Date : avril 22, 2021

Certificate of Analysis – GC Profiling

Sample identification

Internal code : 21D15-PTH07
Customer identification : Clary Sage ORGANIC - France - CC4103912R
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 : Seydou Ka, M. Sc.
Analysis date : avril 21, 2021

Checked and approved by :

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

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Méthode certifiée ISO 17025:2017 Certified method

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PHYSICOCHEMICAL DATA

Physical aspect: Faintly yellow liquid
Refractive index: 1.4594 ± 0.0003 (20 °C; method PC-MAT-016)

NF T 75-255:1992 - CLARY SAGE OIL - FRESHLY CRUSHED

Compound	Min. %	Max. %	Observed %	Complies?
Linalool	13	24	17	Yes
Linalyl acetate	56.0	70.5	63.9	Yes
α-Terpineol	1	5	2	Yes
Germacrene D	1.2	7.5	2.4	Yes
Sclareol	0.4	2.6	0.4	Yes
Refractive index	1.456	1.466	1.459	Yes

CONCLUSION

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

Analysis summary – Consolidated contents

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

Identification	%	Class
Methacrolein	tr	Aliphatic aldehyde
Acetic acid	tr	Aliphatic acid
Isovaleral	0.01	Aliphatic aldehyde
2-Methylbutyral	tr	Aliphatic aldehyde
2-Ethylfuran	tr	Furan
Isoamyl alcohol	0.01	Aliphatic alcohol
2-Methylbutanol	tr	Aliphatic alcohol
Toluene	tr	Simple phenolic
Hexanal	tr	Aliphatic aldehyde
(2*E*)-Hexenal	0.03	Aliphatic aldehyde
(3*Z*)-Hexenol	0.17	Aliphatic alcohol
(2*E*)-Hexenol	0.07	Aliphatic alcohol
Hexanol	0.05	Aliphatic alcohol
3-Acetyl-3-methylcyclopentene	0.01	Aliphatic ketone
α-Pinene	0.12	Monoterpene
Camphene	0.02	Monoterpene
α-Fenchene	tr	Monoterpene
Benzaldehyde	tr	Simple phenolic
β-Pinene	0.09	Monoterpene
Sabinene	0.05	Monoterpene
Octen-3-ol	0.04	Aliphatic alcohol
trans-Dehydroxylinalool oxide	0.05	Monoterpenic ether
Myrcene	0.55	Monoterpene
Octan-3-ol	tr	Aliphatic alcohol
α-Phellandrene	tr	Monoterpene
cis-Dehydroxylinalool oxide	tr	Monoterpenic ether
Δ3-Carene	0.05	Monoterpene
para-Cymene	0.04	Monoterpene
β-Phellandrene	0.01	Monoterpene
Limonene	0.24	Monoterpene
(*Z*)-β-Ocimene	0.17	Monoterpene
(*E*)-β-Ocimene	0.29	Monoterpene
cis-Sabinene hydrate	tr	Monoterpenic alcohol
cis-Linalool oxide (fur.)	0.03	Monoterpenic alcohol
Octanol	tr	Aliphatic alcohol
trans-Linalool oxide (fur.)	0.02	Monoterpenic alcohol
Terpinolene	0.07	Monoterpene
Linalool	16.92	Monoterpenic alcohol
Dehydrosabinaketone	tr	Normonoterpenic ketone
Unknown	0.01	Unknown
trans-Pinocarveol	tr	Monoterpenic alcohol
(*E*)-Myroxide	0.01	Monoterpenic ether
Nerol oxide	0.02	Aliphatic ether
Borneol	0.05	Monoterpenic alcohol
δ-Terpineol	tr	Monoterpenic alcohol

