Date : October 20, 2022

Certificate of Analysis – GC Profiling

Sample identification

Internal code : 22J06-NSO01
Customer identification : Essential Oil : Cajeput LOT# H0D1029N
Type : Essential oil
Source : *Melaleuca cajuputi*
Customer : Natural Sourcing LLC

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 2014-005
Analysis date : October 18, 2022

Checked and approved by :

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

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PHYSICOCHEMICAL DATA

Physical aspect: Faintly yellow liquid
Refractive index: 1.4697 ± 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
Isovaleral	0.01	Aliphatic aldehyde
2-Methylbutyral	0.03	Aliphatic aldehyde
Isoamyl alcohol	0.01	Aliphatic alcohol
2-Methylbutanol	0.01	Aliphatic alcohol
Methyl 2-methylbutyrate	0.04	Aliphatic ester
2,4-Dimethyl-3-pentanone	0.02	Aliphatic ketone
2-Methylbutyl acetate	0.01	Aliphatic ester
2-Methylbutyric acid	0.02	Aliphatic acid
α-Thujene	0.51	Monoterpene
α-Pinene	3.11	Monoterpene
α-Fenchene	0.01	Monoterpene
Camphene	0.03	Monoterpene
Benzaldehyde	0.10	Simple phenolic
β-Pinene	2.11	Monoterpene
Sabinene	0.06	Monoterpene
Myrcene	1.02	Monoterpene
Pseudolimonene	0.07	Monoterpene
α-Phellandrene	0.14	Monoterpene
Δ3-Carene	0.05	Monoterpene
α-Terpinene	0.54	Monoterpene
para-Cymene	1.14	Monoterpene
1,8-Cineole	52.60	Monoterpenic ether
Limonene	6.19	Monoterpene
(*Z*)-β-Ocimene	0.01	Monoterpene
(*E*)-β-Ocimene	0.04	Monoterpene
γ-Terpinene	2.74	Monoterpene
Terpinolene	1.42	Monoterpene
para-Cymenene	0.05	Monoterpene
Linalool	0.32	Monoterpenic alcohol
cis-Rose oxide	0.02	Monoterpenic ether
endo-Fenchol	0.02	Monoterpenic alcohol
trans-Rose oxide	0.02	Monoterpenic ether
trans-Pinocarveol	0.01	Monoterpenic alcohol
Isopulegol	0.04	Monoterpenic alcohol
Borneol	0.02	Monoterpenic alcohol
δ-Terpineol	0.20	Monoterpenic alcohol
Terpinen-4-ol	0.87	Monoterpenic alcohol
Cryptone	0.01	Normonoterpenic ketone
para-Cymen-8-ol	0.03	Monoterpenic alcohol
α-Terpineol	7.97	Monoterpenic alcohol
exo-2-Hydroxycineole	0.02	Monoterpenic alcohol
Citronellol	0.04	Monoterpenic alcohol
Geraniol	0.04	Monoterpenic alcohol
δ-Terpinyl acetate	0.03	Monoterpenic ester
δ-Elemene	0.05	Sesquiterpene

