Date : October 17, 2018

Certificate of Analysis – GC Profiling

Sample identification

Internal code : 18J04-PTH1-1-CC
Customer identification : Neroli - Egypt - N1010683R
Type : Essential oil
Source : *Citrus aurantium* subsp. *amara*
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 : Lindsay Girard, B. Sc.
Analysis date : October 10, 2018

Checked and approved by :

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

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PHYSICOCHEMICAL DATA

Physical aspect: Light yellow liquid
Refractive index: 1.4665 ± 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
Ethanol	0.03	0.02	Aliphatic alcohol
Methacrolein	tr		Aliphatic aldehyde
Ethyl acetate	tr		Aliphatic ester
Hexanol	tr	0.01	Aliphatic alcohol
α-Thujene	0.01	0.01	Monoterpene
α-Pinene	0.25	0.25	Monoterpene
Camphene	0.02*	0.02	Monoterpene
α-Fenchene	[0.02]*	tr	Monoterpene
Benzaldehyde	0.02	0.02	Simple phenolic
Sabinene	3.52*	0.39	Monoterpene
β-Pinene	[3.52]*	3.08	Monoterpene
6-Methyl-5-hepten-2-one	0.02	0.02	Aliphatic ketone
Myrcene	1.96	1.91	Monoterpene
α-Phellandrene	0.01	0.01	Monoterpene
Octanal	0.02	0.39*	Aliphatic aldehyde
Δ3-Carene	0.03	0.02	Monoterpene
α-Terpinene	0.03	0.03	Monoterpene
ortho-Cymene	0.02	0.03*	Simple phenolic
para-Cymene	0.03	[0.03]*	Monoterpene
Limonene	10.41*	10.08	Monoterpene
1,8-Cineole	[10.41]*	0.07*	Monoterpenic ether
β-Phellandrene	[10.41]*	[0.07]*	Monoterpene
(*Z*)-β-Ocimene	0.84	0.80	Monoterpene
(*E*)-β-Ocimene	4.19	4.09	Monoterpene
γ-Terpinene	0.08	0.05	Monoterpene
cis-Sabinene hydrate	tr	0.01	Monoterpenic alcohol
cis-Linalool oxide (fur.)	0.10	0.10	Monoterpenic alcohol
Octanol	0.01	47.11*	Aliphatic alcohol
Terpinolene	0.43*	[0.39]*	Monoterpene
trans-Linalool oxide (fur.)	[0.43]*	0.01	Monoterpenic alcohol
Linalool	46.55	[47.11]*	Monoterpenic alcohol
cis-para-Menth-2-en-1-ol	0.04	[47.11]*	Monoterpenic alcohol
allo-Ocimene	0.01	0.01	Monoterpene
Benzeneacetonitrile	0.10*	0.09	Simple phenolic
Camphor	[0.10]*	0.01	Monoterpenic ketone
neo-allo-Ocimene	0.01*	0.01	Monoterpene
(*E*)-Myroxide	[0.01]*	0.01	Monoterpenic ether
Lilac aldehyde A	0.01		Monoterpenic aldehyde
Borneol	0.01	4.93*	Monoterpenic alcohol
Terpinen-4-ol	0.14	0.14	Monoterpenic alcohol
trans-Linalool oxide (pyr.)	0.01	3.58*	Monoterpenic alcohol
α-Terpineol	5.05	[4.93]*	Monoterpenic alcohol
(3*E*,5*E*)-2,6-Dimethylocta-3,5,7-trien-2-ol	0.02	0.02	Monoterpenic alcohol
Octyl acetate	0.02	0.01	Aliphatic ester
Linalyl formate	0.03	0.62*	Monoterpenic ester
Citronellol	1.14*	0.01	Monoterpenic alcohol
Nerol	[1.14]*	1.31	Monoterpenic alcohol

