Date : September 16, 2020

Certificate of Analysis – GC Profiling

Sample identification

Internal code : 20I09-PTH04
Customer identification : Sage - S10105810R
Type : Essential oil
Source : *Salvia officinalis*
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 : Fanny Charlier, B. Sc., chimiste à l'entraînement
Analysis date : September 14, 2020

Checked and approved by :

Sylvain Mercier, M. Sc., chimiste 2014-005

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PHYSICOCHEMICAL DATA

Physical aspect: Faintly yellow liquid
Refractive index: 1.4657 ± 0.0003 (20 °C; method PC-MAT-016)

ISO 9909:1999 - OIL OF DALMATIAN SAGE

Compound	Min. %	Max. %	Observed %	Complies?
α-Humulene		12	4	Yes
Bornyl acetate		2.5	1.7	Yes
Camphor	4.5	24.5	22.3	Yes
β-Thujone	3.0	8.5	4.5	Yes
α-Thujone	18	43	28	Yes
1,8-Cineole	5.5	13.0	9.2	Yes
Limonene	0.5	3.0	2.0	Yes
Camphene	1.5	7.0	6.2	Yes
α-Pinene	1.0	6.5	3.7	Yes
Linalool + linalyl acetate		1.0	0.6	Yes
Refractive index	1.4580	1.4740	1.4657	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
Isobutyral	tr	Aliphatic aldehyde
Isovaleral	0.02	Aliphatic aldehyde
2-Methylbutyral	0.01	Aliphatic aldehyde
Heptane	tr	Alkane
Isoamyl alcohol	tr	Aliphatic alcohol
2-Methylbutanol	tr	Aliphatic alcohol
Methyl isovalerate	0.01	Aliphatic ester
Hexanal	tr	Aliphatic aldehyde
Octane	tr	Alkane
(*Z*)-Salvene	0.53	Normonoterpene
(*E*)-Salvene	0.09	Normonoterpene
Hexanol	0.02	Aliphatic alcohol
Santene	0.01	Normonoterpene
Hashishene	0.04	Monoterpene
Tricyclene	0.20	Monoterpene
α-Thujene	0.15	Monoterpene
α-Pinene	3.68	Monoterpene
Camphene	6.17	Monoterpene
α-Fenchene	0.05	Monoterpene
Thuja-2,4(10)-diene	0.01	Monoterpene
endo-Isocamphane	0.01	Monoterpene
β-Pinene	1.53	Monoterpene
Sabinene	0.04	Monoterpene
Octen-3-ol	0.18	Aliphatic alcohol
6-Methyl-5-hepten-2-one	0.03	Aliphatic ketone
Myrcene	0.73	Monoterpene
α-Phellandrene	0.02	Monoterpene
Octan-3-ol	0.05	Aliphatic alcohol
Δ3-Carene	0.02	Monoterpene
α-Terpinene	0.09	Monoterpene
para-Cymene	1.02	Monoterpene
Limonene	2.02	Monoterpene
1,8-Cineole	9.25	Monoterpenic ether
Benzyl alcohol	0.01	Simple phenolic
(*Z*)-β-Ocimene	0.09	Monoterpene
(*E*)-β-Ocimene	0.03	Monoterpene
γ-Terpinene	0.16	Monoterpene
cis-Sabinene hydrate	0.05	Monoterpenic alcohol
cis-Linalool oxide (fur.)	0.03	Monoterpenic alcohol
Fenchone	0.02	Monoterpenic ketone
Terpinolene	0.16	Monoterpene
para-Cymenene	0.03	Monoterpene
α-Thujone	27.98	Monoterpenic ketone
Linalool	0.61	Monoterpenic alcohol
β-Thujone	4.49	Monoterpenic ketone