Terpinen-4-ol	0.04	Monoterpenic alcohol
para-Cymen-8-ol	0.02	Monoterpenic alcohol
α-Terpineol	2.13	Monoterpenic alcohol
Hodiendiol	0.03	Monoterpenic alcohol
Linalyl formate	0.36	Monoterpenic ester
Nerol	0.43	Monoterpenic alcohol
Unknown	0.01	Unknown
Neral	0.03	Monoterpenic aldehyde
Geraniol	1.10	Monoterpenic alcohol
Linalyl acetate	63.93	Monoterpenic ester
(*trans*?)-Linalool oxide acetate (fur.)?	0.01	Monoterpenic ester
Geranial	0.07	Monoterpenic aldehyde
Unknown	0.01	Unknown
Neryl formate	0.04	Monoterpenic ester
Bornyl acetate	0.03	Monoterpenic ester
Thymol	0.01	Monoterpenic alcohol
Geranyl formate	0.10	Monoterpenic ester
δ-Elemene	0.02	Sesquiterpene
Hodiendiol derivative	0.10	Oxygenated monoterpene
α-Cubebene	0.03	Sesquiterpene
α-Terpinyl acetate	0.04	Monoterpenic ester
Unknown	0.08	Oxygenated monoterpene
Unknown	0.06	Monoterpenic ester
Unknown	0.02	Oxygenated monoterpene
Neryl acetate	0.65	Monoterpenic ester
α-Copaene	0.50	Sesquiterpene
(*Z*)-8-Hydroxylinalool?	0.01	Monoterpenic alcohol
β-Bourbonene	0.13	Sesquiterpene
1,5-diepi-β-Bourbonene	0.01	Sesquiterpene
Geranyl acetate	1.38	Monoterpenic ester
β-Elemene	0.10	Sesquiterpene
Isocaryophyllene	0.01	Sesquiterpene
β-Caryophyllene	1.67	Sesquiterpene
β-Copaene	0.04	Sesquiterpene
α-Humulene	0.09	Sesquiterpene
α-Amorphene	0.01	Sesquiterpene
Germacrene D	2.39	Sesquiterpene
β-Selinene	0.03	Sesquiterpene
Hodiendiol derivative IV	0.15	Oxygenated monoterpene
Bicyclogermacrene	0.33	Sesquiterpene
α-Muurolene	0.01	Sesquiterpene
Hodiendiol derivative II	0.12	Oxygenated monoterpene
γ-Cadinene	0.03	Sesquiterpene
δ-Cadinene	0.15	Sesquiterpene
trans-Calamenene	0.01	Sesquiterpene
α-Calacorene	0.01	Sesquiterpene
α-Elemol	0.03	Sesquiterpenic alcohol
Isocaryophyllene epoxide B	0.02	Sesquiterpenic ether
1,5-Epoxysalvial-4(14)-ene	0.04	Sesquiterpenic ether
Spathulenol	0.01	Sesquiterpenic alcohol
Caryophyllene oxide	0.26	Sesquiterpenic ether
Caryophyllene oxide isomer	0.05	Sesquiterpenic ether

Salvial-4(14)-en-1-one	0.02	Aliphatic alcohol
Guaiol	0.10	Sesquiterpenic alcohol
Unknown	0.15	Unknown
τ-Cadinol	0.02	Sesquiterpenic alcohol
β-Eudesmol	0.12	Sesquiterpenic alcohol
α-Eudesmol	0.11	Sesquiterpenic alcohol
Bulnesol	0.05	Sesquiterpenic alcohol
Eudesma-4(15),7-dien-1β-ol	0.01	Sesquiterpenic alcohol
Cyclocolorenone	0.03	Sesquiterpenic ketone
Unknown	0.04	Unknown
Sclareoloxide	0.02	Terpenic ether
Unknown	0.06	Unknown
Geranyl-para-cymene	0.05	Diterpene
Manoyl oxide	0.01	Diterpenic ether
Sclareol	0.37	Diterpenic alcohol
Consolidated total	**97.35%**	

