PLANT THERAPY
100% PURE ESSENTIAL OILS

GC/MS BATCH NUMBER: 030108

ESSENTIAL OIL: ORANGE ORGANIC
BOTANICAL NAME: CITRUS SINENIS
ORIGIN: MEXICO

KEY CONSTITUENTS PRESENT IN THIS BATCH OF ORANGE ORGANIC OIL	%
LIMONENE	93.2

Comments from Robert Tisserand: Fresh, sweet, characteristic odor profile. All thirteen key ISO constituents are within range.

Date : August 07, 2018

Certificate of Analysis – GC Profiling

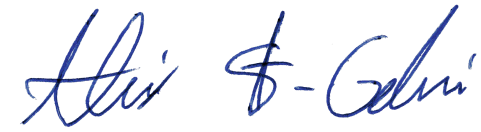
Sample identification

Internal code : 18H03-PTH4-1-CC
Customer identification : Orange Organic - Mexico - O3010884R
Type : Essential oil
Source : *Citrus sinensis*
Customer : Plant Therapy

Analysis

Method: PC-PA-014-17J19 - Analysis of the composition of an essential oil, or other volatile liquid, by FAST GC-FID (in French); identifications validated by GC-MS.
Analyst : Sarah-Eve Tremblay, M. Sc. A., Chimiste
Analysis date : August 06, 2018

Checked and approved by :



Alexis St-Gelais, M. Sc., chimiste 2013-174

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PHYSICOCHEMICAL DATA

Physical aspect: Bright yellow liquid
Refractive index: 1.4720 ± 0.0003 (20 °C)

CONCLUSION

No adulterant, contaminant or diluent has been detected using this method.

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ANALYSIS SUMMARY

Identification	DB-5 (%)	DB-WAX (%)	Classe
Hexanal	tr	tr	Aliphatic aldehyde
Heptanal	tr	tr	Aliphatic aldehyde
α-Thujene	tr	tr	Monoterpene
α-Pinene	0.50	0.50	Monoterpene
Camphene	tr	tr	Monoterpene
Sabinene	0.22*	0.20	Monoterpene
β-Pinene	[0.22]*	0.02	Monoterpene
Myrcene	1.90	1.91	Monoterpene
Octanal	0.32*	0.28	Aliphatic aldehyde
α-Phellandrene	[0.32]*	0.04	Monoterpene
Δ3-Carene	0.08	0.07	Monoterpene
Limonene	93.32*	93.17	Monoterpene
β-Phellandrene	[93.32]*	0.21*	Monoterpene
1,8-Cineole	[93.32]*	[0.21]*	Monoterpenic ether
para-Cymene	[93.32]*	tr	Monoterpene
(*Z*)-β-Ocimene	0.01	0.01	Monoterpene
(*E*)-β-Ocimene	0.02	0.02	Monoterpene
γ-Terpinene	tr	tr	Monoterpene
cis-Sabinene hydrate	0.01	0.01*	Monoterpenic alcohol
Octanol	0.02	0.02	Aliphatic alcohol
Isoterpinolene	tr	tr	Monoterpene
Terpinolene	0.02	0.02	Monoterpene
Linalool	0.38	0.39	Monoterpenic alcohol
Nonanal	0.05	0.04	Aliphatic aldehyde
trans-para-Mentha-2,8-dien-1-ol	0.01	tr	Monoterpenic alcohol
cis-Limonene oxide	tr	tr	Monoterpenic ether
cis-para-Mentha-2,8-dien-1-ol	tr	0.06*	Monoterpenic alcohol
trans-Limonene oxide	0.01	0.01	Monoterpenic ether
Citronellal	0.04	0.04	Monoterpenic aldehyde
Terpinen-4-ol	0.01	tr	Monoterpenic alcohol
α-Terpineol	0.05	0.05	Monoterpenic alcohol
cis-Piperitol	0.01	0.02*	Monoterpenic alcohol
Decanal	0.23	0.22	Aliphatic aldehyde
Octyl acetate	tr	0.01	Aliphatic ester
trans-Carveol	tr	tr	Monoterpenic alcohol
Nerol	0.01	0.01	Monoterpenic alcohol
cis-Carveol	0.01	tr	Monoterpenic alcohol
Neral	0.06	[0.06]*	Monoterpenic aldehyde
(*E*)-Isogeraniol?	0.01	0.01	Monoterpenic alcohol
Geraniol	tr	tr	Monoterpenic alcohol
Perillaldehyde	0.02	0.01	Monoterpenic aldehyde
Geranial	0.10	0.12*	Monoterpenic aldehyde
Decanol	tr	0.01	Aliphatic alcohol
Limonen-10-ol	0.01	0.01	Monoterpenic alcohol
Undecanal	0.01	0.01	Aliphatic aldehyde
α-Cubebene	0.01	[0.01]*	Sesquiterpene
Neryl acetate	0.01	tr	Monoterpenic ester
α-Copaene	0.06	0.05	Sesquiterpene

