

Date : October 18, 2018

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 18J05-PTH2-1-CC

Customer identification : Basil Linalool - Egypt - B1010587R

Type : Essential oil

Source : *Ocimum basilicum* ct. Linalool

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 : October 17, 2018

Checked and approved by :

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

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PHYSICOCHEMICAL DATA

Physical aspect: Faintly yellow liquid

Refractive index: 1.4740 ± 0.0003 (20 °C)

CONCLUSION

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

ANALYSIS SUMMARY

Identification	DB-5 (%)	DB-WAX (%)	Classe
Isovaleral	0.02	0.02	Aliphatic aldehyde
2-Methylbutyral	0.01	0.01	Aliphatic aldehyde
2-Ethylfuran	tr	tr	Furan
Isoamyl alcohol	0.01	0.01*	Aliphatic alcohol
2-Methylbutanol	tr	[0.01]*	Aliphatic alcohol
(2E)-Hexenal	0.01	8.84*	Aliphatic aldehyde
(2E)-Hexenol	0.02	0.01	Aliphatic alcohol
Tricyclene	0.01	tr	Monoterpene
α -Thujene	0.03	0.03	Monoterpene
α -Pinene	0.47	0.49	Monoterpene
Camphene	0.09	0.09	Monoterpene
Thuja-2,4(10)-diene	tr	0.48*	Monoterpene
Benzaldehyde	0.01	0.02	Simple phenolic
Sabinene	1.39*	[0.48]*	Monoterpene
β -Pinene	[1.39]*	0.93	Monoterpene
Octan-3-one	0.09	0.81*	Aliphatic ketone
Myrcene	1.02	1.00	Monoterpene
α -Phellandrene	0.03*	0.02	Monoterpene
Pseudolimonene	[0.03]*	0.01	Monoterpene
Δ^3 -Carene	0.02	0.01	Monoterpene
(3Z)-Hexenyl acetate	0.04	0.03	Aliphatic ester
α -Terpinene	0.09	0.08	Monoterpene
para-Cymene	0.07	0.08	Monoterpene
1,8-Cineole	9.24*	[8.84]*	Monoterpenic ether
Limonene	[9.24]*	0.38	Monoterpene
β -Phellandrene	[9.24]*	[8.84]*	Monoterpene
(Z)- β -Ocimene	0.09	0.07	Monoterpene
(E)- β -Ocimene	0.80	[0.81]*	Monoterpene
γ -Terpinene	0.12	0.12	Monoterpene
cis-Sabinene hydrate	0.10	0.16	Monoterpenic alcohol
cis-Linalool oxide (fur.)	0.04	0.04	Monoterpenic alcohol
Terpinolene	0.20*	0.15	Monoterpene
trans-Linalool oxide (fur.)	[0.20]*	0.01	Monoterpenic alcohol
6,7-Epoxymyrcene	0.03	0.04	Monoterpenic ether
Linalool	51.24	51.00*	Monoterpenic alcohol
Octen-3-yl acetate	[51.24]	0.06	Aliphatic ester
cis-para-Menth-2-en-1-ol	0.11	[51.00]*	Monoterpenic alcohol
Limona ketone	0.01	0.02	Normoterpenic ketone
(Z)-Myroxide	0.01	tr	Monoterpenic ether
Camphor	0.44	0.48	Monoterpenic ketone
(E)-Myroxide	0.17	0.19	Monoterpenic ether
Menthone	tr	tr	Monoterpenic ketone
Isomenthone	0.03	0.04	Monoterpenic ketone
Borneol	0.10	0.99*	Monoterpenic alcohol
cis-Linalool oxide (pyr.)	0.19*	0.01	Monoterpenic alcohol
δ -Terpineol	[0.19]*	0.18	Monoterpenic alcohol
Terpinen-4-ol	0.47	0.48	Monoterpenic alcohol
para-Cymen-8-ol	0.01	tr	Monoterpenic alcohol