Dehydrosabinaketone	0.03	Normonoterpenic ketone
cis-para-Menth-2-en-1-ol	0.07	Monoterpenic alcohol
Camphor	22.26	Monoterpenic ketone
Camphene hydrate	0.06	Monoterpenic alcohol
Sabinaketone	0.01	Normonoterpenic ketone
Isoborneol	0.06	Monoterpenic alcohol
Pinocarvone	0.08	Monoterpenic ketone
Borneol	2.46	Monoterpenic alcohol
Thujol	0.38	Monoterpenic alcohol
δ-Terpineol	0.05	Monoterpenic alcohol
Terpinen-4-ol	0.40	Monoterpenic alcohol
para-Cymen-8-ol	0.09	Monoterpenic alcohol
α-Terpineol	0.15	Monoterpenic alcohol
Myrtenol	0.04	Monoterpenic alcohol
Unknown	0.07	Oxygenated monoterpene
Unknown	0.02	Unknown
Bornyl formate	0.04	Monoterpenic ester
Cuminal	0.01	Monoterpenic aldehyde
Carvone	0.02	Monoterpenic ketone
Carvotanacetone	0.01	Monoterpenic ketone
Geraniol	0.02	Monoterpenic alcohol
Linalyl acetate	0.01	Monoterpenic ester
Unknown	0.02	Unknown
Unknown	0.04	Oxygenated monoterpene
Unknown	0.03	Unknown
Bornyl acetate	1.72	Monoterpenic ester
Isobornyl acetate	0.04	Monoterpenic ester
trans-Sabinyl acetate	0.11	Monoterpenic ester
Cuminol	0.01	Monoterpenic alcohol
Unknown	0.04	Unknown
Thymol	0.02	Monoterpenic alcohol
Carvacrol	0.02	Monoterpenic alcohol
δ-Terpinyl acetate	0.04	Monoterpenic ester
trans-Carvyl acetate	0.04	Monoterpenic ester
exo-2-Hydroxycineole acetate	0.02	Monoterpenic ester
Eugenol	0.01	Phenylpropanoid
α-Ylangene	0.01	Sesquiterpene
α-Copaene	0.03	Sesquiterpene
β-Bourbonene	0.01	Sesquiterpene
Geranyl acetate	0.03	Monoterpenic ester
(*Z*)-Jasmone	0.01	Jasmonate
Isocaryophyllene	0.04	Sesquiterpene
α-Gurjunene	0.02	Sesquiterpene
β-Caryophyllene	2.65	Sesquiterpene
Aromadendrene	0.17	Sesquiterpene
Unknown	0.04	Unknown
α-Humulene	3.88	Sesquiterpene
Unknown	0.18	Unknown
allo-Aromadendrene	0.17	Sesquiterpene
Germacrene D	0.04	Sesquiterpene
β-Selinene	0.02	Sesquiterpene
Viridiflorene	0.19	Sesquiterpene

5-Methyl-2,4-diisopropylphenol	0.01	Terpene derivative
γ-Cadinene	0.03	Sesquiterpene
δ-Cadinene	0.04	Sesquiterpene
trans-Calamenene	0.01	Sesquiterpene
α-Calacorene	0.01	Sesquiterpene
Isocaryophyllene epoxide B	0.04	Sesquiterpenic ether
Caryophyllene oxide	0.31	Sesquiterpenic ether
Caryophyllene oxide isomer	0.03	Sesquiterpenic ether
Globulol	0.01	Sesquiterpenic alcohol
Viridiflorol	1.45	Sesquiterpenic alcohol
Humulene epoxide I	0.06	Sesquiterpenic ether
Humulene epoxide II	0.44	Sesquiterpenic ether
Unknown	0.04	Oxygenated sesquiterpene
Unknown	0.02	Oxygenated sesquiterpene
Caryophylladienol II	0.03	Sesquiterpenic alcohol
α-Eudesmol	0.01	Sesquiterpenic alcohol
(3*Z*)-Caryophylla-3,8(13)-dien-5β-ol	0.04	Sesquiterpenic alcohol
Unknown	0.02	Sesquiterpene
Phytone	0.01	Terpenic ketone
Isopimaradiene isomer I	0.03	Diterpene
Unknown	0.01	Unknown
Trachylobane?	0.01	Diterpene
Manool	0.16	Diterpenic alcohol
Unknown	0.01	Unknown
Consolidated total	**98.44%**	

