

Date : May 31, 2018

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 18E25-PTH2-1-CC

Customer identification : Petitgrain - Egypt, Paraguay - P60104712R

Type : Essential oil

Source : *Citrus x aurantium*

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 : Benoit Roger, Ph. D.

Analysis date : May 29, 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: 1.4573 ± 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	0.11	0.15	Aliphatic alcohol
2-Methyl-3-buten-2-ol	tr	tr	Aliphatic alcohol
Isoamyl alcohol	tr	tr	Aliphatic alcohol
Toluene	tr	tr	Simple phenolic
(3Z)-Hexenol	0.02	0.02	Aliphatic alcohol
(2E)-Hexenol	tr	tr	Aliphatic alcohol
Hexanol	0.02	0.02	Aliphatic alcohol
α -Thujene	0.01	0.01	Monoterpene
α -Pinene	0.08	0.08	Monoterpene
α -Fenchene	tr	tr	Monoterpene
Camphene	0.01	tr	Monoterpene
Benzaldehyde	tr	0.01	Simple phenolic
β -Pinene	1.10*	0.91	Monoterpene
Sabinene	[1.10]*	0.19	Monoterpene
6-Methyl-5-hepten-2-one	0.03	0.03	Aliphatic ketone
Myrcene	1.63	1.63	Monoterpene
6-Methyl-5-hepten-2-ol	tr	tr	Aliphatic alcohol
α -Phellandrene	0.03*	0.03	Monoterpene
Pseudolimonene	[0.03]*	tr	Monoterpene
Octanal	tr	tr	Aliphatic aldehyde
Δ^3 -Carene	0.33	0.32	Monoterpene
α -Terpinene	0.03	0.03	Monoterpene
ortho-Cymene	0.01	0.02*	Simple phenolic
para-Cymene	0.01	[0.02]*	Monoterpene
1,8-Cineole	0.96*	0.05	Monoterpenic ether
β -Phellandrene	[0.96]*	0.04	Monoterpene
Limonene	[0.96]*	0.88	Monoterpene
(Z)- β -Ocimene	0.66	0.67	Monoterpene
(E)- β -Ocimene	1.94	1.96	Monoterpene
γ -Terpinene	0.04	0.03	Monoterpene
cis-Sabinene hydrate	tr	0.03*	Monoterpenic alcohol
cis-Linalool oxide (fur.)	0.04	0.04	Monoterpenic alcohol
Terpinolene	0.38*	0.36	Monoterpene
para-Cymenene	[0.38]*	tr	Monoterpene
trans-Linalool oxide (fur.)	[0.38]*	[0.03]*	Monoterpenic alcohol
trans-Sabinene hydrate	tr	tr	Monoterpenic alcohol
Rosefuran	tr	tr	Monoterpenic ether
Linalool	22.02*	22.18*	Monoterpenic alcohol
Phenylethyl alcohol	[22.02]*	tr*	Simple phenolic
cis-para-Menth-2-en-1-ol	0.01	[22.18]*	Monoterpenic alcohol
allo-Ocimene	0.01	0.01	Monoterpene
Benzeneacetonitrile	0.01*	[tr]*	Simple phenolic
Camphor	[0.01]*	0.01	Monoterpenic ketone
neo-allo-Ocimene	0.01*	tr	Monoterpene
(E)-Myroxide	[0.01]*	0.01	Monoterpenic ether
Citronellal	0.02	0.04	Monoterpenic aldehyde
Terpinen-4-ol	0.10	0.10	Monoterpenic alcohol
trans-Linalool oxide (pyr.)	tr	3.57*	Monoterpenic alcohol

