Date : August 03, 2020

Certificate of Analysis – GC Profiling

Sample identification

Internal code : 20G23-PTH04
Customer identification : Clary Sage Organic - Spain - CC4102204R
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 : Fanny Charlier, B. Sc., chimiste à l'entraînement
Analysis date : July 29, 2020

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: Light yellow liquid
Refractive index: 1.4587 ± 0.0003 (20 °C; method PC-MAT-016)

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

Compound	Min. %	Max. %	Observed %	Complies?
Sclareol	0.4	2.6	1.0	Yes
Germacrene D	1.2	7.5	2.1	Yes
α-Terpineol	1	5	2	Yes
Linalyl acetate	56.0	70.5	62.1	Yes
Linalool	13	24	20	Yes
Refractive index	1.456	1.466	1.459	Yes

CONCLUSION

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

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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
2-Ethylfuran	tr	Furan
2-Methylbutanol	tr	Aliphatic alcohol
Toluene	tr	Simple phenolic
(2*E*)-Hexenal	0.03	Aliphatic aldehyde
(3*Z*)-Hexenol	0.06	Aliphatic alcohol
(2*E*)-Hexenol	0.07	Aliphatic alcohol
Hexanol	0.07	Aliphatic alcohol
α-Pinene	0.10	Monoterpene
Camphene	0.02	Monoterpene
α-Fenchene	tr	Monoterpene
β-Pinene	0.11	Monoterpene
Sabinene	0.03	Monoterpene
Octen-3-ol	0.04	Aliphatic alcohol
Octan-3-one	0.01	Aliphatic ketone
Myrcene	0.61	Monoterpene
trans-Dehydroxylinalool oxide	0.04	Monoterpenic ether
2-Carene	0.01	Monoterpene
cis-Dehydroxylinalool oxide	0.05	Monoterpenic ether
α-Terpinene	0.01	Monoterpene
para-Cymene	0.04	Monoterpene
Limonene	0.33	Monoterpene
β-Phellandrene	tr	Monoterpene
1,8-Cineole	0.02	Monoterpenic ether
(*Z*)-β-Ocimene	0.26	Monoterpene
(*E*)-β-Ocimene	0.41	Monoterpene
γ-Terpinene	0.02	Monoterpene
cis-Linalool oxide (fur.)	0.02	Monoterpenic alcohol
Terpinolene	0.09	Monoterpene
trans-Linalool oxide (fur.)	0.03	Monoterpenic alcohol
Linalool	19.72	Monoterpenic alcohol
Rosefuran	tr	Monoterpenic ether
Hotrienol	0.03	Monoterpenic alcohol
Dehydrosabinaketone	0.02	Normonoterpenic ketone
trans-Sabinol	0.02	Monoterpenic alcohol
Camphor	0.02	Monoterpenic ketone
Borneol	0.10	Monoterpenic alcohol
Terpinen-4-ol	0.07	Monoterpenic alcohol
para-Cymen-8-ol	0.02	Monoterpenic alcohol
α-Terpineol	1.98	Monoterpenic alcohol
Hodiendiol	0.03	Monoterpenic alcohol
γ-Terpineol	0.01	Monoterpenic alcohol
Unknown	0.04	Unknown
Linalyl formate	0.28	Monoterpenic ester