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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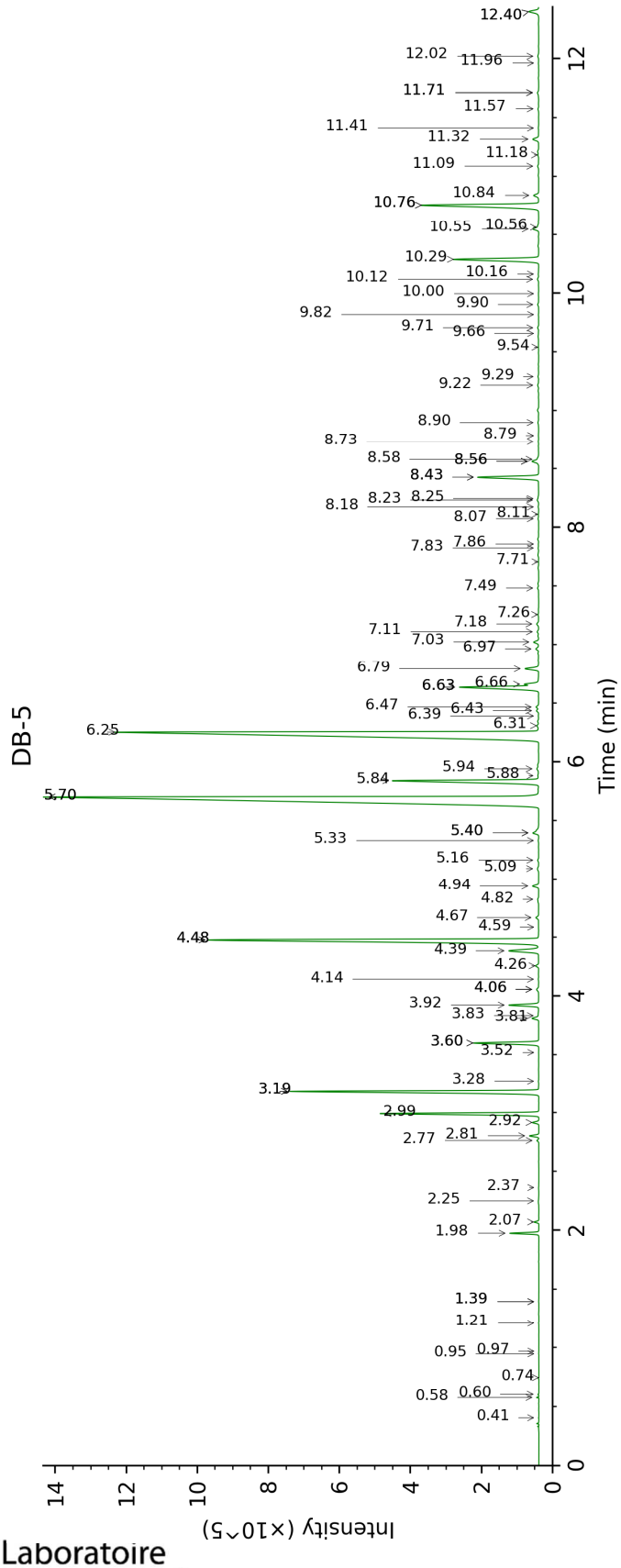
DB-5
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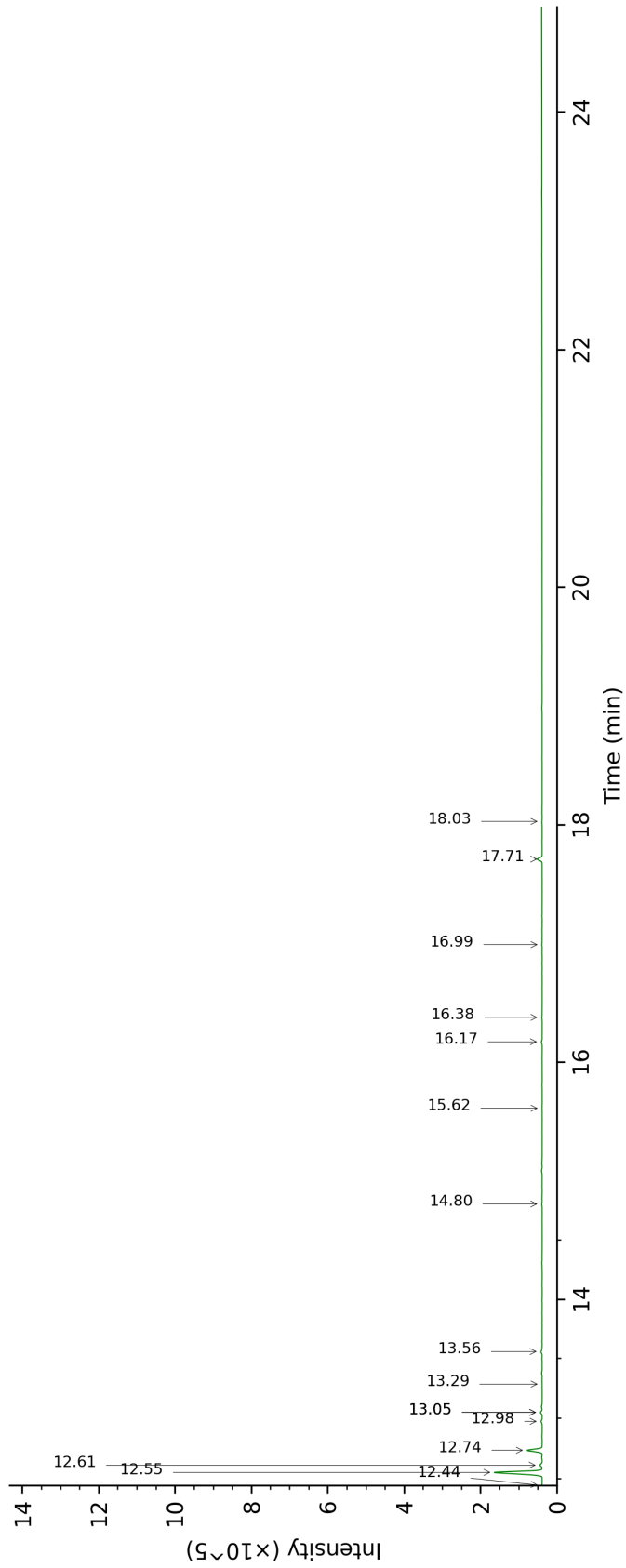
