

Date : April 12, 2019

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 19D02-ORA03-1-SCC
Customer identification : Organic Eucalyptus
Type : Essential oil
Source : *Eucalyptus radiata*
Customer : Organic Aromas Inc.

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 : Sylvain Mercier, M. Sc., Chimiste

Analysis date : April 09, 2019

Checked and approved by :

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

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PHYSICOCHEMICAL DATA

Physical aspect: Clear liquid

Refractive index: 1.4627 ± 0.0003 (20 °C)

CONCLUSION

No adulterant, contaminant or diluent has been detected using this method. This profile correspond to an *Eucalyptus radiata* essential oil.

ANALYSIS SUMMARY

Identification	DB-5 (%)	DB-WAX (%)	Classe
2-Methyl-3-buten-2-ol	0.01	0.01	Aliphatic alcohol
Isobutanol	tr	0.01	Aliphatic alcohol
Isovaleral	0.01	0.01	Aliphatic aldehyde
2-Methylbutyral	tr	tr	Aliphatic aldehyde
Isoamyl alcohol	0.02	0.04*	Aliphatic alcohol
2-Methylbutanol	0.01	[0.04]*	Aliphatic alcohol
Toluene	tr	0.01	Simple phenolic
(2E)-Hexenal	tr	70.54*	Aliphatic aldehyde
(3Z)-Hexenol	0.05	0.06	Aliphatic alcohol
Hexanol	0.01	0.02	Aliphatic alcohol
2-Methylbutyl acetate	0.01	0.01	Aliphatic ester
α -Thujene	0.29	0.28	Monoterpene
α -Pinene	2.29	2.27	Monoterpene
Camphene	0.04*	0.02	Monoterpene
α -Fenchene	[0.04]*	0.01	Monoterpene
Sabinene	1.05	0.41	Monoterpene
β -Pinene	[1.05]	0.66	Monoterpene
<i>trans</i> -para-Menthane	0.02	0.01	Monoterpene
Unknown	0.01		Unknown
Myrcene	1.26	1.27	Monoterpene
α -Phellandrene	0.50*	0.47	Monoterpene
Pseudolimonene	[0.50]*	0.02	Monoterpene
α -Terpinene	0.25	0.26	Monoterpene
para-Cymene	77.93*	1.05	Monoterpene
Limonene	[77.93]*	6.02	Monoterpene
1,8-Cineole	[77.93]*	[70.54]*	Monoterpenic ether
(Z)- β -Ocimene	0.02	0.02	Monoterpene
(E)- β -Ocimene	0.19	0.19	Monoterpene
γ -Terpinene	0.56	0.57	Monoterpene
Unknown	0.01	0.01	Oxygenated monoterpene
<i>cis</i> -Linalool oxide (fur.)	0.03	0.03	Monoterpenic alcohol
Terpinolene	0.20*	0.15	Monoterpene
<i>trans</i> -Linalool oxide (fur.)	[0.20]*	0.04	Monoterpenic alcohol
para-Cymenene	[0.20]*	0.03	Monoterpene
Linalool	0.42	0.44	Monoterpenic alcohol
Unknown	0.01	0.02	Unknown
endo-Fenchol	0.01	0.17*	Monoterpenic alcohol
<i>cis</i> -para-Menth-2-en-1-ol	0.07	0.09*	Monoterpenic alcohol
<i>trans</i> -Pinocarveol	0.02	0.05*	Monoterpenic alcohol
<i>trans</i> -para-Menth-2-en-1-ol	0.04	0.09*	Monoterpenic alcohol
Isopulegol	0.03	[0.09]*	Monoterpenic alcohol
Citronellal	0.03*	0.01	Monoterpenic aldehyde
Nerol oxide	[0.03]*	0.01	Aliphatic ether
Borneol	0.01	9.24*	Monoterpenic alcohol
δ -Terpineol	0.17	0.26*	Monoterpenic alcohol
Terpinen-4-ol	2.08	2.06*	Monoterpenic alcohol
Cryptone	0.03	[0.05]*	Normoterpenic ketone
para-Cymen-8-ol	0.02	0.03	Monoterpenic alcohol

