Date : 2023-09-01

Certificate of Analysis - GC Profiling

Sample Identification

Internal code : 23H11-NPA01
Customer Identification : Eucalyptus Globulus - India - NPS00099 - Lot # NP0186
Type : Essential Oil
Source : *Eucalyptus globulus*
Customer : Nature Packaged

Checked an approved by:

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

Notes: 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.

This report is an update from the first version issued on 2023-08-24 to format it for online publication.

Méthode certifiée ISO 17025:2017 Certified method

Laboratoire PhytoChemia

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Gas Chromatographic Analysis

Method : PC-MAT-014 - Analysis of the composition of an essential oil or other volatile liquide by FAST GC-FID
ISO
Results : See analysis summary (next page)
Analyst : Sylvain Mercier, M. Sc., Chimiste 2014-005
Date : 2023-08-16

Physicochemical data

Refractive index : 1.4598 ± 0.0003 (20 °C)
Method : PC-MAT-016 - Measure of the refractive index of a liquid.
Analyst : Cindy Caron B. Sc.
Date : 2023-08-11

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
Ethanol	tr	Aliphatic alcohol
Isobutyral	tr	Aliphatic aldehyde
Isobutanol	tr	Aliphatic alcohol
Isovaleral	0.36	Aliphatic aldehyde
2-Methylbutyral	tr	Aliphatic aldehyde
Isoamyl alcohol	0.07	Aliphatic alcohol
2-Methylbutanol	tr	Aliphatic alcohol
Toluene	tr	Simple phenolic
Hexanal	0.01	Aliphatic aldehyde
(2*E*)-Hexenal	tr	Aliphatic aldehyde
(3*Z*)-Hexenol	0.01	Aliphatic alcohol
Hexanol	tr	Aliphatic alcohol
2-Methylbutyl acetate	tr	Aliphatic ester
Isovaleric acid	0.08	Aliphatic acid
Hashishene	0.02	Monoterpene
α-Pinene	6.67	Monoterpene
Camphene	0.03	Monoterpene
α-Fenchene	0.01	Monoterpene
Thuja-2,4(10)-diene	0.01	Monoterpene
Sabinene	0.02	Monoterpene
β-Pinene	0.22	Monoterpene
Octen-3-ol	tr	Aliphatic alcohol
trans-para-Menthane	0.01	Monoterpene
Myrcene	0.27	Monoterpene
α-Phellandrene	0.36	Monoterpene
Pseudolimonene	0.01	Monoterpene
α-Terpinene	0.08	Monoterpene
para-Cymene	2.36	Monoterpene
Limonene	3.35	Monoterpene
1,8-Cineole	80.02	Monoterpenic ether
(*Z*)-β-Ocimene	0.09	Monoterpene
(*E*)-β-Ocimene	0.03	Monoterpene
γ-Terpinene	2.65	Monoterpene
Unknown	0.01	Oxygenated monoterpene
cis-Linalool oxide (fur.)	0.02	Monoterpenic alcohol
para-Cymenene	0.03	Monoterpene
Terpinolene	0.09	Monoterpene
Linalool	0.06	Monoterpenic alcohol
Unknown	0.01	Unknown
Isoamyl isovalerate	0.03	Aliphatic ester

