

Date : January 28, 2022

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 22A14-PTH08

Customer identification : Laurel Leaf - Greece - L10108217R

Type : Essential oil

Source : *Laurus nobilis*

Customer : Plant Therapy

ANALYSIS

Method: PC-MAT-014  - Analysis of the composition of an essential oil or other volatile liquid by FAST GC-FID (in French); identifications validated by GC-MS.

Analyst : Seydou Ka, Ph. D.

Analysis date : January 26, 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: 1.4661 ± 0.0003 (20 °C; method PC-MAT-016)

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
Methylcyclopentadiene isomer I	tr	Alkene
Isovaleral	tr	Aliphatic aldehyde
3-Methyl-1-penten-3-ol	0.01	Aliphatic alcohol
1-Methylpyrrole	tr	Pyrrole
Ethyl isobutyrate	tr	Aliphatic ester
Toluene	0.01	Simple phenolic
Hexanal	0.01	Aliphatic aldehyde
Isopropyl isobutyrate	0.01	Aliphatic ester
Ethyl 2-methylbutyrate	0.01	Aliphatic ester
Ethyl isovalerate	0.01	Aliphatic ester
(3Z)-Hexenol	0.08	Aliphatic alcohol
Hexanol	0.01	Aliphatic alcohol
Isopropyl 2-methylbutyrate	0.01	Aliphatic ester
Tricyclene	0.04	Monoterpene
α -Thujene	0.46	Monoterpene
α -Pinene	6.72	Monoterpene
Camphene	0.78	Monoterpene
Thujadiene isomer	0.06	Monoterpene
α -Fenchene	0.03	Monoterpene
Sabinene	7.20	Monoterpene
β -Pinene	4.94	Monoterpene
6-Methyl-5-hepten-2-one	tr	Aliphatic ketone
Dehydro-1,8-cineole	0.15	Monoterpenic ether
Myrcene	0.81	Monoterpene
α -Phellandrene	0.18	Monoterpene
Pseudolimonene	0.03	Monoterpene
Isobutyl 2-methylbutyrate	0.02	Aliphatic ester
Δ^3 -Carene	0.07	Monoterpene
(3Z)-Hexenyl acetate	0.01	Aliphatic ester
α -Terpinene	0.58	Monoterpene
Unknown	0.01	Unknown
para-Cymene	1.30	Monoterpene
Limonene	1.70	Monoterpene
1,8-Cineole	47.43	Monoterpenic ether
(Z)- β -Ocimene	0.02	Monoterpene
Unknown	0.01	Unknown
(E)- β -Ocimene	0.08	Monoterpene
γ -Terpinene	0.90	Monoterpene
cis-Sabinene hydrate	0.14	Monoterpenic alcohol
para-Mentha-3,8-diene	0.01	Monoterpene
cis-Linalool oxide (fur.)	0.01	Monoterpenic alcohol
Terpinolene	0.27	Monoterpene
para-Cymenene	0.03	Monoterpene
trans-Linalool oxide (fur.)	tr	Monoterpenic alcohol
2-Nonanone	0.02	Aliphatic ketone