α-Terpineol	0.74	[0.99]*	Monoterpenic alcohol
Methylchavicol	0.93	0.91	Phenylpropanoid
(3E,5E)-2,6-Dimethylocta-3,5,7-trien-2-ol	0.01	0.01	Monoterpenic alcohol
Octyl acetate	0.19	0.21	Aliphatic ester
Nerol	0.04	0.06	Monoterpenic alcohol
Unknown	0.20*	0.05	Oxygenated monoterpene
Citronellol	[0.20]*	0.30*	Monoterpenic alcohol
Carvone	0.04	0.91*	Monoterpenic ketone
Geraniol	0.23*	0.21	Monoterpenic alcohol
Linalyl acetate	[0.23]*	0.04	Monoterpenic ester
Chavicol	0.23		Phenylpropanoid
Geranial	0.17	0.12	Monoterpenic aldehyde
Citronellyl formate	0.08	0.06	Monoterpenic ester
Bornyl acetate	0.83	0.79	Monoterpenic ester
Lavandulyl acetate	0.02	0.01	Monoterpenic ester
Geranyl formate	0.02	1.15*	Monoterpenic ester
δ-Elemene isomer	0.02	0.06*	Sesquiterpene
exo-2-Hydroxycineole acetate	0.03	0.04	Monoterpenic ester
α-Cubebene	0.04	[0.06]*	Sesquiterpene
Eugenol	5.55	5.53	Phenylpropanoid
α-Copaene	0.15	0.11	Sesquiterpene
β-Bourbonene	0.32*	0.22	Sesquiterpene
1,5-diepi-β-Bourbonene	[0.32]*	0.02	Sesquiterpene
cis-β-Elemene	[0.32]*	0.10*	Sesquiterpene
Geranyl acetate	0.14	0.24	Monoterpenic ester
β-Elemene	1.50	6.95*	Sesquiterpene
β-Caryophyllene	0.33*	[6.95]*	Sesquiterpene
cis-α-Bergamotene	[0.33]*	0.16	Sesquiterpene
β-Copaene	0.11	0.13	Sesquiterpene
β-Gurjunene	0.02	[0.10]*	Sesquiterpene
trans-α-Bergamotene	5.50*	[6.95]*	Sesquiterpene
α-Guaiene	[5.50]*	[6.95]*	Sesquiterpene
(Z)-β-Farnesene?	[5.50]*	0.43*	Sesquiterpene
cis-Muurolo-3,5-diene	0.08	0.06	Sesquiterpene
cis-β-Bergamotene?	0.16*		Sesquiterpene
trans-Muurolo-3,5-diene	[0.16]*	0.16	Sesquiterpene
α-Humulene	0.64*	0.62	Sesquiterpene
Cadina-4,11-diene	[0.64]*	0.11	Sesquiterpene
(E)-β-Farnesene	0.64*	0.35	Sesquiterpene
cis-Muurolo-4(15),5-diene	[0.64]*	[0.43]*	Sesquiterpene
Germacrene D	2.82	2.91	Sesquiterpene
β-Selinene	0.49	[1.15]*	Sesquiterpene
Bicyclgermacrene	0.91	[0.91]*	Sesquiterpene
Viridiflorene	0.17*	0.04	Sesquiterpene
α-Muurolole	[0.17]*	[0.91]*	Sesquiterpene
(Z)-α-Bisabolene	1.18	3.52*	Sesquiterpene
δ-Guaiene	1.25	[1.15]*	Sesquiterpene
β-Bisabolene	0.07	0.04	Sesquiterpene
γ-Cadinene	2.13*	[3.52]*	Sesquiterpene
(Z)-γ-Bisabolene	[2.13]*	0.06	Sesquiterpene
δ-Cadinene	0.36*	[3.52]*	Sesquiterpene