α-Terpinyl acetate	0.99	Monoterpenic ester
Eugenol	0.04	Phenylpropanoid
α-Ylangene	0.18	Sesquiterpene
α-Copaene	0.09	Sesquiterpene
7-Cubebene	0.04	Sesquiterpene
Geranyl acetate	0.04	Monoterpenic ester
β-Elemene	0.17	Sesquiterpene
α-Gurjunene	0.09	Sesquiterpene
β-Maaliene	0.01	Sesquiterpene
β-Caryophyllene	4.49	Sesquiterpene
β-Copaene	0.02	Sesquiterpene
β-Gurjunene	0.04	Sesquiterpene
γ-Elemene	0.05	Sesquiterpene
Aromadendrene	0.11	Sesquiterpene
α-Guaiene	0.07	Sesquiterpene
6,9-Guaiadiene	0.08	Sesquiterpene
Unknown	0.04	Sesquiterpene
α-Humulene	2.07	Sesquiterpene
allo-Aromadendrene	0.27	Sesquiterpene
Valerena-4,7(11)-diene	0.06	Sesquiterpene
4,5-diepi-Aristolochene	0.04	Sesquiterpene
Unknown	0.06	Sesquiterpene
Selina-4,11-diene	0.56	Sesquiterpene
α-Amorphene	0.33	Sesquiterpene
β-Selinene	1.41	Sesquiterpene
δ-Selinene	0.23	Sesquiterpene
Valencene	0.15	Sesquiterpene
Viridiflorene	0.22	Sesquiterpene
α-Selinene	1.26	Sesquiterpene
δ-Amorphene	0.26	Sesquiterpene
γ-Cadinene	0.14	Sesquiterpene
trans-Calamenene	0.02	Sesquiterpene
Zonarene	0.03	Sesquiterpene
δ-Cadinene	0.20	Sesquiterpene
Selina-4(15),7(11)-diene	0.12	Sesquiterpene
α-Calacorene	0.09	Sesquiterpene
Selina-3,7(11)-diene	0.06	Sesquiterpene
Germacrene B	0.24	Sesquiterpene
Palustrol	0.03	Sesquiterpenic alcohol
β-Calacorene	0.02	Sesquiterpene
Spathulenol	0.02	Sesquiterpenic alcohol
Caryophyllene oxide	0.22	Sesquiterpenic ether
Globulol	0.37	Sesquiterpenic alcohol
Viridiflorol	0.54	Sesquiterpenic alcohol
Guaiol	0.10	Sesquiterpenic alcohol
Ledol	0.09	Sesquiterpenic alcohol
Humulene epoxide II	0.09	Sesquiterpenic ether
Unknown	0.04	Oxygenated sesquiterpene
Isoleptospermone	0.03	Sesquiterpenic ketone
1,10-diepi-Cubenol	0.11	Sesquiterpenic alcohol
Eremoligenol?	0.07	Sesquiterpenic alcohol
Unknown	0.18	Oxygenated sesquiterpene

Caryophylladienol II	0.03	Sesquiterpenic alcohol
Cubenol	0.05	Sesquiterpenic alcohol
τ-Cadinol	0.03	Sesquiterpenic alcohol
β-Eudesmol	0.15	Sesquiterpenic alcohol
α-Eudesmol	0.13	Sesquiterpenic alcohol
Neointermedeol	0.10	Sesquiterpenic alcohol
Bulnesol	0.02	Sesquiterpenic alcohol
(3*Z*)-Caryophylla-3,8(13)-dien-5β-ol	0.01	Sesquiterpenic alcohol
Juniper camphor	0.01	Sesquiterpenic alcohol
(2*E*,6*E*)-Farnesol	0.02	Sesquiterpenic alcohol
Consolidated total	**98.61%**	