<i>trans</i> -Sabinene hydrate	0.11	Monoterpenic alcohol
Linalool	1.98	Monoterpenic alcohol
Unknown	0.06	Unknown
Hotrienol	0.06	Monoterpenic alcohol
endo-Fenchol	0.02	Monoterpenic alcohol
Unknown	0.01	Unknown
<i>cis</i> -para-Menth-2-en-1-ol	0.13	Monoterpenic alcohol
Limona ketone	0.01	Normonoterpenic ketone
<i>trans</i> -Pinocarveol	0.17	Monoterpenic alcohol
<i>trans</i> -para-Menth-2-en-1-ol	0.08	Monoterpenic alcohol
<i>trans</i> -Verbenol	0.05	Monoterpenic alcohol
Sabinaketone	0.02	Normonoterpenic ketone
Nerol oxide	0.03	Aliphatic ether
(<i>E</i>)-2,6-Dimethyl-1,5,7-octatrien-3-ol	0.05	Monoterpenic alcohol
Pinocarvone	0.09	Monoterpenic ketone
Borneol	0.22	Monoterpenic alcohol
δ -Terpineol	0.32	Monoterpenic alcohol
Rosefuran oxide	3.01*	Monoterpenic ether
Terpinen-4-ol	3.01*	Monoterpenic alcohol
Thuj-3-en-10-al	0.02	Monoterpenic aldehyde
para-Cymen-8-ol	0.01	Monoterpenic alcohol
α -Terpineol	1.45	Monoterpenic alcohol
Myrtenal	0.07	Monoterpenic aldehyde
Myrtenol	0.09	Monoterpenic alcohol
<i>cis</i> -Piperitol	0.04	Monoterpenic alcohol
Methylchavicol	0.01	Phenylpropanoid
<i>trans</i> -Piperitol	0.03	Monoterpenic alcohol
<i>trans</i> -Carveol	0.01	Monoterpenic alcohol
1-para-Menthen-9-al	0.01	Monoterpenic aldehyde
<i>cis</i> -para-Mentha-1(7),8-dien-2-ol	0.03	Monoterpenic alcohol
Nerol	0.12	Monoterpenic alcohol
Citronellol	0.02	Monoterpenic alcohol
Carvone	0.03	Monoterpenic ketone
Geraniol	0.03	Monoterpenic alcohol
Linalyl acetate	0.05	Monoterpenic ester
Geranial	0.02	Monoterpenic aldehyde
4-Thujen-2 α -yl acetate	0.11	Monoterpenic ester
Bornyl acetate	0.52	Monoterpenic ester
para-Cymen-7-ol	0.03	Monoterpenic alcohol
2-Undecanone	0.19	Aliphatic ketone
<i>trans</i> -Pinocarvyl acetate	0.01	Monoterpenic ester
δ -Terpinyl acetate	0.68	Monoterpenic ester
Unknown	0.05	Unknown
para-Mentha-1,4-dien-7-ol	0.01	Monoterpenic alcohol
exo-2-Hydroxycineole acetate	0.13	Monoterpenic ester
α -Terpinyl acetate	10.44	Monoterpenic ester
α -Cubebene	0.09	Sesquiterpene
Eugenol	0.64	Phenylpropanoid
α -Ylangene	0.07	Sesquiterpene
Neryl acetate	0.06	Monoterpenic ester
α -Copaene	0.05	Sesquiterpene
β -Bourbonene	0.02	Sesquiterpene

