

Date : September 05, 2019

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 19H27-PTH10-1-SCC

Customer identification : Basil Linalool - Egypt - B1010689R

Type : Essential oil

Source : *Ocimum basilicum* ct. Linalool

Customer : Plant Therapy

ANALYSIS

Method: PC-PA-014 - 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 : September 04, 2019

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: 1.4758 ± 0.0003 (20 °C)

NFT 75-244:1992 - OIL OF BASIL, LINALOOL TYPE

Compound	Min. %	Max. %	Observed %	Complies?
Eugenol	2	15	6	Yes
Methylchavicol	tr	30.0	0.8	Yes
Terpinen-4-ol	tr	4.00	0.47	Yes
Linalool	45.0	62.0	50.6	Yes
Camphor	0.2	1.5	0.6	Yes
(E)-β-Ocimene	0.2	2.0	0.8	Yes
1,8-Cineole	2.0	8.0	8.9	No
Refractive index	1.4750	1.4950	1.4758	Yes

CONCLUSION

No adulterant, contaminant or diluent has been detected using this method. The oil marginally does not comply with the AFNOR standard for linalool type basil oil.

ANALYSIS SUMMARY – CONSOLIDATED CONTENTS

New readers of similar reports are encouraged to read table footnotes at least once.

Identification	%	Classe
Ethanol	tr	Aliphatic alcohol
Acetone	tr	Aliphatic ketone
Isovaleral	0.01	Aliphatic aldehyde
2-Methylbutyral	0.01	Aliphatic aldehyde
2-Ethylfuran	tr	Furan
Isoamyl alcohol	0.01	Aliphatic alcohol
2-Methylbutanol	tr	Aliphatic alcohol
(2E)-Hexenal	0.01	Aliphatic aldehyde
(3Z)-Hexenal	0.04	Aliphatic alcohol
(2E)-Hexenal	0.01	Aliphatic alcohol
Hexanol	0.01	Aliphatic alcohol
Tricyclene	0.01	Monoterpene
α -Thujene	0.03	Monoterpene
α -Pinene	0.46	Monoterpene
Camphene	0.10	Monoterpene
Thuja-2,4(10)-diene	0.01	Monoterpene
Benzaldehyde	0.02	Simple phenolic
β -Pinene	0.90	Monoterpene
Sabinene	0.46	Monoterpene
Octen-3-ol	0.05	Aliphatic alcohol
Octan-3-one	0.05	Aliphatic ketone
Myrcene	0.94	Monoterpene
Octan-3-ol	0.02	Aliphatic alcohol
α -Phellandrene	0.04	Monoterpene
Octanal	0.01	Aliphatic aldehyde
Δ^3 -Carene	0.01	Monoterpene
α -Terpinene	0.07	Monoterpene
para-Cymene	0.10	Monoterpene
Limonene	0.40	Monoterpene
1,8-Cineole	8.90*	Monoterpenic ether
β -Phellandrene	[8.90]*	Monoterpene
(Z)- β -Ocimene	0.08	Monoterpene
(E)- β -Ocimene	0.84	Monoterpene
γ -Terpinene	0.10	Monoterpene
cis-Sabinene hydrate	0.10	Monoterpenic alcohol
cis-Linalool oxide (fur.)	0.04	Monoterpenic alcohol
Octanol	0.01	Aliphatic alcohol
Terpinolene	0.16	Monoterpene
trans-Linalool oxide (fur.)	0.03	Monoterpenic alcohol
para-Cymenene	0.01	Monoterpene
trans-Sabinene hydrate	0.04	Monoterpenic alcohol
Linalool	50.61	Monoterpenic alcohol
Phenylethyl alcohol	0.03	Simple phenolic
Octen-3-yl acetate	0.08	Aliphatic ester
cis-para-Menth-2-en-1-ol	0.02	Monoterpenic alcohol
Limona ketone	0.01	Normonoterpenic ketone
Camphor	0.64	Monoterpenic ketone

