Date : February 04, 2022

Certificate of Analysis – GC Profiling

Sample identification

Internal code : 22A28-PTH03
Customer identification : Clary Sage - France - CF0115216R
Type : Essential oil
Source : *Salvia sclarea*
Customer : Plant Therapy

Analysis

Method: PC-MAT-014 ISO - Analysis of the composition of an essential oil or other volatile liquid by FAST GC-FID (in French); identifications validated by GC-MS.
Analyst : Pamela Lavoie, M.Sc., Chimiste
Analysis date : February 03, 2022

Checked and approved by :

Alexis St-Gelais, Ph. D., Chimiste 2013-174

Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia. This report is digitally signed, it is only considered valid if the digital signature is intact. The results only describe the samples that were submitted to the assays.

Laboratoire PhytoChemia
628 Boulevard du Saguenay Ouest, Saguenay (Qc) G7J 1H4 | www.phytochemia.com

PHYSICOCHEMICAL DATA

Physical aspect: Clear liquid
Refractive index: 1.4585 ± 0.0003 (20 °C; method PC-MAT-016)

CONCLUSION

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

628 Boulevard du Saguenay, Saguenay (Qc) G7J 1H4 | www.phytochemia.com

Analysis summary – Consolidated contents

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

Identification	%	Class
Isovaleral	0.01	Aliphatic aldehyde
2-Methylbutyral	tr	Aliphatic aldehyde
Isoamyl alcohol	tr	Aliphatic alcohol
2-Methylbutanol	tr	Aliphatic alcohol
(2*E*)-Hexenal	0.02	Aliphatic aldehyde
(3*Z*)-Hexenol	0.02	Aliphatic alcohol
2-Methyloctane	0.01	Alkane
(2*E*)-Hexenol	0.03	Aliphatic alcohol
Hexanol	0.01	Aliphatic alcohol
α-Pinene	0.06	Monoterpene
Camphene	0.01	Monoterpene
Sabinene	0.01	Monoterpene
β-Pinene	0.05	Monoterpene
Octen-3-ol	0.03	Aliphatic alcohol
Octan-3-one	0.02	Aliphatic ketone
Myrcene	1.16	Monoterpene
Octan-3-ol	0.02	Aliphatic alcohol
α-Phellandrene	0.08	Monoterpene
α-Terpinene	0.01	Monoterpene
para-Cymene	0.01	Monoterpene
Limonene	0.21	Monoterpene
(*Z*)-β-Ocimene	0.56	Monoterpene
(*E*)-β-Ocimene	0.94	Monoterpene
γ-Terpinene	0.02	Monoterpene
cis-Linalool oxide (fur.)	0.05	Monoterpenic alcohol
trans-Linalool oxide (fur.)	0.10	Monoterpenic alcohol
Terpinolene	0.12	Monoterpene
Linalool	22.50	Monoterpenic alcohol
Hotrienol	0.02	Monoterpenic alcohol
Dehydrosabinaketone	0.01	Normonoterpenic ketone
allo-Ocimene	0.02	Monoterpene
Camphor	0.01	Monoterpenic ketone
neo-allo-Ocimene	0.01	Monoterpene
Nerol oxide	0.01	Aliphatic ether
Borneol	0.02	Monoterpenic alcohol
Terpinen-4-ol	0.01	Monoterpenic alcohol
α-Terpineol	4.43	Monoterpenic alcohol
Hodiendiol	0.02	Monoterpenic alcohol
Linalyl formate	0.27	Monoterpenic ester
Nerol	0.88	Monoterpenic alcohol
Geraniol	1.95	Monoterpenic alcohol
Linalyl acetate	56.63	Monoterpenic ester
Geranial	0.02	Monoterpenic aldehyde
(*trans*?)-Linalool oxide acetate (fur.)?	0.06	Monoterpenic ester
Neryl formate	0.05	Monoterpenic ester

