Date : May 04, 2021

Certificate of Analysis – GC Profiling

Sample identification

Internal code : 21D20-ORA11
Customer identification : Elemi - Philippines - 3 years - 350027
Type : Essential oil
Source : *Canarium luzonicum*
Customer : Organic Aromas Inc.

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 : Sylvain Mercier, M. Sc., Chimiste
Analysis date : May 04, 2021

Checked and approved by :

Alexis St-Gelais, M. Sc., 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Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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.

Méthode certifiée ISO 17025:2017 Certified method

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PHYSICOCHEMICAL DATA

Physical aspect: Light yellow liquid
Refractive index: 1.4796 ± 0.0003 (20 °C; method PC-MAT-016)

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
Toluene	0.02	Simple phenolic
α-Thujene	0.19	Monoterpene
α-Pinene	0.48	Monoterpene
Camphene	0.02	Monoterpene
Sabinene	2.97	Monoterpene
β-Pinene	0.24	Monoterpene
3-Methyl-3-cyclohexenone	0.01	Aliphatic ketone
Myrcene	0.47	Monoterpene
α-Phellandrene	13.26	Monoterpene
Δ3-Carene	0.05	Monoterpene
α-Terpinene	0.46	Monoterpene
Carvomenthene	0.01	Aliphatic alcohol
para-Cymene	2.35	Monoterpene
β-Phellandrene	2.06	Monoterpene
Limonene	53.43	Monoterpene
(*Z*)-β-Ocimene	0.20	Monoterpene
(*E*)-β-Ocimene	0.18	Monoterpene
γ-Terpinene	0.30	Monoterpene
cis-Sabinene hydrate	0.35	Monoterpenic alcohol
Terpinolene	1.28	Monoterpene
para-Cymenene	0.04	Monoterpene
trans-Sabinene hydrate	0.10	Monoterpenic alcohol
Linalool	0.01	Monoterpenic alcohol
Unknown	0.01	Monoterpenic alcohol
trans-para-Mentha-2,8-dien-1-ol	0.03	Monoterpenic alcohol
cis-para-Menth-2-en-1-ol	0.05	Monoterpenic alcohol
Limona ketone	0.01	Normonoterpenic ketone
cis-Limonene oxide	0.02	Monoterpenic ether
allo-Ocimene	0.03	Monoterpene
cis-para-Mentha-2,8-dien-1-ol	0.05	Monoterpenic alcohol
trans-Limonene oxide	0.01	Monoterpenic ether
Camphor	0.03	Monoterpenic ketone
trans-para-Menth-2-en-1-ol	0.06	Monoterpenic alcohol
Epoxyterpinolene	0.02	Monoterpenic ether
Unknown	0.01	Oxygenated monoterpene
Unknown	0.01	Oxygenated monoterpene
trans-2-Caren-4-ol?	0.01	Monoterpenic alcohol
Unknown	0.02	Oxygenated monoterpene
Terpinen-4-ol	0.45	Monoterpenic alcohol
Unknown	0.01	Oxygenated monoterpene
Cryptone	0.03	Normonoterpenic ketone
para-Cymen-8-ol	0.20	Monoterpenic alcohol
α-Terpineol	2.81	Monoterpenic alcohol
cis-Piperitol	0.03	Monoterpenic alcohol
cis-α-Phellandrene epoxide (IPP vs Me)	0.25	Monoterpenic ether