(E)-Myroxide	0.22	Monoterpenic ether
Isomenthone	0.03	Monoterpenic ketone
Borneol	0.22	Monoterpenic alcohol
δ-Terpineol	tr	Monoterpenic alcohol
cis-Linalool oxide (pyr.)	0.10	Monoterpenic alcohol
Terpinen-4-ol	0.47	Monoterpenic alcohol
para-Cymen-8-ol	0.01	Monoterpenic alcohol
α-Terpineol	0.88	Monoterpenic alcohol
Methylchavicol	0.79	Phenylpropanoid
(3E,5E)-2,6-Dimethylocta-3,5,7-trien-2-ol	0.03	Monoterpenic alcohol
Octyl acetate	0.22	Aliphatic ester
Nerol	0.04	Monoterpenic alcohol
Citronellol	0.29	Monoterpenic alcohol
Unknown	0.01	Oxygenated monoterpene
Carvone	0.02	Monoterpenic ketone
Geraniol	0.18	Monoterpenic alcohol
Linalyl acetate	0.04	Monoterpenic ester
Geranial	0.02	Monoterpenic aldehyde
Citronellyl formate	0.04	Monoterpenic ester
Bornyl acetate	0.91	Monoterpenic ester
Lavandulyl acetate	0.01	Monoterpenic ester
trans-Pinocarvyl acetate	0.03	Monoterpenic ester
Geranyl formate	0.01	Monoterpenic ester
exo-2-Hydroxycineole acetate	0.08	Monoterpenic ester
α-Cubebene	0.08	Sesquiterpene
Eugenol	6.01	Phenylpropanoid
Neryl acetate	0.14	Monoterpenic ester
α-Copaene	0.16	Sesquiterpene
β-Bourbonene	0.23	Sesquiterpene
cis-β-Elemene	0.09	Sesquiterpene
Geranyl acetate	0.02	Monoterpenic ester
β-Cubebene	0.11	Sesquiterpene
β-Elemene	1.61	Sesquiterpene
Methyleugenol	0.10	Phenylpropanoid
α-Gurjunene	0.07	Sesquiterpene
β-Caryophyllene	0.37	Sesquiterpene
β-Copaene	0.08	Sesquiterpene
β-Gurjunene	0.19	Sesquiterpene
Aromadendrene	0.01	Sesquiterpene
trans-α-Bergamotene	4.98*	Sesquiterpene
α-Guaiene	[4.98]*	Sesquiterpene
cis-Muurolo-3,5-diene	0.03	Sesquiterpene
trans-Muurolo-3,5-diene	0.15	Sesquiterpene
Cadina-4,11-diene	0.05	Sesquiterpene
α-Humulene	0.68	Sesquiterpene
(E)-β-Farnesene	0.63	Sesquiterpene
Germacrene D	2.92	Sesquiterpene
β-Selinene	0.43	Sesquiterpene
Bicyclogermacrene	0.94	Sesquiterpene
Germacrene A	0.07	Sesquiterpene
α-Muurolo-3,5-diene	0.10	Sesquiterpene
(Z)-α-Bisabolene	1.23	Sesquiterpene

δ-Guaiene	1.08	Sesquiterpene
γ-Cadinene	2.19	Sesquiterpene
β-Bisabolene	tr	Sesquiterpene
δ-Cadinene	0.02	Sesquiterpene
<i>trans</i> -Calamenene	0.01	Sesquiterpene
Zonarene	0.24	Sesquiterpene
β-Sesquiphellandrene	0.20	Sesquiterpene
<i>trans</i> -Cadina-1,4-diene	0.06	Sesquiterpene
(<i>Z</i>)-Nerolidol	0.06	Sesquiterpenic alcohol
Maaliol	0.13	Sesquiterpenic alcohol
(<i>E</i>)-Nerolidol	0.14	Sesquiterpenic alcohol
Germacrene D-4-ol	0.11	Sesquiterpenic alcohol
Caryophyllene oxide	0.01	Sesquiterpenic ether
Globulol	0.03	Sesquiterpenic alcohol
Viridiflorol	0.04	Sesquiterpenic alcohol
Humulene epoxide II	0.03	Sesquiterpenic ether
10-epi-Cubenol	0.26	Sesquiterpenic alcohol
10-epi-γ-Eudesmol	0.14	Sesquiterpenic alcohol
1,10-diepi-Cubenol	0.01	Sesquiterpenic alcohol
τ-Cadinol	1.99	Sesquiterpenic alcohol
β-Eudesmol	0.10	Sesquiterpenic alcohol
α-Eudesmol	0.04	Sesquiterpenic alcohol
α-Cadinol	0.10	Sesquiterpenic alcohol
α-Bisabolol	0.03	Sesquiterpenic alcohol
Unknown	0.01	Lignan
Geranyl tiglate	0.03	Monoterpenic ester
Mint sulfide?	0.01	Sesquiterpenic sulfide
Phytone	0.02	Terpenic ketone
Phytol	0.02	Diterpenic alcohol
Consolidated total	98.76%	