α -Terpineol	4.87	4.89*	Monoterpenic alcohol
(3E,5E)-2,6-Dimethylocta-3,5,7-trien-2-ol	tr	0.01	Monoterpenic alcohol
Nerol	1.09	1.09	Monoterpenic alcohol
Neral	0.09	0.08	Monoterpenic aldehyde
Geranial	56.56*	0.10	Monoterpenic aldehyde
Linalyl acetate	[56.56]*	53.49*	Monoterpenic ester
Geraniol	[56.56]*	2.69	Monoterpenic alcohol
Bornyl acetate	tr	[53.49]*	Monoterpenic ester
4-Vinylguaiaacol	0.01	0.01	Simple phenolic
Methyl anthranilate	0.02*	0.01	Phenolic ester
δ -Elemene isomer	[0.02]*	0.01	Sesquiterpene
Linalyl propionate	0.04	0.04	Monoterpenic ester
Hodiendiol derivative	0.01	0.01	Oxygenated monoterpene
α -Terpinyl acetate	0.10	0.10	Monoterpenic ester
Eugenol	0.03	0.03	Phenylpropanoid
Neryl acetate	2.10	2.09*	Monoterpenic ester
Geranyl acetate	3.57*	[3.57]*	Monoterpenic ester
(Z)-Jasmone	[3.57]*	tr	Jasmonate
β -Elemene	[3.57]*	tr	Sesquiterpene
Dimethyl anthranilate	0.01	0.01	Phenolic ester
β -Caryophyllene	0.76	0.76	Sesquiterpene
α -Humulene	0.08	0.08	Sesquiterpene
(E)- β -Farnesene	0.02	0.03	Sesquiterpene
γ -Murolene	tr	tr	Sesquiterpene
Germacrene D	0.01	[4.89]*	Sesquiterpene
Bicyclogermacrene	0.26	0.25	Sesquiterpene
(3Z,6E)- α -Farnesene	0.02*	[2.09]*	Sesquiterpene
α -Murolene	[0.02]*	0.01	Sesquiterpene
(3E,6E)- α -Farnesene	0.04*	[3.57]*	Sesquiterpene
γ -Cadinene	[0.04]*	0.04*	Sesquiterpene
<i>trans</i> -Calamenene	0.04*	0.01	Sesquiterpene
δ -Cadinene	[0.04]*	[0.04]*	Sesquiterpene
(E)-Nerolidol	0.06	0.06	Sesquiterpenic alcohol
Spathulenol	0.01	0.01	Sesquiterpenic alcohol
Caryophyllene oxide	0.02	0.02	Sesquiterpenic ether
Phytol	0.03	0.04	Diterpenic alcohol
Total identified	99.47%	99.44%	

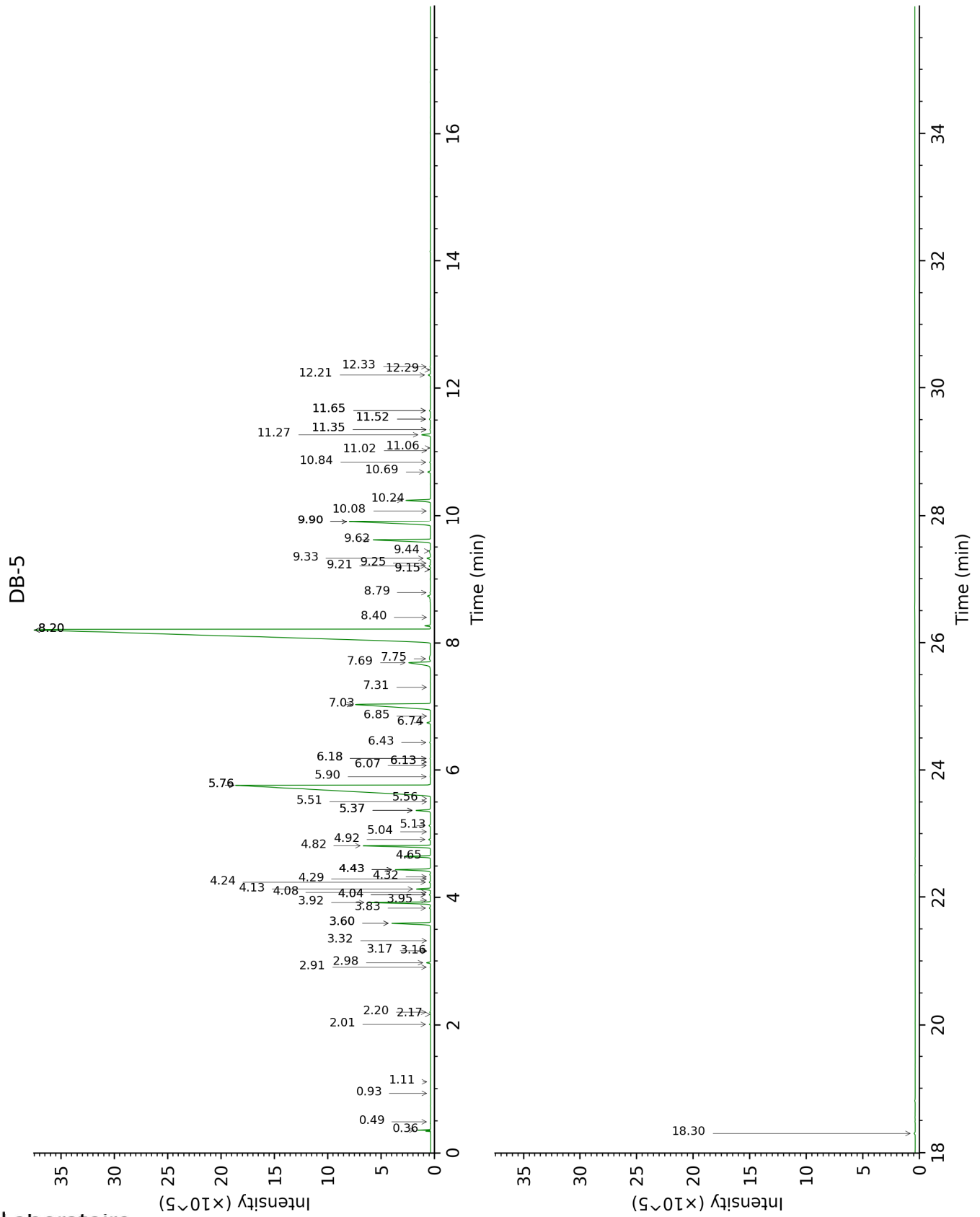
*: Two or more compounds are coeluting on this column