α-Terpineol	9.22	[9.24]*	Monoterpenic alcohol
trans-Piperitol	0.03	0.04*	Monoterpenic alcohol
Unknown	0.01		Oxygenated monoterpene
trans-Carveol	0.01	0.01	Monoterpenic alcohol
exo-2-Hydroxycineole	0.03	0.66*	Monoterpenic alcohol
Nerol	0.05	0.06	Monoterpenic alcohol
Citronellol	0.05	0.07	Monoterpenic alcohol
Unknown	0.02	0.02	Oxygenated monoterpene
Neral	0.14*	[0.26]*	Monoterpenic aldehyde
Carvone	[0.14]*	0.10*	Monoterpenic ketone
Piperitone	0.08	0.09	Monoterpenic ketone
Geraniol	0.63	[0.66]*	Monoterpenic alcohol
trans-Ascaridole glycol	0.02	0.02	Monoterpenic alcohol
Geranial	0.15	0.15*	Monoterpenic aldehyde
cis-Ascaridole glycol	0.01	0.02	Monoterpenic alcohol
Unknown	0.01		Unknown
Unknown	0.02		Oxygenated monoterpene
Unknown	0.03	0.04	Unknown
Unknown	0.02	0.02	Monoterpenic alcohol
Unknown	0.01		Unknown
exo-2-Hydroxycineole acetate	0.01	[0.15]*	Monoterpenic ester
α-Terpinyl acetate	0.35	0.35	Monoterpenic ester
Unknown	0.01	0.02*	Unknown
Methyl (E)-cinnamate	0.01	0.01	Phenylpropanoid ester
Geranyl acetate	0.02	0.02	Monoterpenic ester
Unknown	0.01		Sesquiterpene
α-Gurjunene	0.02	0.01	Sesquiterpene
β-Caryophyllene	0.20	[0.17]*	Sesquiterpene
Aromadendrene	0.02	[2.06]*	Sesquiterpene
α-Humulene	0.03	0.02	Sesquiterpene
allo-Aromadendrene	0.03	[0.09]*	Sesquiterpene
Bicyclgermacrene	0.12*	[0.10]*	Sesquiterpene
Viridiflorene	[0.12]*	0.06	Sesquiterpene
δ-Cadinene	0.01	[0.04]*	Sesquiterpene
Spathulenol	0.02	0.03	Sesquiterpenic alcohol
Caryophyllene oxide	0.01	0.01	Sesquiterpenic ether
Globulol	0.03	0.02	Sesquiterpenic alcohol
Viridiflorol	0.02	[0.02]*	Sesquiterpenic alcohol
Cubeban-11-ol	0.01	0.01	Sesquiterpenic alcohol
Ledol	0.02	0.01	Sesquiterpenic alcohol
Rosifoliol	0.01	0.01	Sesquiterpenic alcohol
γ-Eudesmol	0.02	0.01	Sesquiterpenic alcohol
Isospathulenol	0.01	0.02	Sesquiterpenic alcohol
β-Eudesmol	0.02	0.03	Sesquiterpenic alcohol
α-Eudesmol	0.02	0.02	Sesquiterpenic alcohol
Total identified	99.13%	98.83%	