Bornyl acetate	0.01	Monoterpenic ester
Unknown	0.01	Unknown
Geranyl formate	0.09	Monoterpenic ester
Hodiendiol derivative	0.05	Oxygenated monoterpene
α-Cubebene	0.01	Sesquiterpene
α-Terpinyl acetate	0.02	Monoterpenic ester
Unknown	0.02	Monoterpenic ester
Unknown	0.06	Oxygenated monoterpene
Neryl acetate	1.28	Monoterpenic ester
α-Copaene	0.34	Sesquiterpene
β-Bourbonene	0.04	Sesquiterpene
β-Cubebene	0.06	Sesquiterpene
β-Elemene	0.01	Sesquiterpene
Geranyl acetate	2.34	Monoterpenic ester
γ-4-Dimethylbenzenebutyral	0.01	Simple phenolic
Isocaryophyllene	0.02	Sesquiterpene
α-Gurjunene	0.01	Sesquiterpene
β-Caryophyllene	1.71	Sesquiterpene
β-Copaene	0.02	Sesquiterpene
α-Humulene	0.06	Sesquiterpene
(*E*)-β-Farnesene	0.01	Sesquiterpene
Germacrene D	1.21	Sesquiterpene
β-Selinene	0.01	Sesquiterpene
Hodiendiol derivative IV	0.08	Oxygenated monoterpene
Bicyclogermacrene	0.18	Sesquiterpene
α-Muurolene	0.04	Sesquiterpene
(*Z*)-α-Bisabolene	0.02	Sesquiterpene
β-Bisabolene	0.01	Sesquiterpene
γ-Cadinene	0.03	Sesquiterpene
Cubebol	0.01	Sesquiterpenic alcohol
δ-Cadinene	0.08	Sesquiterpene
1,5-Epoxysalvial-4(14)-ene	0.01	Sesquiterpenic ether
Spathulenol	0.04	Sesquiterpenic alcohol
Caryophyllene oxide	0.04	Sesquiterpenic ether
Caryophyllene oxide isomer	0.01	Sesquiterpenic ether
Unknown	0.03	Oxygenated sesquiterpene
Torilenol?	0.01	Oxygenated sesquiterpene
Unknown	0.03	Unknown
τ-Muurolol	0.01	Sesquiterpenic alcohol
β-Eudesmol	0.03	Sesquiterpenic alcohol
α-Eudesmol	0.01	Sesquiterpenic alcohol
α-Cadinol	0.01	Sesquiterpenic alcohol
Unknown	0.01	Unknown
Eudesma-4(15),7-dien-1β-ol	0.01	Sesquiterpenic alcohol
Unknown	0.01	Unknown
Unknown	0.02	Unknown
Manoyl oxide	0.03	Diterpenic ether
13-epi-Manoyl oxide	0.01	Diterpenic ether
Manool	0.02	Diterpenic alcohol
Sclareol	0.60	Diterpenic alcohol
Consolidated total	**99.30%**	