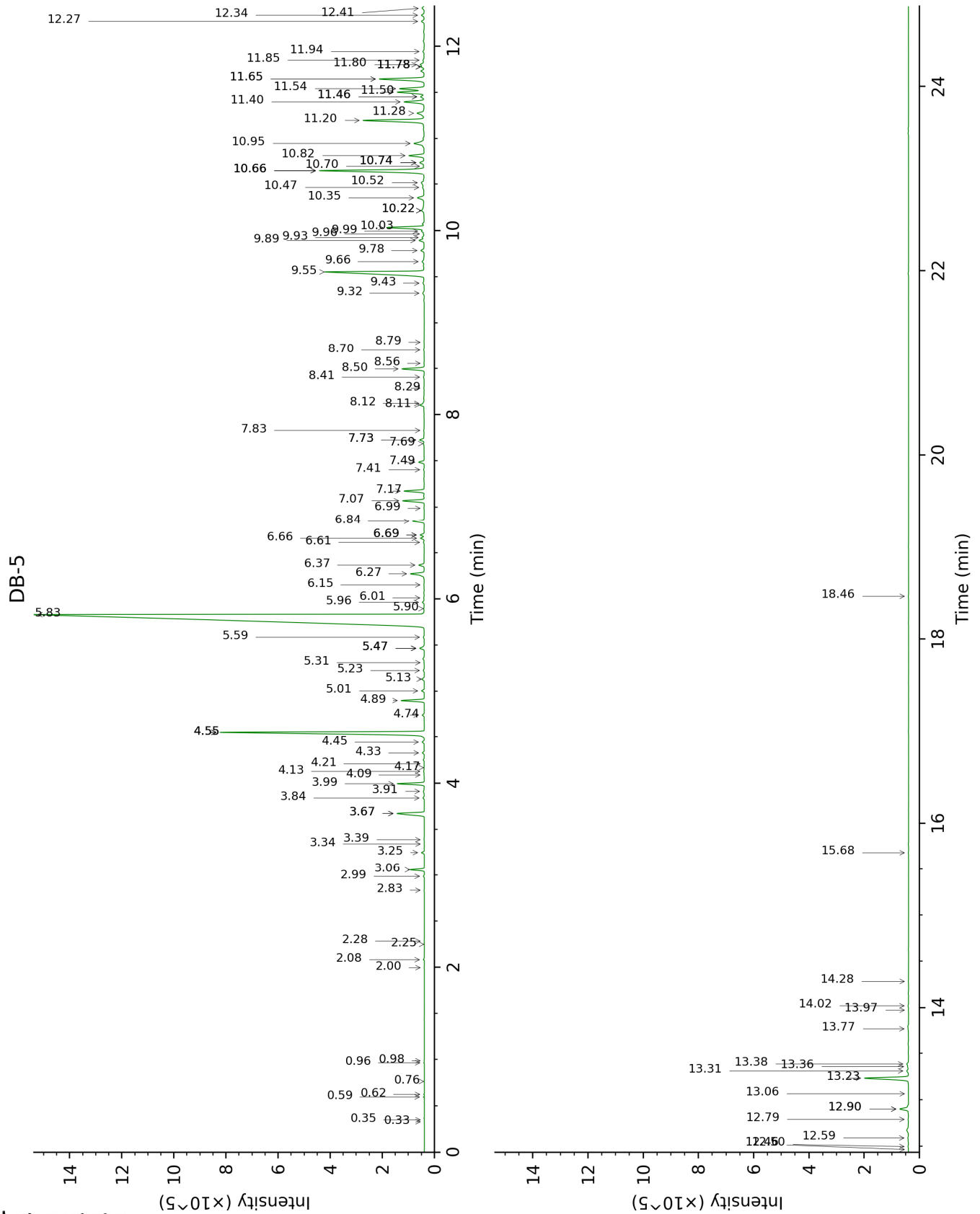
*: Individual compounds concentration could not be found due to overlapping coelutions on columns considered
[xx]: Duplicate percentage due to coelutions, not taken into account in the consolidated total
tr: The compound has been detected below 0.005% of total signal.