Neral	0.07	0.07	Monoterpenic aldehyde
Linalyl acetate	13.27*	8.80*	Monoterpenic ester
Geraniol	[13.27]*	3.30*	Monoterpenic alcohol
Geranial	0.07	0.07	Monoterpenic aldehyde
Bornyl acetate	0.01	[8.80]*	Monoterpenic ester
1-Nitro-2-phenylethane	0.02	0.03	Simple phenolic
Indole	0.13	0.13	Indole
4-Vinylguaiacol	0.01	0.01	Simple phenolic
Linalyl propionate	0.14*	0.03	Monoterpenic ester
Methyl anthranilate	[0.14]*	0.15	Phenolic ester
α-Terpinyl acetate	0.09	0.07	Monoterpenic ester
Neryl acetate	1.89	1.86	Monoterpenic ester
Geranyl acetate	3.67	[3.58]*	Monoterpenic ester
β-Elemene	0.03	[0.62]*	Sesquiterpene
(*Z*)-Jasmone	0.04	0.03	Jasmonate
Dimethyl anthranilate	0.01	0.01	Phenolic ester
β-Caryophyllene	0.61	[0.62]*	Sesquiterpene
(*Z*)-β-Farnesene?	0.01	0.01	Sesquiterpene
α-Humulene	0.06	0.06	Sesquiterpene
Geranylacetone	0.04	[3.30]*	Monoterpenic ketone
(*E*)-β-Farnesene	0.07	0.05	Sesquiterpene
Germacrene D	0.06	0.05	Sesquiterpene
Bicyclogermacrene	0.22	0.22	Sesquiterpene
(3*Z*,6*E*)-α-Farnesene	0.02	0.02	Sesquiterpene
γ-Cadinene	0.05	0.05	Sesquiterpene
trans-Calamenene	0.04*	0.01	Sesquiterpene
δ-Cadinene	[0.04]*	0.03	Sesquiterpene
(*E*)-Nerolidol	2.27	2.20	Sesquiterpenic alcohol
Caryophyllene oxide	0.06*	0.02	Sesquiterpenic ether
Spathulenol	[0.06]*	0.03	Sesquiterpenic alcohol
Viridiflorol	0.01	0.01	Sesquiterpenic alcohol
τ-Cadinol	tr	0.01	Sesquiterpenic alcohol
α-Cadinol	0.02	0.02	Sesquiterpenic alcohol
(2*E*,6*Z*)-Farnesol	0.02	0.05	Sesquiterpenic alcohol
(2*E*,6*E*)-Farnesol	0.86	1.57	Sesquiterpenic alcohol
(2*E*,6*E*)-Farnesal	0.04	0.04	Sesquiterpenic aldehyde
(2*E*,6*E*)-Farnesyl acetate	0.01	0.02	Sesquiterpenic ester
Tricosane	0.04		Alkane
Pentacosane	0.04	0.03	Alkane
Total identified	**99.20%**	**98.32%**	