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

Note: no correction factor was applied

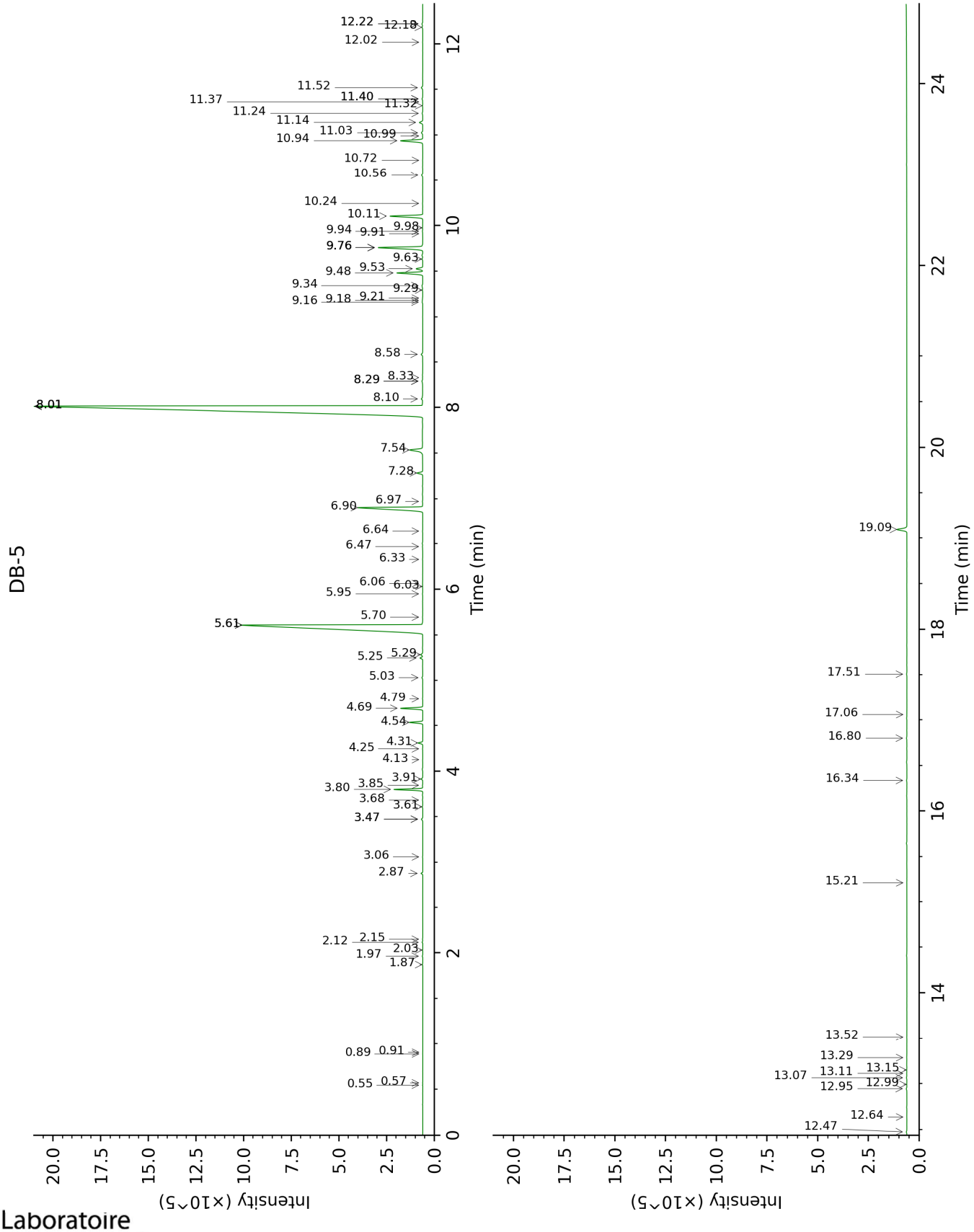
About "consolidated" data: The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm 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.

628 Boulevard du Saguenay, Saguenay (Qc) G7J 1H4 | www.phytochemia.com

This page was intentionally left blank. The following pages present the complete data of the analysis.