Geranyl acetate	0.01	Monoterpenic ester
β -Cubebene	0.05	Sesquiterpene
β -Elemene	0.30	Sesquiterpene
Methyleugenol	0.65	Phenylpropanoid
β -Caryophyllene	0.32	Sesquiterpene
β -Copaene	0.01	Sesquiterpene
Aromadendrene	0.02	Sesquiterpene
α -Guaiene	0.04	Sesquiterpene
6,9-Guaiadiene	0.04	Sesquiterpene
(<i>E</i>)-Cinnamyl acetate	0.06	Phenylpropanoid ester
α -Humulene	0.05	Sesquiterpene
Selina-4(15),7-diene	0.05	Sesquiterpene
allo-Aromadendrene	0.04	Sesquiterpene
<i>cis</i> -Muurolo-4(15),5-diene	0.02	Sesquiterpene
Unknown	0.07	Unknown
Germacrene D	0.08	Sesquiterpene
β -Selinene	0.07	Sesquiterpene
Viridiflorene	0.05	Sesquiterpene
α -Selinene	0.05	Sesquiterpene
Bicyclogermacrene	0.05	Sesquiterpene
(3 <i>Z</i> ,6 <i>E</i>)- α -Farnesene	0.05	Sesquiterpene
Germacrene A	0.04	Sesquiterpene
δ -Amorphene	0.02	Sesquiterpene
γ -Cadinene	0.13	Sesquiterpene
δ -Cadinene	0.24	Sesquiterpene
<i>trans</i> -Cadina-1,4-diene	0.01	Sesquiterpene
α -Calacorene	0.03	Sesquiterpene
(<i>E</i>)- α -Bisabolene	0.06	Sesquiterpene
Elemicin	0.02	Phenylpropanoid
Germacrene D-4-ol	0.01	Sesquiterpenic alcohol
Spathulenol	0.10	Sesquiterpenic alcohol
Caryophyllene oxide	0.10	Sesquiterpenic ether
Globulol	0.02	Sesquiterpenic alcohol
Viridiflorol	0.01	Sesquiterpenic alcohol
Unknown	0.02	Oxygenated sesquiterpene
Ledol	0.02	Sesquiterpenic alcohol
Humulene epoxide II	0.02	Sesquiterpenic ether
Junenol	0.03	Sesquiterpenic alcohol
Eremoligenol?	0.03	Sesquiterpenic alcohol
Caryophylladienol II	0.02	Sesquiterpenic alcohol
τ -Cadinol	0.02	Sesquiterpenic alcohol
τ -Muurolool	0.01	Sesquiterpenic alcohol
β -Eudesmol	0.03	Sesquiterpenic alcohol
α -Eudesmol	0.01	Sesquiterpenic alcohol
(<i>E</i>)-Isoelemicin	0.03	Phenylpropanoid
Unknown	0.01	Unknown
Unknown	0.03	Aliphatic ester
Germacra-4(15),5,10(14)-trien-1-ol isomer	0.02	Sesquiterpenic alcohol
Gazaniolide	0.03	Sesquiterpenic lactone
Consolidated total	98.94%	

*: Individual compounds concentration could not be found due to overlapping coelutions on columns considered [xx]: Duplicate percentage due to coelutions, not taken into account in the consolidated total