endo-Fenchol	0.03	Monoterpenic alcohol
α-Campholenal	0.01	Monoterpenic aldehyde
trans-Pinocarveol	0.10	Monoterpenic alcohol
meta-Mentha-4,6-dien-8-ol	0.01	Monoterpenic alcohol
Nerol oxide	0.01	Aliphatic ether
Pinocarvone	0.03	Monoterpenic ketone
Borneol	0.02	Monoterpenic alcohol
δ-Terpineol	0.05	Monoterpenic alcohol
Terpinen-4-ol	0.38	Monoterpenic alcohol
Cryptone	0.01	Normonoterpenic ketone
para-Cymen-8-ol	0.01	Monoterpenic alcohol
α-Terpineol	1.11	Monoterpenic alcohol
cis-α-Phellandrene epoxide (iPr vs Me)	0.01	Monoterpenic ether
Unknown	0.02	Oxygenated monoterpene
trans-Carveol	0.01	Monoterpenic alcohol
cis-Isocarveol	0.02	Monoterpenic alcohol
trans-α-Phellandrene epoxide (iPr vs Me)	0.01	Monoterpenic ether
Carvone	0.02	Monoterpenic ketone
Unknown	0.01	Unknown
Geraniol	0.03	Monoterpenic alcohol
Vitispirane?	0.01	Terpenic ether
trans-Pinocarvyl acetate	0.01	Monoterpenic ester
δ-Terpinyl acetate	0.01	Monoterpenic ester
Unknown	0.01	Monoterpenic alcohol
exo-2-Hydroxycineole acetate	0.01	Monoterpenic ester
α-Terpinyl acetate	0.02	Monoterpenic ester
α-Copaene	0.02	Sesquiterpene
Unknown	0.01	Sesquiterpene
α-Gurjunene	0.03	Sesquiterpene
β-Caryophyllene	0.04	Sesquiterpene
γ-Maaliene	0.01	Sesquiterpene
β-Gurjunene	0.02	Sesquiterpene
α-Maaliene	tr	Sesquiterpene
Aromadendrene	0.14	Sesquiterpene
α-Humulene	0.02	Sesquiterpene
allo-Aromadendrene	0.05	Sesquiterpene
allo-Aromadendr-9-ene	0.01	Sesquiterpene
Viridiflorene	0.03	Sesquiterpene
γ-Cadinene	0.01	Sesquiterpene
Unknown	0.01	Sesquiterpene
δ-Cadinene	0.01	Sesquiterpene
Epiglobulol	0.01	Sesquiterpenic alcohol
Palustrol	0.01	Sesquiterpenic alcohol
Globulol	0.03	Sesquiterpenic alcohol
Viridiflorol	0.01	Sesquiterpenic alcohol

Cubeban-11-ol	tr	Sesquiterpenic alcohol
Eudes*m*-5-en-11-ol analog	0.01	Sesquiterpenic alcohol
Ledol	tr	Sesquiterpenic alcohol
Unknown	0.01	Oxygenated sesquiterpene
Rosifoliol	0.01	Sesquiterpenic alcohol
γ-Eudesmol	0.02	Sesquiterpenic alcohol
β-Eudesmol	0.07	Sesquiterpenic alcohol
α-Eudesmol	0.05	Sesquiterpenic alcohol
Consolidated total	**99.59**	

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

Bracketed value ([xx]): A bracketed percent value indicate that two or more compound percentage could not be solved due to coelution.