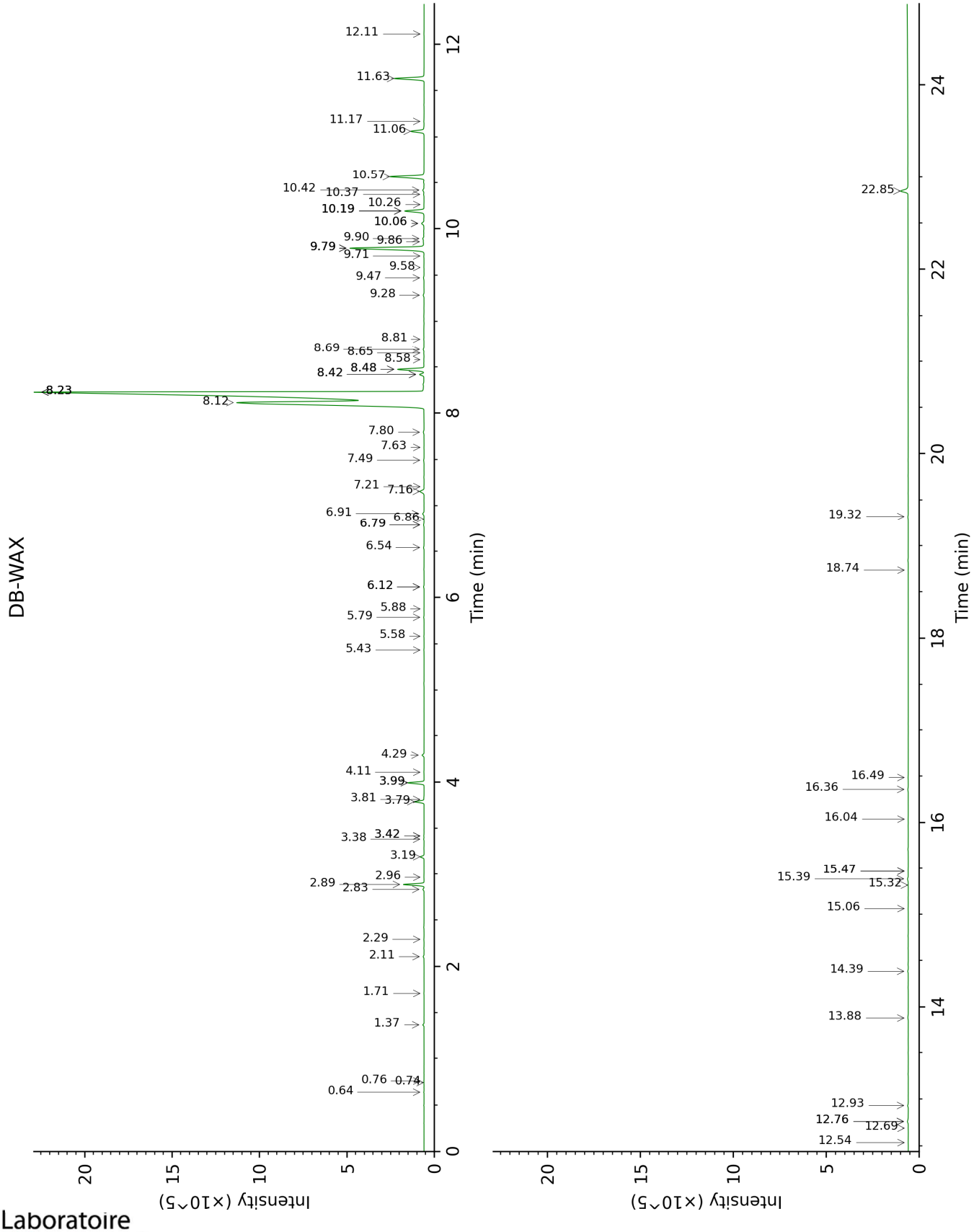
628 Boulevard du Saguenay, Saguenay (Qc) G7J 1H4 | www.phytochemia.com



Laboratoire PhytoChemia

Plus que des analyses... des conseils

628 Boulevard du Saguenay, Saguenay (Qc) G7J 1H4 | www.phytochemia.com


DB-WAX
Intensity (×10^5)
Time (min)
12.11
11.63
11.17
11.06
10.57
10.42
10.37
10.26
10.19
10.06
9.90
9.86
9.79
9.71
9.58
9.47
9.28
8.81
8.69
8.65
8.58
8.42
8.48
8.23
8.12
7.80
7.63
7.49
7.21
7.16
6.91
6.86
6.79
6.54
6.12
5.88
5.79
5.58
5.43
4.29
4.11
3.99
3.81
3.79
3.38
3.42
3.19
2.96
2.89
2.83
2.29
2.11
1.71
1.37
0.76
0.74
0.64
22.85
19.32
18.74
16.49
16.36
16.04
15.47
15.39
15.32
15.06
14.39
13.88
12.93
12.76
12.69
12.54

FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Isovaleral	0.55	640	0.01	0.76	885	0.01
2-Methylbutyral	0.57	650	tr	0.74	879	tr
Isoamyl alcohol	0.89	732	tr	3.42*	1175	0.02
2-Methylbutanol	0.91	735	tr	3.42*	1175	[0.02]
(2*E*)-Hexenal	1.87	850	0.02	3.38	1172	0.02
(3*Z*)-Hexenol	1.96	858	0.02	5.79	1346	0.03
2-Methyloctane	2.03	864	0.01	0.64	842	0.01
(2*E*)-Hexenol	2.12	871	0.03	6.12*	1370	0.03
Hexanol	2.15	874	0.01	5.43	1321	0.01
α-Pinene	2.87	930	0.06	1.37	990	0.07
Camphene	3.06	943	0.01	1.71	1026	0.01
Sabinene	3.47*	971	0.07	2.29	1083	0.01
β-Pinene	3.47*	971	[0.07]	2.11	1065	0.05
Octen-3-ol	3.61	980	0.03	6.79*	1419	0.04
Octan-3-one	3.68	985	0.02	3.99*	1219	0.94
Myrcene	3.80	993	1.16	2.89	1133	1.14
Octan-3-ol	3.85	996	0.02	6.12*	1370	[0.03]
α-Phellandrene	3.91	1001	0.08	2.83	1129	0.07
α-Terpinene	4.13	1014	0.01	2.96	1139	0.02
para-Cymene	4.24	1022	0.01	4.11	1228	0.01
Limonene	4.31	1026	0.21	3.19	1157	0.22
(*Z*)-β-Ocimene	4.54	1040	0.56	3.79	1204	0.56
(*E*)-β-Ocimene	4.69	1050	0.94	3.99*	1219	[0.94]
γ-Terpinene	4.79	1057	0.02	3.81	1206	0.02
cis-Linalool oxide (fur.)	5.03	1072	0.05	6.54	1401	0.04
trans-Linalool oxide (fur.)	5.25†	1085	0.23	6.91	1428	0.10
Terpinolene	5.28†	1088	[0.23]	4.29	1241	0.12
Linalool	5.61*†	1108	22.53	8.12†	1519	78.85
Hotrienol	5.61*†	1108	[22.53]	8.81	1572	0.02
Dehydrosabinaketone	5.70	1114	0.01	8.65	1560	0.02
allo-Ocimene	5.95	1130	0.02	5.58	1332	0.02
Camphor	6.03	1136	0.01	7.21	1450	0.01
neo-allo-Ocimene	6.06	1138	0.01	5.88	1353	0.01
Nerol oxide	6.33	1155	0.01	6.86	1424	0.02
Borneol	6.47	1164	0.02	9.79*	1651	5.74
Terpinen-4-ol	6.64	1174	0.01	8.58	1555	0.02
α-Terpineol	6.90	1192	4.43	9.79*	1651	[5.74]
Hodiendiol	6.97	1196	0.02	12.76*	1906	0.09
Linalyl formate	7.28	1216	0.27	8.42*	1542	0.31
Nerol	7.54	1234	0.88	11.06	1757	0.91
Geraniol	8.01*	1266	58.59	11.63	1806	1.95
Linalyl acetate	8.01*	1266	[58.59]	8.23*†	1527	[78.85]
Geranial	8.01*	1266	[58.59]	10.19*	1684	1.31
(*trans*?)-Linalool oxide acetate (fur.)?	8.10	1271	0.06	8.69	1563	0.06
Neryl formate	8.29*	1284	0.06	9.47	1625	0.05
Bornyl acetate	8.29*	1284	[0.06]	8.23*†	1527	[78.85]