*: 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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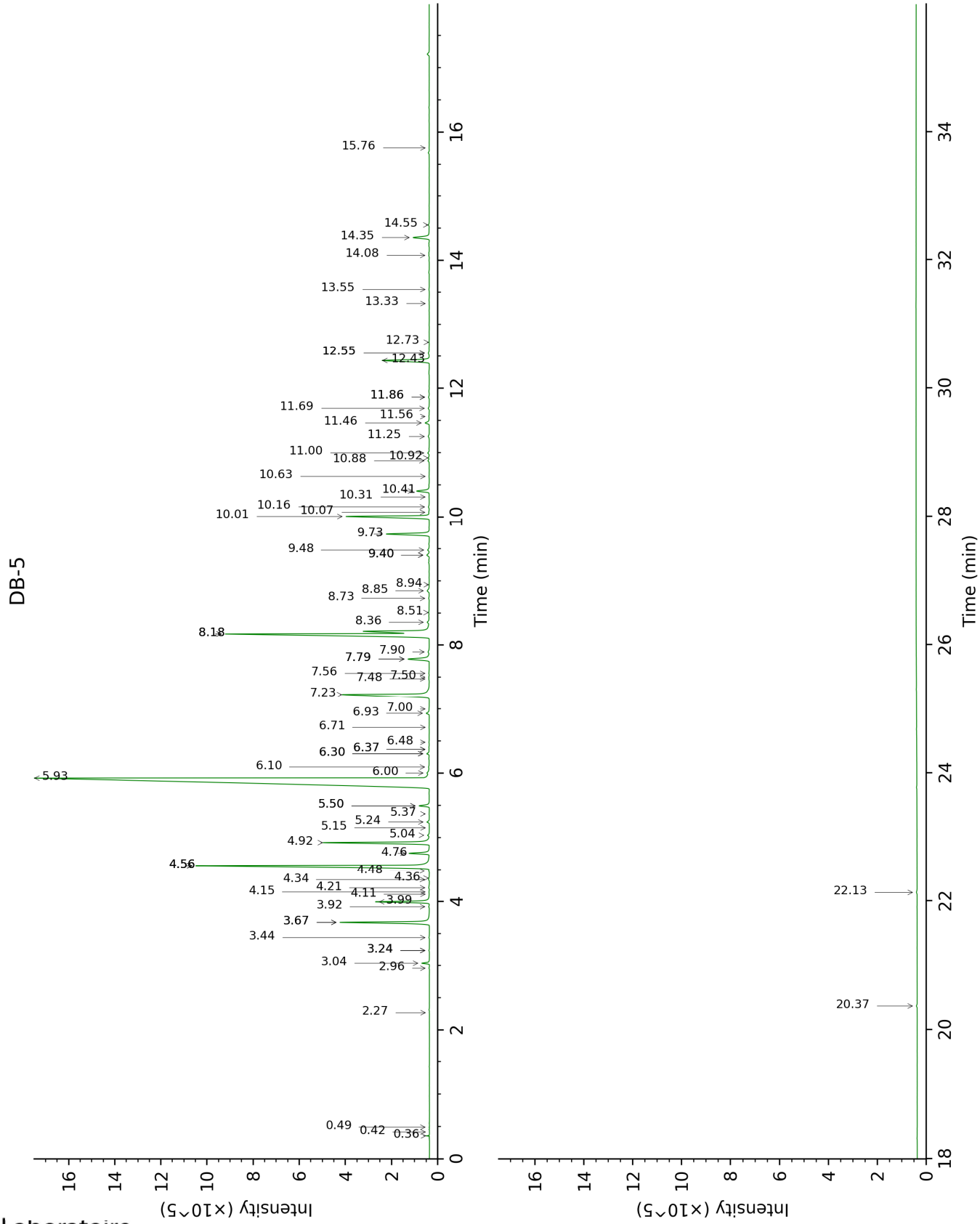
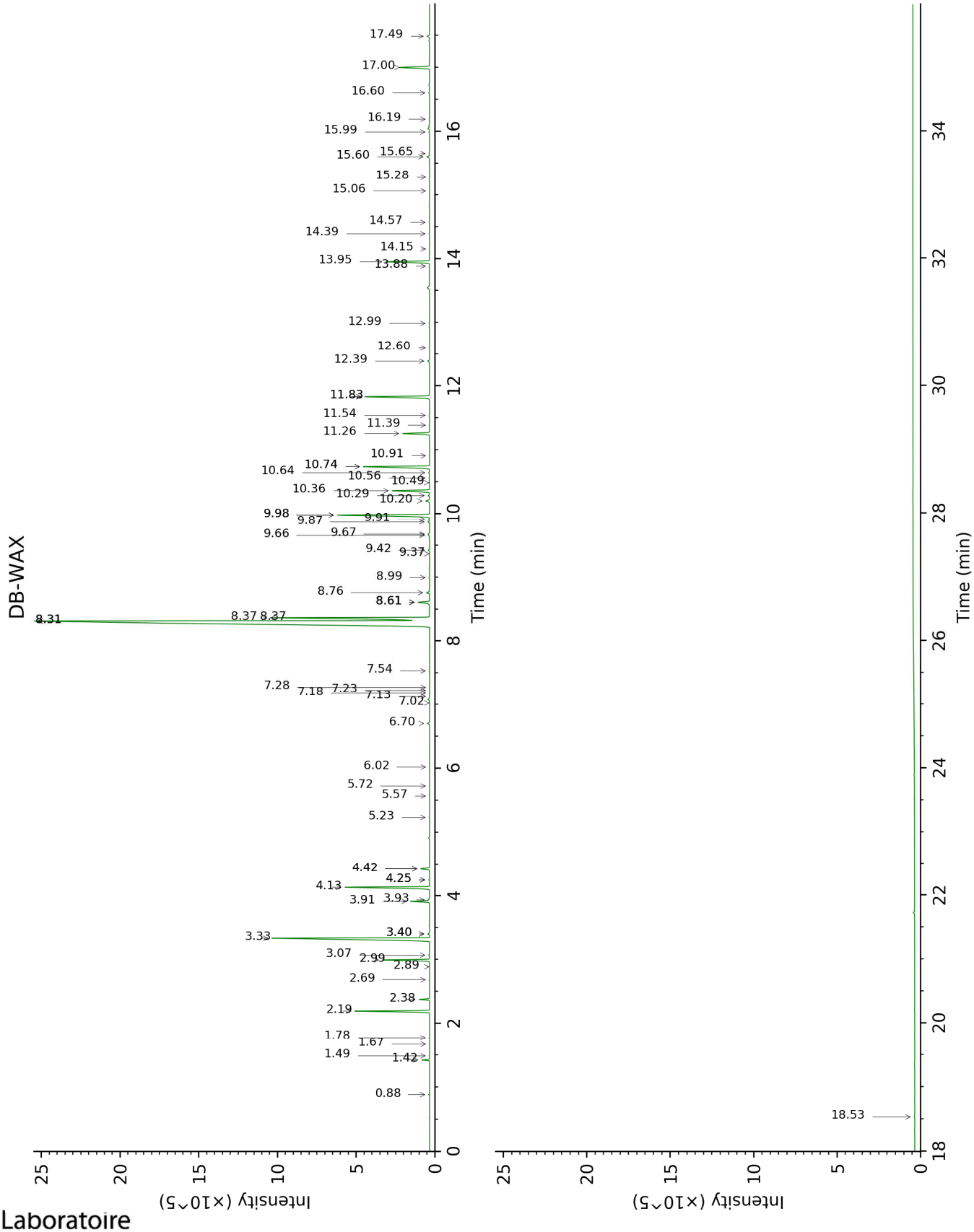

