

Supplementary Table 1: VOC identities and prevalences among all vaping liquids (n=25)

Compound	CAS #	Prevalence (# of products)
Propylene glycol	4254-15-3	25
Ethanol*	64-17-5	13
Limonene*	138-86-3	12
alpha-Pinene	80-56-8	9
Ethyl butyrate	105-54-4	7
beta-Pinene	127-91-3	6
Eucalyptol	470-82-6	6
2-Heptyl-4-methyl-1,3-dioxolane	74094-61-4	4
Camphene	79-92-5	4
Ethyl acetate*	141-78-6	4
Ethyl propionate*	105-37-3	4
Hexyl acetate	142-92-7	4
Isoamyl acetate*	123-92-2	4
Isocaryophyllene	118-65-0	4
2-Methylbutyl acetate*	624-41-9	3
Butyl butyryl lactate	7492-70-8	3
Ethyl 2-methylbutyrate	7452-79-1	3
Isoamyl isovalerate	659-70-1	3
L-menthol	2216-51-5	3
2-Ethyl-4-methyl-1,3-dioxolane	4359-46-0	2
beta-Myrcene*	123-35-3	2
Butyl butyrate*	109-21-7	2
Butyl valerate	591-68-4	2
Ethyl hexanoate	123-66-0	2
Ethyl isovalerate	108-64-5	2
gamma-Terpinene	99-85-4	2
Hexyl hexanoate	6378-65-0	2
Isoamyl butylate	106-27-4	2
Isobutyl butyrate	539-90-2	2
m-Cymene	535-77-3	2
Terpinolene	586-62-9	2
(1S,2R,5R)-(+)-Isomenthol	23283-97-8	1
(S)-p-mentha-1,8-diene*	5989-54-8	1
(Z)-sabinene hydrate	15537-55-0	1

1,4-Cineole	470-67-7	1
1-Methyl-1-(4-methylenecyclohexyl)ethyl pentanoate	93836-53-4	1
2,2,6-Trimethyl-6-vinyltetrahydropyran	7392-19-0	1
2,3,6-Trimethyl-7-octen-3-ol	118989-21-2	1
2-Carene	554-61-0	1
2-Isopropyl-5-methylcyclohexanol	15356-60-2	1
2-Isopropyl-5-methylcyclohexyl acetate	20777-36-0	1
2-Methylbutyl 2-methylbutyrate	2445-78-5	1
2-Methylbutyl valerate	55590-83-5	1
2-Methyl-m-dioxane	626-68-6	1
4-Isopropyl-1-methyl-2-cyclohexen-1-ol	29803-82-5	1
Allyl hexanoate	123-68-2	1
alpha-Copaene	3856-25-5	1
alpha-Humulene	6753-98-6	1
alpha-Ionone	127-41-3	1
alpha-Phellandrene	99-83-2	1
Amyl acetate*	628-63-7	1
Amyl butyrate	540-18-1	1
beta-Bisabolene	495-61-4	1
beta-Bourbonene	5208-59-3	1
Butyl isovalerate	109-19-3	1
Butyric anhydride	106-31-0	1
cis-3-Hexenyl acetate	3681-71-8	1
Damascenone	23726-93-4	1
Diisopropoxymethane	2568-89-0	1
DL-menthyl acetate	16409-45-3	1
Ethyl 2,2-diethoxypropionate	7476-20-2	1
Hexyl formate	629-33-4	1
Isoamyl phenylacetate	102-19-2	1
Isomenthol acetate	20777-45-1	1
Isomenthone	491-07-6	1
Linalool	78-70-6	1
Methanol*	67-56-1	1
o-Cymene	527-84-4	1
Sabinene	3387-41-5	1
Terpinyl acetate	80-26-2	1
trans-alpha-Bergamotene	13474-59-4	1
trans-beta-Ionone	79-77-6	1
Undecane	1120-21-4	1

*Compound classified as potentially hazardous

Supplementary Table 2: VOC identities and prevalences among flavoured vaping liquids (n=20)