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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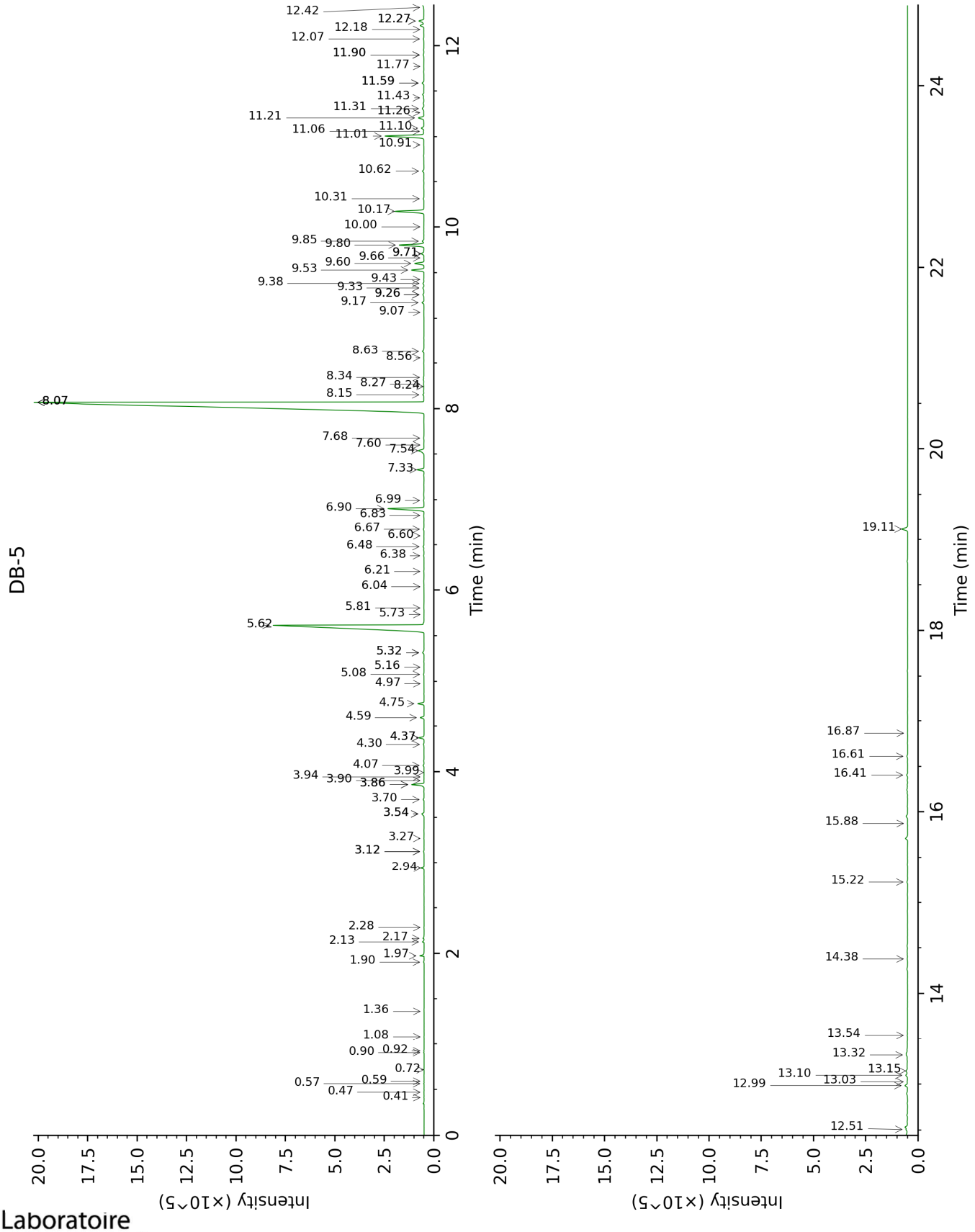
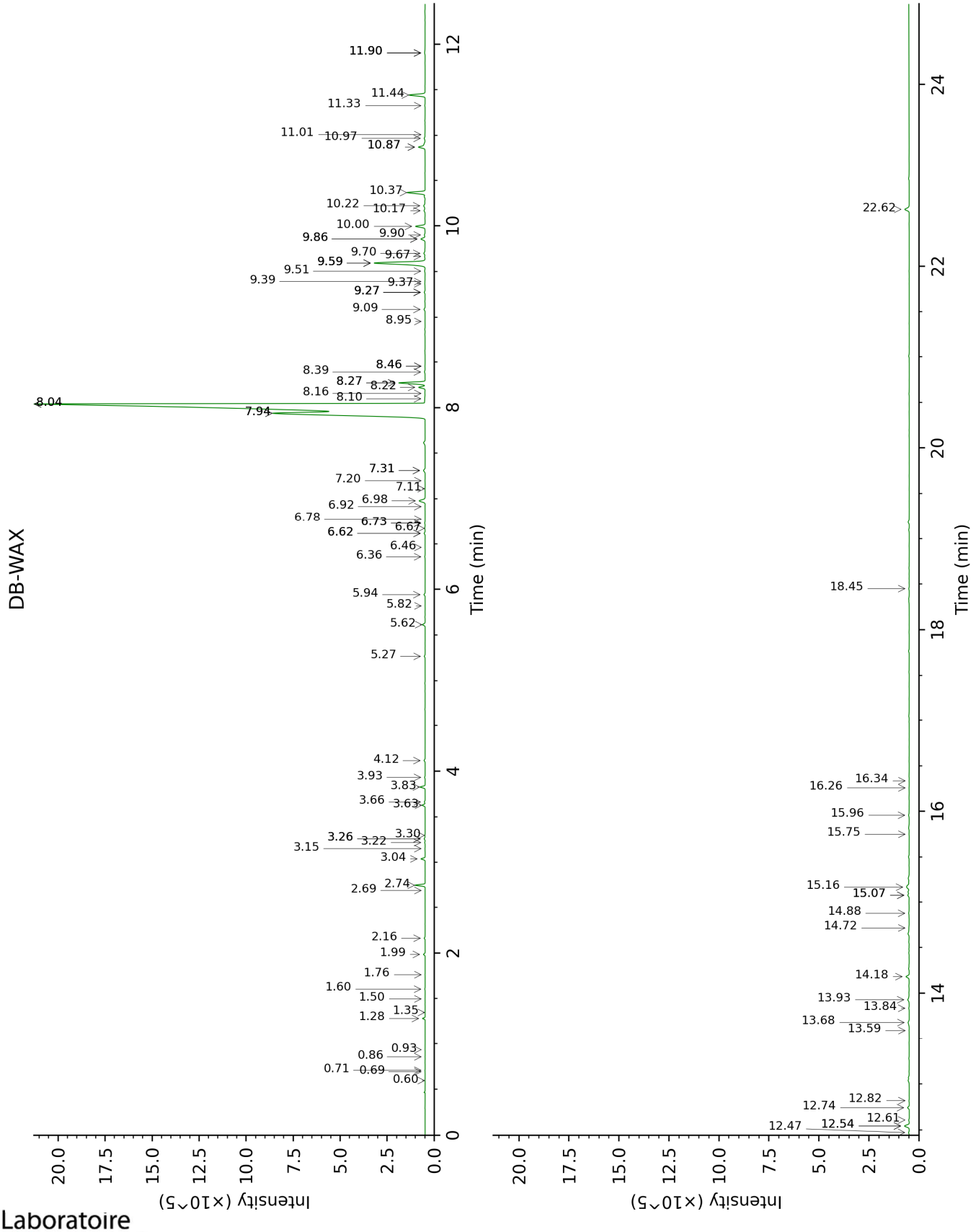