<i>trans</i> -Calamenene	[0.36]*	0.15	Sesquiterpene
10-epi-Cubebol?	0.09	0.13*	Sesquiterpenic alcohol
α -Cadinene	0.04	[0.30]*	Sesquiterpene
Maaliol	0.09	0.11	Sesquiterpenic alcohol
(<i>E</i>)-Nerolidol	0.12	[0.13]*	Sesquiterpenic alcohol
Spathulenol	0.12	0.14	Sesquiterpenic alcohol
Globulol	0.01	0.02	Sesquiterpenic alcohol
Humulene epoxide II	0.03	0.08	Sesquiterpenic ether
10-epi- γ -Eudesmol	0.48*	0.01	Sesquiterpenic alcohol
10-epi-Cubenol	[0.48]*	0.38	Sesquiterpenic alcohol
τ -Cadinol	2.17	2.10	Sesquiterpenic alcohol
β -Eudesmol	0.06	0.05	Sesquiterpenic alcohol
α -Eudesmol	0.03	0.09*	Sesquiterpenic alcohol
α -Bisabolol	0.03	[0.09]*	Sesquiterpenic alcohol
Unknown	0.04	0.01	Lignan
Geranyl tiglate	0.01	0.04	Monoterpenic ester
Mint sulfide?	0.04		Sesquiterpenic sulfide
Phytone	0.02	0.01	Terpenic ketone
Total identified	98.54%	97.30%	

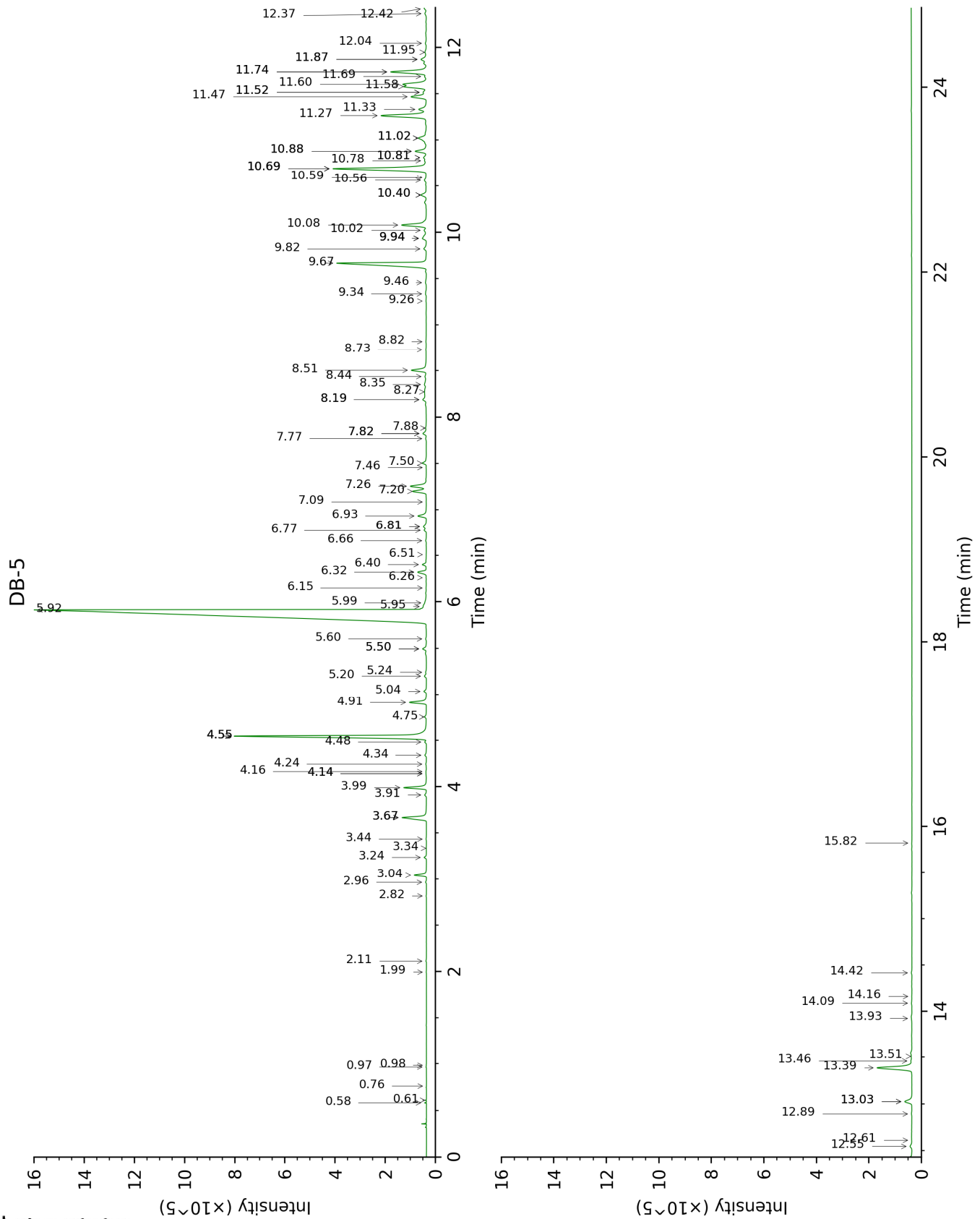
*: Two or more compounds are coeluting on this column

