg/L)** Glycerol: 2.6 PG: 2.1 Nicotine: 1.67 Ethyl vanillin: 1.0 1,3-Propanediol: 0.96 Thujone: 3.4 Ethylene glycol: 0.17
Han (2016)	55	**Constituents (mg/mL)** Nicotine: 0.13 - 36.12 (52) PG: 4.8 - 78.88 (55) VG: 4.76 - 48.37 (55) Anabasine: 0.004 - 0.144 (43) Anatabine: 0.006 - 0.184 (42) Myosmine: 0.003 - 0.088 (42) Solanesol: 0.060 - 49.26 μg/g (22) Cotinine: 0.004 - 0.72 (20) Menthol: 0.42 - 2.70 (16) Noronicotine: 0.023 - 0.263 (15) Triethylene glycol: 2.99 (1) **Minor tobacco alkaloids (ng/g)** NAB: 0.51 - 2.27 (43) NNK: 5.56 - 6.88 (2) NAT: 0.93 - 3.80 (2)	N/A

		Phenolic compounds (µg/g) Phenol: 0.080 - 1.23 (40) m(p)-cresol: 0.040 - 0.43 (25) o-cresol: 0.070 - 4.31 (18) o-dihydroxybenzene: 0.39 - 0.45 (3) p-dihydroxybenzene: 0.10 (1) **Carbonyl compounds (µg/g)** Formaldehyde: 0.31 - 17.22 (55) Acetaldehyde: 0.036 - 15.61 (54) Acetone: 0.080 - 1254.42 (52) Propionic aldehyde: 0.12 - 7.73 (6) Butyraldehyde: 0.13 - 7.30 (6) **VOCs (µg/g)** m(p)-xylene: 0.39 - 31.85 (55) Benzene: 0.11 - 13.20 (55) o-xylene: 0.13 - 17.31 (51) Ethylbenzene: 0.11 - 11.43 (43) Toluene: 0.10 - 16.09 (32) Styrene: 0.04 - 8.56 (21) 2,5-dimethylfuran: 0.25 - 3.42 (7) Benzaldehyde: 1.25 - 4.38 (3) 2-methylfuran: 0.61 - 1.65 (3) 1,3-pentadiene: 0.56 (1) **PAHs (ng/g)** Benzo[a]anthrene: 0.61 - 2.45 (14) Fluoranthene: 1.73 - 9.44 (13) Chrysene: 0.52 - 2.18 (13) Anthracene: 3.97 - 6.80 (12) Naphthalene: 4.59 - 5.85 (12) Benzo[b]fluorathene: 1.40 - 2.36 (11) Benzo[g,h,i]perylene: 0.65 - 2.10 (10) Pyrene: 1.75 - 12.13 (9) Indeno[1,2,3-c,d]pyrene: 0.79 - 2.30 (9)	

		Benzo[a]pyrene: 1.06 - 2.44 (8) Phenanthrene: 2.91 - 10.50 (7) Acenaphthene: 1.86 - 2.98 (7) Benzo[k]fluorathene: 1.06 - 2.33 (7) Fluorene: 4.13 - 6.13 (5) Acenaphthylene: 2.75 - 3.00 (4) Dibenzo[a,h]anthrene: 0.71 - 1.68 (3)	
Hutzler (2014) *For the appendices, we did not include all constituents identified in this study, as 141 constituents were reported. We have listed identifying samples of n>2. However, the constituents identified in this study (even at less than 2) may be present in Table 1.*	28	**No ranges given for identified compounds:** Vanillin (22) Ethyl maltol (16) Ethyl vanillin (14) Menthol (12) Piperonal (7) Damascenone (α or β) (7) 3-Methyl-1,2-cyclopentanedione (6) Acetamide (6) Linalool (6) Trimethylpyrazine (6) Terpineol (5) Eugenol (5) Piperonal PG acetal (5) Citral (5) Corylon (5) Anisaldehyde PG acetal (4) Benzaldehyde (4) Benzyl benzoate (4) Coumarin (4) γ-Octalactone (4) 1,2-Hexanediol (3) Acetylpyrazine (3) Anisaldehyde (3) Benzophenone (3) Benzyl alcohol (3) Diisobutyl phthalate (3) Phenylethyl alcohol (3) Benzyle acetate (3) Pulegone (3)	N/A
Kamilari (2018)	22	**Metals (µg/g)** Copper: 0.004 - 0.025 (22) Lead: 0.001 - 0.005 (22)	N/A