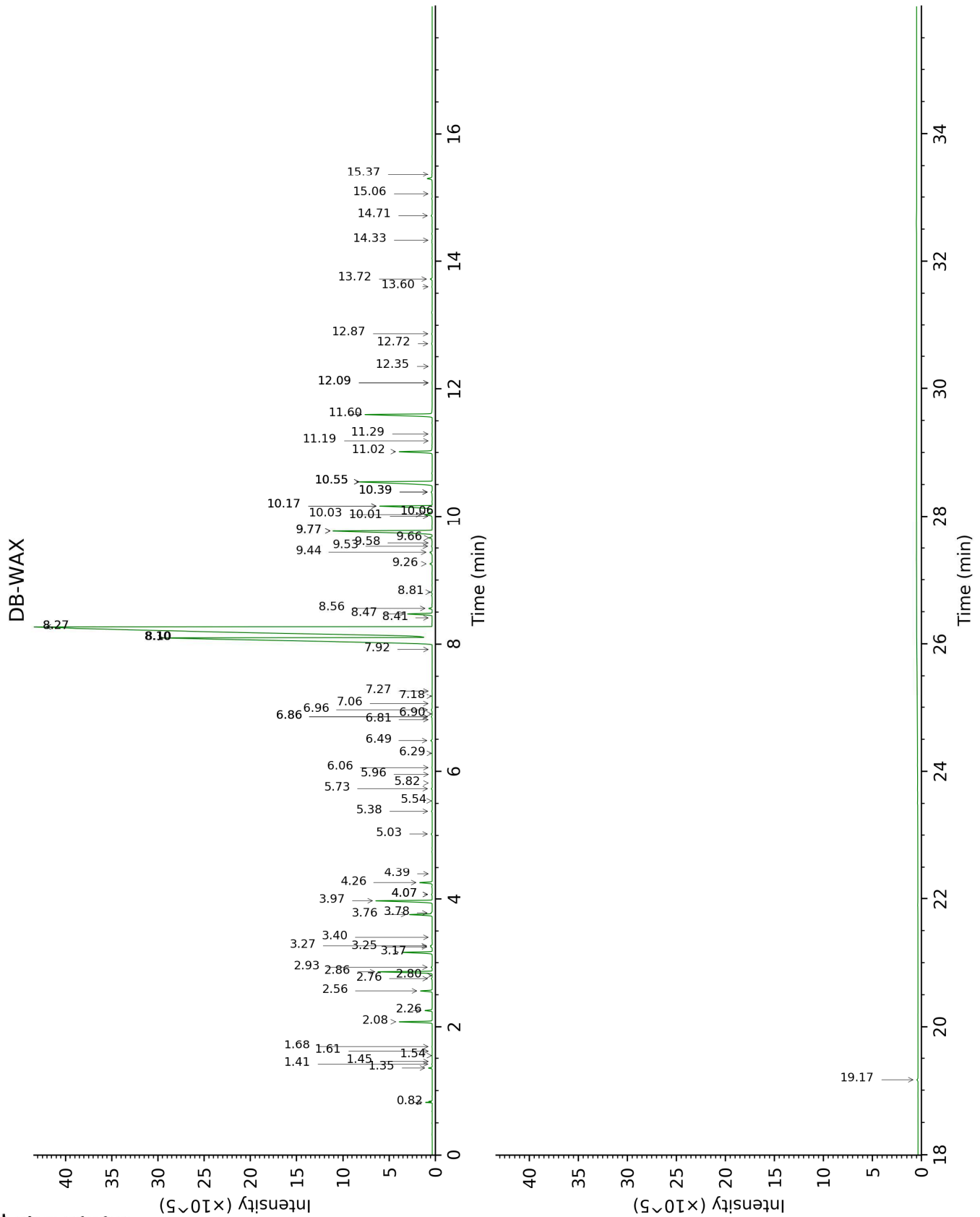
[xx]: Duplicate percentage due to coelutions, not taken account in the identified total