trans-Piperitol	0.04	Monoterpenic alcohol
trans-Carveol	0.13	Monoterpenic alcohol
cis-Carveol	0.05	Monoterpenic alcohol
trans-α-Phellandrene epoxide (IPP vs Me)	0.04	Monoterpenic ether
Carvone	0.06	Monoterpenic ketone
Carvotanacetone	0.02	Monoterpenic ketone
Unknown	0.08	Unknown
Piperitone	0.07	Monoterpenic ketone
Unknown	0.02	Unknown
Unknown	0.02	Oxygenated monoterpene
Limonen-10-ol	0.07	Monoterpenic alcohol
Perilla alcohol	0.02	Monoterpenic alcohol
Unknown	0.01	Unknown
Thymol	0.01	Monoterpenic alcohol
Unknown	0.04	Unknown
para-Menth-5-en-1,2-diol isomer II	0.05	Monoterpenic alcohol
para-Menth-5-en-1,2-diol isomer III	0.38	Monoterpenic alcohol
δ-Elemene	0.04	Sesquiterpene
α-Cubebene	0.05	Sesquiterpene
α-Copaene	0.14	Sesquiterpene
β-Elemene	0.10	Sesquiterpene
Unknown	0.13	Unknown
Methyleugenol	0.27	Phenylpropanoid
β-Caryophyllene	0.13	Sesquiterpene
(*trans*?)-6-Hydroxy-para-menth-1-en-3-one	0.10	Monoterpenic alcohol
β-Copaene	0.03	Sesquiterpene
α-Guaiene	0.03	Sesquiterpene
α-Humulene	0.10	Sesquiterpene
Unknown	0.05	Unknown
allo-Aromadendrene	0.01	Sesquiterpene
γ-Muurolene	0.01	Sesquiterpene
Germacrene D	0.07	Sesquiterpene
Unknown	0.01	Oxygenated sesquiterpene
Viridiflorene	0.05	Sesquiterpene
α-Muurolene	0.04	Sesquiterpene
γ-Cadinene	0.03	Sesquiterpene
epi-Elemol?	0.09	Sesquiterpenic alcohol
δ-Cadinene	0.04	Sesquiterpene
α-Elemol	8.89	Sesquiterpenic alcohol
Elemicin	3.58	Phenylpropanoid
Caryophyllene oxide	0.01	Sesquiterpenic ether
Guaiol	0.14	Sesquiterpenic alcohol
10-epi-γ-Eudesmol	0.01	Sesquiterpenic alcohol
γ-Eudesmol	0.11	Sesquiterpenic alcohol
β-Eudesmol	0.26	Sesquiterpenic alcohol
α-Eudesmol	0.18	Sesquiterpenic alcohol
Unknown	0.22	Oxygenated sesquiterpene
Bulnesol	0.03	Sesquiterpenic alcohol
α-Phellandrene dimer II	0.04	Diterpene
Cryptomeridiol	0.28	Sesquiterpenic alcohol
Unknown	0.04	Oxygenated sesquiterpene
Consolidated total	**99.04%**	