		Chromium: 0.003 - 0.036 (21) Nickel: 0.002 - 0.017 (21)	
LeBouf (2018)	146	**No ranges given for identified compounds:** Ethanol (139) Acetaldehyde (89) d-Limonene (79) Isopropyl alcohol (75) Acetone (74) Diacetyl (67) α-Pinene (56) 2,3-Pentanedione (28) Benzene (20) m,p-xylene (16) Toluene (13) o-Xylene (6) 2,3-Hexanedione (4) Methylene chloride (4) Ethylbenzene (3) Methyl methacrylate (3) n-Hexane (2) Acetonitrile (1) Styrene (1) Ethyl acetate (11) Ethyl butanoate (91) Ethyl propionate (58) Ethyl 2-methylbutanoate (53) Isoamyl acetate (41) β-Pinene (34) 2-Methylbutyl acetate (29) Isopentyl isovalerate (28) Isobutyl acetate (28) p-Cymene (26) Ethyl 3-methylbutanoate (23) γ-Terpinene (23) 1,3-Dioxolane, 2,2,4-trimethyl (22) Ethyl hexanoate (19) Benzaldehyde (18) Hexyl acetate (15) Isobutyl isovalerate (15) Pentyl acetate (13) Cyclohexanone, 5-methyl-2-(1-methylethyl)-, (2R-cis) (12) Camphene (12)	Ethanol: 225 ppb Acetaldehyde: 106 ppb d-Limonene: 275 ppb Isopropyl alcohol: 189 pp Acetone: 275 ppb Diacetyl: 102 ppb α-Pinene: 161 ppb 2,3-Pentanedione: 141 ppb Benzene: 102 ppb m,p-Xylene: 114 ppb Toluene: 126 ppb o-Xylene: 102 ppb 2,3-Hexanedione: 251 ppb Methylene chloride: 98 ppb Ethylbenzene: 138 ppb Methyl methacrylate: 98 ppb n-Hexane: 169 ppb Acetonitrile: 134 ppb Styrene: 181 ppb

		β-Ocimene (10) α-Thujene (9) 1,1-Diethoxyethane (7) Terpinolene (7) 4-Hexen-1-ol, acetate (7) (Z)-Ocimene (7) 2-Heptanone (7) Butyl isovalerate (7) Methylcyclopentane (7) Phellandral (6) 1,8-Cineole (6)	
Lisko (2015)	36	**No ranges given for identified compounds:** Nicotine (29) **Minor tobacco alkaloids** Nornicotine (30) Myosmine (30) Anabasine (30) Anatabine (30) Isonicoteine (30) **Flavorings** Menthol (12) Pulegone (8) Camphor (7) Eucalyptol (5) Cinnamaldehyde (4) Ethyl salicylate (1)	N/A
Lisko (2017)	44	Caffeine: 3.3 - 9,290 μg/g (25)	0.04 μg/g
Peace (2017)	3	**No ranges given for identified compounds:** PG (3) VG (3) Ethanol (3) MDMB-FUBINACA (3) **Flavorings** Raspberry ketone (2) Raspberry ketone PG (2) Amyl isovalerate (1) Ethyl butanoate (1) Ethyl 3-hydroxybutanoate (1) Ethyl Isovalerate (1) Ethyl maltol (1)	N/A

		Ethyl phenyl acetate (1) Folione (1) Glycerin (1) Hydrocinnamic acid (1) 5-Hydroxymethylfurfural (1) Isovanillin (1) Linalool (1) Methyl anthranilate (1) Peace lactone (1) Triethyl citrate (1)	
Sleiman (2016)	3	**Values in (mg/mL)** PG: 441 - 531 (3) VG: 414 - 470 (3) Nicotine: 20.4 - 32.1 (3) Ethanol: 135 - 245 (3) Propylene oxide: 4.2 - 6.7 (3) Acetol: 4.1 - 7.7 (3) **Flavorings; no ranges given for identified compounds:** 3-hexene-1-ol (2) Isopentyl alcohol (2) Vanillin (1) α-isomethylionone (1) α-irone (1) Trans-β-ionone (1) 1-pentanol (1) Benzyl alcohol (1) D-carvone (1) Linalool (1) Eucalyptol (1) α-terpineol (1) Acetic acid (1) **Carbonyls; no ranges given for identified compounds:** Formaldehyde (3) Acetaldehyde (3) Acetone (3) Acrolein (1)	N/A
Tierney (2015)	30	**Values in (mg/mL)** Vanillin: 0.1 - 33.0 (15) Ethyl maltol: 0.3 - 27.1 (10) Ethyl vanillin: 0.2 - 8.4 (10) Maltol: 0.8 - 6.2 (8)	N/A