Compound	CAS #	Prevalence (# of products)
Propylene glycol	106-27-4	20
Ethanol*	64-17-5	13
Limonene*	138-86-3	12
alpha-Pinene	80-56-8	9
Ethyl butyrate	105-54-4	7
beta-Pinene	127-91-3	6
Eucalyptol	470-82-6	6
2-Heptyl-4-methyl-1,3-dioxolane	74094-61-4	4
Camphene	79-92-5	4
Ethyl acetate*	141-78-6	4
Ethyl propionate*	105-37-3	4
Hexyl acetate	142-92-7	4
Isoamyl acetate*	123-92-2	4
Isocaryophyllene	118-65-0	4
2-Methylbutyl acetate*	624-41-9	3
Butyl butyryl lactate	7492-70-8	3
Ethyl 2-methylbutyrate	7452-79-1	3
Isoamyl isovalerate	659-70-1	3
L-menthol	2216-51-5	3
2-Ethyl-4-methyl-1,3-dioxolane	4359-46-0	2
beta-Myrcene*	123-35-3	2
Butyl butyrate*	109-21-7	2
Butyl valerate	591-68-4	2
Ethyl hexanoate	123-66-0	2
Ethyl isovalerate	108-64-5	2
gamma-Terpinene	99-85-4	2
Hexyl hexanoate	6378-65-0	2
Isobutyl butyrate	539-90-2	2
m-Cymene	535-77-3	2
Terpinolene	586-62-9	2
Propylene glycol	4254-15-3	1
(1S,2R,5R)-(+)-Isomenthol	23283-97-8	1
(S)-p-mentha-1,8-diene*	5989-54-8	1
(Z)-sabinene hydrate	15537-55-0	1

1,4-Cineole	470-67-7	1
1-Methyl-1-(4-methylenecyclohexyl)ethyl pentanoate	93836-53-4	1
2,2,6-Trimethyl-6-vinyltetrahydropyran	7392-19-0	1
2,3,6-Trimethyl-7-octen-3-ol	118989-21-2	1
2-Carene	554-61-0	1
2-Isopropyl-5-methylcyclohexanol	15356-60-2	1
2-Isopropyl-5-methylcyclohexyl acetate	20777-36-0	1
2-Methylbutyl 2-methylbutyrate	2445-78-5	1
2-Methylbutyl valerate	55590-83-5	1
2-Methyl-m-dioxane	626-68-6	1
4-Isopropyl-1-methyl-2-cyclohexen-1-ol	29803-82-5	1
Allyl hexanoate	123-68-2	1
alpha-Copaene	3856-25-5	1
alpha-Humulene	6753-98-6	1
alpha-Ionone	127-41-3	1
alpha-Phellandrene	99-83-2	1
Amyl acetate*	628-63-7	1
Amyl butyrate	540-18-1	1
beta-Bisabolene	495-61-4	1
beta-Bourbonene	5208-59-3	1
Butyl isovalerate	109-19-3	1
Butyric anhydride	106-31-0	1
cis-3-Hexenyl acetate	3681-71-8	1
Damascenone	23726-93-4	1
Diisopropoxymethane	2568-89-0	1
DL-menthyl acetate	16409-45-3	1
Ethyl 2,2-diethoxypropionate	7476-20-2	1
Hexyl formate	629-33-4	1
Isoamyl phenylacetate	102-19-2	1
Isomenthol acetate	20777-45-1	1
Isomenthone	491-07-6	1
Linalool	78-70-6	1
o-Cymene	527-84-4	1
Sabinene	3387-41-5	1
Terpinyl acetate	80-26-2	1
trans-alpha-Bergamotene	13474-59-4	1
trans-beta-Ionone	79-77-6	1
Undecane	1120-21-4	1

*Compound classified as potentially hazardous

Supplementary Table 3: VOC identities and prevalences among regular vaping liquids (n=10)