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	499	0.11	0.82	907	0.15
2-Methyl-3-buten-2-ol	0.49	607	tr	1.54	1017	tr
Isoamyl alcohol	0.93	728	tr	3.40	1180	tr
Toluene	1.11	755	tr	1.45	1008	tr
(3Z)-Hexenol	2.01	853	0.02	5.73	1349	0.02
(2E)-Hexenol	2.17	867	tr	6.06	1373	tr
Hexanol	2.20	870	0.02	5.38	1324	0.02
α -Thujene	2.91	924	0.01	1.41	1004	0.01
α -Pinene	2.98	929	0.08	1.35	994	0.08
α -Fenchene	3.16	941	tr	1.61	1024	tr
Camphene	3.17	942	0.01	1.68	1031	tr
Benzaldehyde	3.32	952	tr	7.27	1462	0.01
β -Pinene	3.60*	971	1.10	2.08	1070	0.91
Sabinene	3.60*	971	[1.10]	2.26	1087	0.19
6-Methyl-5-hepten-2-one	3.83	987	0.03	5.03	1298	0.03
Myrcene	3.92	993	1.63	2.86	1138	1.63
6-Methyl-5-hepten-2-ol	3.95	995	tr	6.90	1434	tr
α -Phellandrene	4.04*	1001	0.03	2.76	1130	0.03
Pseudolimonene	4.04*	1001	[0.03]	2.80	1133	tr
Octanal	4.08	1003	tr	4.39	1253	tr
Δ^3 -Carene	4.13	1007	0.33	2.56	1115	0.32
α -Terpinene	4.24	1013	0.03	2.93	1143	0.03
ortho-Cymene	4.29	1017	0.01	4.07*	1230	0.02
para-Cymene	4.32	1019	0.01	4.07*	1230	[0.02]
1,8-Cineole	4.43*	1026	0.96	3.27	1169	0.05
β -Phellandrene	4.43*	1026	[0.96]	3.25	1168	0.04
Limonene	4.43*	1026	[0.96]	3.17	1161	0.88
(Z)- β -Ocimene	4.65	1040	0.66	3.76	1207	0.67
(E)- β -Ocimene	4.82	1050	1.94	3.97	1222	1.96
γ -Terpinene	4.92	1056	0.04	3.78	1209	0.03
cis-Sabinene hydrate	5.04	1064	tr	6.86*	1431	0.03
cis-Linalool oxide (fur.)	5.13	1070	0.04	6.48	1403	0.04
Terpinolene	5.37*	1085	0.38	4.26	1243	0.36
para-Cymenene	5.37*	1085	[0.38]	6.29	1389	tr
trans-Linalool oxide (fur.)	5.37*	1085	[0.38]	6.86*	1431	[0.03]
trans-Sabinene hydrate	5.51	1094	tr	7.92	1510	tr
Rosefuran	5.56	1097	tr	5.96	1365	tr
Linalool	5.76*	1110	22.02	8.10*	1525	22.18
Phenylethyl alcohol	5.76*	1110	[22.02]	12.09*	1855	tr
cis-para-Menth-2-en-1-ol	5.90	1119	0.01	8.10*	1525	[22.18]