		Ethyl butyrate: 0.1 - 11.1 (7) Benzyl alcohol: 0.1 - 8.4 (7) Ethyl acetate: 0.2 - 7.2 (6) Menthol: 5.7 - 21.6 (4) Benzaldehyde: 0.6 - 21.2 (3) Limonene: 0.7 - 2.9 (3) 2-Methylbutyl acetate: 0.6 - 0.9 (3) Hexyl acetate: 1.7 - 2.5 (2) Methyl anthranilate: 1.0 - 1.3 (2) Menthone: 0.6 - 0.9 (2) Piperonal: 0.3 - 0.7 (2) (E)-2-Hexen-1-ol: 4.5 (1) (3Z)-3-Hexen-1-ol: 4.3 (1) Benzaldehyde PG acetal: 0.9 (1) Ethyl isovalerate: 0.7 (1) 2356-Tetramethylpyrazine: 0.6 (1) Neomenthol: 0.6 (1) β-Damascone: 0.2 (1)	
Varlet (2015)	42	**Constituents (µg/g)** Ethylene glycol: 2.90 - 66.97 (31) Ethanol: 6 - 3,675 (30) Diethylene glycol: 0.6 - 4.0 (9) Hydrocarbons: 779 - 106,479 (5) **Aldehydes (µg/g)** Formaldehyde: 0.114 - 9 (42) Acetaldehyde: 0.04 - 10.2 (42) Benzaldehyde: 0.035 - 305 (30) Propionaldehyde: 0.043 - 0.261 (17) Hexladehyde: 0.046 - 0.532 (12) Butyraldehyde: 0.101 - 1.03 (8) Isovaleraldehyde: N/A (4) Acrolein: N/A (3) Crotonaldehyde: 0.067 - 0.084 (2) m-tolualdehyde: N/A (1)	**Constituents (µg/g)** Ethylene glycol: N/A Ethanol: N/A Diethylene glycol: 0.5 Hydrocarbons: 25 **Aldehydes (µg/g)** Formaldehyde: 0.06 Acetaldehyde: 0.03 Benzaldehyde: 0.035 Propionaldehyde: 0.043 Hexladehyde: 0.036 Butyraldehyde: 0.077 Isovaleraldehyde: 0.194 Acrolein: 0.111 Crotonaldehyde: 0.053 m-tolualdehyde: 0.018 p-tolualdehyde: 0.018 o-tolualdehyde: 0.017

		p-tolualdehyde: N/A (1) o-tolualdehyde: N/A (1) **Solvents (µg/g)** Ethyl acetate: 8 - 253 (10) Propanoic Acid, Ethyl ester: 6 - 123 (3) Diacetyl: 9 - 43 (3) 1,1-Diethoxy ethane: 11 - 40 (3) 2-Methyl-1,3-Dioxane: 41 - 57 (2) Acetone: 9 - 20 (2) 3-Methyl Butanal: 6 - 14 (2) Acetaldehyde/Ethylene oxide: 9 - 13 (2) Cyclohexane: 6 - 11 (2) Acetic acid, 2-methylpropyl ester: 26 (1) 3-Hydroxy-2-butanone: 16 (1) 1-Propanol: 16 (1) Butanoic acid, 2-Methyl-,Methyl ester: 12 (1) 1-Butanol: 10 (1) 1,3-Butadiene: 10 (1)	**Solvents** N/A
Wagner (2018)	13	No combustion-related HPHC's detected	**Values in (ng/g)** 1-aminonaphthalene: 1.0 2-aminonaphthalene: 1.8 4-aminobiphenyl: 0.3 1,3-butadiene: 0.7 isoprene: 1.7 acrylonitrile: 0.8 benzene: 0.7 toluene: 0.7 benzo[a]pyrene: 7

Table S2. Summary of studies included in this review that assess e-cigarette aerosol constituents. Organized by greatest number of samples indicating presence. Unavailable LOD/LOQ values are not reported.