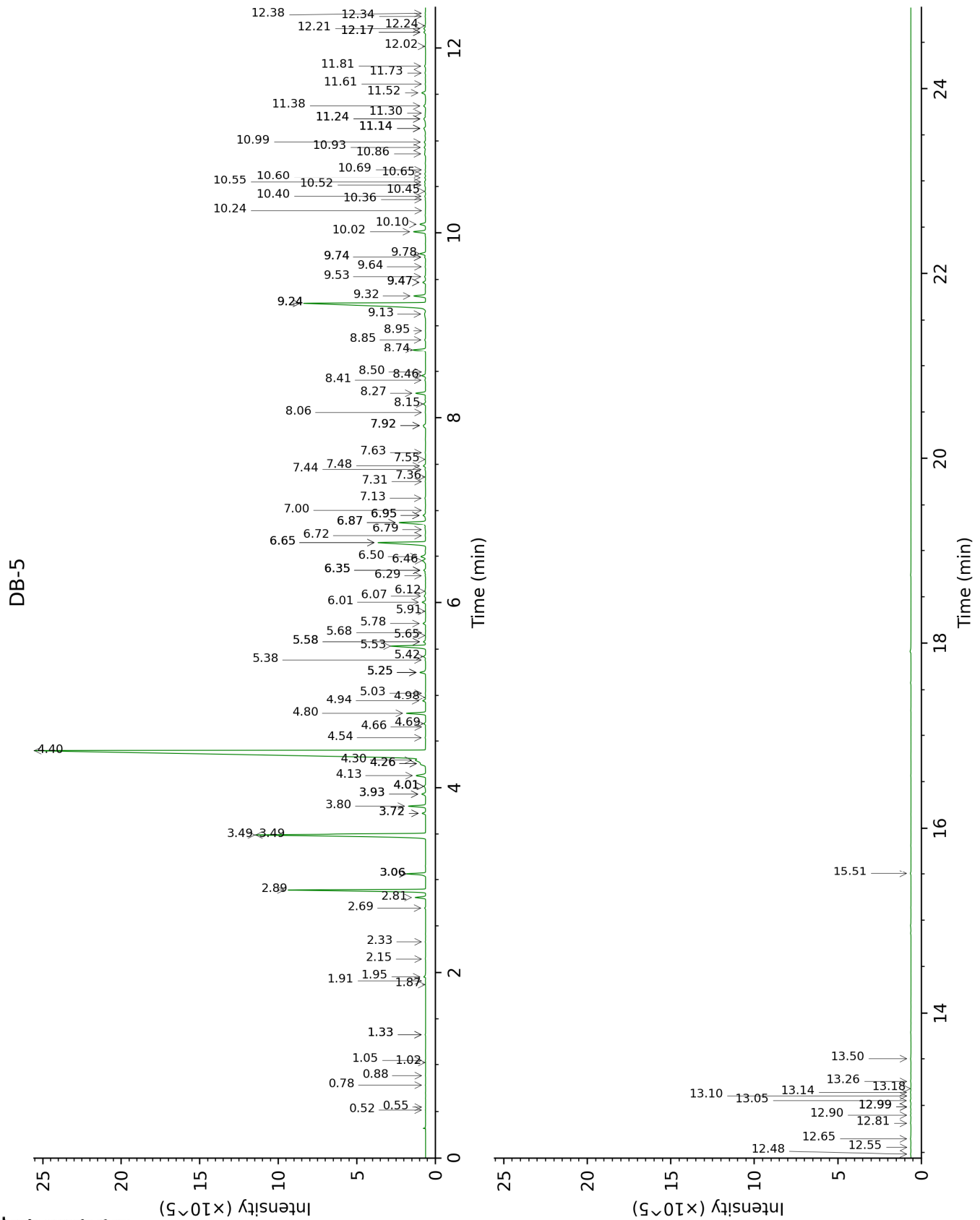
tr: The compound has been detected below 0.005% of total signal.