allo-Ocimene	6.07	1130	0.01	5.54	1335	0.01
Benzeneacetonitrile	6.13*	1134	0.01	12.09*	1855	[tr]
Camphor	6.13*	1134	[0.01]	7.18	1455	0.01
neo-allo-Ocimene	6.18*	1137	0.01	5.82	1356	tr
(E)-Myroxide	6.18*	1137	[0.01]	7.06	1446	0.01
Citronellal	6.43	1153	0.02	6.96	1439	0.04
Terpinen-4-ol	6.74	1173	0.10	8.56	1560	0.10
trans-Linalool oxide (pyr.)	6.85	1180	tr	10.55*	1721	3.57
α-Terpineol	7.03	1192	4.87	9.77*	1657	4.89
(3E,5E)-2,6-Dimethylocta-3,5,7-trien-2-ol	7.31	1210	tr	11.29	1785	0.01
Nerol	7.69	1236	1.09	11.02	1761	1.09
Neral	7.76	1240	0.09	9.44	1630	0.08
Geranial	8.20*†	1270	56.56	10.06	1681	0.10
Linalyl acetate	8.20*†	1270	[56.56]	8.27*	1538	53.49
Geraniol	8.20*†	1270	[56.56]	11.60	1811	2.69
Bornyl acetate	8.40	1283	tr	8.27*	1538	[53.49]
4-Vinylguaiacol	8.79	1310	0.01	15.06	2135	0.01
Methyl anthranilate	9.15*	1335	0.02	15.37	2166	0.01
δ-Elemene isomer	9.15*	1335	[0.02]	6.81	1428	0.01
Linalyl propionate	9.21	1339	0.04	8.81	1580	0.04
Hodiendiol derivative	9.25	1342	0.01	12.87	1925	0.01
α-Terpinyl acetate	9.33	1348	0.10	9.66	1648	0.10
Eugenol	9.44	1356	0.03	14.71	2101	0.03
Neryl acetate	9.62	1368	2.10	10.17*	1690	2.09
Geranyl acetate	9.90*	1389	3.57	10.55*	1721	[3.57]
(Z)-Jasmone	9.90*	1389	[3.57]	12.35	1878	tr
β-Elemene	9.90*	1389	[3.57]	8.41	1549	tr
Dimethyl anthranilate	10.08	1401	0.01	13.60	1994	0.01
β-Caryophyllene	10.24	1413	0.76	8.47	1554	0.76
α-Humulene	10.69	1446	0.08	9.26	1615	0.08
(E)-β-Farnesene	10.84	1458	0.02	9.53	1638	0.03
γ-Murolene	11.02	1471	tr	9.58	1642	tr
Germacrene D	11.06	1474	0.01	9.77*	1657	[4.89]
Bicylogermacrene	11.27	1490	0.26	10.03	1679	0.25
(3Z,6E)-α-Farnesene	11.35*	1496	0.02	10.17*	1690	[2.09]
α-Murolene	11.35*	1496	[0.02]	10.01	1677	0.01
(3E,6E)-α-Farnesene	11.52*	1508	0.04	10.55*	1721	[3.57]
γ-Cadinene	11.52*	1508	[0.04]	10.39*	1708	0.04
trans-Calamenene	11.65*	1519	0.04	11.19	1776	0.01
δ-Cadinene	11.65*	1519	[0.04]	10.39*	1708	[0.04]
(E)-Nerolidol	12.20	1563	0.06	13.72	2005	0.06
Spathulenol	12.28	1569	0.01	14.33	2064	0.01
Caryophyllene oxide	12.33	1573	0.02	12.72	1911	0.02
Phytol	18.30	2111	0.03	19.17	2582	0.04
Total identified		99.47%			99.44%	

Total reported	99.47%	99.44%
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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

†: Peaks apexes were resolved, but peaks overlapped and were summed for analysis

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