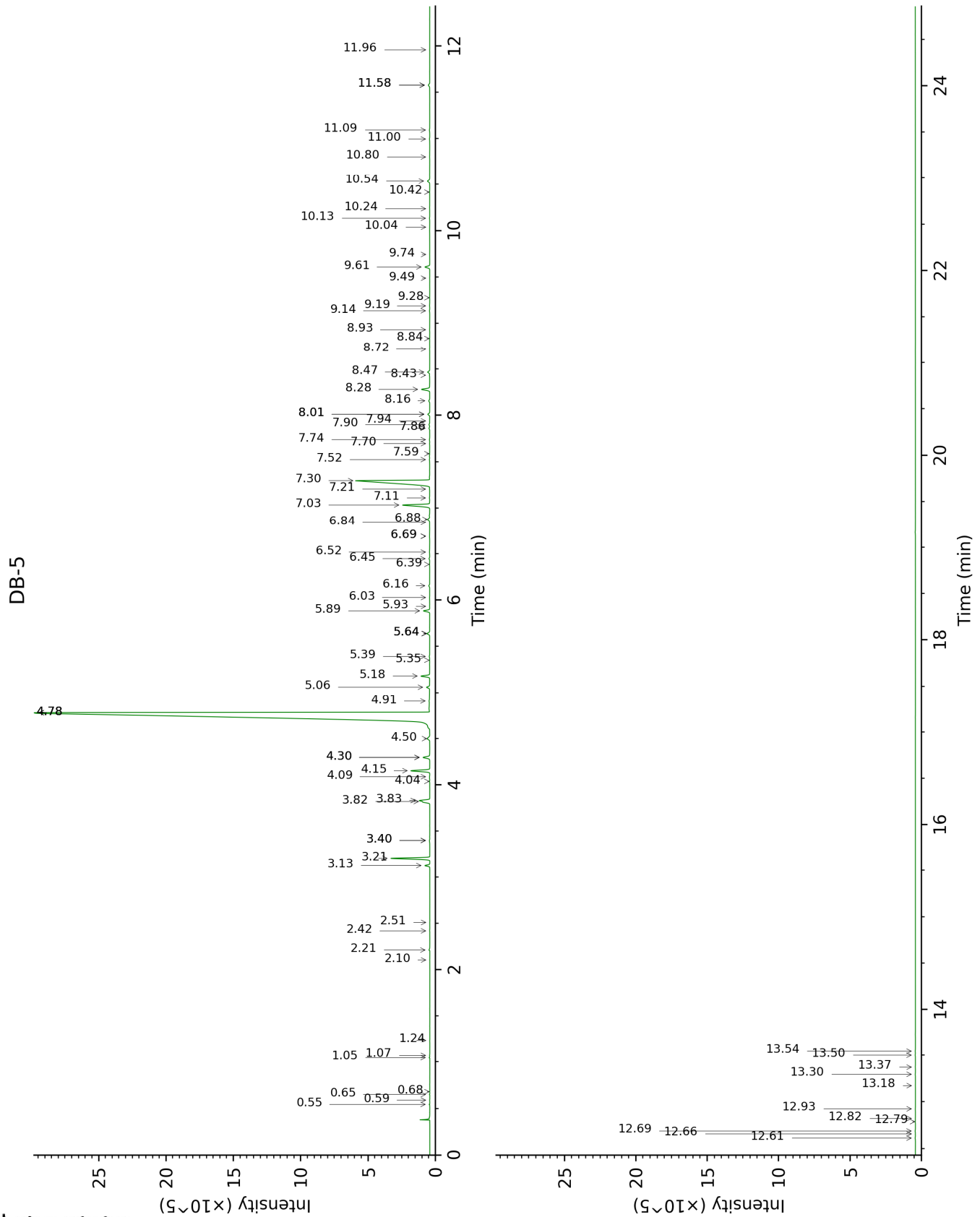
*: Two or more compounds are coeluting on this column