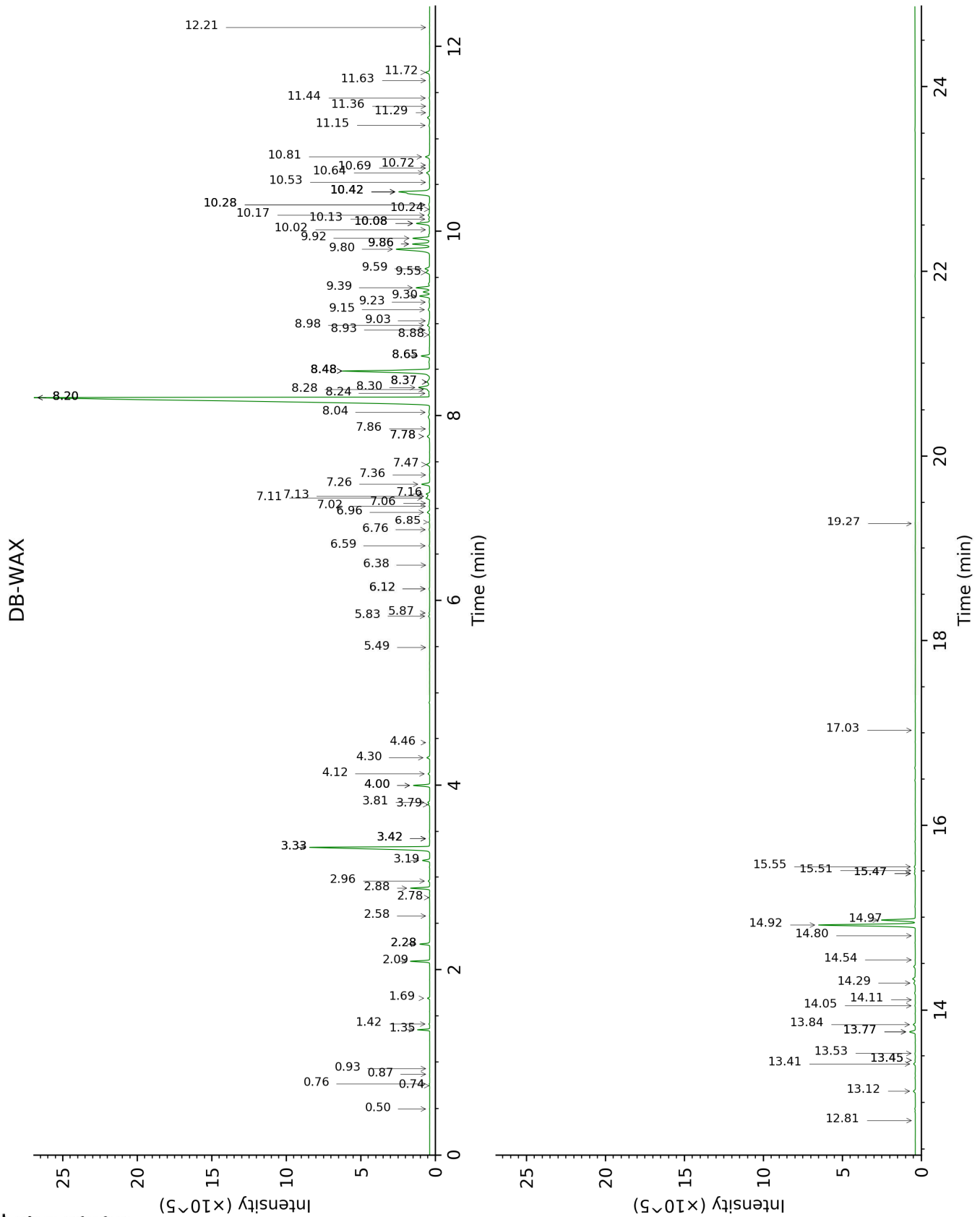
Note: no correction factor was applied

About "consolidated" data: The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm is set to prioritize data from the most standard DB-5 column, and smallest values so as to avoid overestimating individual content. This process is semi-automatic. Advanced users are invited to consult the "Full analysis data" table after the chromatograms in this report to access the full untreated data and perform their own calculations if needed.

Unknowns: Unknown compounds' mass spectral data is presented in the "Full analysis data" table. The occurrence of unknown compounds is to be expected in many samples, and does not denote particular problems unless noted otherwise in the conclusion.

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FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Ethanol	0.33	519	tr	0.87	911	tr
Acetone	0.35	519	tr	0.50	781	tr
Isovaleral	0.60	640	0.01	0.76	889	0.01
2-Methylbutyral	0.62	650	0.01	0.74	882	0.01
2-Ethylfuran	0.76	702	tr	0.93	921	tr
Isoamyl alcohol	0.96	735	0.01	3.42*	1175	0.02
2-Methylbutanol	0.98	738	tr	3.42*	1175	[0.02]
(2E)-Hexenal	2.00	849	0.01	3.42*	1175	[0.02]
(3Z)-Hexenol	2.08	856	0.04	5.86	1353	0.04
(2E)-Hexenol	2.25	870	0.01	6.12*	1372	0.05
Hexanol	2.28	872	0.01	5.49	1327	0.01
Tricyclene	2.84	915	0.01			
α -Thujene	2.99	925	0.03	1.42	998	0.03