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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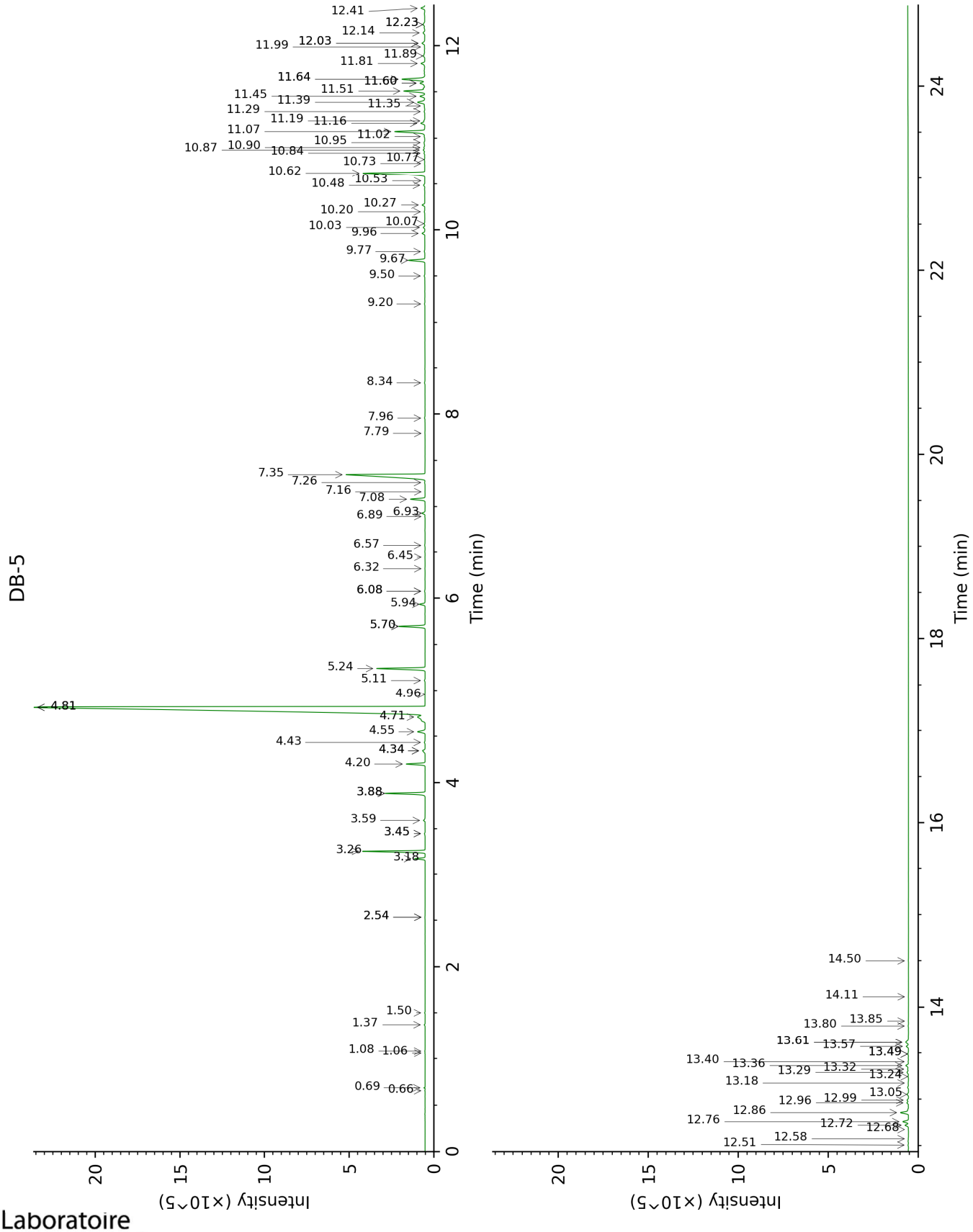
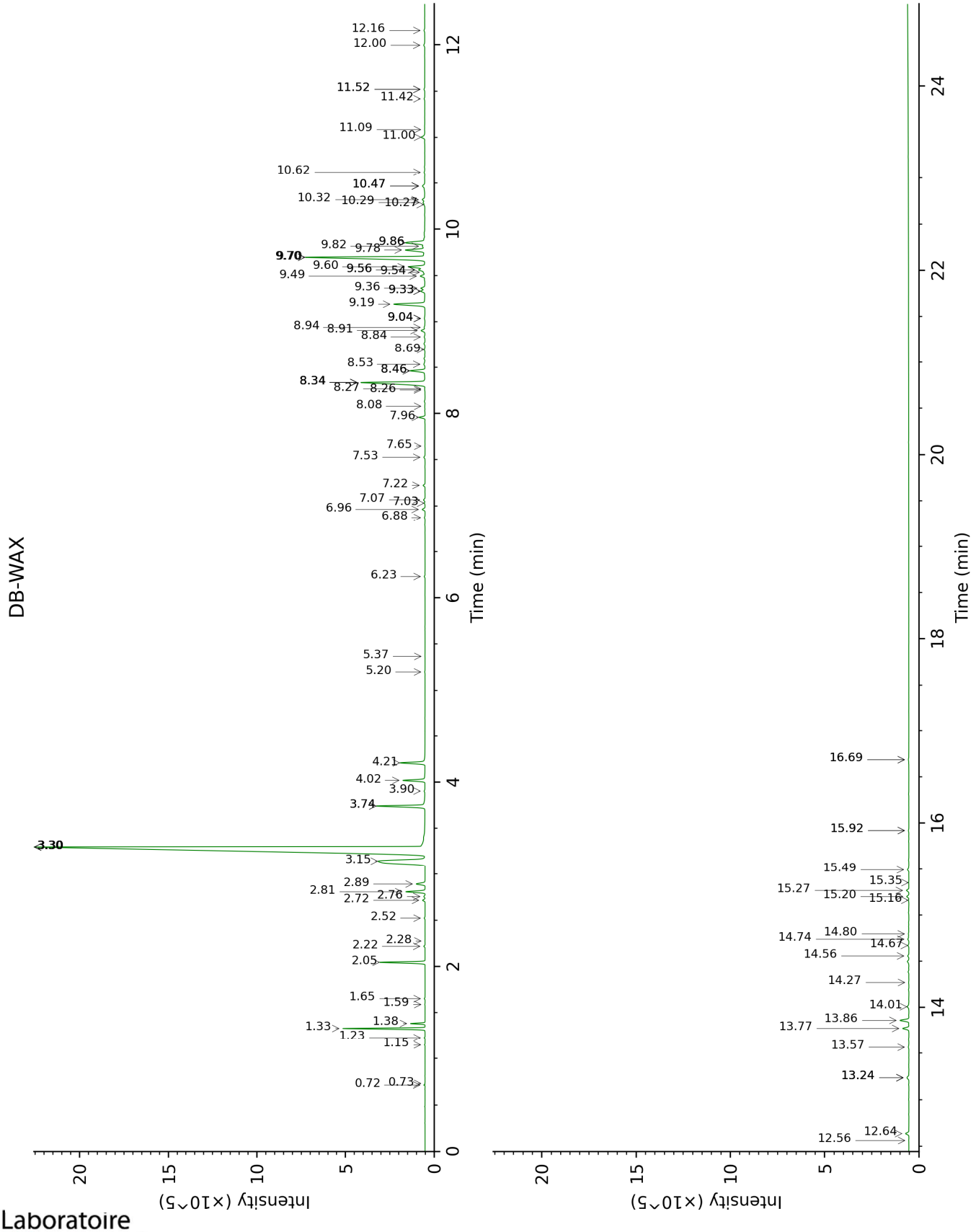