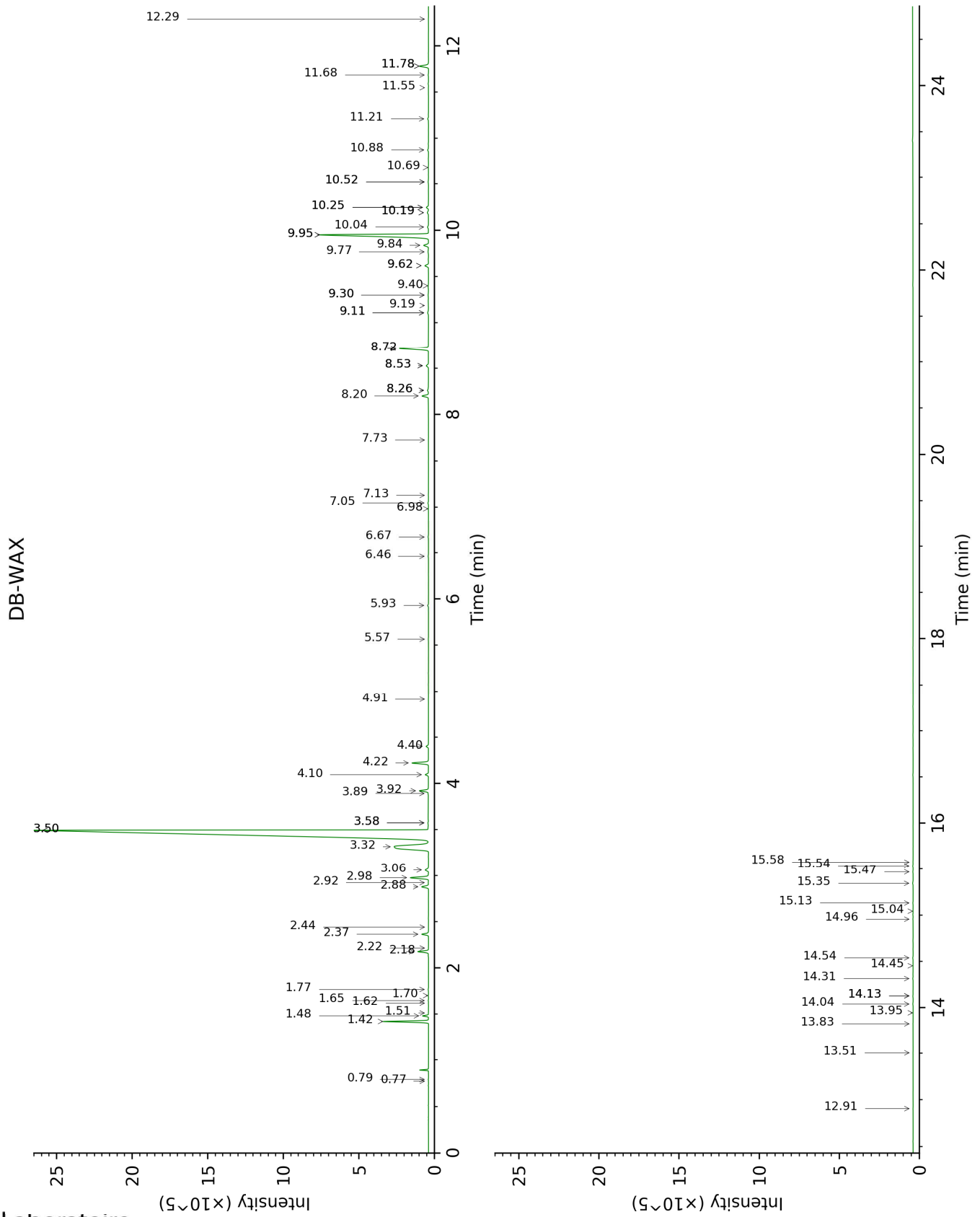
[xx]: Duplicate percentage due to coelutions, not taken account in the identified total