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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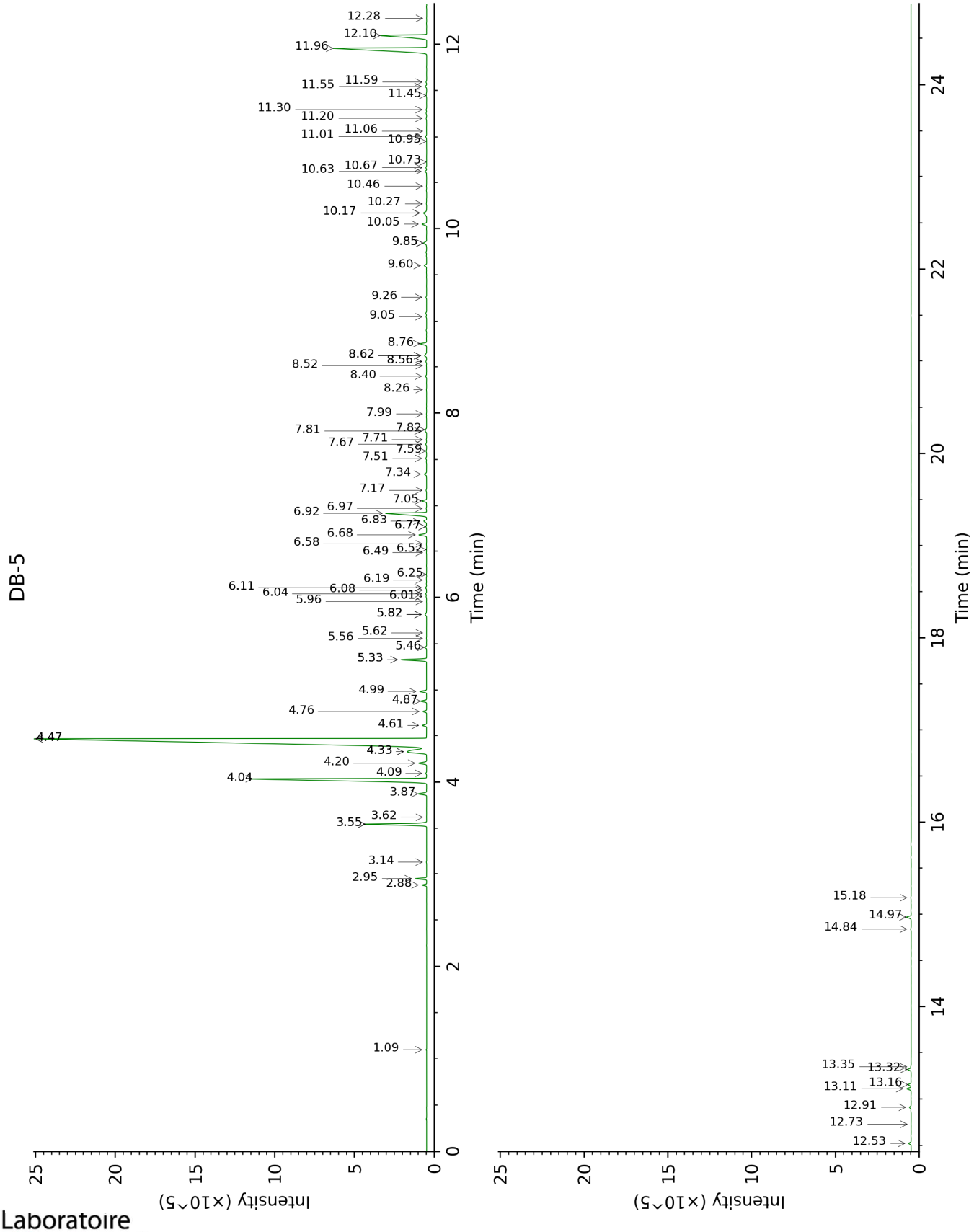
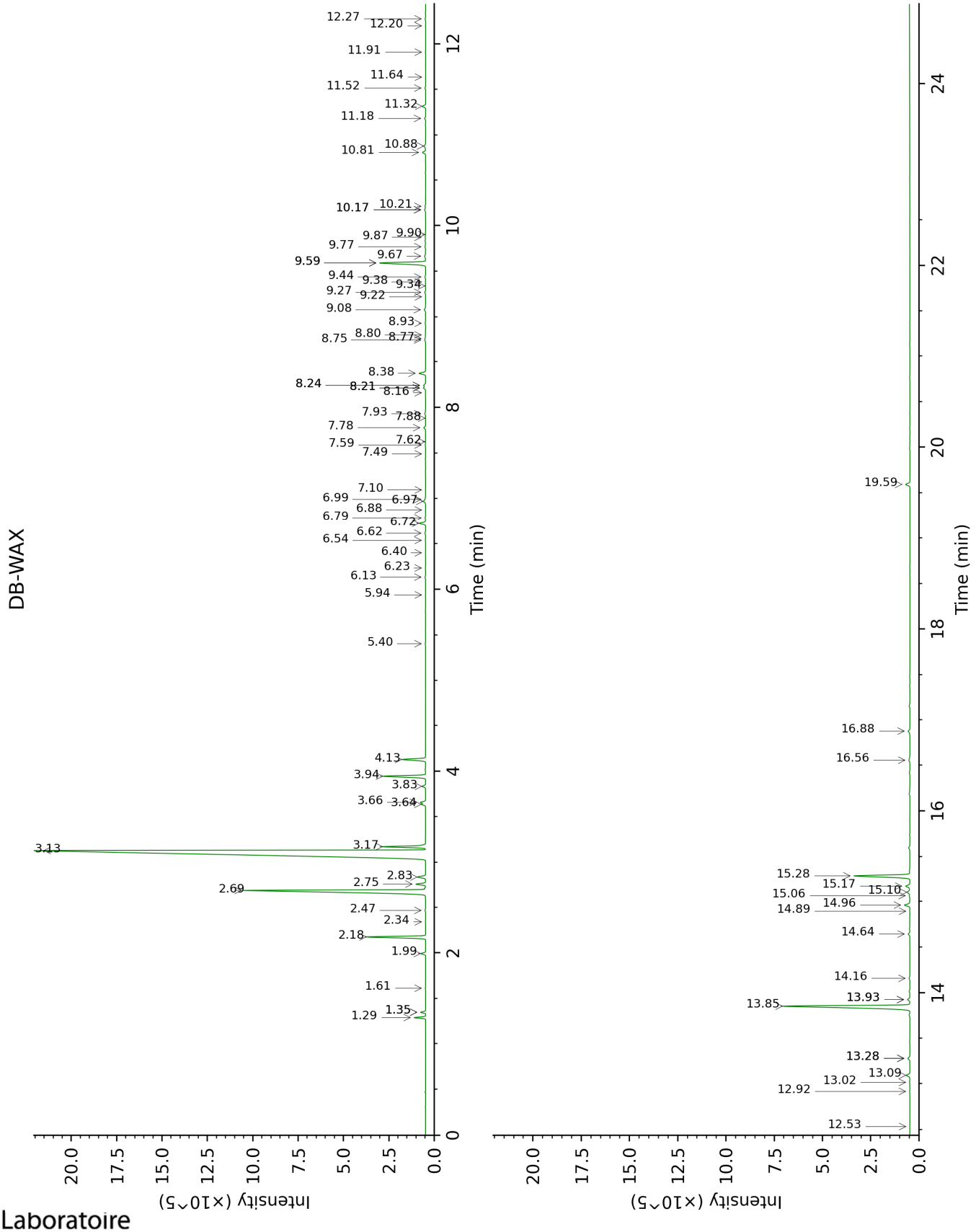