Unknown [m/z 43, 121 (74), 93 (42), 95 (38), 107 (29), 41 (29), 136 (28)...]	8.33	1287	0.01			
Geranyl formate	8.58	1304	0.09	9.90	1659	0.11
Hodiendiol derivative	9.16†	1345	0.06	12.93	1922	0.05
α-Cubebene	9.18†	1346	[0.06]	6.79*	1419	[0.04]
α-Terpinyl acetate	9.21†	1348	[0.06]	9.71	1644	0.02
Unknown [m/z 43, 121 (52), 93 (48), 79 (33), 41 (30), 136 (26), 81 (25)...]	9.30	1354	0.02			
Unknown [m/z 43, 79 (46), 71 (30), 94 (25), 41 (23), 81 (21)... 197 (0)]	9.34	1358	0.06	11.17	1766	0.02
Neryl acetate	9.48	1368	1.28	10.19*	1684	[1.31]
α-Copaene	9.53	1371	0.34	7.16	1446	0.34
β-Bourbonene	9.64	1378	0.04	7.49	1471	0.03
β-Cubebene	9.76*	1387	2.41	7.80	1494	0.06
β-Elemene	9.76*	1387	[2.41]	8.48*	1546	1.74
Geranyl acetate	9.76*	1387	[2.41]	10.57	1715	2.34
γ-4-Dimethylbenzenebutyral	9.91	1398	0.01			
Isocaryophyllene	9.94	1400	0.02	8.23*†	1527	[78.85]
α-Gurjunene	9.98	1402	0.01	7.63	1482	0.01
β-Caryophyllene	10.11	1412	1.71	8.48*	1546	[1.74]
β-Copaene	10.24	1422	0.02	8.42*	1542	[0.31]
α-Humulene	10.56	1446	0.06	9.28	1610	0.06
(*E*)-β-Farnesene	10.72	1458	0.01	9.58	1634	0.01
Germacrene D	10.94	1474	1.21	9.79*	1651	[5.74]
β-Selinene	10.99	1478	0.01	9.86	1657	0.06
Hodiendiol derivative IV	11.03	1481	0.08			
Bicyclogermacrene	11.14	1489	0.18	10.06*	1673	0.19
α-Muurolene	11.24	1497	0.04	10.06*	1673	[0.19]
(*Z*)-α-Bisabolene	11.32	1503	0.02	10.26	1689	0.02
β-Bisabolene	11.37	1506	0.01	10.19*	1684	[1.31]
γ-Cadinene	11.40*	1509	0.04	10.37	1698	0.03
Cubebol	11.40*	1509	[0.04]	12.54	1886	0.01
δ-Cadinene	11.52	1518	0.08	10.42	1702	0.10
1,5-Epoxysalvial-4(14)-ene	12.02	1558	0.01	12.11	1848	0.02
Spathulenol	12.18	1570	0.04	14.39	2059	0.04
Caryophyllene oxide	12.22*	1574	0.05	12.76*	1906	[0.09]
Caryophyllene oxide isomer	12.22*	1574	[0.05]	12.69	1900	0.01
Unknown [m/z 91, 119 (91), 79 (86), 93 (85), 41 (74), 107 (68), 105 (67), 134 (65)... 220 (1)]	12.48	1594	0.03			
Torilenol?	12.64	1606	0.01	15.47*	2166	0.02
Unknown [m/z 43, 93 (89), 91 (88), 79 (87), 123 (76), 81 (75)...]	12.95	1632	0.03	13.88	2010	0.04
τ-Muurolol	12.99	1636	0.01	15.06	2125	0.02

β-Eudesmol	13.07	1642	0.03	15.39	2157	0.07
α-Eudesmol	13.11	1646	0.01	15.32	2150	0.01
α-Cadinol	13.15	1649	0.01	15.47*	2166	[0.02]
Unknown [m/z 81, 41 (46), 79 (46), 93 (39), 91 (33), 107 (33)... 206 (8)]	13.28	1660	0.01			
Eudesma-4(15),7-dien-1β-ol	13.52	1679	0.01	16.04	2224	0.01
Unknown [m/z 123, 191 (88), 81 (86), 41 (86), 151 (80), 91 (76)...]	15.21	1826	0.01	18.74	2517	0.01
Unknown [m/z 109, 132 (88), 157 (76), 119 (66), 91 (57), 105 (55)...]	16.34	1930	0.02			
Manoyl oxide	16.80	1974	0.03	16.49	2270	0.02
13-epi-Manoyl oxide	17.06	1999	0.01	16.36	2257	0.04
Manool	17.51	2043	0.02	19.32	2585	0.03
Sclareol	19.09	2205	0.60	22.85	3029	0.59
Total identified		**99.08%**			**99.01%**	
Total reported		**99.28%**			**99.08%**	

*: 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