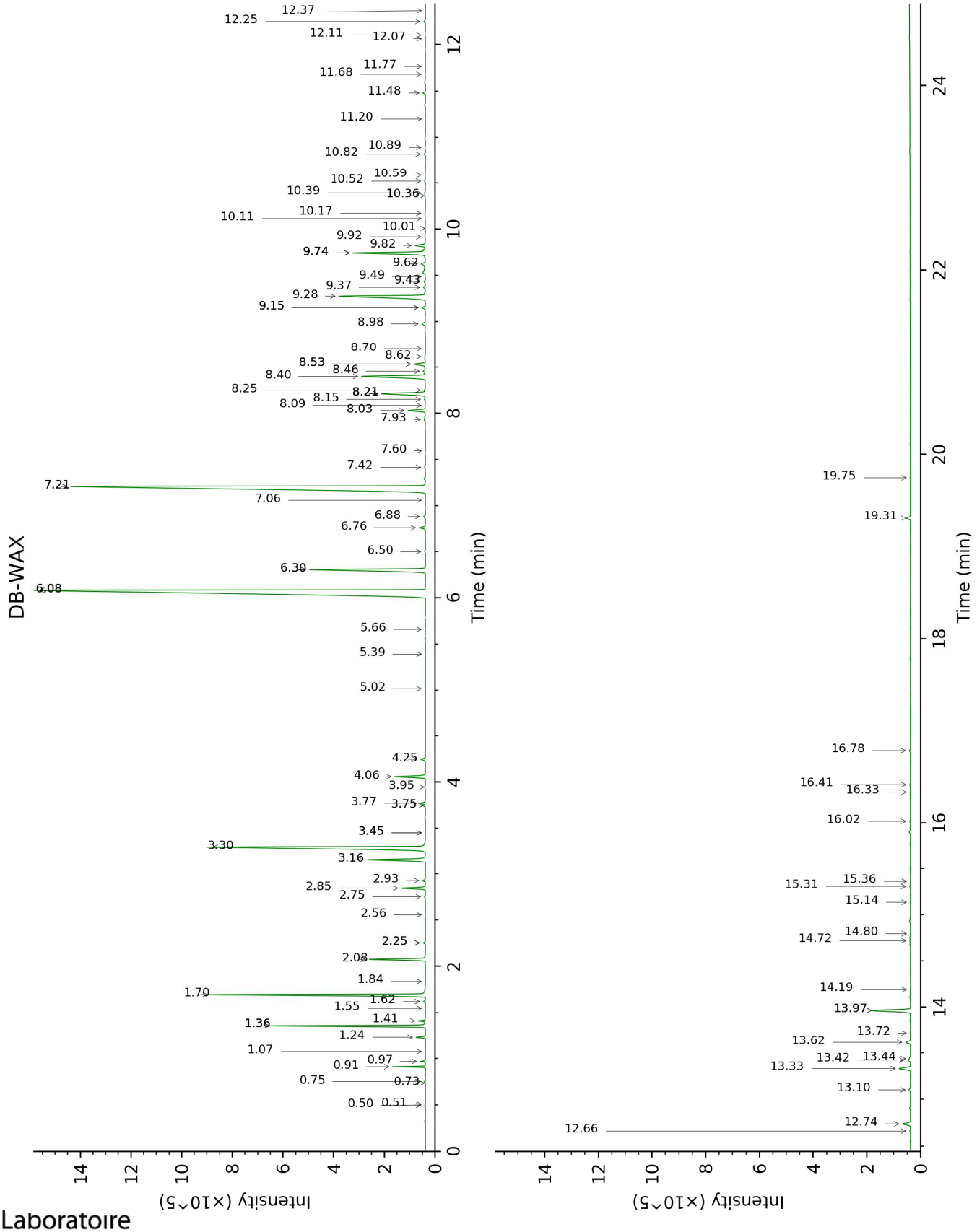
12.02
11.96
11.71
11.57
11.41
11.32
11.18
11.09
10.84
10.76
10.55
10.56
10.29
10.16
10.12
10.00
9.90
9.82
9.71
9.66
9.54
9.29
9.22
8.90
8.79
8.73
8.58
8.56
8.43
8.25
8.23
8.18
8.11
8.07
7.86
7.83
7.71
7.49
7.26
7.18
7.11
7.03
6.97
6.79
6.66
6.63
6.47
6.43
6.39
6.31
6.25
5.94
5.88
5.84
5.70
5.40
5.33
5.16
5.09
4.94
4.82
4.67
4.59
4.48
4.39
4.26
4.14
4.06
3.92
3.83
3.81
3.60
3.52
3.28
3.19
2.99
2.92
2.81
2.77
2.37
2.25
2.07
1.98
1.39
1.21
0.97
0.95
0.74
0.60
0.58
0.41
Time (min)
Intensity (×10^5)