DB-5
Intensity (×10^5)
Time (min)
12.28
12.10
11.96
11.55
11.59
11.45
11.30
11.20
11.01
11.06
10.95
10.63
10.67
10.73
10.46
10.17
10.27
10.05
9.85
9.60
9.26
9.05
8.76
8.62
8.56
8.52
8.40
8.26
7.99
7.81
7.82
7.67
7.71
7.59
7.51
7.34
7.17
7.05
6.92
6.97
6.83
6.77
6.68
6.58
6.49
6.52
6.19
6.25
6.11
6.04
6.08
6.01
5.96
5.82
5.56
5.62
5.46
5.33
4.99
4.87
4.76
4.61
4.47
4.33
4.20
4.09
4.04
3.87
3.62
3.55
3.14
2.95
2.88
1.09
15.18
14.97
14.84
13.35
13.32
13.11
13.16
12.91
12.73
12.53


DB-WAX
Time (min)
Intensity (×10^5)
12.27
12.20
11.91
11.64
11.52
11.32
11.18
10.88
10.81
10.21
10.17
9.90
9.87
9.77
9.67
9.59
9.44
9.38
9.34
9.27
9.22
9.08
8.93
8.80
8.77
8.75
8.38
8.24
8.21
8.16
7.93
7.88
7.78
7.62
7.59
7.49
7.10
6.99
6.97
6.88
6.79
6.72
6.62
6.54
6.40
6.23
6.13
5.94
5.40
4.13
3.94
3.83
3.66
3.64
3.17
3.13
2.83
2.75
2.69
2.47
2.34
2.18
1.99
1.61
1.35
1.29
19.59
16.88
16.56
15.28
15.17
15.10
15.06
14.96
14.89
14.64
14.16
13.93
13.85
13.28
13.09
13.02
12.92
12.53

FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Toluene	1.09	760	0.02	1.35*	1002	0.21
α-Thujene	2.88	928	0.19	1.35*	1002	[0.21]
α-Pinene	2.95	932	0.48	1.29	994	0.49
Camphene	3.14	945	0.02	1.61	1028	0.01
Sabinene	3.55*	973	3.20	2.18	1085	2.97
β-Pinene	3.55*	973	[3.20]	1.99	1067	0.24
3-Methyl-3-cyclohexenone	3.62	978	0.01	5.94	1371	0.01
Myrcene	3.87	995	0.47	2.76	1135	0.47
α-Phellandrene	4.04	1006	13.26	2.69	1129	13.37
Δ3-Carene	4.09	1010	0.05	2.47	1112	0.04
α-Terpinene	4.20	1016	0.46	2.83	1141	0.47
Carvomenthene	4.33*	1024	2.29	2.34	1102	0.01
para-Cymene	4.33*	1024	[2.29]	3.94	1228	2.35
β-Phellandrene	4.47*	1033	55.10	3.17	1168	2.06
Limonene	4.47*	1033	[55.10]	3.13	1165	53.43
(*Z*)-β-Ocimene	4.61	1042	0.20	3.64	1205	0.21
(*E*)-β-Ocimene	4.76	1052	0.18	3.83	1220	0.18
γ-Terpinene	4.87	1059	0.30	3.66	1206	0.27
cis-Sabinene hydrate	4.99	1066	0.35	6.72	1429	0.36
Terpinolene	5.33*	1088	1.31	4.13	1241	1.28
para-Cymenene	5.33*	1088	[1.31]	6.13	1386	0.04
trans-Sabinene hydrate	5.46	1096	0.10	7.78	1508	0.10
Linalool	5.56	1102	0.01	7.88	1517	0.01
Unknown [m/z 119, 109 (94), 43 (61), 95 (56), 91 (48), 77 (32), 152 (32), 137 (31), 134 (24)]	5.62	1106	0.01	8.24*†	1545	[0.26]
trans-para-Mentha-2,8-dien-1-ol	5.82*	1119	0.11	8.76	1586	0.03
cis-para-Menth-2-en-1-ol	5.82*	1119	[0.11]	7.93	1520	0.05
Limona ketone	5.96	1128	0.01	7.62	1497	0.01
cis-Limonene oxide	6.01*	1131	0.03	6.23	1393	0.02
allo-Ocimene	6.01*	1131	[0.03]	5.40	1333	0.03
cis-para-Mentha-2,8-dien-1-ol	6.04	1133	0.05	9.27	1626	0.05
trans-Limonene oxide	6.08	1136	0.01	6.40	1405	0.01
Camphor	6.11*	1138	0.07	6.99	1449	0.03
trans-para-Menth-2-en-1-ol	6.11*	1138	[0.07]	8.75	1584	0.06

Epoxyterpinolene	6.19	1143	0.02	6.54	1415	0.02
Unknown [m/z 95, 43 (74), 109 (72), 82 (62), 110 (50)... 152 (14)]	6.25	1147	0.01	6.88	1441	0.01
Unknown [m/z 95, 110 (38), 81 (21), 79 (16)... 152 (7)]	6.49	1162	0.01	7.49	1487	0.01
trans-2-Caren-4-ol?	6.52	1164	0.01			
Unknown [m/z 95, 110 (43), 81 (28), 41 (15)... 152 (8)]	6.58	1168	0.02	7.59	1494	0.03
Terpinen-4-ol	6.68	1174	0.45	8.38	1555	0.39
Unknown [m/z 109, 82 (77), 41 (56), 119 (55), 91 (54)... 152 (17)]	6.77*	1180	0.05	7.10	1457	0.01
Cryptone	6.77*	1180	[0.05]	8.93	1599	0.03
para-Cymen-8-ol	6.83	1184	0.20	11.32	1798	0.20
α-Terpineol	6.92	1190	2.81	9.59*	1652	2.94
cis-Piperitol	6.97	1193	0.03	9.34	1632	0.02
cis-α-Phellandrene epoxide (IPP vs Me)	7.05	1198	0.25	10.81	1754	0.20
trans-Piperitol	7.17	1206	0.04	10.17*	1700	0.08
trans-Carveol	7.34	1218	0.13	11.18	1786	0.07
cis-Carveol	7.51	1229	0.05	11.52	1815	0.04
trans-α-Phellandrene epoxide (IPP vs Me)	7.59	1234	0.04	11.91	1850	0.02
Carvone	7.66	1239	0.06	9.77	1667	0.06
Carvotanacetone	7.71	1242	0.02	9.22	1622	0.01
Unknown [m/z 43, 97 (69), 107 (46), 41 (28), 55 (21), 109 (20)...]	7.81	1249	0.08	10.88	1760	0.13
Piperitone	7.82	1250	0.07	9.67	1659	0.09
Unknown [m/z 43, 56 (54), 69 (40), 155 (40), 41 (35), 55 (33)...]	7.99	1261	0.02	9.90	1678	0.02
Unknown [m/z 95, 67 (45), 41 (42), 110 (42), 43 (41), 59 (36)]	8.26	1279	0.02	12.20	1876	0.01
Limonen-10-ol	8.40	1289	0.07	12.92	1942	0.02
Perilla alcohol	8.52	1296	0.02	13.02	1951	0.02