First Author (Year)	Number of samples	Ranges of identified constituents (samples)	LOD or LOQ
Allen (2016)	51	**Values in (µg/EC)** Acetoin: 2.1 - 529.2 (46) Diacetyl: 0.3 - 238.9 (39) 2,3-pentanedione: 0.2 - 64.4 (23)	**Values in (µg/sample)** Acetoin: 0.05 Diacetyl: 0.05 2,3-pentanedione: 0.05
Beauval (2017)	6	**Humectants/Nicotine (µg/mL puff)** PG: 10 - 22.8 (6) Glycerol: 7.1 - 15.7 (6) Nicotine: 0.3 - 0.56 (3) **Trace elements (pg/mL puff)** Lead: 1.0 - 1.6 (4) Antimony: 0.14 - 0.47 (4) Chromium: 2.9 - 3.4 (3) Cadmium: 0.04 - 0.14 (2) **PAHs (pg/mL puff)** Naphthalene: 1.79 - 4.01 (6) Acenaphthylene: 0.19 - 0.37 (6) **Carbonyls (ng/mL puff)** Formaldehyde: 0.37-1.48 (6) Acetaldehyde: 0.16-0.96 (6) Acrolein: 0.11-2.11 (4)	**Humectants/Nicotine (µg/mL puff)** PG: 3.0 Glycerol: 3.4 Nicotine: 0.0038 **Trace elements (pg/mL puff)** Lead: 0.23 Antimony: 0.11 Chromium: 2.1 Cadmium: 0.02 **PAHs (pg/mL puff)** Naphthalene: 0.47 Acenaphthylene: 0.09 **Carbonyls (ng/mL puff)** Formaldehyde: 0.05 Acetaldehyde: 0.05 Acrolein: 0.05
Bekki (2014)	13	**Values in (µg/10 puffs)** Formaldehyde: 0.7 - 29 (9) Acetaldehyde: 0.2 - 26 (9) Acrolein: 0.6 - 20 (9) Methylglyoxal: 0.9 - 20 (8) Glyoxal: 0.7 - 16 (8) Propanal: 0.4 - 13.2 (8)	N/A
Czogala (2013)	12	Nicotine: 0.82-6.23 µg/m³ (12)	0.22 µg/m³
Famele (2017)	13	**Values in (µg/m³)** Nicotine: 1.4 - 4.0 (7) Nicotine-N′-oxides: 0.2 - 1.4 (7) Myosmine: 0.1 (3) Cotinine: 0.1 (1)	**Values in (µg/m³)** Nicotine: 0.1 Nicotine-N′-oxides: 0.1 Myosmine: 0.1 Cotinine: 0.1

Farsalinos, Kistler (2015)	3	**Values in (µg/mL)** Diacetyl: 349 - 7,546 (3) Acetyl Propionyl: 160 - 606 (3)	N/A
Goniewicz (2013)	12	**Carbonyls (µg)** Formaldehyde: 3.2 - 56.1 (12) Acetaldehyde: 2.0 - 13.6 (12) o-methylbenzaldehyde: 1.3 - 7.1 (12) Acrolein: 0.7 - 30.1 (10) **VOCs (µg)** Toluene: 0.2 - 6.3 (10) p,m-xylene: 0.1 - 0.2 (10) **Nitrosamines (ng)** NNN: 0.9 - 4.3 (9) NNK: 2.0 - 28.3 (9) **Heavy metals (µg)** Lead: 0.03 - 0.57 (12) Nickel: 0.11 - 0.26 (12) Cadmium: 0.02 - 0.22 (11)	N/A
Halstead (2019)	17	**Values in (ng/10 puffs)** Nickel: 0.459 - 9.63 (14) Copper: 1.28 - 488 (13) Stannum: 0.40 - 1.79 (10) Chromium: 0.231 - 1.85 (9) Zinc: 27.9 - 339 (8) Lead: 0.128 - 11.4 (8)	**Values in (ng/10 puffs)** Nickel: 0.250 Copper: 0.20 Stannum: 0.10 Chromium: 0.125 Zinc: 5.00 Lead: 0.05
Klager (2017)	26	**Aldehydes (µg/m³)** Acetaldehyde: 22.5 - 20,400 (26) Formaldehyde: 55.9 - 99,400 (24) Propionaldehyde: 18.6 - 1,470 (23) Benzaldehyde: 7.02 - 10,300 (17) Isobutyraldehyde: 97.8 - 3,900 (13) Valeraldehyde: 337 - 6,630 (7) Crotonaldehyde: 7,400 - 82,900 (4) **Flavoring chemicals (µg/m³)** Acetoin: 0.028 - 23.8 (17) Diacetyl: 0.028 - 3.69 (16) 2,3-pentanedione: 0.071 - 1.14 (5) 2,3-hexanedione: 0.809 - 3.15 (4) 3,4-hexanedione: 0.423 - 2.23 (3) 2,3-heptanedione: 0.09 - 5.33 (2)	**Aldehydes (µg/m³)** Acetaldehyde: 27.3 Formaldehyde: 5.77 Benzaldehyde: 9.81 Crotonaldehyde: 0 Isobutyraldehyde: 0 Propionaldehyde: 1.2 Valeraldehyde: 0 **Flavoring chemicals (µg/m³)** Acetoin: 0 Diacetyl: 0 2,3-pentanedione: 0 2,3-hexanedione: 0.784