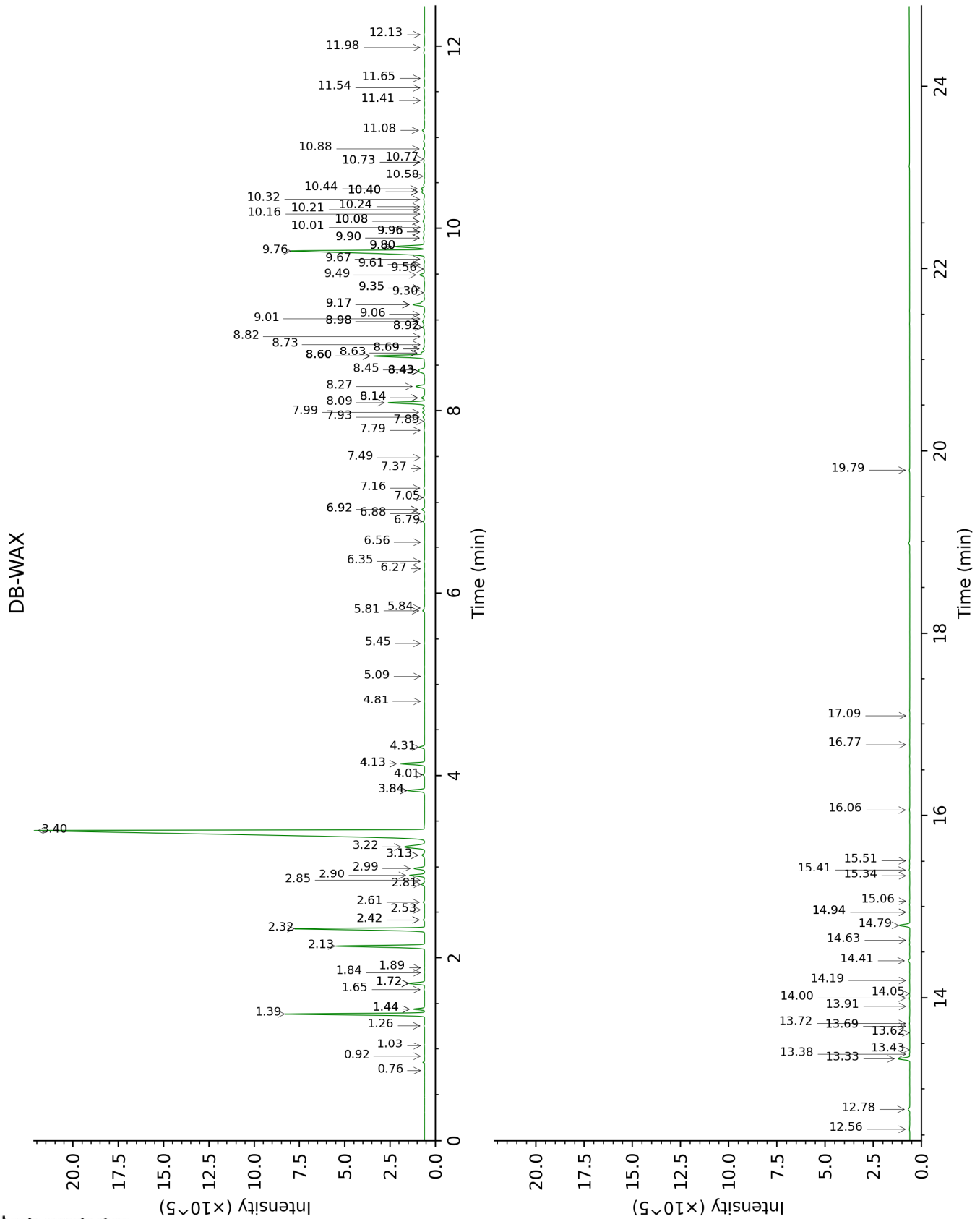
Note: no correction factor was applied

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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FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Methylcyclopentadiene isomer I	0.52	628	tr			
Isovaleral	0.55	640	tr	0.76	887	tr
3-Methyl-1-penten-3-ol	0.78	716	0.01	2.53	1104	0.01
1-Methylpyrrole	0.88	732	tr	2.42*	1096	0.06
Ethyl isobutyrate	1.02	753	tr	1.03	936	tr
Toluene	1.05	757	0.01	1.44*	999	0.47
Hexanal	1.33*	801	0.01	1.89	1044	0.01
Isopropyl isobutyrate	1.33*	801	[0.01]	0.92	917	0.01
Ethyl 2-methylbutyrate	1.87	850	0.01	1.72*	1027	0.80
Ethyl isovalerate	1.91	853	0.01	1.84	1038	0.01
(3Z)-Hexenol	1.95	857	0.08	5.81	1348	0.09
Hexanol	2.15	874	0.01	5.45	1322	0.01
Isopropyl 2-methylbutyrate	2.33	890	0.01	1.72*	1027	[0.80]
Tricyclene	2.70	918	0.04	1.26	972	0.03
α-Thujene	2.81	926	0.46	1.44*	999	[0.47]
α-Pinene	2.89	931	6.72	1.39	993	6.69
Camphene	3.06*	943	0.88	1.72*	1027	[0.80]
Thujadiene isomer	3.06*	943	[0.88]	2.42*	1096	[0.06]
α-Fenchene	3.06*	943	[0.88]	1.65	1020	0.03
Sabinene	3.49*	972	12.16	2.32	1086	7.20
β-Pinene	3.49*	972	[12.16]	2.13	1067	4.94
6-Methyl-5-hepten-2-one	3.72*	988	0.16	5.09	1301	tr
Dehydro-1,8-cineole	3.72*	988	[0.16]	3.13*	1152	0.17
Myrcene	3.80	993	0.81	2.90	1134	0.79
α-Phellandrene	3.93*	1002	0.21	2.81	1126	0.18
Pseudolimonene	3.93*	1002	[0.21]	2.85	1130	0.03
Isobutyl 2-methylbutyrate	4.02*	1007	0.10	3.13*	1152	[0.17]
Δ3-Carene	4.02*	1007	[0.10]	2.61	1111	0.07
(3Z)-Hexenyl acetate	4.02*	1007	[0.10]	4.81	1280	0.01
α-Terpinene	4.13	1015	0.58	2.99	1141	0.59
Unknown [m/z 109, 43 (58), 95 (26)... 137 (15)...]	4.26*†	1023	50.47	6.27	1381	0.01
para-Cymene	4.26*†	1023	[50.47]	4.13*	1229	1.31
Limonene	4.30†	1025	[50.47]	3.22	1159	1.70
1,8-Cineole	4.40†	1032	[50.47]	3.40	1173	47.43
(Z)-β-Ocimene	4.54	1040	0.02	3.84*	1208	0.94
Unknown [m/z 109, 43 (57), 91 (28), 67 (25), 93 (24), 95 (22), 77 (21), 137 (21), 41 (17), 79 (14)...]	4.66	1048	0.01	7.37	1462	0.01
(E)-β-Ocimene	4.69	1050	0.08	4.01	1220	0.08
γ-Terpinene	4.80	1057	0.90	3.84*	1208	[0.94]