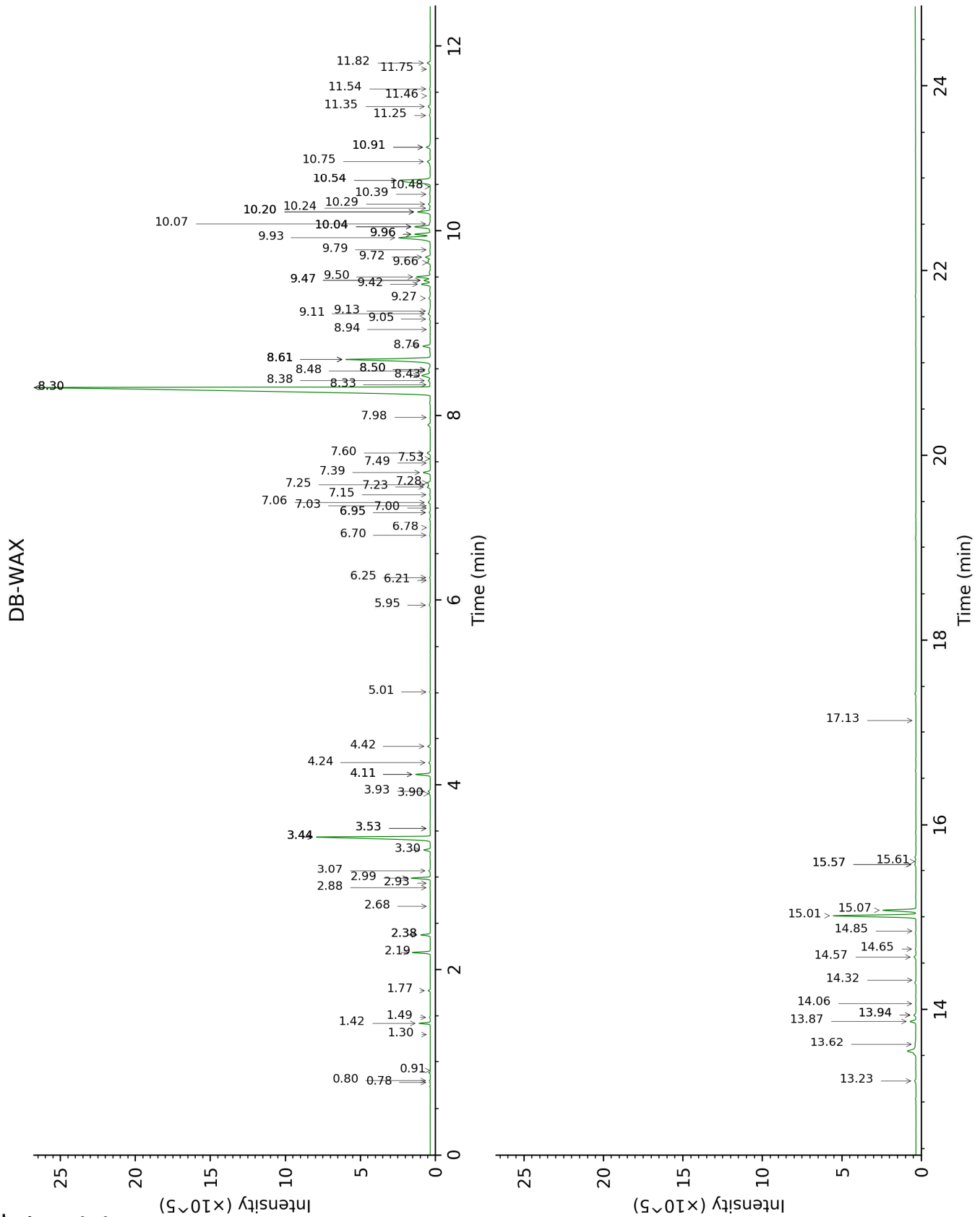
[xx]: Duplicate percentage due to coelutions, not taken account in the identified total