Compound	CAS #	Prevalence (# of products)
Propylene glycol	4254-15-3	10
Limonene*	138-86-3	7
Ethyl butyrate	105-54-4	6
alpha-Pinene	80-56-8	4
Ethanol*	64-17-5	4
Ethyl propionate*	105-37-3	4
2-Heptyl-4-methyl-1,3-dioxolane	74094-61-4	3
2-Methylbutyl acetate*	624-41-9	3
Ethyl acetate*	141-78-6	3
Isoamyl acetate*	123-92-2	3
Isoamyl isovalerate	659-70-1	3
2-Ethyl-4-methyl-1,3-dioxolane	4359-46-0	2
beta-Myrcene*	123-35-3	2
beta-Pinene	127-91-3	2
Butyl butyrate*	109-21-7	2
Butyl butyryl lactate	7492-70-8	2
Camphene	79-92-5	2
Ethyl 2-methylbutyrate	7452-79-1	2
Eucalyptol	470-82-6	2
Isoamyl butylate	106-27-4	2
Isobutyl butyrate	539-90-2	2
L-menthol	2216-51-5	2
(Z)-sabinene hydrate	15537-55-0	1
1,4-Cineole	470-67-7	1
2,2,6-Trimethyl-6-vinyltetrahydropyran	7392-19-0	1
2,3,6-Trimethyl-7-octen-3-ol	118989-21-2	1
2-Methyl-m-dioxane	626-68-6	1
Allyl hexanoate	123-68-2	1
alpha-Copaene	3856-25-5	1
alpha-Ionone	127-41-3	1
alpha-Phellandrene	99-83-2	1
Amyl acetate*	628-63-7	1
Amyl butyrate	540-18-1	1
beta-Bisabolene	495-61-4	1

Butyl valerate	591-68-4	1
Butyric anhydride	106-31-0	1
Damascenone	23726-93-4	1
Diisopropoxymethane	2568-89-0	1
Ethyl hexanoate	123-66-0	1
Ethyl isovalerate	108-64-5	1
gamma-Terpinene	99-85-4	1
Hexyl acetate	142-92-7	1
Hexyl formate	629-33-4	1
Hexyl hexanoate	6378-65-0	1
Isocaryophyllene	118-65-0	1
Linalool	78-70-6	1
m-Cymene	535-77-3	1
o-Cymene	527-84-4	1
Sabinene	3387-41-5	1
Terpinolene	586-62-9	1
trans-alpha-Bergamotene	13474-59-4	1
trans-beta-Ionone	79-77-6	1

*Compound classified as potentially hazardous

Supplementary Table 4: VOC identities and prevalences among organic vaping liquids (n=10)

Compound	CAS #	Prevalence (# of products)
Propylene glycol	4254-15-3	10
Ethanol*	64-17-5	9
Limonene*	138-86-3	5
alpha-Pinene	80-56-8	5
beta-Pinene	127-91-3	4
Eucalyptol	470-82-6	4
Hexyl acetate	142-92-7	3
Isocaryophyllene	118-65-0	3
Camphene	79-92-5	2
(1S,2R,5R)-(+)-Isomenthol	23283-97-8	1
(S)-p-mentha-1,8-diene*	5989-54-8	1
1-Methyl-1-(4-methylenecyclohexyl)ethyl pentanoate	93836-53-4	1
2-Carene	554-61-0	1
2-Heptyl-4-methyl-1,3-dioxolane	74094-61-4	1
2-Isopropyl-5-methylcyclohexanol	15356-60-2	1
2-Isopropyl-5-methylcyclohexyl acetate	20777-36-0	1
2-Methylbutyl 2-methylbutyrate	2445-78-5	1
2-Methylbutyl valerate	55590-83-5	1
4-Isopropyl-1-methyl-2-cyclohexen-1-ol	29803-82-5	1
alpha-Humulene	6753-98-6	1
beta-Bourbonene	5208-59-3	1
Butyl butyryl lactate	7492-70-8	1
Butyl isovalerate	109-19-3	1
Butyl valerate	591-68-4	1
cis-3-Hexenyl acetate	3681-71-8	1
DL-menthyl acetate	16409-45-3	1
Ethyl 2,2-diethoxypropionate	7476-20-2	1
Ethyl 2-methylbutyrate	7452-79-1	1
Ethyl acetate*	141-78-6	1
Ethyl butyrate	105-54-4	1
Ethyl hexanoate	123-66-0	1
Ethyl isovalerate	108-64-5	1
gamma-Terpinene	99-85-4	1