α -Pinene	3.06	930	0.46	1.35	990	0.46
Camphene	3.25	942	0.10	1.69	1026	0.09
Thuja-2,4(10)-diene	3.34	948	0.01	2.28*	1083	0.47
Benzaldehyde	3.39	951	0.02	7.36	1461	0.01
β -Pinene	3.67*	970	1.36	2.09	1065	0.90
Sabinene	3.67*	970	[1.36]	2.28*	1083	[0.47]
Octen-3-ol	3.84	981	0.05	6.85	1424	0.06
Octan-3-one	3.91	986	0.05	4.00*	1218	0.87
Myrcene	3.99	991	0.94	2.88	1133	0.94
Octan-3-ol	4.09	998	0.02	6.12*	1372	[0.05]
α -Phellandrene	4.13	1000	0.04	2.78	1125	0.02
Octanal	4.17	1003	0.01	4.46	1251	0.01
Δ^3 -Carene	4.21	1006	0.01	2.58	1110	0.01
α -Terpinene	4.33	1013	0.07	2.96	1139	0.07
para-Cymene	4.44	1020	0.10	4.12	1227	0.09
Limonene	4.55*	1027	9.30	3.19	1157	0.40
1,8-Cineole	4.55*	1027	[9.30]	3.33*	1168	8.82
β -Phellandrene	4.55*	1027	[9.30]	3.33*	1168	[8.82]
(Z)- β -Ocimene	4.74	1039	0.08	3.79	1203	0.07
(E)- β -Ocimene	4.89	1048	0.84	4.00*	1218	[0.87]
γ -Terpinene	5.01	1056	0.10	3.81	1205	0.10
cis-Sabinene hydrate	5.13	1064	0.10	6.96	1432	0.16
cis-Linalool oxide (fur.)	5.23	1070	0.04	6.59	1405	0.05
Octanol	5.31	1075	0.01	8.24	1527	0.02
Terpinolene	5.47*	1085	0.21	4.30	1240	0.16
trans-Linalool oxide (fur.)	5.47*	1085	[0.21]	7.02	1437	0.03
para-Cymenene	5.47*	1085	[0.21]	6.38	1390	0.01
trans-Sabinene hydrate	5.59	1092	0.04	8.04	1512	0.06
Linalool	5.83	1108	50.61	8.20*	1524	50.92
Phenylethyl alcohol	5.90	1112	0.03	12.20	1851	0.01
Octen-3-yl acetate	5.96	1117	0.08	5.83	1351	0.07