Nerol	0.42	Monoterpenic alcohol
Unknown	0.02	Unknown
Neral	0.03	Monoterpenic aldehyde
Geraniol	1.18	Monoterpenic alcohol
Linalyl acetate	62.15	Monoterpenic ester
Geranial	0.06	Monoterpenic aldehyde
Neryl formate	0.05	Monoterpenic ester
Bornyl acetate	0.04	Monoterpenic ester
Geranyl formate	0.11	Monoterpenic ester
δ-Elemene	0.02	Sesquiterpene
Hodiendiol derivative	0.06	Oxygenated monoterpene
α-Cubebene	0.06	Sesquiterpene
Unknown	0.05	Monoterpenic ester
Unknown	0.05	Oxygenated monoterpene
Neryl acetate	0.65	Monoterpenic ester
α-Copaene	0.44	Sesquiterpene
β-Bourbonene	0.12	Sesquiterpene
1,5-diepi-β-Bourbonene	0.01	Sesquiterpene
Geranyl acetate	1.25	Monoterpenic ester
β-Cubebene	0.12	Sesquiterpene
β-Elemene	0.06	Sesquiterpene
Isocaryophyllene	0.01	Sesquiterpene
β-Caryophyllene	1.15	Sesquiterpene
β-Copaene	0.04	Sesquiterpene
trans-α-Bergamotene	0.03	Sesquiterpene
α-Humulene	0.07	Sesquiterpene
9-epi-β-Caryophyllene	0.07	Sesquiterpene
Germacrene D	2.13	Sesquiterpene
β-Selinene	0.03	Sesquiterpene
Hodiendiol derivative IV	0.24	Oxygenated monoterpene
Bicyclogermacrene	0.28	Sesquiterpene
Hodiendiol derivative II	0.05	Oxygenated monoterpene
γ-Cadinene	0.11	Sesquiterpene
β-Bisabolene	0.01	Sesquiterpene
δ-Cadinene	0.08	Sesquiterpene
trans-Calamenene	0.07	Sesquiterpene
trans-Cadina-1,4-diene	0.02	Sesquiterpene
α-Calacorene	0.01	Sesquiterpene
Isocaryophyllene epoxide B	0.02	Sesquiterpenic ether
α-Elemol	0.02	Sesquiterpenic alcohol
Spathulenol	0.14	Sesquiterpenic alcohol
Caryophyllene oxide	0.17	Sesquiterpenic ether
Caryophyllene oxide isomer	0.03	Sesquiterpenic ether
Salvial-4(14)-en-1-one	0.05	Aliphatic alcohol
Unknown	0.08	Oxygenated sesquiterpene
Guaiol	0.01	Sesquiterpenic alcohol
Hinesol	0.04	Sesquiterpenic alcohol
Unknown	0.07	Unknown
Unknown	tr	Unknown
τ-Cadinol	0.03	Sesquiterpenic alcohol
β-Eudesmol	0.05	Sesquiterpenic alcohol
α-Eudesmol	0.02	Sesquiterpenic alcohol

Bulnesol	0.04	Sesquiterpenic alcohol
Bulnesol analog	0.01	Sesquiterpenic alcohol
Cyclocolorenone	0.02	Sesquiterpenic ketone
Phytone	0.02	Terpenic ketone
Sclareoloxide	0.01	Terpenic ether
Geranyl-para-cymene	0.05	Diterpene
Manoyl oxide	0.02	Diterpenic ether
13-epi-Manoyl oxide	0.02	Diterpenic ether
Manool	0.04	Diterpenic alcohol
Sclareol	0.97	Diterpenic alcohol
Consolidated total	**98.11%**	