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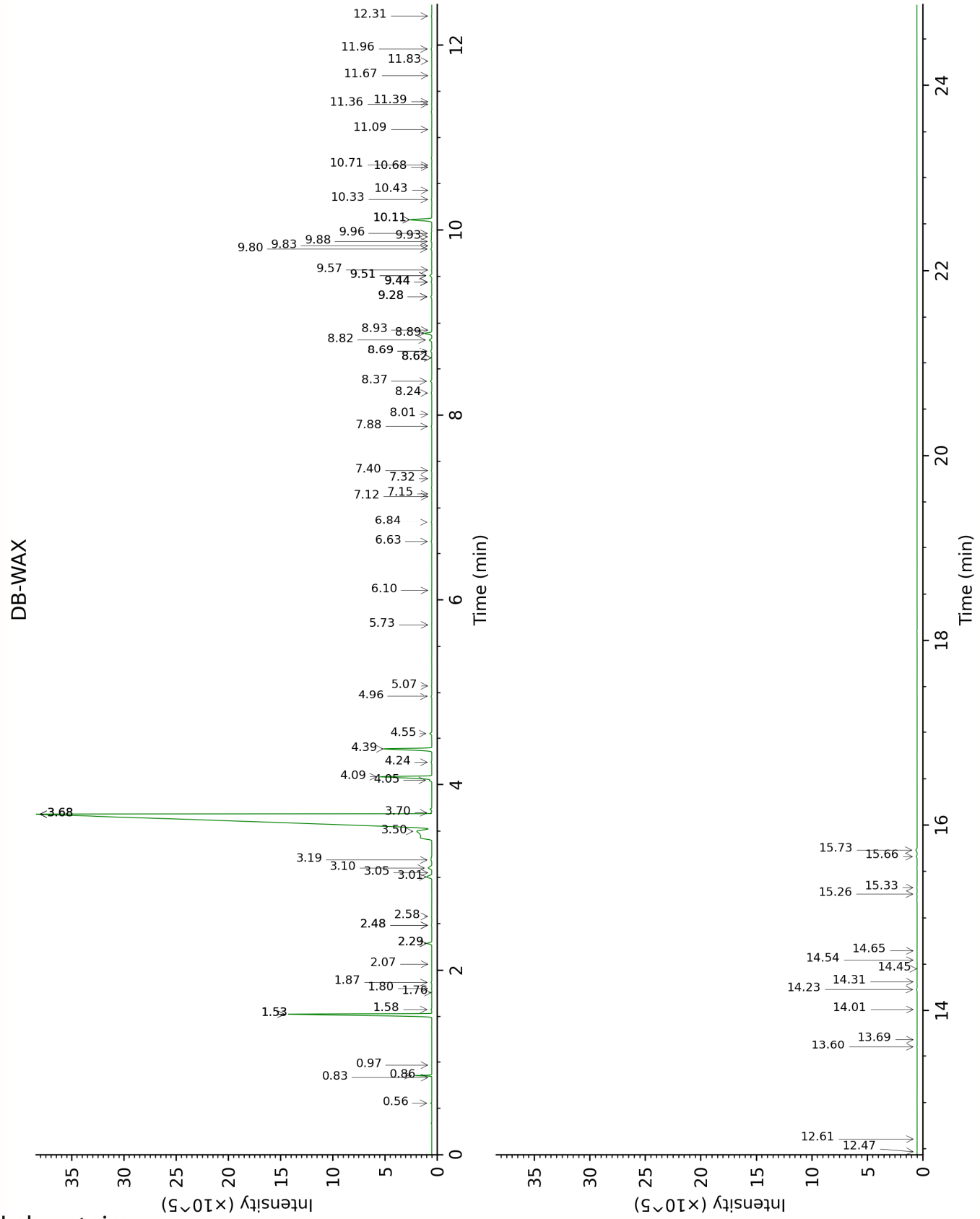
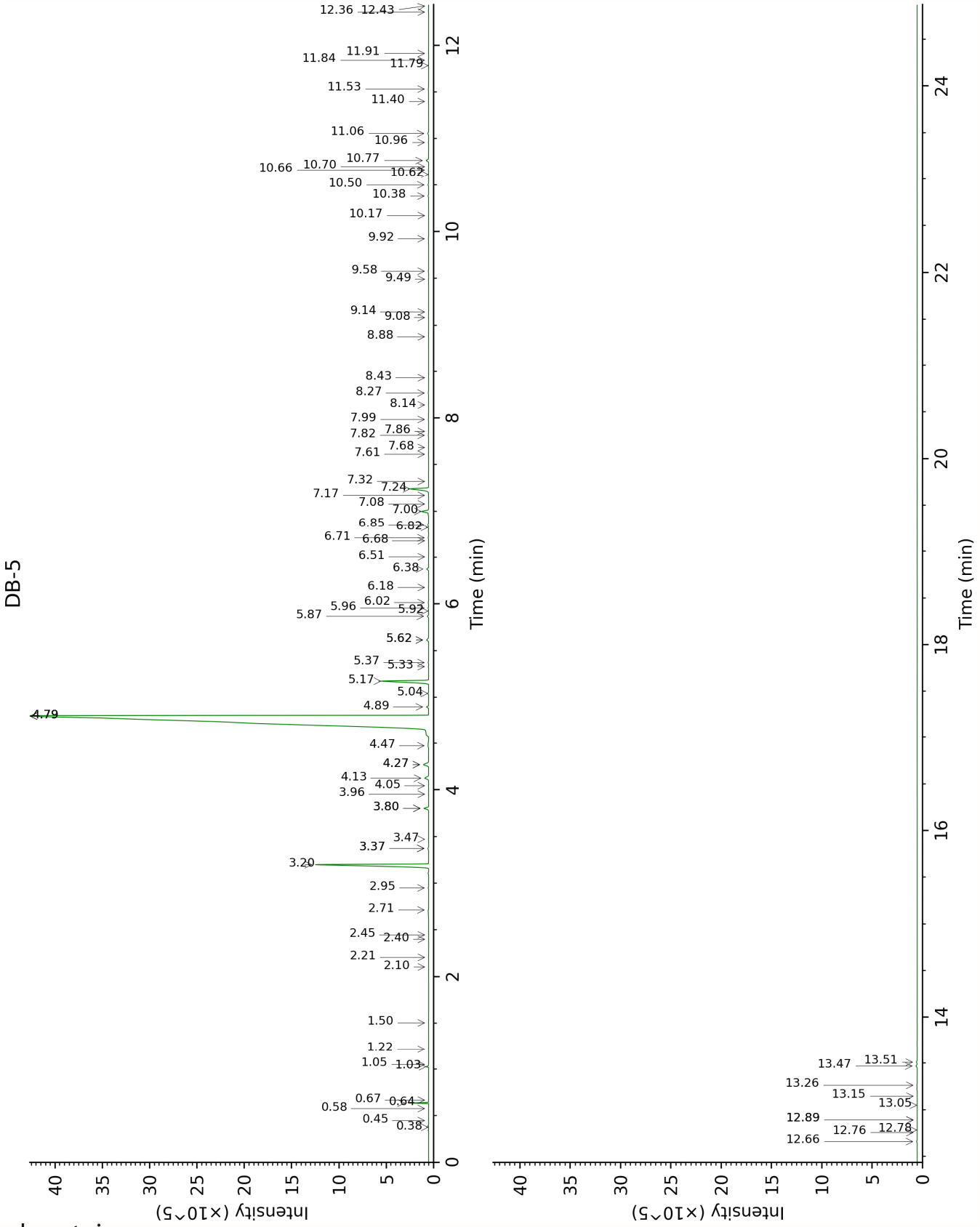