DB-5
Intensity (×10^5)
Time (min)
15.76
14.55
14.35
14.08
13.55
13.33
12.73
12.55
12.43
11.86
11.69
11.56
11.46
11.25
11.00
10.88
10.92
10.63
10.31
10.41
10.16
10.01
10.07
9.73
9.48
9.40
8.94
8.85
8.73
8.51
8.36
8.18
7.90
7.79
7.56
7.48
7.50
7.23
7.00
6.93
6.71
6.48
6.37
6.30
6.10
6.00
5.93
5.50
5.37
5.24
5.15
5.04
4.92
4.76
4.56
4.48
4.36
4.34
4.21
4.15
4.11
3.99
3.92
3.67
3.44
3.24
3.04
2.96
2.27
0.49
0.42
0.36
22.13
20.37


DB-WAX
17.49
17.00
16.60
16.19
15.99
15.60
15.65
15.28
15.06
14.57
14.39
14.15
13.95
13.88
12.99
12.60
12.39
11.83
11.54
11.39
11.26
10.91
10.64
10.74
10.56
10.49
10.36
10.29
10.20
9.98
9.87
9.91
9.66
9.67
9.42
9.37
8.99
8.76
8.61
8.31
8.37
8.37
7.54
7.28
7.18
7.23
7.13
7.02
6.70
6.02
5.72
5.57
5.23
4.42
4.25
4.13
3.91
3.93
3.40
3.33
3.07
2.99
2.89
2.69
2.38
2.19
1.78
1.67
1.49
1.42
0.88
18.53
Time (min)
Intensity (×10^5)

FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Ethanol	0.36	513	0.03	0.88	912	0.02
Methacrolein	0.42	550	tr			
Ethyl acetate	0.49	604	tr			
Hexanol	2.27	872	tr	5.57	1324	0.01
α-Thujene	2.96	924	0.01	1.49	1001	0.01
α-Pinene	3.04	930	0.25	1.42	992	0.25
Camphene	3.24*	942	0.02	1.78	1028	0.02
α-Fenchene	3.24*	942	[0.02]	1.67	1018	tr
Benzaldehyde	3.44	956	0.02	7.54	1467	0.02
Sabinene	3.67*	971	3.52	2.38	1085	0.39
β-Pinene	3.67*	971	[3.52]	2.20	1068	3.08
6-Methyl-5-hepten-2-one	3.92	987	0.02	5.23	1300	0.02
Myrcene	3.99	992	1.96	2.99	1135	1.91
α-Phellandrene	4.11	1000	0.01	2.89	1127	0.01
Octanal	4.15	1002	0.02	4.42*	1244	0.39
Δ3-Carene	4.21	1006	0.03	2.68	1111	0.02
α-Terpinene	4.34	1014	0.03	3.07	1141	0.03
ortho-Cymene	4.36	1015	0.02	4.25*	1232	0.03
para-Cymene	4.48	1022	0.03	4.25*	1232	[0.03]
Limonene	4.56*	1028	10.41	3.33	1162	10.08
1,8-Cineole	4.56*	1028	[10.41]	3.40*	1167	0.07
β-Phellandrene	4.56*	1028	[10.41]	3.40*	1167	[0.07]
(*Z*)-β-Ocimene	4.76	1040	0.84	3.91	1207	0.80
(*E*)-β-Ocimene	4.92	1050	4.19	4.13	1223	4.09
γ-Terpinene	5.04	1057	0.08	3.93	1208	0.05
cis-Sabinene hydrate	5.15	1064	tr	7.13	1437	0.01
cis-Linalool oxide (fur.)	5.24	1070	0.10	6.70	1406	0.10
Octanol	5.37	1078	0.01	8.31*	1526	47.11
Terpinolene	5.50*	1085	0.43	4.42*	1244	[0.39]
trans-Linalool oxide (fur.)	5.50*	1085	[0.43]	7.02	1429	0.01
Linalool	5.93	1112	46.55	8.31*	1526	[47.11]
cis-para-Menth-2-en-1-ol	6.00	1117	0.04	8.31*	1526	[47.11]
allo-Ocimene	6.10	1123	0.01	5.72	1335	0.01
Benzeneacetonitrile	6.30*	1136	0.10	12.39	1860	0.09
Camphor	6.30*	1136	[0.10]	7.28	1448	0.01
neo-allo-Ocimene	6.37*	1140	0.01	6.02	1356	0.01
(*E*)-Myroxide	6.37*	1140	[0.01]	7.18	1440	0.01
Lilac aldehyde A	6.48	1147	0.01			
Borneol	6.71	1162	0.01	9.98*	1656	4.93
Terpinen-4-ol	6.93	1176	0.14	8.76	1559	0.14
trans-Linalool oxide (pyr.)	7.00	1180	0.01	10.74*	1718	3.58
α-Terpineol	7.23	1194	5.05	9.98*	1656	[4.93]