DB-5
Time (min)
Intensity (×10^5)
12.41
12.23
12.14
11.99
12.03
11.89
11.81
11.64
11.60
11.51
11.45
11.39
11.35
11.29
11.19
11.16
11.07
11.02
10.95
10.87
10.90
10.84
10.77
10.73
10.62
10.53
10.48
10.27
10.20
10.07
10.03
9.96
9.77
9.67
9.50
9.20
8.34
7.96
7.79
7.35
7.26
7.16
7.08
6.93
6.89
6.57
6.45
6.32
6.08
5.94
5.70
5.24
5.11
4.96
4.81
4.71
4.55
4.43
4.34
4.20
3.88
3.59
3.45
3.26
3.18
2.54
1.50
1.37
1.08
1.06
0.69
0.66
14.50
14.11
13.85
13.80
13.61
13.57
13.49
13.40
13.36
13.29
13.32
13.24
13.18
13.05
12.96
12.99
12.86
12.76
12.72
12.68
12.58
12.51


DB-WAX
Time (min)
Intensity (×10^5)
12.16
12.00
11.52
11.42
11.09
11.00
10.62
10.47
10.32
10.29
10.27
9.82
9.86
9.78
9.70
9.60
9.56
9.54
9.49
9.36
9.33
9.19
9.04
8.94
8.91
8.84
8.69
8.53
8.46
8.34
8.27
8.26
8.08
7.96
7.65
7.53
7.22
7.07
7.03
6.96
6.88
6.23
5.37
5.20
4.21
4.02
3.90
3.74
3.30
3.15
2.89
2.81
2.72
2.76
2.52
2.22
2.28
2.05
1.65
1.59
1.38
1.33
1.23
1.15
0.72
0.73
16.69
15.92
15.49
15.35
15.27
15.20
15.16
14.80
14.74
14.67
14.56
14.27
14.01
13.86
13.77
13.57
13.24
12.64
12.56

FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Isovaleral	0.66	641	0.01	0.73	885	0.01
2-Methylbutyral	0.69	651	0.03	0.72	878	0.03
Isoamyl alcohol	1.06	730	0.01	3.30*	1171	52.62
2-Methylbutanol	1.08	733	0.01	3.30*	1171	[52.62]
Methyl 2-methylbutyrate	1.37	773	0.04	1.23	975	0.03
2,4-Dimethyl-3-pentanone	1.50	790	0.02	1.15	962	0.02
2-Methylbutyl acetate	2.54*	880	0.03	2.28	1089	0.01
2-Methylbutyric acid	2.54*	880	[0.03]			
α-Thujene	3.18	926	0.51	1.38	999	0.52
α-Pinene	3.26	931	3.11	1.33	993	3.14
α-Fenchene	3.45*	944	0.05	1.59	1020	0.01
Camphene	3.45*	944	[0.05]	1.65	1026	0.03
Benzaldehyde	3.59	953	0.10	7.22	1459	0.11
β-Pinene	3.88*	973	2.14	2.05	1066	2.11
Sabinene	3.88*	973	[2.14]	2.22	1084	0.06
Myrcene	4.20	993	1.02	2.81	1132	1.04
Pseudolimonene	4.34*	1003	0.21	2.76	1128	0.07
α-Phellandrene	4.34*	1003	[0.21]	2.72	1125	0.14
Δ3-Carene	4.44	1009	0.05	2.52	1110	0.04
α-Terpinene	4.55	1016	0.54	2.89	1139	0.54
para-Cymene	4.71	1026	1.14	4.02	1225	1.18
1,8-Cineole	4.81*	1032	59.20	3.30*	1171	[52.62]
Limonene	4.81*	1032	[59.20]	3.15	1159	6.19
(*Z*)-β-Ocimene	4.96	1041	0.01	3.74*	1205	2.78
(*E*)-β-Ocimene	5.11	1051	0.04	3.90	1217	0.05
γ-Terpinene	5.24	1059	2.74	3.74*	1205	[2.78]
Terpinolene	5.70*	1088	1.48	4.21	1239	1.42
para-Cymenene	5.70*	1088	[1.48]	6.23	1385	0.05
Linalool	5.94	1102	0.32	7.96	1515	0.32
cis-Rose oxide	6.08*	1111	0.04	5.20	1311	0.02
endo-Fenchol	6.08*	1111	[0.04]	8.26	1538	0.02
trans-Rose oxide	6.32	1127	0.02	5.37	1323	0.01
trans-Pinocarveol	6.45	1135	0.01	9.04*	1599	0.05
Isopulegol	6.57	1143	0.04	8.08	1524	0.03
Borneol	6.89	1164	0.02	9.70*	1652	8.17
δ-Terpineol	6.93	1166	0.20	9.36†	1625	[0.55]
Terpinen-4-ol	7.08	1175	0.87	8.46*	1554	0.92
Cryptone	7.16	1180	0.01	9.04*	1599	[0.05]
para-Cymen-8-ol	7.26	1187	0.03	11.42	1797	0.04
α-Terpineol	7.35	1192	7.97	9.70*	1652	[8.17]
exo-2-Hydroxycineole	7.79	1222	0.02	11.52*	1806	0.06
Citronellol	7.96	1233	0.04	10.62	1729	0.05
Geraniol	8.34	1258	0.04	11.52*	1806	[0.06]