<i>cis</i> -Sabinene hydrate	4.94	1066	0.14	6.92*	1429	0.15
para-Mentha-3,8-diene	4.98	1068	0.01	4.13*	1229	[1.31]
<i>cis</i> -Linalool oxide (fur.)	5.03	1071	0.01	6.56	1402	0.01
Terpinolene	5.25*	1086	0.30	4.31	1243	0.27
para-Cymenene	5.25*	1086	[0.30]	6.35	1387	0.03
<i>trans</i> -Linalool oxide (fur.)	5.25*	1086	[0.30]	6.92*	1429	[0.15]
2-Nonanone	5.38	1094	0.02	5.84	1350	0.02
<i>trans</i> -Sabinene hydrate	5.42	1096	0.11	7.98	1508	0.11
Linalool	5.53	1104	1.98	8.09	1517	1.98
Unknown [m/z 43, 59 (37), 79 (33), 91 (32), 119 (31)...]	5.58*	1107	0.13	9.06	1592	0.06
Hotrienol	5.58*	1107	[0.13]	8.82	1573	0.06
endo-Fenchol	5.65	1111	0.02	8.43*	1543	0.32
Unknown [m/z 93, 121 (64), 91 (58), 77 (58), 94 (53), 79 (47)...]	5.68	1113	0.01			
<i>cis</i> -para-Menth-2-en-1-ol	5.78	1119	0.13	8.14*	1521	0.18
Limona ketone	5.91	1128	0.01	7.89	1501	0.03
<i>trans</i> -Pinocarveol	6.01	1134	0.17	9.17*	1600	0.88
<i>trans</i> -para-Menth-2-en-1-ol	6.07	1138	0.08	8.98*	1586	0.17
<i>trans</i> -Verbenol	6.12	1142	0.05	9.56	1632	0.04
Sabinaketone	6.29	1152	0.02	8.73	1566	0.04
Nerol oxide	6.35*	1156	0.10	6.88	1426	0.03
(<i>E</i>)-2,6-Dimethyl-1,5,7-octatrien-3-ol	6.35*	1156	[0.10]	10.32	1694	0.05
Pinocarvone	6.35*	1156	[0.10]	7.93	1504	0.09
Borneol	6.46	1163	0.22	9.80*	1652	1.75
δ-Terpineol	6.50	1166	0.32	9.49	1627	0.31
Rosefuran oxide	6.65*	1175	3.01	8.60*	1556	3.04
Terpinen-4-ol	6.65*	1175	[3.01]	8.60*	1556	[3.04]
Thuj-3-en-10-al	6.72	1180	0.02	8.69*	1563	0.10
para-Cymen-8-ol	6.79	1184	0.01	11.54	1798	0.04
α-Terpineol	6.87*	1190	1.58	9.80*	1652	[1.75]
Myrtenal	6.87*	1190	[1.58]	8.69*	1563	[0.10]
Myrtenol	6.95*	1195	0.15	10.88	1741	0.09
<i>cis</i> -Piperitol	6.95*	1195	[0.15]	9.61	1636	0.04
Methylchavicol	7.00	1198	0.01	9.35*	1615	0.02
<i>trans</i> -Piperitol	7.14	1207	0.03	10.40*	1701	0.20
<i>trans</i> -Carveol	7.31	1219	0.01	11.41	1786	0.02
1-para-Menthen-9-al	7.36	1222	0.01	8.92*	1581	0.11
<i>cis</i> -para-Mentha-1(7),8-dien-2-ol	7.44	1227	0.03	11.98	1837	0.05
Nerol	7.48	1230	0.12	11.08	1758	0.13
Citronellol	7.55	1235	0.02	10.77	1732	0.05
Carvone	7.63	1240	0.03	10.01	1669	0.02
Geraniol	7.92*	1259	0.19	11.65	1807	0.03
Linalyl acetate	7.92*	1259	[0.19]	8.14*	1521	[0.18]
Geranial	8.06	1269	0.02	10.16	1681	0.04