Unknown [m/z 124, 68 (35), 40 (35), 96 (34), 123 (29), 95 (20)...]	8.56*	1299	0.05	11.64	1826	0.01
Thymol	8.56*	1299	[0.05]	14.89	2132	0.01
Unknown [m/z 93, 111 (86), 43 (70), 110 (55), 59 (53), 69 (52), 41 (47)...]	8.62*	1304	0.16	13.28*	1975	0.13
para-Menth-5-en-1,2-diol isomer II	8.62*	1304	[0.16]	14.16	2060	0.05
para-Menth-5-en-1,2-diol isomer III	8.76	1313	0.38	14.96	2139	0.33
δ-Elemene	9.05	1334	0.04	6.79	1434	0.03
α-Cubebene	9.26	1349	0.05	6.62	1421	0.05
α-Copaene	9.60	1373	0.14	6.97	1448	0.14
β-Elemene	9.85*	1390	0.23	8.21*†	1543	0.26
Unknown [m/z 71, 100 (92), 111 (79), 69 (46), 109 (45)...]	9.85*	1390	[0.23]	16.88	2338	0.13
Methyleugenol	10.05	1404	0.27	13.09	1958	0.23
β-Caryophyllene	10.17*	1414	0.30	8.24*†	1545	[0.26]
(*trans*?)-6-Hydroxy-para-menth-1-en-3-one	10.17*	1414	[0.30]	16.56	2304	0.10
β-Copaene	10.27	1421	0.03	8.16	1538	0.01
α-Guaiene	10.46	1435	0.03	8.21*†	1543	[0.26]
α-Humulene	10.63	1448	0.10	9.08	1610	0.10
Unknown [m/z 109, 110 (33), 43 (30), 95 (23), 71 (20), 41 (19)...]	10.67	1451	0.05			
allo-Aromadendrene	10.73	1455	0.01	8.80	1589	0.02
γ-Muurolene	10.95	1472	0.01	9.38	1635	0.02
Germacrene D	11.00	1476	0.07	9.59*	1652	[2.94]
Unknown [m/z 149, 205 (84), 177 (78), 220 (54)]	11.06	1480	0.01			
Viridiflorene	11.20	1490	0.05	9.44	1640	0.05
α-Muurolene	11.30	1498	0.04	9.87	1676	0.03
γ-Cadinene	11.45	1509	0.03	10.17*	1700	[0.08]
epi-Elemol?	11.55	1517	0.09	13.28*	1975	[0.13]
δ-Cadinene	11.59	1521	0.04	10.21	1703	0.04
α-Elemol	11.96	1549	8.89	13.85	2030	9.04
Elemicin	12.10	1560	3.58	15.28	2171	3.46
Caryophyllene oxide	12.28	1575	0.01	12.53	1906	tr
Guaiol	12.53	1594	0.14	13.93*	2037	0.15

10-epi-γ-Eudesmol	12.73	1610	0.01	13.93*	2037	[0.15]
γ-Eudesmol	12.91	1625	0.11	14.64	2107	0.10
β-Eudesmol	13.11	1642	0.26	15.17	2160	0.26
α-Eudesmol	13.16	1646	0.18	15.10	2153	0.17
Unknown [suspected m/z 59, 93 (79), 161 (61), 107 (47), 81 (44), 121 (37)...]	13.32	1659	0.22			
Bulnesol	13.35	1661	0.03	15.06	2150	0.04
α-Phellandrene dimer II	14.84	1789	0.04	12.27	1883	0.05
Cryptomeridiol	14.97	1800	0.28	19.60	2648	0.28
Unknown [m/z 159, 93 (87), 146 (72), 43 (72), 119 (48), 121 (48), 59 (25)... 220 (31)]	15.18	1819	0.04			
Total identified		**98.26%**			**98.24%**	
Total reported		**98.75%**			**98.59%**	

*: 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