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	%
2-Methyl-3-buten-2-ol	0.54	608	0.01	1.65	1014	0.01
Isobutanol	0.59	622	tr	2.22	1070	0.01
Isovaleral	0.65	642	0.01	0.79	887	0.01
2-Methylbutyral	0.68	652	tr	0.77	880	tr
Isoamyl alcohol	1.05	731	0.02	3.58*	1180	0.04
2-Methylbutanol	1.07	734	0.01	3.58*	1180	[0.04]
Toluene	1.24	757	tr	1.51	1001	0.01
(2E)-Hexenal	2.10	846	tr	3.50*	1174	70.54
(3Z)-Hexenol	2.21	854	0.05	5.93	1350	0.06
Hexanol	2.42	871	0.01	5.57	1324	0.02
2-Methylbutyl acetate	2.51	879	0.01	2.44	1092	0.01
α-Thujene	3.13	924	0.29	1.48	998	0.28
α-Pinene	3.21	929	2.29	1.42	992	2.27
Camphene	3.40*	942	0.04	1.77	1026	0.02
α-Fenchene	3.40*	942	[0.04]	1.70	1020	0.01
Sabinene	3.82†	970	1.05	2.36	1084	0.41
β-Pinene	3.83†	971	[1.05]	2.18	1066	0.66
trans-para-Menthane	4.04	984	0.02	1.62	1012	0.01
Unknown [m/z 67, 68 (95), 43 (73), 94 (65), 79 (54), 41 (50)...]	4.09	988	0.01			
Myrcene	4.15	992	1.26	2.98	1134	1.27
α-Phellandrene	4.30*	1001	0.50	2.88	1126	0.47
Pseudolimonene	4.30*	1001	[0.50]	2.92	1129	0.02
α-Terpinene	4.50	1014	0.25	3.06	1140	0.26
para-Cymene	4.78*	1032	77.93	4.22	1227	1.05
Limonene	4.78*	1032	[77.93]	3.32	1160	6.02
1,8-Cineole	4.78*	1032	[77.93]	3.50*	1174	[70.54]
(Z)-β-Ocimene	4.91	1040	0.02	3.89	1203	0.02
(E)-β-Ocimene	5.06	1050	0.19	4.10	1218	0.19
γ-Terpinene	5.18	1057	0.56	3.92	1205	0.57
Unknown [m/z 79, 93 (60), 43 (40), 94 (35), 137 (33), 77 (26), 91 (20), 152 (18)]	5.35	1068	0.01	4.91	1276	0.01
cis-Linalool oxide (fur.)	5.39	1070	0.03	6.67	1403	0.03
Terpinolene	5.64*	1086	0.20	4.40	1240	0.15
trans-Linalool oxide (fur.)	5.64*	1086	[0.20]	7.05	1430	0.04
para-Cymenene	5.64*	1086	[0.20]	6.46	1388	0.03
Linalool	5.89	1102	0.42	8.20	1517	0.44
Unknown [m/z 43,	5.93	1105	0.01	9.19	1593	0.02

59 (37), 79 (33), 91 (32), 119 (31)...						
endo-Fenchol	6.03	1111	0.01	8.53*	1542	0.17
cis-para-Menth-2-en-1-ol	6.16	1119	0.07	8.26*	1521	0.09
trans-Pinocarveol	6.39	1134	0.02	9.30*	1602	0.05
trans-para-Menth-2-en-1-ol	6.45	1138	0.04	9.11*	1586	0.09
Isopulegol	6.52	1142	0.03	8.26*	1521	[0.09]
Citronellal	6.69*	1154	0.03	7.13	1436	0.01
Nerol oxide	6.69*	1154	[0.03]	6.98	1426	0.01
Borneol	6.84	1163	0.01	9.95*	1654	9.24
δ-Terpineol	6.88	1166	0.17	9.62*	1627	0.26
Terpinen-4-ol	7.03	1176	2.08	8.72*	1556	2.06
Cryptone	7.11	1181	0.03	9.30*	1602	[0.05]
para-Cymen-8-ol	7.21	1187	0.02	11.68	1799	0.03
α-Terpineol	7.30	1193	9.22	9.95*	1654	[9.24]
trans-Piperitol	7.52	1208	0.03	10.52*	1701	0.04
Unknown [m/z 107, 79 (99), 91 (57), 94 (54), 135 (44), 150 (44)]	7.59	1212	0.01			
trans-Carveol	7.70	1219	0.01	11.55	1787	0.01
exo-2-Hydroxycineole	7.74	1222	0.03	11.78*	1808	0.66
Nerol	7.86	1231	0.05	11.21	1759	0.06
Citronellol	7.90	1233	0.05	10.88	1730	0.07
Unknown [m/z 91, 92 (87), 137 (57), 81 (47)... 152 (17), 178 (1)]	7.94	1236	0.02	12.29	1852	0.02
Neral	8.01*	1241	0.14	9.62*	1627	[0.26]
Carvone	8.01*	1241	[0.14]	10.19*	1673	0.10
Piperitone	8.16	1251	0.08	10.04	1661	0.09
Geraniol	8.28	1259	0.63	11.78*	1808	[0.66]
trans-Ascaridole glycol	8.43	1270	0.02	14.32	2039	0.02
Geranial	8.47	1272	0.15	10.25*	1678	0.15
cis-Ascaridole glycol	8.72	1289	0.01	14.96	2101	0.02
Unknown [m/z 95, 110 (95), 67 (31), 43 (29), 122 (18), 41 (14)...	8.84	1297	0.01			
Unknown [m/z 59, 94 (99), 79 (68), 43 (32), 97 (17)... 137 (8)...	8.93	1303	0.02			
Unknown [m/z 111, 126 (93), 43 (90), 71 (60)...	9.14	1313	0.03	15.34	2140	0.04
Unknown [m/z 97,	9.19	1317	0.02	15.13	2119	0.02