4-Thujen-2 α -yl acetate	8.15	1275	0.11	8.92*	1581	[0.11]
Bornyl acetate	8.27	1282	0.52	8.27	1530	0.52
para-Cymen-7-ol	8.41	1292	0.03	14.19	2040	0.02
2-Undecanone	8.46	1295	0.19	8.63*	1559	0.19
<i>trans</i> -Pinocarvyl acetate	8.50	1298	0.01	9.17*	1600	[0.88]
δ -Terpinyl acetate	8.74	1315	0.68	9.17*	1600	[0.88]
Unknown [m/z 119, 43 (99), 93 (52), 59 (44), 91 (41), 134 (34)...]	8.85	1323	0.05	9.90*	1660	0.15
para-Mentha-1,4-dien-7-ol	8.95	1330	0.01	13.72	1995	0.03
exo-2-Hydroxycineole acetate	9.13	1342	0.13	10.08*	1674	0.12
α -Terpinyl acetate	9.24*	1350	10.49	9.76	1648	10.44
α -Cubebene	9.24*	1350	[10.49]	6.79	1419	0.09
Eugenol	9.32	1356	0.64	14.79	2098	0.61
α -Ylangene	9.47*	1366	0.16	7.05	1439	0.07
Neryl acetate	9.47*	1366	[0.16]	10.21	1685	0.06
α -Copaene	9.53	1371	0.05	7.16	1446	0.05
β -Bourbonene	9.64	1378	0.02	7.49	1471	0.03
Geranyl acetate	9.74*	1386	0.05	10.58	1715	0.01
β -Cubebene	9.74*	1386	[0.05]	7.79	1493	0.05
β -Elemene	9.78	1388	0.30	8.43*	1543	[0.32]
Methyleugenol	10.02	1405	0.65	13.33	1958	0.66
β -Caryophyllene	10.10	1411	0.32	8.45	1544	0.33
β -Copaene	10.24	1422	0.01	8.43*	1543	[0.32]
Aromadendrene	10.36	1431	0.02	8.60*	1556	[3.04]
α -Guaiene	10.40	1434	0.04	8.43*	1543	[0.32]
6,9-Guaiadiene	10.45	1438	0.04	8.63*	1559	[0.19]
(<i>E</i>)-Cinnamyl acetate	10.52	1443	0.06	14.63	2082	0.02
α -Humulene	10.55	1445	0.05	9.30	1611	0.06
Selina-4(15),7-diene	10.60	1449	0.05	8.98*	1586	[0.17]
allo-Aromadendrene	10.65	1452	0.04	9.01	1588	0.03
<i>cis</i> -Muurolo-4(15),5-diene	10.69	1456	0.02	9.35*	1615	[0.02]
Unknown [m/z 43, 67 (61), 79 (57), 81 (44), 54 (44)...]	10.86	1468	0.07			
Germacrene D	10.93	1474	0.08	9.80*	1652	[1.75]
β -Selinene	10.99	1478	0.07	9.90*	1660	[0.15]
Viridiflorene	11.14*	1489	0.15	9.67	1641	0.05
α -Selinene	11.14*	1489	[0.15]	9.96*	1665	0.07
Bicyclogermacrene	11.14*	1489	[0.15]	10.08*	1674	[0.12]
(3 <i>Z</i> ,6 <i>E</i>)- α -Farnesene	11.24*	1497	0.16	10.24	1687	0.05
Germacrene A	11.24*	1497	[0.16]	10.40*	1701	[0.20]
δ -Amorphene	11.30	1501	0.02	9.96*	1665	[0.07]
γ -Cadinene	11.38	1507	0.13	10.40*	1701	[0.20]
δ -Cadinene	11.52	1518	0.24	10.44	1704	0.21
<i>trans</i> -Cadina-1,4-diene	11.61	1526	0.01	10.73*	1729	0.05
α -Calacorene	11.73	1535	0.03	12.13	1849	0.04
(<i>E</i>)- α -Bisabolene	11.81	1541	0.06	10.73*	1729	[0.05]