Hexyl hexanoate	6378-65-0	1
Isoamyl acetate*	123-92-2	1
Isoamyl phenylacetate	102-19-2	1
Isomenthol acetate	20777-45-1	1
Isomenthone	491-07-6	1
L-menthol	2216-51-5	1
m-Cymene	535-77-3	1
Terpinolene	586-62-9	1
Terpinyl acetate	80-26-2	1
Undecane	1120-21-4	1

*Compound classified as potentially hazardous

Supplementary Table 5: VOC identities and prevalences among flavourless vaping liquids (n=5)

Compound	CAS #	Prevalence (# of products)
Propylene glycol	4254-15-3	5
Methanol*	67-56-1	1

*Compound classified as potentially hazardous

Supplementary Table 5**VOC occurrences among regular vaping liquids (n=10 products):*****Regular Flavoured Vaping Liquid #1***

Compounds	CAS#
Ethyl butyrate	105-54-4
alpha-Pinene	80-56-8
Limonene*	138-86-3
beta-Pinene	127-91-3
alpha-Copaene	3856-25-5
Camphene	79-92-5
Propylene glycol	4254-15-3

*Compound classified as potentially hazardous

Regular Flavoured Vaping Liquid #2

Compounds	CAS#
Limonene*	138-86-3
beta-Pinene	127-91-3
alpha-Pinene	80-56-8
gamma-Terpinene	99-85-4
beta-Myrcene*	123-35-3
Sabinene	3387-41-5
alpha-Phellandrene	99-83-2
Camphene	79-92-5
o-Cymene	527-84-4
Terpinolene	586-62-9
Isocaryophyllene	118-65-0
beta-Bisabolene	495-61-4
2-Heptyl-4-methyl-1,3-dioxolane	74094-61-4
trans-alpha-Bergamotene	13474-59-4
(Z)-sabinene hydrate	15537-55-0
Eucalyptol	470-82-6
Propylene glycol	4254-15-3

*Compound classified as potentially hazardous

Regular Flavoured Vaping Liquid #3

Compounds	CAS#
Ethanol*	64-17-5
Propylene glycol	4254-15-3

*Compound classified as potentially hazardous

Regular Flavoured Vaping Liquid #4

Compounds	CAS#
L-menthol	2216-51-5
Ethanol*	64-17-5
Propylene glycol	4254-15-3

*Compound classified as potentially hazardous

Regular Flavoured Vaping Liquid #5

Compounds	CAS#
Ethyl butyrate	105-54-4
Ethyl propionate*	105-37-3
Isoamyl isovalerate	659-70-1
Amyl butyrate	540-18-1
Limonene*	138-86-3
Butyl butyryl lactate	7492-70-8
Propylene glycol	4254-15-3

*Compound classified as potentially hazardous

Regular Flavoured Vaping Liquid #6

Compounds	CAS#
Ethyl acetate*	141-78-6
Ethyl 2-methylbutyrate	7452-79-1
Ethyl propionate*	105-37-3
Ethanol*	64-17-5
Isoamyl acetate*	123-92-2
2-Methylbutyl acetate*	624-41-9
Butyl butyrate*	109-21-7
Hexyl acetate	142-92-7
Limonene*	138-86-3
m-Cymene	535-77-3
1,4-Cineole	470-67-7
Eucalyptol	470-82-6
alpha-Ionone	127-41-3
Damascenone	23726-93-4
trans-beta-Ionone	79-77-6
2,2,6-Trimethyl-6-vinyltetrahydropyran	7392-19-0
alpha-Pinene	80-56-8
Propylene glycol	4254-15-3