Geranyl acetate	0.04	0.02	Monoterpenic ester
β-Elemene	0.01	0.28*	Sesquiterpene
Dodecanal	0.07	0.04	Aliphatic aldehyde
β-Caryophyllene	0.32	[0.28]*	Sesquiterpene
β-Copaene	0.02	0.02	Sesquiterpene
α-Humulene	0.05	0.05	Sesquiterpene
(*E*)-β-Farnesene	0.01	[0.02]*	Sesquiterpene
γ-Muurolene	0.02	0.02	Sesquiterpene
Germacrene D	0.09	0.07	Sesquiterpene
Valencene	0.03	0.03	Sesquiterpene
Bicyclogermacrene	0.02	[0.12]*	Sesquiterpene
α-Muurolene	0.01	0.01	Sesquiterpene
γ-Cadinene	0.03	0.01*	Sesquiterpene
δ-Cadinene	0.06*	0.06	Sesquiterpene
Zonarene	[0.06]*	[0.01]*	Sesquiterpene
Caryophyllene oxide	0.02*	0.01	Sesquiterpenic ether
Caryophyllene oxide isomer	[0.02]*	tr	Sesquiterpenic ether
β-Sinensal	0.03	0.03	Sesquiterpenic aldehyde
α-Sinensal	0.03	0.03	Sesquiterpenic aldehyde
Myristic acid	0.04	0.05	Aliphatic acid
Hexadecanal	tr	tr	Aliphatic aldehyde
Palmitic acid	0.06	0.06	Aliphatic acid
Linoleic acid	0.02	0.04	Aliphatic acid
Oleic acid	0.01	0.11	Aliphatic acid
Stearic acid	0.02	0.06	Aliphatic acid
Tetramethoxyflavone isomer	0.02		Flavonoid
Tangeretin	0.04		Flavonoid
3,3',4',5,6,7,8-Heptamethoxyflavone	0.11		Flavonoid
Nobiletin	0.05		Flavonoid
Total identified	**98.76%**	**98.61%**	

*: Two or more compounds are coeluting on this column
[xx]: Duplicate percentage due to coelutions, not taken account in the identified total
tr: The compound has been detected below 0.005% of total signal.