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	%
Isovaleral	0.58	638	0.02	0.80	891	0.02
2-Methylbutyral	0.61	647	0.01	0.78	885	0.01
2-Ethylfuran	0.76	696	tr	0.91	915	tr
Isoamyl alcohol	0.97	733	0.01	3.53*	1177	0.01
2-Methylbutanol	0.98	736	tr	3.53*	1177	[0.01]
(2E)-Hexenal	1.99	850	0.01	3.44*	1170	8.84
(2E)-Hexenol	2.11	859	0.02	6.22	1370	0.01
Tricyclene	2.82	915	0.01	1.30	974	tr
α-Thujene	2.96	925	0.03	1.49	1001	0.03
α-Pinene	3.04	930	0.47	1.42	992	0.49
Camphene	3.24	942	0.09	1.78	1028	0.09
Thuja-2,4(10)-diene	3.34	949	tr	2.38*	1085	0.48
Benzaldehyde	3.44	955	0.01	7.49	1463	0.02
Sabinene	3.67*	971	1.39	2.38*	1085	[0.48]
β-Pinene	3.67*	971	[1.39]	2.19	1067	0.93
Octan-3-one	3.91	986	0.09	4.11*	1222	0.81
Myrcene	3.99	992	1.02	2.99	1135	1.00
α-Phellandrene	4.14*	1002	0.03	2.88	1127	0.02
Pseudolimonene	4.14*	1002	[0.03]	2.93	1130	0.01
Δ3-Carene	4.16	1003	0.02	2.68	1111	0.01
(3Z)-Hexenyl acetate	4.24	1008	0.04	5.01	1289	0.03
α-Terpinene	4.34	1014	0.09	3.07	1141	0.08
para-Cymene	4.48	1023	0.07	4.24	1231	0.08
1,8-Cineole	4.55*	1027	9.24	3.44*	1170	[8.84]
Limonene	4.55*	1027	[9.24]	3.30	1159	0.38
β-Phellandrene	4.55*	1027	[9.24]	3.44*	1170	[8.84]
(Z)-β-Ocimene	4.75	1039	0.09	3.90	1206	0.07
(E)-β-Ocimene	4.91	1049	0.80	4.11*	1222	[0.81]
γ-Terpinene	5.04	1057	0.12	3.93	1208	0.12
cis-Sabinene hydrate	5.20	1067	0.10	7.06	1432	0.16
cis-Linalool oxide (fur.)	5.24	1070	0.04	6.70	1405	0.04
Terpinolene	5.50*	1085	0.20	4.42	1244	0.15
trans-Linalool oxide (fur.)	5.50*	1085	[0.20]	7.03	1429	0.01
6,7-Epoxyterpinene	5.60	1092	0.03	6.24	1372	0.04
Linalool	5.92†	1111	51.24	8.30*	1524	51.00
Octen-3-yl acetate	5.95†	1114	[51.24]	5.95	1351	0.06
cis-para-Menth-2-en-1-ol	5.99	1116	0.11	8.30*	1524	[51.00]
Limona ketone	6.15	1126	0.01	7.98	1500	0.02
(Z)-Myroxide	6.26	1133	0.01	7.00	1428	tr
Camphor	6.32	1137	0.44	7.39	1456	0.48
(E)-Myroxide	6.40	1142	0.17	7.28	1448	0.19
Menthone	6.51	1149	tr	6.78	1411	tr