DB-WAX
Time (min)
Intensity (×10^5)
12.31
11.96
11.83
11.67
11.36
11.39
11.09
10.71
10.68
10.43
10.33
10.11
9.96
9.93
9.88
9.83
9.80
9.57
9.51
9.44
9.28
8.93
8.89
8.82
8.69
8.62
8.37
8.24
8.01
7.88
7.40
7.32
7.12
7.15
6.84
6.63
6.10
5.73
5.07
4.96
4.55
4.39
4.24
4.09
4.05
3.70
3.68
3.50
3.19
3.10
3.05
3.01
2.58
2.48
2.29
2.07
1.87
1.80
1.76
1.58
1.53
0.97
0.83
0.86
0.56
15.73
15.66
15.33
15.26
14.65
14.54
14.45
14.31
14.23
14.01
13.69
13.60
12.61
12.47


DB-5
Time (min)
Intensity (×10^5)
12.36 12.43
11.84 11.91 11.79
11.53 11.40
11.06 10.96
10.66 10.70 10.77 10.62
10.50 10.38
10.17
9.92
9.58 9.49
9.14 9.08
8.88
8.43
8.27 8.14
7.99
7.82 7.86
7.61 7.68
7.32 7.24
7.17 7.08 7.00
6.85 6.82
6.71 6.68
6.51 6.38
6.18
5.96 6.02 5.92
5.87
5.62
5.37 5.33
5.17 5.04
4.89
4.79
4.47
4.27
4.13 4.05
3.96
3.80
3.47
3.37
3.20
2.95
2.71
2.45 2.40
2.21 2.10
1.50
1.22
1.05 1.03
0.67 0.64
0.58
0.45 0.38
13.47 13.51
13.26
13.15 13.05
12.89
12.76 12.78
12.66