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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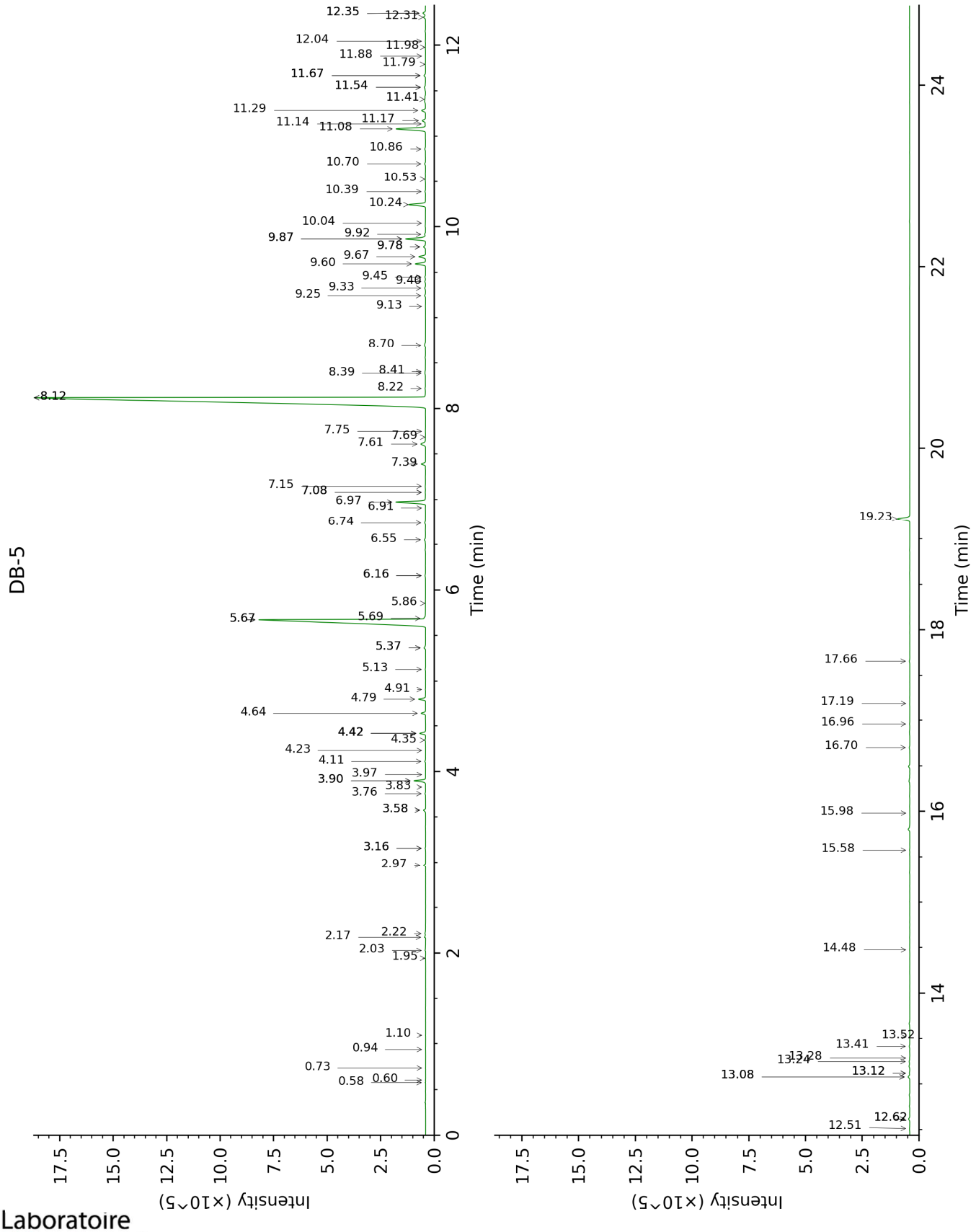
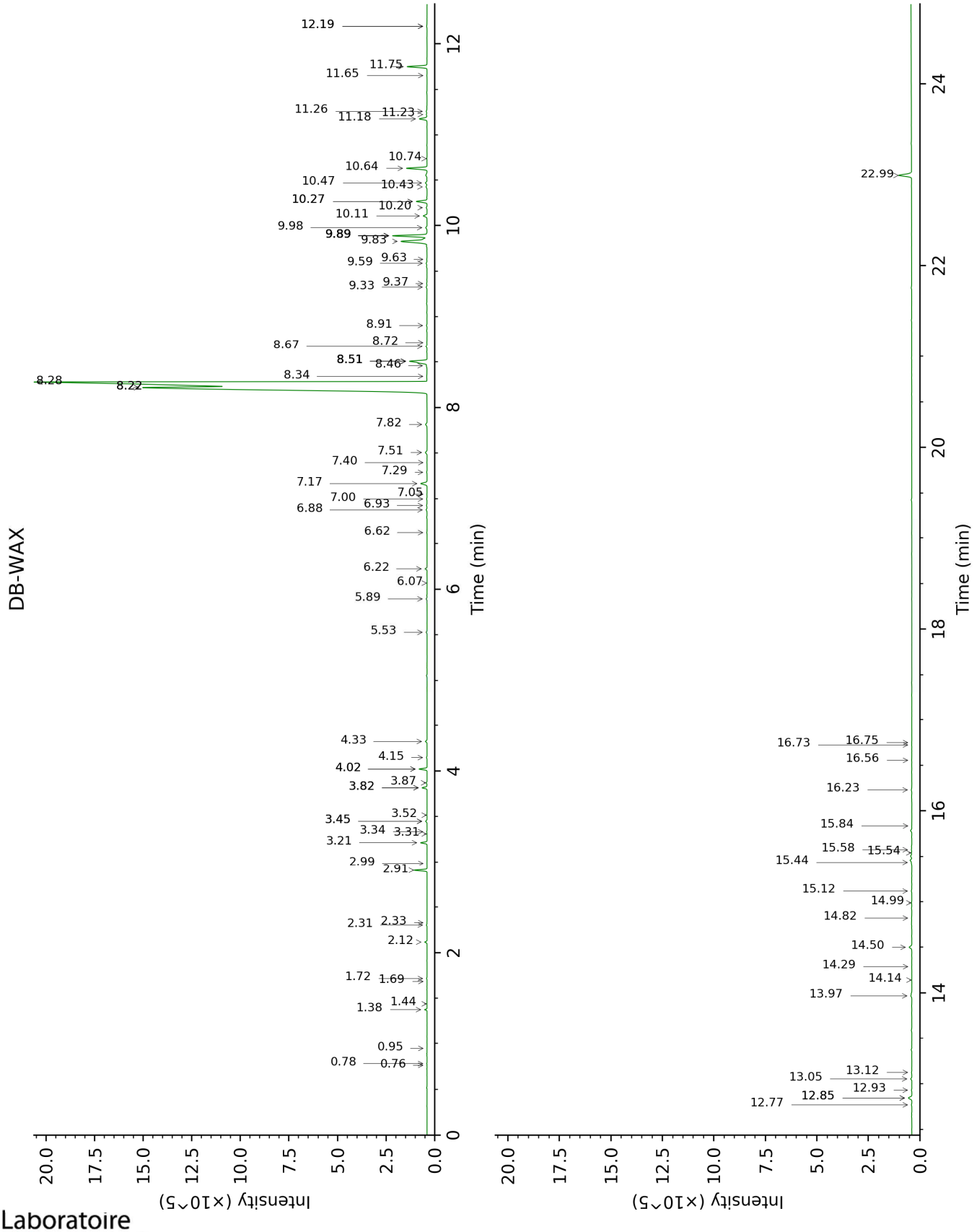