18.03
17.71
16.99
16.38
16.17
15.62
14.80
13.56
13.29
13.05
12.98
12.74
12.61
12.55
12.44
Time (min)
Intensity (×10^5)


DB-WAX
Time (min)
Intensity (×10^5)
12.37
12.25
12.11
12.07
11.77
11.68
11.48
11.20
10.89
10.82
10.59
10.52
10.39
10.36
10.17
10.11
10.01
9.92
9.82
9.74
9.62
9.49
9.43
9.37
9.28
9.15
8.98
8.70
8.62
8.53
8.46
8.40
8.25
8.21
8.15
8.09
8.03
7.93
7.60
7.42
7.21
7.06
6.88
6.76
6.50
6.30
6.08
5.66
5.39
5.02
4.25
4.06
3.95
3.77
3.75
3.45
3.30
3.16
2.93
2.85
2.75
2.56
2.25
2.08
1.84
1.70
1.62
1.55
1.41
1.36
1.24
1.07
0.97
0.91
0.75
0.73
0.51
0.50
19.75
19.31
16.78
16.41
16.33
16.02
15.36
15.31
15.14
14.80
14.72
14.19
13.97
13.72
13.62
13.44
13.42
13.33
13.10
12.74
12.66

FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Isobutyral	0.41	533	tr	0.50	781	0.01
Isovaleral	0.58	640	0.02	0.75	884	0.02
2-Methylbutyral	0.60	650	0.01	0.73	878	0.01
Heptane	0.74	704	tr			
Isoamyl alcohol	0.95	734	tr	3.45*	1180	0.01
2-Methylbutanol	0.97	737	tr	3.45*	1180	[0.01]
Methyl isovalerate	1.21	773	0.01	1.36*	992	3.63
Hexanal	1.39*	800	0.01	1.84	1042	tr
Octane	1.39*	800	[0.01]	0.51	789	tr
(*Z*)-Salvene	1.98	851	0.53	0.91	918	0.52
(*E*)-Salvene	2.07	859	0.09	0.97	928	0.08
Hexanol	2.25	875	0.02	5.39	1318	0.01
Santene	2.36	884	0.01	1.07	945	tr
Hashishene	2.76	915	0.04	1.36*	992	[3.63]
Tricyclene	2.80	918	0.20	1.24	972	0.20
α-Thujene	2.92	925	0.15	1.41	1000	0.16
α-Pinene	2.99	930	3.68	1.36*	992	[3.63]
Camphene	3.19*	943	6.32	1.70	1028	6.17
α-Fenchene	3.19*	943	[6.32]	1.62	1020	0.05
Thuja-2,4(10)-diene	3.28	949	0.01	2.26*	1083	0.05
endo-Isocamphane	3.52	965	0.01	1.55	1013	0.01
β-Pinene	3.60*	971	1.63	2.08	1065	1.53
Sabinene	3.60*	971	[1.63]	2.26*	1083	[0.05]
Octen-3-ol	3.81	985	0.18	6.76	1418	0.21
6-Methyl-5-hepten-2-one	3.83	986	0.03	5.02	1294	0.01
Myrcene	3.92	992	0.73	2.85	1132	0.70
α-Phellandrene	4.06*	1001	0.08	2.75	1125	0.02
Octan-3-ol	4.06*	1001	[0.08]	6.08*	1368	27.90
Δ3-Carene	4.14	1007	0.02	2.56	1110	0.01
α-Terpinene	4.26	1014	0.09	2.93	1139	0.08
para-Cymene	4.39	1022	1.02	4.06	1225	1.00
Limonene	4.48*	1028	11.35	3.16	1157	2.02
1,8-Cineole	4.48*	1028	[11.35]	3.30	1168	9.25
Benzyl alcohol	4.59	1034	0.01	11.77	1820	0.01
(*Z*)-β-Ocimene	4.67	1040	0.09	3.75†	1202	0.23
(*E*)-β-Ocimene	4.82	1049	0.03	3.95	1217	0.04
γ-Terpinene	4.94	1056	0.16	3.77†	1204	[0.23]
cis-Sabinene hydrate	5.09	1066	0.05	6.88	1428	0.08
cis-Linalool oxide (fur.)	5.16	1071	0.03	6.50	1399	0.03
Fenchone	5.33	1081	0.02	5.66	1338	0.01
Terpinolene	5.40*	1085	0.24	4.25	1238	0.16
para-Cymenene	5.40*	1085	[0.24]	6.30*	1384	4.52
α-Thujone	5.70*	1104	28.59	6.08*	1368	[27.90]
Linalool	5.70*	1104	[28.59]	8.03	1514	0.61
β-Thujone	5.84	1113	4.49	6.30*	1384	[4.52]
Dehydrosabinaketone	5.88	1116	0.03	8.62	1559	0.03