DB-5
Time (min)
Intensity (×10^5)
12.42
12.27
12.18
12.07
11.90
11.77
11.59
11.43
11.31
11.26
11.21
11.10
11.06
11.01
10.91
10.62
10.31
10.17
10.00
9.85
9.80
9.71
9.66
9.60
9.53
9.43
9.38
9.33
9.26
9.17
9.07
8.63
8.56
8.34
8.27
8.24
8.15
8.07
7.68
7.60
7.54
7.33
6.99
6.90
6.83
6.67
6.60
6.48
6.38
6.21
6.04
5.81
5.73
5.62
5.32
5.16
5.08
4.97
4.75
4.59
4.37
4.30
4.07
3.99
3.94
3.90
3.86
3.70
3.54
3.27
3.12
2.94
2.28
2.17
2.13
1.97
1.90
1.36
1.08
0.92
0.90
0.72
0.59
0.57
0.47
0.41
19.11
16.87
16.61
16.41
15.88
15.22
14.38
13.54
13.32
13.15
13.10
13.03
12.99
12.51


DB-WAX
Time (min)
Intensity (×10^5)
11.90
11.44
11.33
11.01
10.97
10.87
10.37
10.22
10.17
10.00
9.86
9.90
9.70
9.67
9.59
9.51
9.39
9.37
9.27
9.09
8.95
8.46
8.39
8.27
8.22
8.16
8.10
8.04
7.94
7.31
7.20
7.11
6.98
6.92
6.78
6.73
6.67
6.62
6.46
6.36
5.94
5.82
5.62
5.27
4.12
3.93
3.83
3.66
3.63
3.30
3.26
3.22
3.15
3.04
2.74
2.69
2.16
1.99
1.76
1.60
1.50
1.35
1.28
0.93
0.86
0.71
0.69
0.60
22.62
18.45
16.34
16.26
15.96
15.75
15.16
15.07
14.88
14.72
14.18
13.93
13.84
13.68
13.59
12.82
12.74
12.61
12.54
12.47

FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Methacrolein	0.41	545	tr	0.60	844	tr
Acetic acid	0.47	600	tr	6.46	1410	0.01
Isovaleral	0.57	640	0.01	0.71	888	0.01
2-Methylbutyral	0.59	650	tr	0.69	882	tr
2-Ethylfuran	0.72	700	tr	0.86	919	tr
Isoamyl alcohol	0.90	731	0.01	3.30	1178	0.01
2-Methylbutanol	0.92	734	tr	3.26*	1175	0.06
Toluene	1.08	759	tr	1.35	1002	tr
Hexanal	1.36	801	tr	1.76	1043	tr
(2*E*)-Hexenal	1.90	850	0.03	3.22	1172	0.03
(3*Z*)-Hexenol	1.97	856	0.17	5.62	1348	0.18
(2*E*)-Hexenol	2.13	869	0.07	5.94	1372	0.07
Hexanol	2.16	872	0.05	5.27	1323	0.06
3-Acetyl-3-methylcyclopentene	2.28	883	0.01	0.93	932	tr
α-Pinene	2.94	932	0.12	1.28	992	0.12
Camphene	3.12*	944	0.02	1.60	1027	0.02
α-Fenchene	3.12*	944	[0.02]	1.50	1017	tr
Benzaldehyde	3.27	954	tr	7.11	1458	0.02
β-Pinene	3.54*	972	0.14	1.98	1066	0.09
Sabinene	3.54*	972	[0.14]	2.16	1084	0.05
Octen-3-ol	3.70	983	0.04	6.62*	1421	0.07
trans-Dehydroxylinalool oxide	3.86*	994	0.60	3.26*	1175	[0.06]
Myrcene	3.86*	994	[0.60]	2.74	1134	0.55
Octan-3-ol	3.90	997	tr	5.82	1363	tr
α-Phellandrene	3.94	1000	tr	2.69	1129	tr
cis-Dehydroxylinalool oxide	3.99	1003	tr	3.66	1207	0.05
Δ3-Carene	4.07	1008	0.05			
para-Cymene	4.30	1023	0.04	3.93	1227	0.03
β-Phellandrene	4.37*	1027	0.25	3.15	1166	0.01
Limonene	4.37*	1027	[0.25]	3.04	1157	0.24
(*Z*)-β-Ocimene	4.60	1041	0.17	3.63	1204	0.18
(*E*)-β-Ocimene	4.75	1051	0.29	3.83	1219	0.30
cis-Sabinene hydrate	4.98	1065	tr	6.73*	1430	0.03
cis-Linalool oxide (fur.)	5.08	1072	0.03	6.36	1402	0.03
Octanol	5.16	1077	tr	8.04*†	1529	[80.87]
trans-Linalool oxide (fur.)	5.32*	1087	0.09	6.73*	1430	[0.03]
Terpinolene	5.32*	1087	[0.09]	4.12	1241	0.07
Linalool	5.62	1106	16.92	7.94*†	1521	80.87
Dehydrosabinaketone	5.73	1114	tr	8.46*	1561	0.01
Unknown [m/z 82, 81 (72), 43 (64), 54 (32), 41 (20)...]	5.81	1118	0.01	9.37	1634	0.03

