

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.

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
Δ^3 -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
(3E,5E)-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
(3Z,6E)- α -Farnesene	0.02	0.02	Sesquiterpene
γ -Cadinene	0.05	0.05	Sesquiterpene
<i>trans</i> -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
(2E,6Z)-Farnesol	0.02	0.05	Sesquiterpenic alcohol
(2E,6E)-Farnesol	0.86	1.57	Sesquiterpenic alcohol
(2E,6E)-Farnesal	0.04	0.04	Sesquiterpenic aldehyde
(2E,6E)-Farnesyl acetate	0.01	0.02	Sesquiterpenic ester
Tricosane	0.04		Alkane
Pentacosane	0.04	0.03	Alkane
Total identified	99.20%	98.32%	

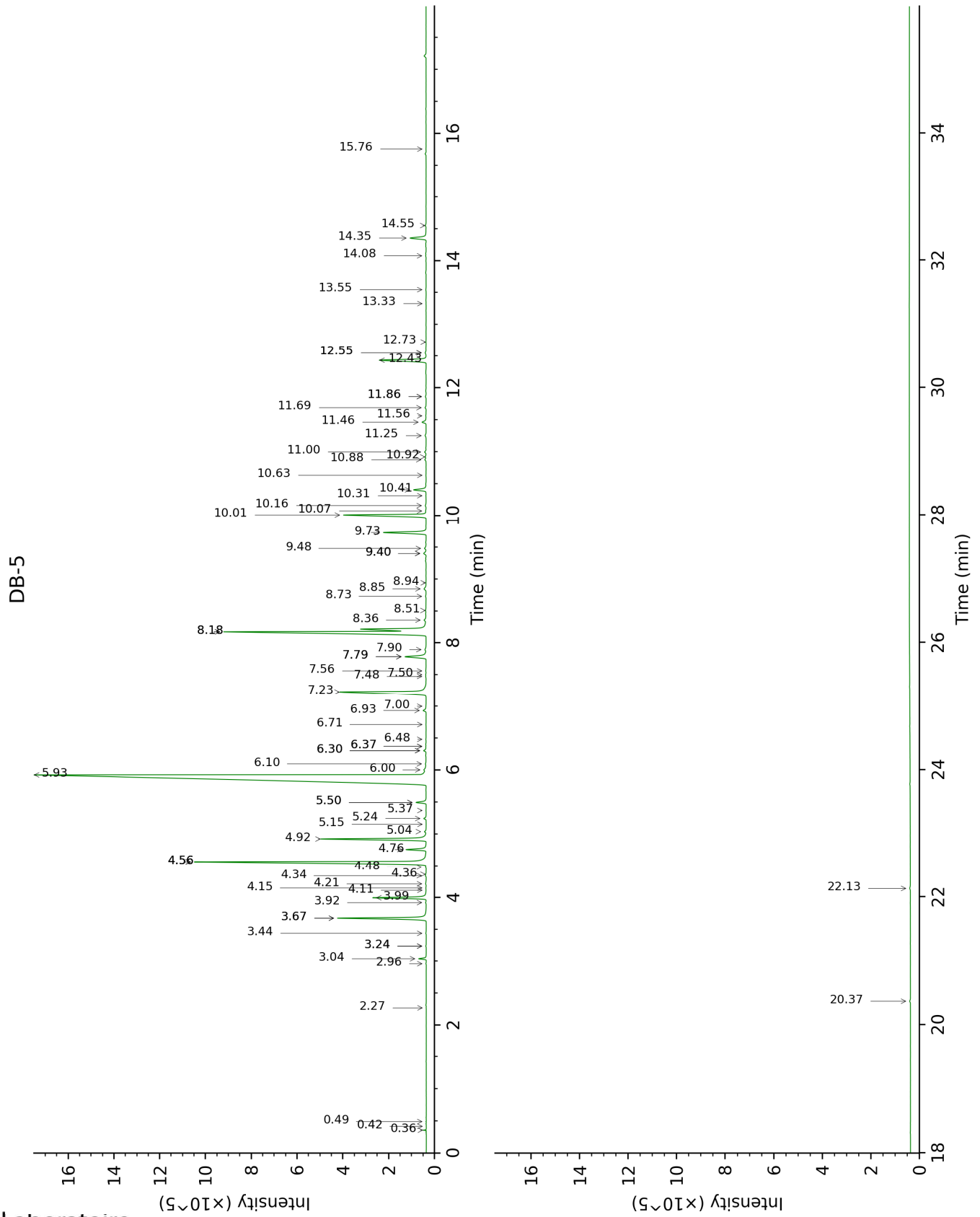
*: Two or more compounds are coeluting on this column