cis-para-Menth-2-en-1-ol	5.94	1120	0.07	8.15	1523	0.05
Camphor	6.25	1139	22.26	7.21*	1452	22.34
Camphene hydrate	6.31	1143	0.06	8.46	1547	0.09
Sabinaketone	6.39	1148	0.01	8.70	1566	0.01
Isoborneol	6.44	1151	0.06	9.37	1619	0.07
Pinocarvone	6.47	1153	0.08	7.93	1506	0.05
Borneol	6.64*†	1164	2.89	9.74*†	1649	2.73
Thujol	6.64*†	1164	[2.89]	9.82	1656	0.38
δ-Terpineol	6.66†	1165	[2.89]	9.43	1624	0.05
Terpinen-4-ol	6.79	1174	0.40	8.53*	1553	0.48
para-Cymen-8-ol	6.97	1185	0.09	11.48	1794	0.09
α-Terpineol	7.03	1189	0.15	9.74*†	1649	[2.73]
Myrtenol	7.11	1194	0.04	10.82	1738	0.04
Unknown [m/z 43, 97 (84), 85 (65), 55 (56), 41 (50)...]	7.18	1198	0.07	12.25	1862	0.06
Unknown [m/z 95, 93 (32), 121 (24), 79 (22), 91 (21), 105 (16)... 154 (2)]	7.26	1204	0.02	10.89	1744	0.02
Bornyl formate	7.48	1219	0.04	8.09	1518	0.02
Cuminal	7.71	1234	0.01	10.59	1718	0.02
Carvone	7.83	1241	0.02	10.01	1671	0.01
Carvotanacetone	7.86	1244	0.01	9.49	1628	0.01
Geraniol	8.08	1258	0.02	11.68	1812	0.02
Linalyl acetate	8.11	1260	0.01	8.22*	1528	1.78
Unknown [m/z 107, 43 (83), 59 (54), 109 (50), 108 (43), 67(42)...]	8.18	1264	0.02			
Unknown [m/z 109, 41 (22), 81 (14), 43 (11)... 152 (4)]	8.23	1268	0.04			
Unknown [m/z 109, 43 (83), 95 (70), 110 (70), 99 (53), 119 (48)...]	8.25	1269	0.03			
Bornyl acetate	8.43*	1281	1.78	8.22*	1528	[1.78]
Isobornyl acetate	8.43*	1281	[1.78]	8.25	1531	0.04
trans-Sabinyl acetate	8.56*	1290	0.21	9.15*	1601	0.14
Cuminol	8.56*	1290	[0.21]	14.19	2042	0.01
Unknown [m/z 166, 96 (61), 83 (60), 41 (57), 69 (56), 69 (56), 81 (53), 97 (51), 95 (48), 151 (41), 123 (39), 109 (39)...]	8.58	1292	0.04			
Thymol	8.73	1301	0.02	15.14	2134	0.02
Carvacrol	8.79	1305	0.02	15.36	2156	0.01
δ-Terpinyl acetate	8.90	1313	0.04	9.15*	1601	[0.14]
trans-Carvyl acetate	9.22	1335	0.04	10.17	1684	0.03