<i>cis</i> -para-Menth-2-en-1-ol	6.01	1120	0.02	8.20*	1524	[50.92]
Limona ketone	6.15	1129	0.01	7.86	1498	0.02
Camphor	6.27	1137	0.64	7.26	1454	0.52
(<i>E</i>)-Myroxide	6.37	1143	0.22	7.13	1445	0.11
Isomenthone	6.61	1159	0.03	7.06	1439	0.02
Borneol	6.66†	1162	0.31	9.86*	1654	1.10
δ-Terpineol	6.69*†	1164	[0.31]	9.55†	1629	0.61
<i>cis</i> -Linalool oxide (pyr.)	6.69*†	1164	[0.31]	10.42*	1699	3.36
Terpinen-4-ol	6.84	1174	0.47	8.65*	1558	0.48
para-Cymen-8-ol	6.99	1183	0.01	11.63	1801	0.02
α-Terpineol	7.07	1189	0.88	9.86*	1654	[1.10]
Methylchavicol	7.18	1196	0.79	9.39	1616	0.86
(3 <i>E</i> ,5 <i>E</i>)-2,6-Dimethylocta-3,5,7-trien-2-ol	7.41	1211	0.03	11.44	1785	0.04
Octyl acetate	7.49	1216	0.22	7.11	1443	0.24
Nerol	7.69	1230	0.04	11.15	1760	0.06
Citronellol	7.73*	1233	0.21	10.81	1732	0.29
Unknown [m/z 137, 152 (28), 43 (25), 91 (24), 109 (23), 119 (19)]	7.73*	1233	[0.21]	11.36	1777	0.01
Carvone	7.83	1240	0.02	10.08*	1672	0.90
Geraniol	8.11	1259	0.18	11.72	1809	0.31
Linalyl acetate	8.12	1260	0.04	8.20*	1524	[50.92]
Geranial	8.29	1272	0.02	10.24	1684	0.02
Citronellyl formate	8.41	1280	0.04	8.93	1580	0.05
Bornyl acetate	8.50	1286	0.91	8.30	1532	0.85
Lavandulyl acetate	8.56	1290	0.01	8.88	1576	0.03
<i>trans</i> -Pinocarvyl acetate	8.70	1300	0.03	9.15	1597	0.11
Geranyl formate	8.79	1307	0.01	10.02	1666	0.02
exo-2-Hydroxycineole acetate	9.32	1339	0.08	10.13	1675	0.06
α-Cubebene	9.43	1346	0.08	6.76	1418	0.04
Eugenol	9.55	1355	6.01	14.92	2104	6.17
Neryl acetate	9.66	1363	0.14	10.28*	1688	0.07
α-Copaene	9.78	1372	0.16	7.16	1446	0.21
β-Bourbonene	9.89	1379	0.23	7.47	1470	0.22
<i>cis</i> -β-Elemene	9.92	1382	0.09	8.28	1530	0.08
Geranyl acetate	9.96	1384	0.02	10.69	1721	0.01
β-Cubebene	9.99	1386	0.11	7.78*	1492	0.18
β-Elemene	10.03	1389	1.61	8.48*	1546	6.79
Methyleugenol	10.22*	1402	0.23	13.41	1960	0.10
α-Gurjunene	10.22*	1402	[0.23]	7.78*	1492	[0.18]
β-Caryophyllene	10.35	1412	0.37	8.48*	1546	[6.79]
β-Copaene	10.47	1421	0.08	8.36*	1537	0.22
β-Gurjunene	10.52	1425	0.19	8.36*	1537	[0.22]
Aromadendrene	10.66*	1435	4.99	8.65*	1558	[0.48]