Isomenthone	6.66	1158	0.03	7.15	1438	0.04
Borneol	6.77	1165	0.10	9.96*	1655	0.99
<i>cis</i> -Linalool oxide (pyr.)	6.81*	1168	0.19	10.48	1696	0.01
δ -Terpineol	6.81*	1168	[0.19]	9.66	1630	0.18
Terpinen-4-ol	6.93	1176	0.47	8.76	1559	0.48
para-Cymen-8-ol	7.09	1185	0.01	11.75	1804	tr
α -Terpineol	7.20	1192	0.74	9.96*	1655	[0.99]
Methylchavicol	7.26	1196	0.93	9.50	1618	0.91
(3 <i>E</i> ,5 <i>E</i>)-2,6-Dimethylocta-3,5,7-trien-2-ol	7.46	1209	0.01	11.46	1779	0.01
Octyl acetate	7.50	1212	0.19	7.23	1444	0.21
Nerol	7.77	1229	0.04	11.25	1762	0.06
Unknown [m/z 137, 152 (28), 43 (25), 91 (24), 109 (23), 119 (19)]	7.82*	1233	0.20	11.54	1786	0.05
Citronellol	7.82*	1233	[0.20]	10.91*	1733	0.30
Carvone	7.88	1237	0.04	10.20*	1674	0.91
Geraniol	8.19*	1257	0.23	11.82	1810	0.21
Linalyl acetate	8.19*	1257	[0.23]	8.33	1527	0.04
Chavicol	8.27	1263	0.23			
Geranial	8.35	1268	0.17	10.29	1681	0.12
Citronellyl formate	8.44	1274	0.08	9.05	1582	0.06
Bornyl acetate	8.51	1278	0.83	8.43	1534	0.79
Lavandulyl acetate	8.73	1293	0.02	8.94	1573	0.01
Geranyl formate	8.82	1299	0.02	10.04*	1661	1.15
δ -Elemene isomer	9.26	1331	0.02	6.95*	1424	0.06
exo-2-Hydroxycineole acetate	9.34	1337	0.03	10.24	1677	0.04
α -Cubebene	9.46	1345	0.04	6.95*	1424	[0.06]
Eugenol	9.67	1359	5.55	15.01	2105	5.53
α -Copaene	9.82	1370	0.15	7.25	1446	0.11
β -Bourbonene	9.94*	1378	0.32	7.60	1471	0.22
1,5-diepi- β -Bourbonene	9.94*	1378	[0.32]	7.53	1467	0.02
<i>cis</i> - β -Elemene	9.94*	1378	[0.32]	8.50*	1539	0.10
Geranyl acetate	10.02	1384	0.14	10.75	1720	0.24
β -Elemene	10.08	1388	1.50	8.60*	1548	6.95
β -Caryophyllene	10.40*	1411	0.33	8.60*	1548	[6.95]
<i>cis</i> - α -Bergamotene	10.40*	1411	[0.33]	8.38	1530	0.16
β -Copaene	10.56	1423	0.11	8.48	1538	0.13
β -Gurjunene	10.59	1425	0.02	8.50*	1539	[0.10]
<i>trans</i> - α -Bergamotene	10.69*	1432	5.50	8.60*	1548	[6.95]
α -Guaiene	10.69*	1432	[5.50]	8.60*	1548	[6.95]
(<i>Z</i>)- β -Farnesene?	10.69*	1432	[5.50]	9.47*	1615	0.43
<i>cis</i> -Muurolo-3,5-diene	10.78	1438	0.08	9.14	1588	0.06
<i>cis</i> - β -	10.81*	1441	0.16			