DB-5
Time (min)
Intensity (×10^5)
12.35
12.31
12.04
11.98
11.88
11.79
11.67
11.54
11.41
11.29
11.14
11.17
11.08
10.86
10.70
10.53
10.39
10.24
10.04
9.92
9.87
9.78
9.67
9.60
9.45
9.40
9.33
9.25
9.13
8.70
8.41
8.39
8.22
8.12
7.75
7.69
7.61
7.39
7.15
7.08
6.97
6.91
6.74
6.55
6.16
5.86
5.69
5.67
5.37
5.13
4.91
4.79
4.64
4.42
4.35
4.23
4.11
3.97
3.90
3.83
3.76
3.58
3.16
2.97
2.22
2.17
2.03
1.95
1.10
0.94
0.73
0.60
0.58
19.23
17.66
17.19
16.96
16.70
15.98
15.58
14.48
13.52
13.41
13.28
13.24
13.12
13.08
12.62
12.51


DB-WAX
Time (min)
Intensity (×10^5)
12.19
11.75
11.65
11.26
11.23
11.18
10.74
10.64
10.47
10.43
10.27
10.20
10.11
9.98
9.89
9.83
9.63
9.59
9.37
9.33
8.91
8.72
8.67
8.51
8.46
8.34
8.28
8.22
7.82
7.51
7.40
7.29
7.17
7.05
7.00
6.93
6.88
6.62
6.22
6.07
5.89
5.53
4.33
4.15
4.02
3.87
3.82
3.52
3.45
3.34
3.31
3.21
2.99
2.91
2.33
2.31
2.12
1.72
1.69
1.44
1.38
0.95
0.78
0.76
22.99
16.75
16.73
16.56
16.23
15.84
15.58
15.54
15.44
15.12
14.99
14.82
14.50
14.29
14.14
13.97
13.12
13.05
12.93
12.85
12.77

FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Isovaleral	0.58	642	0.01	0.78	887	0.01
2-Methylbutyral	0.60	653	tr	0.76	880	tr
2-Ethylfuran	0.74	703	tr	0.95	917	tr
2-Methylbutanol	0.94	734	tr	3.52	1180	tr
Toluene	1.10	758	tr	1.44	996	tr
(2*E*)-Hexenal	1.94	849	0.03	3.45*	1174	0.08
(3*Z*)-Hexenol	2.03	856	0.06	5.90	1351	0.05
(2*E*)-Hexenol	2.18	869	0.07	6.22	1375	0.10
Hexanol	2.22	872	0.07	5.53	1325	0.05
α-Pinene	2.97	929	0.10	1.38	989	0.09
Camphene	3.16*	942	0.03	1.72	1024	0.02
α-Fenchene	3.16*	942	[0.03]	1.69	1021	tr
β-Pinene	3.58*	970	0.14	2.12	1064	0.11
Sabinene	3.58*	970	[0.14]	2.30	1083	0.03
Octen-3-ol	3.76	982	0.04	6.93	1426	0.05
Octan-3-one	3.83	987	0.01	4.02*	1217	0.41
Myrcene	3.90*	992	0.67	2.91	1132	0.61
trans-Dehydroxylinalool oxide	3.90*	992	[0.67]	3.45*	1174	[0.08]
2-Carene	3.97	996	0.01	2.33	1086	0.01
cis-Dehydroxylinalool oxide	4.11	1006	0.05	3.87	1206	0.04
α-Terpinene	4.23	1014	0.01	2.99	1138	tr
para-Cymene	4.35	1021	0.04	4.15	1226	0.03
Limonene	4.42*	1025	0.35	3.22	1156	0.33
β-Phellandrene	4.42*	1025	[0.35]	3.31	1164	tr
1,8-Cineole	4.42*	1025	[0.35]	3.34	1166	0.02
(*Z*)-β-Ocimene	4.64	1039	0.26	3.82*	1202	0.26
(*E*)-β-Ocimene	4.80	1049	0.41	4.02*	1217	[0.41]
γ-Terpinene	4.91	1056	0.02	3.82*	1202	[0.26]
cis-Linalool oxide (fur.)	5.13	1070	0.02	6.62	1403	0.02
Terpinolene	5.37*	1085	0.11	4.32	1239	0.09
trans-Linalool oxide (fur.)	5.37*	1085	[0.11]	7.00	1431	0.03
Linalool	5.67*†	1105	19.75	8.22*†	1523	81.92
Rosefuran	5.67*†	1105	[19.75]	6.07	1363	tr
Hotrienol	5.69†	1106	[19.75]	8.91	1576	0.03
Dehydrosabinaketone	5.86	1117	0.02	8.72	1562	0.02
trans-Sabinol	6.16*	1136	0.05	9.89*	1654	2.07
Camphor	6.16*	1136	[0.05]	7.29	1452	0.02
Borneol	6.55	1162	0.10	9.89*	1654	[2.07]
Terpinen-4-ol	6.74	1174	0.07	8.67	1558	0.07
para-Cymen-8-ol	6.91	1185	0.02	11.65	1801	0.02
α-Terpineol	6.97	1190	1.98	9.89*	1654	[2.07]
Hodiendiol	7.08*	1196	0.04	12.93	1913	0.03
γ-Terpineol	7.08*	1196	[0.04]	9.89*	1654	[2.07]