(3*E*,5*E*)-2,6-Dimethylocta-3,5,7-trien-2-ol	7.48	1210	0.02	11.54	1786	0.02
Octyl acetate	7.50	1212	0.02	7.23	1444	0.01
Linalyl formate	7.56	1216	0.03	8.61*	1548	0.62
Citronellol	7.79*	1231	1.14	10.91	1733	0.01
Nerol	7.79*	1231	[1.14]	11.26	1762	1.31
Neral	7.90	1238	0.07	9.67	1632	0.07
Linalyl acetate	8.18*	1256	13.27	8.36*	1529	8.80
Geraniol	8.18*	1256	[13.27]	11.83*	1811	3.30
Geranial	8.36	1268	0.07	10.28	1681	0.07
Bornyl acetate	8.51	1278	0.01	8.36*	1529	[8.80]
1-Nitro-2-phenylethane	8.73	1293	0.02	14.39	2045	0.03
Indole	8.85	1301	0.13	17.49	2360	0.13
4-Vinylguaiacol	8.94	1309	0.01	15.28	2131	0.01
Linalyl propionate	9.40*	1341	0.14	8.99	1578	0.03
Methyl anthranilate	9.40*	1341	[0.14]	15.60	2163	0.15
α-Terpinyl acetate	9.48	1346	0.09	9.87	1647	0.07
Neryl acetate	9.73	1364	1.89	10.36	1687	1.86
Geranyl acetate	10.01	1383	3.67	10.74*	1718	[3.58]
β-Elemene	10.08	1388	0.03	8.61*	1548	[0.62]
(*Z*)-Jasmone	10.16	1394	0.04	12.60	1878	0.03
Dimethyl anthranilate	10.31	1404	0.01	13.88	1996	0.01
β-Caryophyllene	10.41	1411	0.61	8.61*	1548	[0.62]
(*Z*)-β-Farnesene?	10.63	1428	0.01	9.37	1607	0.01
α-Humulene	10.88	1446	0.06	9.42	1611	0.06
Geranylacetone	10.92	1449	0.04	11.83*	1811	[3.30]
(*E*)-β-Farnesene	11.00	1454	0.07	9.66	1630	0.05
Germacrene D	11.25	1473	0.06	9.91	1651	0.05
Bicyclogermacrene	11.46	1488	0.22	10.20	1674	0.22
(3*Z*,6*E*)-α-Farnesene	11.56	1496	0.02	10.49	1697	0.02
γ-Cadinene	11.69	1505	0.05	10.64	1710	0.05
trans-Calamenene	11.86*	1519	0.04	11.39	1773	0.01
δ-Cadinene	11.86*	1519	[0.04]	10.56	1704	0.03
(*E*)-Nerolidol	12.43	1563	2.27	13.95	2003	2.20
Caryophyllene oxide	12.55*	1572	0.06	12.99	1914	0.02
Spathulenol	12.55*	1572	[0.06]	14.57	2062	0.03
Viridiflorol	12.73	1586	0.01	14.15	2022	0.01
τ-Cadinol	13.33	1634	tr	15.06	2109	0.01
α-Cadinol	13.55	1652	0.02	15.65	2168	0.02
(2*E*,6*Z*)-Farnesol	14.08	1695	0.02	16.60	2266	0.05
(2*E*,6*E*)-Farnesol	14.35	1718	0.86	17.00	2308	1.57
(2*E*,6*E*)-Farnesal	14.55	1735	0.04	15.99	2202	0.04
(2*E*,6*E*)-Farnesyl acetate	15.76	1841	0.01	16.19	2223	0.02
Tricosane	20.37	2300	0.04			
Pentacosane	22.13	2502	0.04	18.53	2475	0.03
Total identified		**99.20%**			**98.32%**	

Total reported	**99.20%**	**98.32%**

*: 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

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