Bergamotene?						
<i>trans</i> -Muuroala-3,5-diene	10.81*	1441	[0.16]	9.11	1586	0.16
α -Humulene	10.88*	1446	0.64	9.42	1612	0.62
Cadina-4,11-diene	10.88*	1446	[0.64]	9.27	1599	0.11
(<i>E</i>)- β -Farnesene	11.02*	1456	0.64	9.72	1635	0.35
<i>cis</i> -Muuroala-4(15),5-diene	11.02*	1456	[0.64]	9.47*	1615	[0.43]
Germacrene D	11.27	1474	2.82	9.93	1652	2.91
β -Selinene	11.33	1479	0.49	10.04*	1661	[1.15]
Bicyclogermacrene	11.47	1489	0.91	10.20*	1674	[0.91]
Viridiflorene	11.52*	1492	0.17	9.80	1641	0.04
α -Muurolene	11.52*	1492	[0.17]	10.20*	1674	[0.91]
(<i>Z</i>)- α -Bisabolene	11.58	1497	1.18	10.54*	1702	3.52
δ -Guaiene	11.60	1499	1.25	10.04*	1661	[1.15]
β -Bisabolene	11.69	1505	0.07	10.39	1690	0.04
γ -Cadinene	11.74*	1509	2.13	10.54*	1702	[3.52]
(<i>Z</i>)- γ -Bisabolene	11.74*	1509	[2.13]	10.07	1664	0.06
δ -Cadinene	11.87*	1519	0.36	10.54*	1702	[3.52]
<i>trans</i> -Calamenene	11.87*	1519	[0.36]	11.35	1770	0.15
10- <i>epi</i> -Cubebol?	11.95	1525	0.09	13.94*	2002	0.13
α -Cadinene	12.04	1533	0.04	10.91*	1733	[0.30]
Maaliol	12.37	1558	0.09	13.23	1936	0.11
(<i>E</i>)-Nerolidol	12.42	1562	0.12	13.94*	2002	[0.13]
Spathulenol	12.55	1572	0.12	14.57	2062	0.14
Globulol	12.61	1577	0.01	14.06	2014	0.02
Humulene epoxide II	12.89	1598	0.03	13.62	1972	0.08
10- <i>epi</i> - γ -Eudesmol	13.03*	1609	0.48	14.32	2038	0.01
10- <i>epi</i> -Cubenol	13.03*	1609	[0.48]	13.87	1995	0.38
τ -Cadinol	13.39	1639	2.17	15.07	2111	2.10
β -Eudesmol	13.46	1645	0.06	15.60	2164	0.05
α -Eudesmol	13.51	1649	0.03	15.57*	2160	0.09
α -Bisabolol	13.92	1683	0.03	15.57*	2160	[0.09]
Unknown [m/z 133, 93 (97), 131 (85), 145 (83), 107 (69)...220]	14.09	1696	0.04	17.13	2321	0.01
Geranyl tiglate	14.16	1702	0.01	14.65	2070	0.04
Mint sulfide?	14.42	1724	0.04			
Phytone	15.82	1847	0.02	14.85	2088	0.01
Total identified		98.54%			97.30%	
Total reported		98.57%			97.35%	

*: 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