*Compound classified as potentially hazardous

Regular Flavoured Vaping Liquid #7

Compounds	CAS#
Isoamyl acetate*	123-92-2
Limonene*	138-86-3
Isoamyl butylate	106-27-4
2-Methylbutyl acetate*	624-41-9
Ethyl butyrate	105-54-4
Hexyl formate	629-33-4
Butyric anhydride	106-31-0
Ethyl propionate*	105-37-3
Isoamyl isovalerate	659-70-1
alpha-Pinene	80-56-8
beta-Myrcene*	123-35-3
Allyl hexanoate	123-68-2
Propylene glycol	4254-15-3

*Compound classified as potentially hazardous

Regular Flavoured Vaping Liquid #8

Compounds	CAS#
Ethanol*	64-17-5
Ethyl butyrate	105-54-4
Ethyl propionate*	105-37-3
Isoamyl isovalerate	659-70-1
2-Heptyl-4-methyl-1,3-dioxolane	74094-61-4
2-Ethyl-4-methyl-1,3-dioxolane	4359-46-0
Ethyl acetate*	141-78-6
Butyl valerate	591-68-4
Hexyl hexanoate	6378-65-0
Limonene*	138-86-3
Butyl butyryl lactate	7492-70-8
Propylene glycol	4254-15-3

*Compound classified as potentially hazardous

Regular Flavoured Vaping Liquid #9

Compounds	CAS#
Isoamyl acetate*	123-92-2
Ethyl butyrate	105-54-4
Butyl butyrate*	109-21-7
Propylene glycol	4254-15-3

*Compound classified as potentially hazardous

Regular Flavoured Vaping Liquid#10

Compounds	CAS#
Ethyl butyrate	105-54-4
Isobutyl isovalerate	589-59-3
2-Methylbutyl acetate*	624-41-9
Ethyl isovalerate	108-64-5
Ethyl acetate*	141-78-6
Isobutyl butyrate	539-90-2
Isoamyl butylate	106-27-4
Amyl acetate*	628-63-7
Ethyl hexanoate	123-66-0
Ethyl 2-methylbutyrate	7452-79-1
2-Ethyl-4-methyl-1,3-dioxolane	4359-46-0
L-menthol	2216-51-5
Limonene*	138-86-3
2,3,6-Trimethyl-7-octen-3-ol	118989-21-2
Diisopropoxymethane	2568-89-0
Linalool	78-70-6
2-Methyl-m-dioxane	626-68-6
2-Heptyl-4-methyl-1,3-dioxolane	74094-61-4
Propylene glycol	4254-15-3

*Compound classified as potentially hazardous

Supplementary Table 6
VOC occurrences among organic vaping liquids (n=10 products):

Organic Flavoured Vaping Liquid #1

Compounds	CAS#
Ethanol*	64-17-5
alpha-Pinene	80-56-8
Eucalyptol	470-82-6
(S)-p-mentha-1,8-diene*	5989-54-8
Isomenthone	491-07-6
L-menthol	2216-51-5
DL-menthyl acetate	16409-45-3
Limonene*	138-86-3
beta-Pinene	127-91-3
Ethyl isovalerate	108-64-5
Hexyl acetate	142-92-7
(1S,2R,5R)-(+)-Isomenthol	23283-97-8
Isocaryophyllene	118-65-0
gamma-Terpinene	99-85-4
4-Isopropyl-1-methyl-2-cyclohexen-1-ol	29803-82-5
beta-Bourbonene	5208-59-3
Camphene	79-92-5
2-Methylbutyl valerate	55590-83-5
Isomenthol acetate	20777-45-1
Terpinolene	586-62-9
2-Isopropyl-5-methylcyclohexyl acetate	20777-36-0
Butyl valerate	591-68-4
2-Methylbutyl 2-methylbutyrate	2445-78-5
2-Isopropyl-5-methylcyclohexanol	15356-60-2
2-Carene	554-61-0
Propylene glycol	4254-15-3