<i>trans</i> - α -Bergamotene	10.66*	1435	[4.99]	8.48*	1546	[6.79]
α -Guaiene	10.66*	1435	[4.99]	8.48*	1546	[6.79]
<i>cis</i> -Muuro-la-3,5-diene	10.70	1438	0.03	9.03	1588	0.02
<i>trans</i> -Muuro-la-3,5-diene	10.74*	1442	0.21	8.98	1584	0.15
Cadina-4,11-diene	10.74*	1442	[0.21]	9.23	1604	0.05
α -Humulene	10.82	1447	0.68	9.30	1609	1.06
(<i>E</i>)- β -Farnesene	10.95	1457	0.63	9.59†	1632	[0.61]
Germacrene D	11.20	1476	2.92	9.80	1649	2.98
β -Selinene	11.28	1482	0.43	9.92	1659	1.14
Bicyclogermacrene	11.40	1491	0.94	10.08*	1672	[0.90]
Germacrene A	11.46*	1495	0.17	10.42*	1699	[3.36]
α -Muuro-lene	11.46*	1495	[0.17]	10.17	1679	0.10
(<i>Z</i>)- α -Bisabolene	11.50	1498	1.23	10.42*	1699	[3.36]
δ -Guaiene	11.54	1501	1.08	10.08*	1672	[0.90]
γ -Cadinene	11.65*	1509	2.12	10.42*	1699	[3.36]
β -Bisabolene	11.65*	1509	[2.12]	10.28*	1688	[0.07]
δ -Cadinene	11.78*†	1520	0.27	10.53	1708	0.02
<i>trans</i> -Calamenene	11.78*†	1520	[0.27]	11.29	1772	0.01
Zonarene	11.78*†	1520	[0.27]	10.42*	1699	[3.36]
β -Sesquiphellandrene	11.80	1522	0.20	10.64	1717	0.22
<i>trans</i> -Cadina-1,4-diene	11.85	1525	0.06	10.72	1724	0.02
(<i>Z</i>)-Nerolidol	11.94	1533	0.06	13.45*	1964	0.02
Maaliol	12.27	1558	0.13	13.12	1933	0.14
(<i>E</i>)-Nerolidol	12.34	1564	0.14	13.84	2000	0.14
Germacrene D-4-ol	12.41	1570	0.11	13.77*	1993	0.37
Caryophyllene oxide	12.46	1574	0.01	12.81	1904	0.01
Globulol	12.50	1576	0.03	14.05	2020	0.03
Viridiflorol	12.59	1584	0.04	14.11	2026	0.01
Humulene epoxide II	12.79	1600	0.03	13.53	1970	0.03
10-epi-Cubenol	12.90*	1608	0.44	13.77*	1993	[0.37]
10-epi- γ -Eudesmol	12.90*	1608	[0.44]	14.29	2043	0.14
1,10-diepi-Cubenol	13.06	1622	0.01	13.45*	1964	[0.02]
τ -Cadinol	13.23	1636	1.99	14.97	2109	1.98
β -Eudesmol	13.31	1642	0.10	15.47*	2159	0.07
α -Eudesmol	13.36	1646	0.04	15.47*	2159	[0.07]
α -Cadinol	13.38	1649	0.10	15.56	2167	0.07
α -Bisabolol	13.77	1681	0.03	15.51	2162	0.05
Unknown [m/z 133, 93 (97), 131 (85), 145 (83), 107 (69)...220]	13.97	1697	0.01	17.03	2320	0.01
Geranyl tiglate	14.02	1701	0.03	14.54	2067	0.01
Mint sulfide?	14.28	1724	0.01			
Phytone	15.68	1847	0.02	14.80	2092	0.01
Phytol	18.46	2114	0.02	19.26	2571	0.01

Total identified	98.69%	98.12%
Total reported	98.71%	98.15%

*: Two or more compounds are coeluting on this column

[xx]: Duplicate percentage due to coelutions, not taken into account in the consolidated 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