δ-Terpinyl acetate	9.20	1314	0.03	9.04*	1599	[0.05]
δ-Elemene	9.50	1336	0.05	6.88	1433	0.05
α-Terpinyl acetate	9.67	1348	0.99	9.60	1644	1.06
Eugenol	9.77	1354	0.04	14.67	2096	0.06
α-Ylangene	9.96	1368	0.18	6.96	1440	0.18
α-Copaene	10.03	1372	0.09	7.07	1447	0.10
7-Cubebene	10.07	1375	0.04	7.03	1445	0.04
Geranyl acetate	10.20	1384	0.04	10.47*	1716	0.27
β-Elemene	10.27	1390	0.17	8.34*	1544	4.59
α-Gurjunene	10.48	1405	0.09	7.53	1482	0.08
β-Maaliene	10.53	1409	0.01	7.65	1491	0.01
β-Caryophyllene	10.62	1415	4.49	8.34*	1544	[4.59]
β-Copaene	10.73	1423	0.02	8.27	1539	0.02
β-Gurjunene	10.77	1426	0.04	8.34*	1544	[4.59]
γ-Elemene	10.84	1431	0.05	8.94	1591	0.05
Aromadendrene	10.87	1434	0.11	8.46*	1554	[0.92]
α-Guaiene	10.90	1436	0.07	8.34*	1544	[4.59]
6,9-Guaiadiene	10.95	1440	0.08	8.53	1560	0.11
Unknown [m/z 91, 161 (92), 105 (85), 119 (63), 133 (53), 79 (49), 204 (46)]	11.02	1445	0.04	8.69	1572	0.04
α-Humulene	11.07	1449	2.07	9.19	1611	2.21
allo-Aromadendrene	11.16	1455	0.27	8.91	1588	0.25
Valerena-4,7(11)-diene	11.19	1457	0.06	8.84	1583	0.05
4,5-diepi-Aristolochene	11.29	1465	0.04	9.33*†	1623	0.55
Unknown [m/z 159, 145 (22), 91 (17),, 187 (16)... 202 (12)]	11.35	1469	0.06	9.54	1639	0.06
Selina-4,11-diene	11.39	1472	0.56	9.33*†	1623	[0.55]
α-Amorphene	11.45	1477	0.33	9.49	1636	0.31
β-Selinene	11.51	1481	1.41	9.78	1659	1.36
δ-Selinene	11.60*	1488	0.38	9.56*	1641	0.45
Valencene	11.60*	1488	[0.38]	9.82	1662	0.15
Viridiflorene	11.64*	1491	1.65	9.56*	1641	[0.45]
α-Selinene	11.64*	1491	[1.65]	9.86*	1665	1.52
δ-Amorphene	11.81	1504	0.26	9.86*	1665	[1.52]
γ-Cadinene	11.89	1510	0.14	10.29	1701	0.13
trans-Calamenene	11.99	1518	0.02	11.09	1768	0.02
Zonarene	12.03*	1521	0.23	10.27	1699	0.03
δ-Cadinene	12.03*	1521	[0.23]	10.32	1703	0.20
Selina-4(15),7(11)-diene	12.14	1530	0.12	10.47*	1716	[0.27]
α-Calacorene	12.23*	1536	0.14	12.00	1848	0.09
Selina-3,7(11)-diene	12.23*	1536	[0.14]	10.47*	1716	[0.27]
Germacrene B	12.41	1551	0.24	11.00	1761	0.27

Palustrol	12.51	1558	0.03	12.16	1862	0.06
β-Calacorene	12.58	1564	0.02	12.56	1900	0.01
Spathulenol	12.68	1572	0.02	14.27	2058	0.02
Caryophyllene oxide	12.72	1575	0.22	12.64	1907	0.22
Globulol	12.76	1578	0.37	13.77	2010	0.37
Viridiflorol	12.86	1586	0.54	13.86	2019	0.53
Guaiol	12.96	1594	0.10	14.01	2033	0.13
Ledol	12.99	1596	0.09	13.24*	1961	0.16
Humulene epoxide II	13.05	1601	0.09	13.24*	1961	[0.16]
Unknown [m/z 179, 161 (66), 119 (44), 95 (38), 105 (35)... 204 (24), 222 (1)]	13.18	1611	0.04	14.56	2085	0.07
Isoleptospermone	13.24	1617	0.03	15.35	2163	0.01
1,10-diepi-Cubenol	13.29	1620	0.11	13.24*	1961	[0.16]
Eremoligenol?	13.32	1623	0.07	14.74	2103	0.07
Unknown [m/z 161, 119 (63), 105 (52), 179 (52), 107 (51), 82 (51), 95 (50), 81 (41)... 204 (35), 220 (6)]	13.36	1626	0.18			
Caryophylladienol II	13.40	1630	0.03	15.92*	2221	0.03
Cubenol	13.49*	1637	0.05	13.57	1991	0.05
τ-Cadinol	13.49*	1637	[0.05]	14.80	2108	0.03
β-Eudesmol	13.57	1644	0.15	15.27	2155	0.15
α-Eudesmol	13.61*	1647	0.25	15.20	2148	0.13
Neointermedeol	13.61*	1647	[0.25]	15.49	2177	0.10
Bulnesol	13.80	1662	0.02	15.16	2144	0.03
(3*Z*)-Caryophylla-3,8(13)-dien-5β-ol	13.85	1666	0.01	16.69*	2301	0.05
Juniper camphor	14.11	1688	0.01	15.92*	2221	[0.03]
(2*E*,6*E*)-Farnesol	14.50	1721	0.02	16.69*	2301	[0.05]
Total identified		**98.85%**			**98.23%**	
Total reported		**99.16%**			**98.40%**	

*: 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

Note: no correction factor was applied
R.T.: Retention time (minutes)
R.I.: Retention index