Note: no correction factor was applied

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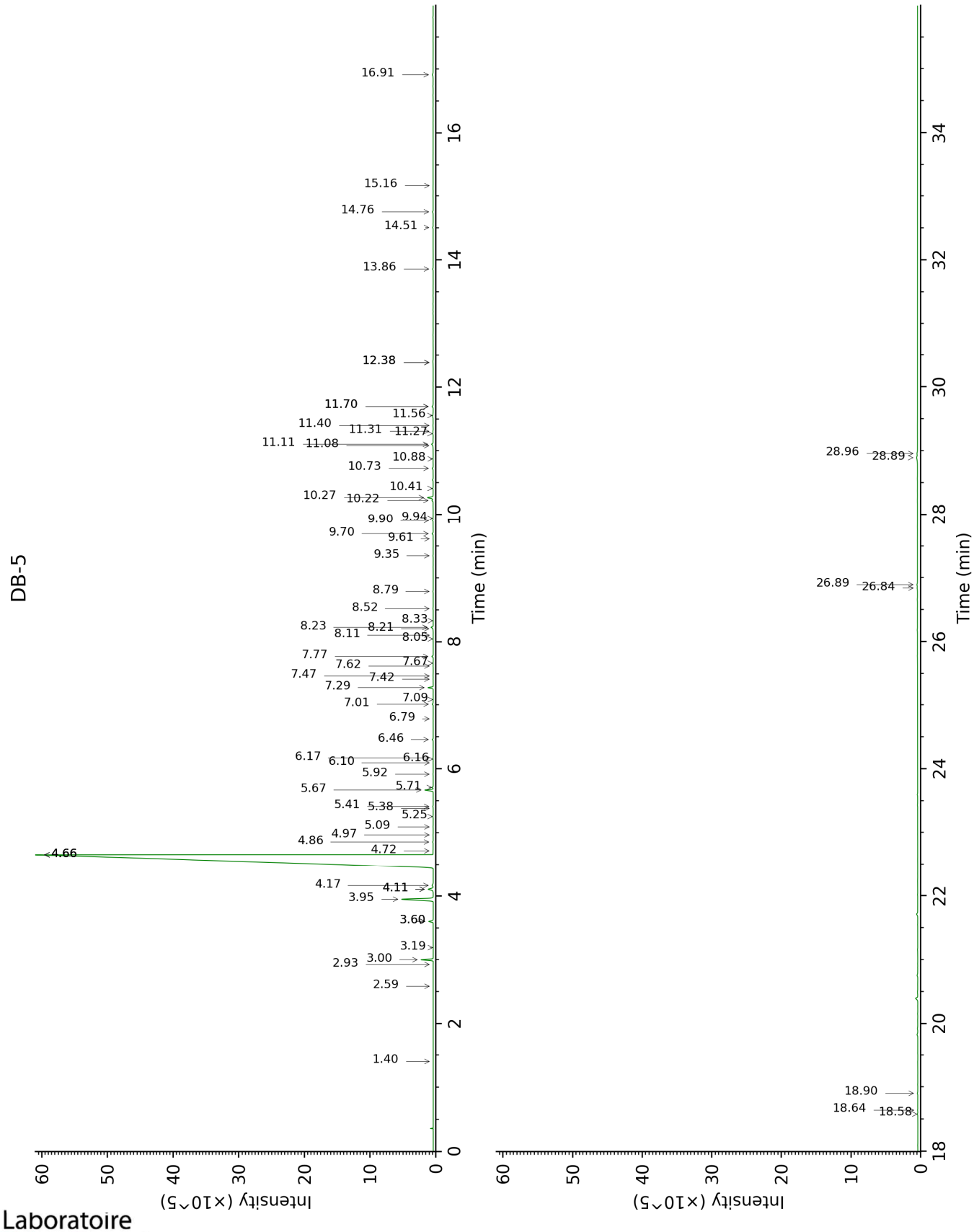
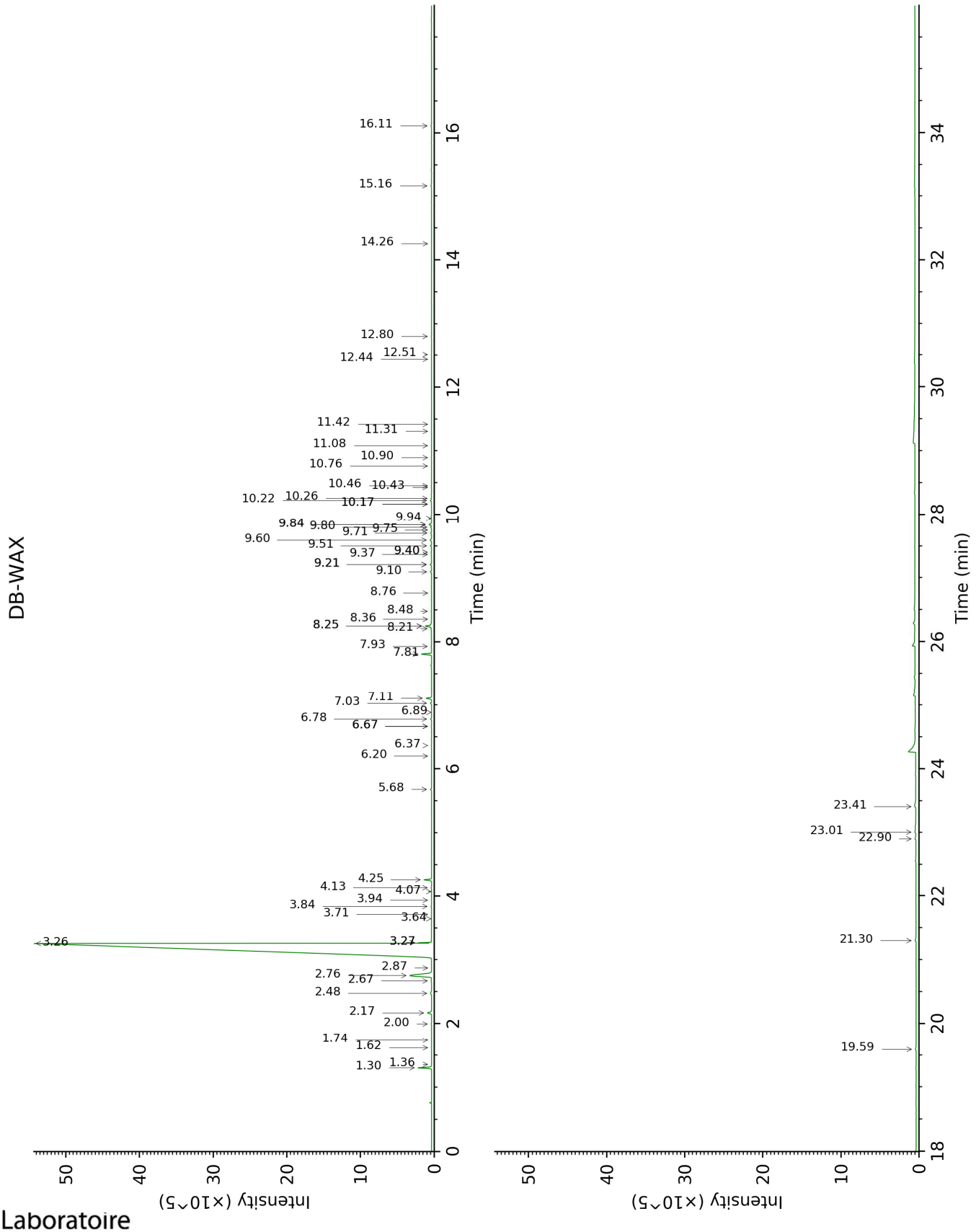