trans-Pinocarveol	6.04	1133	tr	8.95	1600	0.01
(*E*)-Myroxide	6.21	1144	0.01	6.92	1444	0.01
Nerol oxide	6.38	1155	0.02	6.67	1425	0.04
Borneol	6.48	1161	0.05	9.59*	1653	4.65
δ-Terpineol	6.60	1169	tr	9.27*	1626	0.05
Terpinen-4-ol	6.67	1174	0.04	8.39	1556	0.05
para-Cymen-8-ol	6.83	1184	0.02	11.33	1799	0.02
α-Terpineol	6.90	1189	2.13	9.59*	1653	[4.65]
Hodiendiol	6.99	1194	0.03	12.61	1913	0.04
Linalyl formate	7.33	1217	0.36	8.22	1543	0.40
Nerol	7.54	1231	0.43	10.87*	1760	0.57
Unknown [m/z 43, 93 (49), 41 (22), 80 (22), 69 (17), 121 (14)...]	7.60	1235	0.01	7.31*	1473	0.14
Neral	7.68	1240	0.03	9.27*	1626	[0.05]
Geraniol	8.07*	1266	65.07	11.44	1809	1.10
Linalyl acetate	8.07*	1266	[65.07]	8.04*†	1529	[80.87]
(*trans*?)-Linalool oxide acetate (fur.)?	8.07*	1266	[65.07]	8.46*	1561	[0.01]
Geranial	8.15	1272	0.07	9.90	1678	0.06
Unknown [m/z 121, 43 (75), 95 (57), 41 (34), 93 (33), 69 (28)...]	8.24	1278	0.01			
Neryl formate	8.27	1280	0.04	9.27*	1626	[0.05]
Bornyl acetate	8.34	1285	0.03	8.10	1534	0.04
Thymol	8.56	1299	0.01	14.88	2130	0.03
Geranyl formate	8.63	1304	0.10	9.70	1661	0.10
δ-Elemene	9.07	1335	0.02	6.78	1433	tr
Hodiendiol derivative	9.17	1342	0.10	12.74	1926	0.11
α-Cubebene	9.26*	1348	0.07	6.62*	1421	[0.07]
α-Terpinyl acetate	9.26*	1348	[0.07]	9.51	1645	0.04
Unknown [m/z 43, 79 (47), 71 (31), 94 (27), 81 (23), 41 (22)... 197 (0)]	9.33	1354	0.08	10.87*	1760	[0.57]
Unknown [m/z 43, 121 (52), 93 (48), 79 (33), 41 (30), 136 (26), 81 (25)...]	9.38	1357	0.06			
Unknown [m/z 43, 79 (46), 71 (30), 94 (25), 41 (23), 81 (21)... 197 (0)]	9.43	1360	0.02	10.97	1768	0.06
Neryl acetate	9.53	1368	0.65	10.00	1686	0.67
α-Copaene	9.60	1373	0.50	6.98	1448	0.51
(*Z*)-8-Hydroxylinalool?	9.66	1377	0.01	13.59	2005	0.01
β-Bourbonene	9.71*	1380	0.17	7.31*	1473	[0.14]
1,5-diepi-β-Bourbonene	9.71*	1380	[0.17]	7.20	1465	0.01
Geranyl acetate	9.80	1387	1.38	10.37	1716	1.24
β-Elemene	9.85	1390	0.10	8.27*	1547	1.70
Isocaryophyllene	10.00	1401	0.01	7.94*†	1521	[80.87]