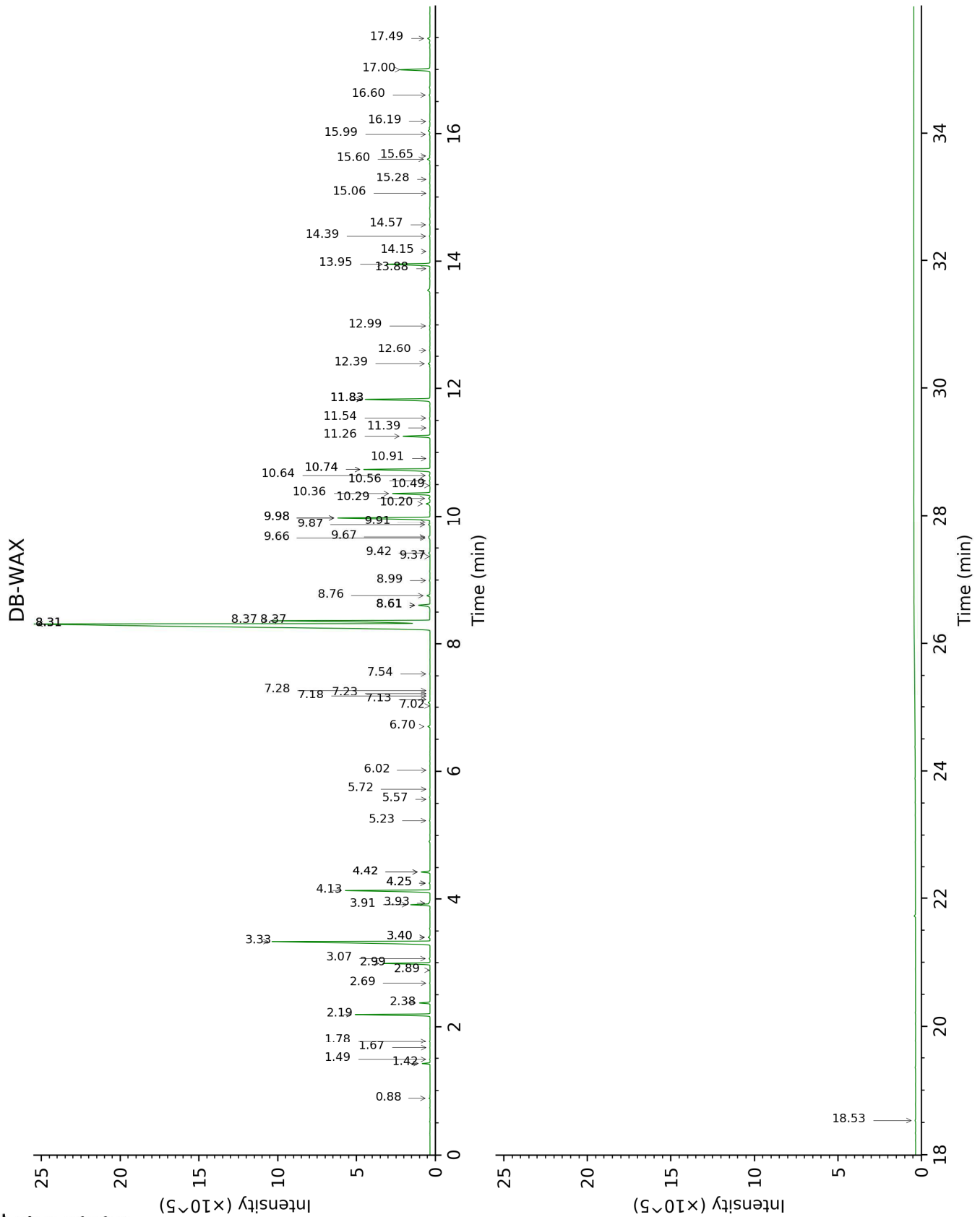
[xx]: Duplicate percentage due to coelutions, not taken account in the identified total

tr: The compound has been detected below 0.005% of total signal.

Note: no correction factor was applied

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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
Δ 3-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
<i>cis</i> -Sabinene hydrate	5.15	1064	tr	7.13	1437	0.01
<i>cis</i> -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]
<i>trans</i> -Linalool oxide (fur.)	5.50*	1085	[0.43]	7.02	1429	0.01
Linalool	5.93	1112	46.55	8.31*	1526	[47.11]
<i>cis</i> -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
<i>trans</i> -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]

(3E,5E)-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
(3Z,6E)- α -Farnesene	11.56	1496	0.02	10.49	1697	0.02
γ -Cadinene	11.69	1505	0.05	10.64	1710	0.05
<i>trans</i> -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
(2E,6Z)-Farnesol	14.08	1695	0.02	16.60	2266	0.05
(2E,6E)-Farnesol	14.35	1718	0.86	17.00	2308	1.57
(2E,6E)-Farnesal	14.55	1735	0.04	15.99	2202	0.04
(2E,6E)-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%
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*: 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