DB-5
16.91
15.16
14.76
14.51
13.86
12.38
11.70
11.56
11.40
11.31
11.27
11.11
11.08
10.88
10.73
10.41
10.27
10.22
9.90
9.94
9.70
9.61
9.35
8.79
8.52
8.33
8.23
8.21
8.11
8.05
7.77
7.62
7.67
7.47
7.42
7.29
7.09
7.01
6.79
6.46
6.17
6.10
6.16
5.92
5.67
5.71
5.41
5.38
5.25
5.09
4.97
4.86
4.72
4.66
4.17
4.11
3.95
3.60
3.19
3.00
2.93
2.59
1.40
28.96
28.89
26.89
26.84
18.90
18.64
18.58
Time (min)
Intensity (×10^5)


DB-WAX
Time (min)
Intensity (×10^5)
16.11
15.16
14.26
12.80
12.44
12.51
11.42
11.31
11.08
10.90
10.76
10.46
10.43
10.22
10.26
10.17
9.94
9.84
9.80
9.71
9.75
9.60
9.51
9.37
9.40
9.21
9.10
8.76
8.48
8.36
8.25
8.21
7.93
7.81
7.11
7.03
6.89
6.78
6.67
6.37
6.20
5.68
4.25
4.13
4.07
3.94
3.84
3.71
3.64
3.26
3.27
2.87
2.76
2.67
2.48
2.17
2.00
1.74
1.62
1.30
1.36
23.41
23.01
22.90
21.30
19.59

FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Hexanal	1.40	797	tr	1.74	1046	tr
Heptanal	2.59	900	tr	2.87	1147	tr
α-Thujene	2.93	924	tr	1.36	1006	tr
α-Pinene	3.00	928	0.50	1.30	998	0.50
Camphene	3.19	941	tr	1.62	1034	tr
Sabinene	3.60*	969	0.22	2.17	1088	0.20
β-Pinene	3.60*	969	[0.22]	2.00	1071	0.02
Myrcene	3.95	992	1.90	2.76	1138	1.91
Octanal	4.11*	1003	0.32	4.26	1250	0.28
α-Phellandrene	4.11*	1003	[0.32]	2.67	1131	0.04
Δ3-Carene	4.17	1006	0.08	2.48	1116	0.07
Limonene	4.66*	1037	93.32	3.26	1176	93.17
β-Phellandrene	4.66*	1037	[93.32]	3.27*	1177	0.21
1,8-Cineole	4.66*	1037	[93.32]	3.27*	1177	[0.21]
para-Cymene	4.66*	1037	[93.32]	3.94	1227	tr
(*Z*)-β-Ocimene	4.72	1041	0.01	3.64	1206	0.01
(*E*)-β-Ocimene	4.86	1050	0.02	3.84	1220	0.02
γ-Terpinene	4.97	1057	tr	3.71	1211	tr
cis-Sabinene hydrate	5.09	1065	0.01	6.67*	1427	0.01
Octanol	5.26	1075	0.02	7.93	1521	0.02
Isoterpinolene	5.38	1083	tr	4.07	1237	tr
Terpinolene	5.41	1085	0.02	4.13	1241	0.02
Linalool	5.67	1101	0.38	7.81	1515	0.39
Nonanal	5.71	1104	0.05	5.68	1354	0.04
trans-para-Mentha-2,8-dien-1-ol	5.92	1117	0.01	8.76	1589	tr
cis-Limonene oxide	6.10	1129	tr	6.20	1392	tr
cis-para-Mentha-2,8-dien-1-ol	6.16	1132	tr	9.21*	1626	0.06
trans-Limonene oxide	6.17	1134	0.01	6.37	1405	0.01
Citronellal	6.46	1152	0.04	6.78	1436	0.04
Terpinen-4-ol	6.78	1173	0.01	8.36	1556	tr
α-Terpineol	7.01	1188	0.05	9.50	1651	0.05
cis-Piperitol	7.09	1192	0.01	9.40*	1642	0.02
Decanal	7.28	1205	0.23	7.11	1461	0.22
Octyl acetate	7.42	1214	tr	6.89	1444	0.01
trans-Carveol	7.47	1217	tr	11.08	1787	tr
Nerol	7.62	1228	0.01	10.76	1759	0.01
cis-Carveol	7.67	1231	0.01	11.42	1816	tr
Neral	7.77	1238	0.06	9.21*	1626	[0.06]
(*E*)-Isogeraniol?	8.05	1256	0.01	10.90	1770	0.01
Geraniol	8.10	1260	tr	11.31	1807	tr
Perillaldehyde	8.21	1267	0.02	10.46	1732	0.01
Geranial	8.23	1268	0.10	9.84*	1679	0.12
Decanol	8.33	1275	tr	10.43	1729	0.01
Limonen-10-ol	8.52	1288	0.01	12.80	1944	0.01
Undecanal	8.79	1306	0.01	8.48	1566	0.01
α-Cubebene	9.35	1346	0.01	6.67*	1427	[0.01]

Neryl acetate	9.61	1364	0.01	9.94	1688	tr
α-Copaene	9.70	1370	0.06	7.03	1455	0.05
Geranyl acetate	9.90	1385	0.04	10.26	1714	0.02
β-Elemene	9.94	1388	0.01	8.25*	1547	0.28
Dodecanal	10.22	1408	0.07	9.80	1675	0.04
β-Caryophyllene	10.27	1412	0.32	8.25*	1547	[0.28]
β-Copaene	10.41	1422	0.02	8.21	1544	0.02
α-Humulene	10.73	1446	0.05	9.10	1616	0.05
(*E*)-β-Farnesene	10.88	1457	0.01	9.40*	1642	[0.02]
γ-Muurolene	11.08	1472	0.02	9.37	1639	0.02
Germacrene D	11.11	1474	0.09	9.60	1658	0.07
Valencene	11.27	1486	0.03	9.71	1668	0.03
Bicyclogermacrene	11.31	1489	0.02	9.84*	1679	[0.12]
α-Muurolene	11.40	1496	0.01	9.75	1672	0.01
γ-Cadinene	11.56	1508	0.03	10.17*	1707	0.01
δ-Cadinene	11.70*	1519	0.06	10.22	1711	0.06
Zonarene	11.70*	1519	[0.06]	10.17*	1707	[0.01]
Caryophyllene oxide	12.38*	1573	0.02	12.51	1916	0.01
Caryophyllene oxide isomer	12.38*	1573	[0.02]	12.44	1909	tr
β-Sinensal	13.86	1693	0.03	15.16	2175	0.03
α-Sinensal	14.51	1749	0.03	16.11	2274	0.03
Myristic acid	14.76	1771	0.04	19.59	2664	0.05
Hexadecanal	15.16	1807	tr	14.26	2084	tr
Palmitic acid	16.91	1969	0.06	21.30	2874	0.06
Linoleic acid	18.58	2134	0.02	23.41	3150	0.04
Oleic acid	18.64	2141	0.01	23.01	3096	0.11
Stearic acid	18.90	2168	0.02	22.90	3082	0.06
Tetramethoxyflavone isomer	26.84	3141	0.02			
Tangeretin	26.89	3147	0.04			
3,3',4',5,6,7,8-Heptamethoxyflavone	28.89	3331	0.11			
Nobiletin	28.96	3336	0.05			
Total identified		**98.76%**			**98.61%**	
Total reported		**98.76%**			**98.61%**	

*: Two or more compounds are coeluting on this column
[xx]: Duplicate percentage due to coelutions, not taken account in the identified total
tr: The compound has been detected below 0.005% of total signal.

Note: no correction factor was applied
R.T.: Retention time (minutes)
R.I.: Retention index