*Compound classified as potentially hazardous

Organic Flavoured Vaping Liquid #2

Compounds	CAS#
Ethanol*	64-17-5
alpha-Pinene	80-56-8
Limonene*	138-86-3
Hexyl acetate	142-92-7
Ethyl hexanoate	123-66-0
cis-3-Hexenyl acetate	3681-71-8
Hexyl hexanoate	6378-65-0
Isocaryophyllene	118-65-0
beta-Pinene	127-91-3
Camphene	79-92-5
1-Methyl-1-(4-methylenecyclohexyl)ethyl pentanoate	93836-53-4
alpha-Humulene	6753-98-6
Propylene glycol	4254-15-3

*Compound classified as potentially hazardous

Organic Flavoured Vaping Liquid #3

Compounds	CAS#
Ethanol*	64-17-5
Ethyl 2-methylbutyrate	7452-79-1
Hexyl acetate	142-92-7
Ethyl acetate*	141-78-6
Ethyl butyrate	105-54-4
Isoamyl acetate*	123-92-2
Limonene*	138-86-3
beta-Pinene	127-91-3
m-Cymene	535-77-3
alpha-Pinene	80-56-8
Ethyl 2,2-diethoxypropionate	7476-20-2
Undecane	1120-21-4
Propylene glycol	4254-15-3

*Compound classified as potentially hazardous

Organic Flavoured Vaping Liquid #4

Compounds	CAS#
Ethanol*	64-17-5
Butyl isovalerate	109-19-3
Isoamyl phenylacetate	102-19-2
Butyl butyryl lactate	7492-70-8
Propylene glycol	4254-15-3

*Compound classified as potentially hazardous

Organic Flavoured Vaping Liquid #5

Compounds	CAS#
Limonene*	138-86-3
Eucalyptol	470-82-6
alpha-Pinene	80-56-8
Propylene glycol	4254-15-3

*Compound classified as potentially hazardous

Organic Flavoured Vaping Liquid #6

Compounds	CAS#
Ethanol*	64-17-5
Limonene*	138-86-3
alpha-Pinene	80-56-8
Eucalyptol	470-82-6
2-Heptyl-4-methyl-1,3-dioxolane	74094-61-4
Isocaryophyllene	118-65-0
beta-Pinene	127-91-3
Propylene glycol	4254-15-3

*Compound classified as potentially hazardous

Organic Flavoured Vaping Liquid #7

Compounds	CAS#
Ethanol*	64-17-5
Propylene glycol	4254-15-3

*Compound classified as potentially hazardous

Organic Flavoured Vaping Liquid #8

Compounds	CAS#
Ethanol*	64-17-5
Propylene glycol	4254-15-3

*Compound classified as potentially hazardous

Organic Flavoured Vaping Liquid #9

Compounds	CAS#
Ethanol*	64-17-5
Eucalyptol	470-82-6
Terpinyl acetate	80-26-2
Isocaryophyllene	118-65-0
Propylene glycol	4254-15-3

*Compound classified as potentially hazardous

Organic Flavoured Vaping Liquid#10

Compounds	CAS#
Ethanol*	64-17-5
Propylene glycol	4254-15-3

*Compound classified as potentially hazardous

Supplementary Table 7

VOC occurrences among flavourless vaping liquids (n=5):

Flavourless Vaping Liquid #1

Compounds	CAS#
Propylene glycol	4254-15-3
Methanol*	67-56-1

*Compound classified as potentially hazardous

Flavourless Vaping Liquid #2

Compounds	CAS#
Propylene glycol	4254-15-3

*Compound classified as potentially hazardous

Flavourless Vaping Liquid #3

Compounds	CAS#
Propylene glycol	4254-15-3

*Compound classified as potentially hazardous

Flavourless Vaping Liquid #4

Compounds	CAS#
Propylene glycol	4254-15-3

*Compound classified as potentially hazardous

Flavourless Vaping Liquid #5

Compounds	CAS#
Propylene glycol	4254-15-3

*Compound classified as potentially hazardous