FULL ANALYSIS DATA

	Column DB-WAX			Column DB-5		
Ethanol	0.97	910.3	tr	0.38	501.9	tr
Isobutyral	0.56	784.0	0.02	0.45	535.6	tr
Isobutanol	2.29*	1065.6	[0.23]	0.58	620.6	tr
Isovaleral	0.86	889.5	0.36	0.64	640.4	0.36
2-Methylbutyral	0.84	882.7	tr	0.67	651.0	tr
Isoamyl alcohol	3.68*	1178.1	[79.92]	1.03	732.5	0.07
2-Methylbutanol	3.70	1179.2	0.03	1.05	735.8	tr
Toluene	1.58	998.4	0.03	1.22	758.9	tr
Hexanal	2.07	1044.4	tr	1.50	797.8	0.01
(2*E*)-Hexenal	3.68*	1178.1	[79.92]	2.10	850.0	tr
(3*Z*)-Hexenol	6.10	1351.5	0.01	2.21	858.3	0.01
Hexanol	5.73	1325.0	tr	2.40	874.1	tr
2-Methylbutyl acetate	2.58	1093.3	0.01	2.45	878.0	tr
Isovaleric acid	9.88*†	1636.1	[0.06]	2.72	899.9	0.08
Hashishene	1.53*	993.2	[6.68]	2.95	916.4	0.02
α-Pinene	1.53*	993.2	[6.68]	3.20	932.7	6.67
Camphene	1.87	1025.9	0.03	3.37*	944.2	[0.04]
α-Fenchene	1.80	1019.6	0.01	3.37*	944.2	[0.04]
Thuja-2,4(10)-diene	2.48*	1084.1	[0.02]	3.47	950.6	0.01
Sabinene	2.48*	1084.1	[0.02]	3.80*	972.3	[0.24]
β-Pinene	2.29*	1065.6	[0.23]	3.80*	972.3	[0.24]
Octen-3-ol	7.12	1425.3	0.01	3.96	982.3	tr
trans-para-Menthane	1.76	1015.6	tr	4.05	988.2	0.01
Myrcene	3.10	1133.3	0.26	4.13	993.5	0.27
α-Phellandrene	3.01	1126.0	0.36	4.27*	1003.0	[0.38]
Pseudolimonene	3.05	1129.5	0.01	4.27*	1003.0	[0.38]
α-Terpinene	3.19	1140.0	0.09	4.48	1015.8	0.08
para-Cymene	4.39	1230.3	2.36	4.79*	1035.5	[85.74]
Limonene	3.50†	1163.8	2.48	4.79*	1035.5	[85.74]
1,8-Cineole	3.68*	1178.1	[79.92]	4.79*	1035.5	[85.74]
(*Z*)-β-Ocimene	4.05	1205.6	0.07	4.89	1041.7	0.09
(*E*)-β-Ocimene	4.24	1219.8	0.03	5.04	1051.2	0.03
γ-Terpinene	4.09	1208.4	2.70	5.17	1059.4	2.65
Unknown PIMA I [m/z 79, 93 (60), 43 (40), 94 (35), 137 (33), 77 (26), 91 (20), 152 (18)]	5.07	1280.5	0.01	5.33	1069.1	0.01
cis-Linalool oxide (fur.)	6.84	1404.7	0.03	5.37	1071.8	0.02

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para-Cymenene	6.63	1389.1	0.03	5.62*	1086.9	[0.13]
Terpinolene	4.55	1242.3	0.09	5.62*	1086.9	[0.13]
Linalool	8.37	1518.1	0.06	5.87	1102.7	0.06
Unknown CASA I [m/z 43, 59 (37), 79 (33), 91 (32), 119 (31)...]	9.28*	1588.5	[0.05]	5.92	1106.2	0.01
Isoamyl isovalerate	4.96	1271.8	0.03	5.96	1108.3	0.03
endo-Fenchol	8.62*	1537.5	[0.02]	6.02	1112.0	0.03
α-Campholenal	7.32	1439.6	0.01	6.18	1122.3	0.01
trans-Pinocarveol	9.51*	1606.6	[0.10]	6.38	1134.8	0.10
meta-Mentha-4,6-dien-8-ol	9.57	1611.5	0.01	6.51	1143.2	0.01
Nerol oxide	7.15	1427.4	0.01	6.68	1154.1	0.01
Pinocarvone	8.24	1508.3	0.03	6.71	1156.2	0.03
Borneol	10.11*	1654.9	[1.10]	6.82	1163.4	0.02
δ-Terpineol	9.80	1629.5	0.05	6.85	1165.3	0.05
Terpinen-4-ol	8.89	1558.2	0.36	7.00	1174.6	0.38
Cryptone	9.44*	1601.0	[0.03]	7.08	1179.7	0.01
para-Cymen-8-ol	11.83	1797.6	0.01	7.17	1185.6	0.01
α-Terpineol	10.11*	1654.9	[1.10]	7.24	1190.0	1.11
cis-α-Phellandrene epoxide (iPr vs Me)	11.36	1758.1	0.01	7.32	1195.1	0.01
Unknown EUGL II [m/z 107, 79 (99), 91 (57), 94 (54), 135 (44), 150 (44)]				7.61	1214.0	0.02
trans-Carveol	11.67	1784.1	0.01	7.68	1218.9	0.01
cis-Isocarveol	12.31	1840.1	0.02	7.82	1227.6	0.02
trans-α-Phellandrene epoxide (iPr vs Me)	12.47	1853.5	0.01	7.86	1230.4	0.01
Carvone	10.33	1672.3	0.02	7.99	1238.9	0.02
Unknown CALU IV [m/z 43, 97 (69), 107 (46), 41 (28), 55 (21), 109 (20)...]	11.39	1760.5	0.01	8.14	1249.3	0.01
Geraniol	11.96	1809.0	0.03	8.27	1257.8	0.03