			3,4-hexanedione: 0.400 2,3-heptanedione: 0
Kosmider (2016)	145	Benzaldehyde: 5.129 - 141.2 µg/30 puffs (108)	0.025 µg/30 puffs
Peace (2018)	4	**Ranges of constituents unavailable** Nicotine (4) PG (4) Ethyl Butyrate (4) Glycerin (3) Limonene (2) 1, 2, 3, Propanetriol, 1-acetate (1) 3-Hydroxy-2-methyl-5(prop-1-en-2yl) (1) Acetaldehyde (1) Acrolein (1) Amyl butyrate (1) Anethole (1) Benzaldehyde (1) Benzaldehyde, 4-methoxy (1) Benzaldehyde propylene glycol acetal (1) Carvone (3) Citronellol (1) Estragole (1) Ethyl Isovalerate (1) Ethyl Maltol (1) Ethyl-methyl-hydroxymethyl-amine (1) Ethyl Propionate (1) Geraniol (1) Maltol (1) Nicotone (1) Pinene (1) α-Terpineol (1) γ-Terpinene (1)	Nicotine: 10 ng/mL Remaining constituents: N/A
Schripp (2013)	3	**Values in (µg/m³)** 1,2-Propanediol: 53,000 - 175,000 (3) 1,2,3-Propanetriol: 161 - 477 (3) 3-Methylbutyl-3-methylbutanoate: 3 - 35 (3) Nicotine: 4 - 7 (3) Diacetin: 1 - 2 (3)	N/A
Sleiman (2016)	3	**Results are reported from steady state conditions for 4.8 V battery**	N/A

		setting (ng/mg) Formaldehyde: 18,860 - 48,200 (3) Nicotine: 13,895 - 23,390 (3) Acetaldehyde: 9,260 - 19,080 (3) Acrolein: 4,240 - 10,060 (3) Nicotyrine: 5,439 - 6,969 (3) p-Tolualdehyde: 1,180 - 6,260 (3) Hexaldehyde: 530 - 4,450 (3) Propanal: 1,270 - 3,200 (3) Acetol: 2,394 - 3,030 (3) 2-Butanone: 710 - 1,890 (3) Acetone: 420 - 1,410 (3) Glycidol: 485 - 758 (3) Crotonaldehyde: 340 - 720 (3) 3-ethenyl pyridine: 217 - 701 (3) Valderaldehyde: 130 - 530 (3) Methacrolein: 50 - 510 (3) Benzene: 390 - 440 (3) Diacetyl: 267 - 433 (3) Methylglyoxal:126 - 181 (3) Methyl ethyl ketone: 56 - 119 (3) Benzaldehyde: 20 - 40 (2) D-Limonene: 430 - 663 (2) 2-propen-1-ol: 591 - 612 (2) Butyraldehyde: 40 (2) Butanoic acid, 3-methyl butyl ester: 576 (1) Butanoic acid, ethyl ester: 469 (1) α-cetone: 353 (1) Vanilin: 195 (1) Hydrocoumarin: 172 (1) Eucalyptol: 136 (1) Furan, 2 methyl: 131 (1)	
Wagner (2018)	19 (n = 6 pre-filled cartridges) (n = 13 refill e-liquids)	No combustion-related HPHC's detected	1-aminonaphthalene: 3.0 ng/g 2-aminonaphthalene: 5.4 ng/g 4-aminobiphenyl: 0.8 ng/g 1,3-Butadiene: 3.2 µg/g Isoprene: 8.0 µg/g Acrylonitrile: 4.0 µg/g Benzene: 3.2 µg/g Toluene: 3.2 µg/g benzo[a]pyrene: 22 ng/g

Williams (2013)	3	**Values in (µg/10 puffs) - Sample size data not available** Sodium: 4.18 Boron: 3.83 Silicon: 2.24 Calcium: 1.03 Iron: 0.52 Aluminum: 0.394 Potassium: 0.292 Sulfur: 0.221 Copper: 0.203 Magnesium: 0.066 Zinc: 0.058 Tin: 0.037 Lead: 0.017 Barium: 0.012 Lithium: 0.008 Zirconium: 0.007 Chromium: 0.007 Strontium: 0.006 Nickel: 0.005 Manganese: 0.002 Titanium: 0.002	N/A