112 (92), 83 (62), 43 (44), 41 (25)... 170? (4)] Unknown [m/z 69, 41 (58), 114 (29), 43 (25), 83 (24), 123 (20)...]	9.28	1323	0.01			
exo-2- Hydroxycineole acetate	9.49	1338	0.01	10.25*	1678	[0.15]
α-Terpinyl acetate	9.61	1346	0.35	9.84	1645	0.35
Unknown [m/z 43, 95 (62), 107 (45), 110 (41), 55 (28), 67 (25)...]	9.74	1356	0.01	14.13*	2021	0.02
Methyl (E)- cinnamate	10.04	1377	0.01	13.94	2004	0.01
Geranyl acetate	10.13	1384	0.02	10.69	1714	0.02
Unknown [m/z 93, 122 (98), 161 (98), 107 (86), 95 (46), 105 (72)... 204 (34)]	10.24	1391	0.01			
α-Gurjunene	10.42	1404	0.02	7.73	1481	0.01
β-Caryophyllene	10.54	1413	0.20	8.53*	1542	[0.17]
Aromadendrene	10.80	1433	0.02	8.72*	1556	[2.06]
α-Humulene	11.00	1447	0.03	9.40	1610	0.02
allo- Aromadendrene	11.09	1454	0.03	9.11*	1586	[0.09]
Bicyclogermacrene	11.58*	1490	0.12	10.19*	1673	[0.10]
Viridiflorene	11.58*	1490	[0.12]	9.77	1639	0.06
δ-Cadinene	11.96	1520	0.01	10.52*	1701	[0.04]
Spathulenol	12.61	1571	0.02	14.54	2061	0.03
Caryophyllene oxide	12.66	1575	0.01	12.91	1908	0.01
Globulol	12.69	1577	0.03	14.04	2013	0.02
Viridiflorol	12.79	1585	0.02	14.13*	2021	[0.02]
Cubeban-11-ol	12.82	1588	0.01	13.83	1992	0.01
Ledol	12.93	1596	0.02	13.51	1963	0.01
Rosifoliol	13.18	1616	0.01	14.45	2052	0.01
γ-Eudesmol	13.30	1626	0.02	15.04	2110	0.01
Isospathulenol	13.37	1633	0.01	15.58	2163	0.02
β-Eudesmol	13.50	1643	0.02	15.54	2159	0.03
α-Eudesmol	13.54	1647	0.02	15.47	2152	0.02
Total identified		99.13%			98.83%	
Total reported		99.29%			98.93%	

*: 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