Vitispirane?	8.01	1490.8	0.01	8.43	1268.7	0.01
trans-Pinocarvyl acetate	9.44*	1601.0	[0.03]	8.88	1298.4	0.01
δ-Terpinyl acetate	9.44*	1601.0	[0.03]	9.08	1312.6	0.01
Unknown MEAL I [m/z 97, 112 (92), 83 (62), 43 (44), 41 (25)... 170? (4)]	15.33	2119.5	0.02	9.14	1316.8	0.01
exo-2-Hydroxycineole acetate	10.43	1680.2	tr	9.49	1341.3	0.01
α-Terpinyl acetate	9.96	1643.1	0.03	9.58	1347.4	0.02
α-Copaene	7.40	1446.0	0.02	9.92	1371.7	0.02
Unknown EUGL IV [m/z 93, 122 (98), 161 (98), 107 (86), 95 (46), 105 (72)... 204 (34)]				10.17	1389.1	0.01
α-Gurjunene	7.88	1481.1	0.03	10.38	1403.8	0.03
β-Caryophyllene	8.69*	1543.0	[0.06]	10.50	1412.7	0.04
γ-Maaliene	8.69*	1543.0	[0.06]	10.62	1421.4	0.01
β-Gurjunene	8.62*	1537.5	[0.02]	10.66	1424.9	0.02
α-Maaliene	8.93	1561.0	0.01	10.70	1427.6	tr
Aromadendrene	8.82	1552.8	0.15	10.77	1432.6	0.14
α-Humulene	9.51*	1606.6	[0.10]	10.96	1446.9	0.02
allo-Aromadendrene	9.28*	1588.5	[0.05]	11.06	1454.0	0.05
allo-Aromadendr-9-ene	9.83	1632.4	tr	11.40	1479.5	0.01
Viridiflorene	9.93*†	1640.1	[0.03]	11.53	1489.4	0.03
γ-Cadinene	10.68	1701.2	0.01	11.78	1508.4	0.01
Unknown EUGL VII [m/z 159, 145 (91), 131 (67), 105 (46), 202 (43)]	11.09	1735.4	0.01	11.84	1512.8	0.01
δ-Cadinene	10.71	1703.2	0.01	11.92	1518.5	0.01
Epiglobulol	13.60	1955.7	0.01	12.36	1553.3	0.01
Palustrol	12.61	1865.8	0.01	12.43	1558.8	0.01
Globulol	14.23	2013.9	0.03	12.66	1576.9	0.03

Viridiflorol	14.31	2021.8	0.01	12.76	1584.5	0.01
Cubeban-11-ol	14.01	1993.4	0.01	12.78	1586.6	tr
Eudes*m*-5-en-11-ol analog	14.54	2043.9	0.01	12.89*	1595.0	[0.02]
Ledol	13.69	1963.5	tr	12.89*	1595.0	[0.02]
Unknown EUGL VIII [m/z 94, 91 (83), 105 (78), 79 (75), 107 (62), 120 (58)... 218 (11)]	14.45	2035.0	tr	13.05	1607.6	0.01
Rosifoliol	14.65	2053.5	0.01	13.15	1615.6	0.01
γ-Eudesmol	15.26	2112.6	0.02	13.26	1625.3	0.02
β-Eudesmol	15.73	2159.4	0.08	13.47	1642.3	0.07
α-Eudesmol	15.66	2152.5	0.04	13.51	1645.8	0.05
Total reported		99.41%			99.62%	

*: Two or more compounds are coeluting on this column

[xx]: Duplicate percentage due to coelutions, only the first one is 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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