β-Caryophyllene	10.17	1414	1.67	8.27*	1547	[1.70]
β-Copaene	10.31	1424	0.04	8.16	1538	0.01
α-Humulene	10.62	1447	0.09	9.09	1611	0.08
α-Amorphene	10.91	1469	0.01	9.39	1636	0.01
Germacrene D	11.01	1476	2.39	9.59*	1653	[4.65]
β-Selinene	11.06	1480	0.03	9.67	1659	0.04
Hodiendiol derivative IV	11.10	1482	0.15			
Bicyclogermacrene	11.21	1491	0.33	9.86*	1674	0.32
α-Muurolene	11.26	1495	0.01	9.86*	1674	[0.32]
Hodiendiol derivative II	11.31	1498	0.12	12.54*	1907	0.38
γ-Cadinene	11.43	1507	0.03	10.17	1700	0.09
δ-Cadinene	11.59*	1520	0.11	10.22	1704	0.15
trans-Calamenene	11.59*	1520	[0.11]	11.01	1772	0.01
α-Calacorene	11.77	1535	0.01	11.90*	1850	0.07
α-Elemol	11.90*	1544	0.05	13.84	2028	0.03
Isocaryophyllene epoxide B	11.90*	1544	[0.05]	11.90*	1850	[0.07]
1,5-Epoxysalvial-4(14)-ene	12.07	1558	0.04	11.90*	1850	[0.07]
Spathulenol	12.18	1566	0.01	14.18	2062	0.24
Caryophyllene oxide	12.27*	1574	0.33	12.54*	1907	[0.38]
Caryophyllene oxide isomer	12.27*	1574	[0.33]	12.47	1900	0.05
Salvial-4(14)-en-1-one	12.42	1586	0.02	12.82	1933	0.03
Guaiol	12.51	1593	0.10	13.93	2038	0.16
Unknown [m/z 43, 93 (89), 91 (88), 79 (87), 123 (76), 81 (75)...]	12.99	1632	0.15	13.68	2013	0.12
τ-Cadinol	13.03	1635	0.02	14.72	2114	0.02
β-Eudesmol	13.10	1641	0.12	15.16	2160	0.30
α-Eudesmol	13.15	1645	0.11	15.08*	2150	0.10
Bulnesol	13.32	1659	0.05	15.08*	2150	[0.10]
Eudesma-4(15),7-dien-1β-ol	13.54	1677	0.01	15.75	2219	0.01
Cyclocolorenone	14.38	1749	0.03	16.26	2273	0.01
Unknown [m/z 123, 191 (88), 81 (86), 41 (86), 151 (80), 91 (76)...]	15.22	1823	0.04	18.45	2514	0.03
Sclareoloxide	15.88	1882	0.02			
Unknown [m/z 109, 132 (88), 157 (76), 119 (66), 91 (57), 105 (55)...]	16.41	1932	0.06			
Geranyl-para-cymene	16.61	1952	0.05	15.96	2241	0.03
Manoyl oxide	16.87	1976	0.01	16.34	2281	0.01
Sclareol	19.11	2202	0.37	22.62	3035	0.38
Total identified		**96.93%**			**97.33%**	
Total reported		**97.37%**			**97.57%**	

*: 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

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