Unknown [m/z 43, 71 (80), 67 (55), 59 (51), 68 (44), 41 (43)...]	7.15	1201	0.04			
Linalyl formate	7.39	1217	0.28	8.51*	1545	1.42
Nerol	7.61	1230	0.42	11.18	1760	0.49
Unknown [m/z 43, 93 (49), 41 (22), 80 (22), 69 (17), 121 (14)...]	7.69	1235	0.02			
Neral	7.75	1239	0.03	9.63	1634	0.02
Geraniol	8.12*	1264	63.33	11.75	1809	1.18
Linalyl acetate	8.12*	1264	[63.33]	8.28†	1528	[81.92]
Geranial	8.22	1271	0.06	10.20	1679	0.05
Neryl formate	8.39	1282	0.05	9.59	1630	0.06
Bornyl acetate	8.41	1283	0.04	8.34	1533	0.03
Geranyl formate	8.70	1303	0.11	9.98	1661	0.10
δ-Elemene	9.13	1333	0.02	7.05	1434	0.01
Hodiendiol derivative	9.25	1341	0.06	13.05	1925	0.07
α-Cubebene	9.33	1347	0.06	6.88	1422	0.07
Unknown [m/z 43, 121 (52), 93 (48), 79 (33), 41 (30), 136 (26), 81 (25)...]	9.40	1352	0.05			
Unknown [m/z 43, 79 (46), 71 (30), 94 (25), 41 (23), 81 (21)... 197 (0)]	9.45	1355	0.05	11.23	1764	0.05
Neryl acetate	9.60	1366	0.65	10.27*	1684	0.66
α-Copaene	9.67	1371	0.44	7.17	1443	0.45
β-Bourbonene	9.78*	1379	0.14	7.51	1468	0.12
1,5-diepi-β-Bourbonene	9.78*	1379	[0.14]	7.40	1460	0.01
Geranyl acetate	9.87*	1385	1.33	10.64	1715	1.25
β-Cubebene	9.87*	1385	[1.33]	7.82	1492	0.12
β-Elemene	9.92	1389	0.06	8.46	1542	0.05
Isocaryophyllene	10.04	1397	0.01	8.22*†	1523	[81.92]
β-Caryophyllene	10.24	1412	1.15	8.51*	1545	[1.42]
β-Copaene	10.39	1423	0.04	8.51*	1545	[1.42]
trans-α-Bergamotene	10.52	1433	0.03	8.51*	1545	[1.42]
α-Humulene	10.70	1446	0.07	9.33	1609	0.05
9-epi-β-Caryophyllene	10.86	1458	0.07	9.37	1612	0.03
Germacrene D	11.08	1474	2.13	9.83	1649	2.31
β-Selinene	11.14	1478	0.03	9.89*	1654	[2.07]
Hodiendiol derivative IV	11.17	1481	0.24			
Bicyclogermacrene	11.29	1490	0.28	10.11	1672	0.25
Hodiendiol derivative II	11.41	1499	0.05	12.84*	1906	0.27
γ-Cadinene	11.54*	1509	0.12	10.47	1701	0.11
β-Bisabolene	11.54*	1509	[0.12]	10.27*	1684	[0.66]
δ-Cadinene	11.67*	1519	0.13	10.43	1698	0.08
trans-Calamenene	11.67*	1519	[0.13]	11.26	1768	0.07

trans-Cadina-1,4-diene	11.79	1528	0.02	10.74	1724	0.02
α-Calacorene	11.88	1535	0.01	12.19*	1848	0.04
Isocaryophyllene epoxide B	11.98	1543	0.02	12.19*	1848	[0.04]
α-Elemol	12.04	1548	0.02	14.14	2025	0.01
Spathulenol	12.31	1569	0.14	14.50	2059	0.21
Caryophyllene oxide	12.35*	1572	0.20	12.84*	1906	[0.27]
Caryophyllene oxide isomer	12.35*	1572	[0.20]	12.77	1899	0.03
Salvial-4(14)-en-1-one	12.51	1585	0.05	13.12	1931	0.03
Unknown [m/z 91, 119 (91), 79 (86), 93 (85), 41 (74), 107 (68), 105 (67), 134 (65)... 220 (1)]	12.62*	1593	0.08			
Guaiol	12.62*	1593	[0.08]	14.29	2039	0.01
Hinesol	13.08*	1630	0.12	15.12	2119	0.04
Unknown [m/z 43, 93 (89), 91 (88), 79 (87), 123 (76), 81 (75)...]	13.08*	1630	[0.12]	13.97	2009	0.07
Unknown [m/z 135, 93 (29), 79 (29), 41 (26), 107 (22), 67 (21), 69 (20)...]	13.12*	1634	0.03			
τ-Cadinol	13.12*	1634	[0.03]	14.99	2106	0.03
β-Eudesmol	13.24	1644	0.05	15.58	2164	0.03
α-Eudesmol	13.28	1648	0.02	15.54	2161	0.03
Bulnesol	13.41	1658	0.04	15.44	2151	0.04
Bulnesol analog	13.52	1667	0.01	15.84	2191	0.01
Cyclocolorenone	14.48	1748	0.02	16.72	2282	0.01
Phytone	15.58	1846	0.02	14.82	2090	0.03
Sclareoloxide	15.98	1883	0.01			
Geranyl-para-cymene	16.70	1950	0.05	16.23	2231	0.05
Manoyl oxide	16.96	1975	0.02	16.75	2284	0.01
13-epi-Manoyl oxide	17.19	1996	0.02	16.56	2264	0.02
Manool	17.66	2043	0.04			
Sclareol	19.22	2203	0.97	22.99	3022	1.00
Total identified		**97.93%**			**97.62%**	
Total reported		**98.09%**			**97.74%**	

*: 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