exo-2-Hydroxycineole acetate	9.29	1340	0.02	10.11	1679	0.01
Eugenol	9.54	1358	0.01	14.80	2100	0.01
α-Ylangene	9.66	1366	0.01	7.06	1441	0.01
α-Copaene	9.71	1369	0.03	7.21*	1452	[22.34]
β-Bourbonene	9.82	1377	0.01	7.42	1467	0.04
Geranyl acetate	9.90	1383	0.03	10.52	1713	0.04
(*Z*)-Jasmone	10.00	1390	0.01	12.37	1873	0.01
Isocaryophyllene	10.12	1398	0.04	8.22*	1528	[1.78]
α-Gurjunene	10.16	1402	0.02	7.60	1480	0.01
β-Caryophyllene	10.29	1411	2.65	8.40	1542	2.66
Aromadendrene	10.55	1430	0.17	8.53*	1553	[0.48]
Unknown [m/z 153, 43 (57), 107 (56), 108 (44)... 204 (11)...]	10.56	1431	0.04	13.44	1971	0.03
α-Humulene	10.76*	1446	4.07	9.28	1611	3.88
Unknown [m/z 153, 43 (55), 168 (33), 41 (28)... 207 (3)...]	10.76*	1446	[4.07]	13.62	1987	0.18
allo-Aromadendrene	10.84	1452	0.17	8.98	1587	0.16
Germacrene D	11.09	1470	0.04	9.74*†	1649	[2.73]
β-Selinene	11.18	1478	0.02	9.92	1663	0.02
Viridiflorene	11.32	1488	0.19	9.62	1639	0.18
5-Methyl-2,4-diisopropylphenol	11.41	1495	0.01	16.42	2264	0.03
γ-Cadinene	11.58	1507	0.03	10.36	1699	0.04
δ-Cadinene	11.71*	1518	0.06	10.39	1702	0.04
trans-Calamenene	11.71*	1518	[0.06]	11.20	1770	0.01
α-Calacorene	11.96	1538	0.01	12.07	1846	0.01
Isocaryophyllene epoxide B	12.02	1542	0.04	12.11	1850	0.03
Caryophyllene oxide	12.40*	1572	0.33	12.74	1906	0.31
Caryophyllene oxide isomer	12.40*	1572	[0.33]	12.66	1899	0.03
Globulol	12.44	1576	0.01	13.97*	2020	1.47
Viridiflorol	12.55	1584	1.45	13.97*	2020	[1.47]
Humulene epoxide I	12.61	1589	0.06	13.10	1940	0.07
Humulene epoxide II	12.74	1598	0.44	13.33	1961	0.45
Unknown [m/z 81, 41 (55), 79 (45), 67 (4), 93 (38)...)	12.98	1618	0.04	13.42	1969	0.10
Unknown [m/z 41, 91 (78), 67 (76), 119 (70), 55 (61)... 220 (7)]	13.05*	1625	0.05	13.72	1997	0.02
Caryophylladienol II	13.05*	1625	[0.05]	16.02	2223	0.03
α-Eudesmol	13.29	1644	0.01	15.31	2151	0.03
(3*Z*)-Caryophylla-3,8(13)-dien-5β-ol	13.56	1666	0.04	16.78	2303	0.04
Unknown [m/z 133, 148 (97), 43 (50), 93 (47), 91 (41), 147 (40)...204 (8)]	14.80	1773	0.02			

Phytone	15.62	1846	0.01	14.72	2093	0.03
Isopimaradiene isomer I	16.17	1897	0.03			
Unknown [m/z 43, 93 (95), 91 (69), 41 (67), 107 (62), 81 (62)...]	16.38	1916	0.01			
Trachylobane?	16.99	1974	0.01	16.33	2256	0.01
Manool	17.71	2046	0.16	19.31	2583	0.16
Unknown [m/z 204, 109 (57), 80 (50), 93 (32), 81 (28), 161 (26)..]	18.03	2077	0.01	19.75	2635	0.01
Total identified		**98.54%**			**97.72%**	
Total reported		**98.87%**			**98.14%**	

*: 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