Elemicin	12.02	1558	0.02	15.51	2170	0.02
Germacrene D-4-ol	12.17*	1570	0.10	13.69	1992	0.01
Spathulenol	12.17*	1570	[0.10]	14.41	2061	0.10
Caryophyllene oxide	12.21	1573	0.10	12.78	1908	0.10
Globulol	12.24	1575	0.02	13.91	2013	0.01
Viridiflorol	12.34	1583	0.01	14.00	2021	0.03
Unknown [m/z 133, 93 (64), 43 (64), 177 (60), 107 (59), 91 (55)...220 (7)]	12.38	1586	0.02	12.56	1888	0.03
Ledol	12.48	1594	0.02	13.38	1963	0.02
Humulene epoxide II	12.55	1600	0.02	13.43	1968	0.01
Junenol	12.65	1607	0.03	13.62	1985	0.01
Eremoligenol?	12.81	1621	0.03	14.94*	2112	0.01
Caryophylladienol II	12.90	1628	0.02	16.06	2226	0.02
τ-Cadinol	12.99*	1635	0.03	14.94*	2112	[0.01]
τ-Muurolol	12.99*	1635	[0.03]	15.06	2124	0.01
β-Eudesmol	13.05	1641	0.03	15.41	2159	0.04
α-Eudesmol	13.10	1645	0.01	15.34	2152	0.01
(E)-Isoelemicin	13.14	1648	0.03	17.09	2335	0.01
Unknown [m/z 41, 79 (99), 91 (88), 69 (82), 93 (81), 55 (74), 95 (65)...]	13.18	1652	0.01			
Unknown [m/z 79, 43 (66), 67 (59), 80 (56), 41 (41), 81 (37), 55 (29)...]	13.26	1658	0.03	14.05	2026	0.02
Germacra-4(15),5,10(14)-trien-1-ol isomer	13.50	1678	0.02	16.78	2301	tr
Gazaniolide	15.51	1853	0.03	19.79	2641	0.03
Total identified		98.98%			98.60%	
Total reported		99.17%			98.73%	

*: 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