

Date : March 09, 2023

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 23C02-PTH03

Customer identification : Lavender Fine - Greece - LK0106R

Type : Essential oil

Source : *Lavandula angustifolia*

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 : Sylvain Mercier, M. Sc., Chimiste 2014-005

Analysis date : March 06, 2023

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: 1.4615 ± 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
Ethanol	0.02	Aliphatic alcohol
Methacrolein	0.01	Aliphatic aldehyde
3-Buten-2-one	tr	Aliphatic ketone
2-Methyl-3-buten-2-ol	0.02	Aliphatic alcohol
Isovaleral	0.08	Aliphatic aldehyde
2-Methylbutyral	0.03	Aliphatic aldehyde
2-Ethylfuran	0.01	Furan
Isoamyl alcohol	0.03	Aliphatic alcohol
2-Methylbutanol	0.02	Aliphatic alcohol
Toluene	0.01	Simple phenolic
Hexanal	0.01	Aliphatic aldehyde
Butyl acetate	0.01	Aliphatic ester
Methyl hexyl ether	0.05	Aliphatic ether
(2E)-Hexenal	0.01	Aliphatic aldehyde
(3Z)-Hexenol	0.10	Aliphatic alcohol
Hexanol	0.22	Aliphatic alcohol
Tricyclene	0.02	Monoterpene
α -Thujene	0.08	Monoterpene
α -Pinene	0.18	Monoterpene
Camphene	0.14	Monoterpene
α -Fenchene	tr	Monoterpene
Thuja-2,4(10)-diene	0.01	Monoterpene
Butyl isobutyrate	0.03	Aliphatic ester
β -Pinene	0.12	Monoterpene
Sabinene	0.03	Monoterpene
Octen-3-ol	0.40	Aliphatic alcohol
Dehydro-1,8-cineole	0.01	Monoterpenic ether
Octan-3-one	0.62	Aliphatic ketone
<i>trans</i> -Dehydroxylinalool oxide	0.02	Monoterpenic ether
Myrcene	0.54	Monoterpene
Butyl butyrate	0.07	Aliphatic ester
Octan-3-ol	0.18	Aliphatic alcohol
α -Phellandrene	0.03	Monoterpene
Pseudolimonene	0.02	Monoterpene
<i>cis</i> -Dehydroxylinalool oxide	0.01	Monoterpenic ether
Δ^3 -Carene	0.13	Monoterpene
(3Z)-Hexenyl acetate	0.02	Aliphatic ester
α -Terpinene	0.06	Monoterpene
Hexyl acetate	0.21	Aliphatic ester
meta-Cymene	0.09	Monoterpene
para-Cymene	0.23	Monoterpene
Limonene	0.25	Monoterpene
1,8-Cineole	0.94	Monoterpenic ether
Lavender lactone	0.02	Aliphatic lactone
(Z)- β -Ocimene	4.86	Monoterpene

(E)-β-Ocimene	3.03	Monoterpene
γ-Terpinene	0.16	Monoterpene
cis-Sabinene hydrate	0.05	Monoterpenic alcohol
cis-Linalool oxide (fur.)	0.21	Monoterpenic alcohol
Octanol	0.02	Aliphatic alcohol
α-Pinene oxide analog	0.02	Monoterpenic ether
trans-Linalool oxide (fur.)	0.15	Monoterpenic alcohol
para-Cymenene	0.05	Monoterpene
Terpinolene	0.09	Monoterpene
Rosefuran	0.05	Monoterpenic ether
Linalool	28.96	Monoterpenic alcohol
(Z)-6-Methyl-3,5-heptadien-2-one	0.05	Aliphatic ketone
β-Thujone	0.03	Monoterpenic ketone
Octen-3-yl acetate	0.91	Aliphatic ester
α-Campholenal	0.03	Monoterpenic aldehyde
Octan-3-yl acetate	0.07	Aliphatic ester
allo-Ocimene	0.14	Monoterpene
(Z)-Myroxide	0.05	Monoterpenic ether
Camphor	0.40	Monoterpenic ketone
(E)-Myroxide	tr	Monoterpenic ether
trans-Verbenol	0.03	Monoterpenic alcohol
Unknown	0.01	Oxygenated monoterpene
Hexyl isobutyrate	0.10	Aliphatic ester
Nerol oxide	0.03	Aliphatic ether
Borneol	0.93	Monoterpenic alcohol
cis-Linalool oxide (pyr.)	0.04	Monoterpenic alcohol
Lavandulol	1.88	Monoterpenic alcohol
Terpinen-4-ol	4.55	Monoterpenic alcohol
(3E,5Z)-Undeca-1,3,5-triene	0.03	Alkene
trans-Linalool oxide (pyr.)	0.02	Monoterpenic alcohol
Cryptone	0.16	Normonoterpenic ketone
meta-Cymen-8-ol	0.12	Monoterpenic alcohol
para-Cymen-8-ol	0.09	Monoterpenic alcohol
α-Terpineol	0.75	Monoterpenic alcohol
Myrtenal	0.03	Monoterpenic aldehyde
Myrtenol	0.02	Monoterpenic alcohol
Hodiendiol (2,6-dimethylocta-3,7-diene-2,6-diol)	0.01	Monoterpenic alcohol
Hexyl butyrate	0.29	Aliphatic ester
Verbenone	0.03	Monoterpenic ketone
Unknown	0.03	Unknown
(3E,5E)-2,6-Dimethylocta-3,5,7-trien-2-ol	0.03	Monoterpenic alcohol
Octyl acetate	0.02	Aliphatic ester
trans-Carveol	0.02	Monoterpenic alcohol
Bornyl formate	0.06	Monoterpenic ester
Nerol	0.15	Monoterpenic alcohol
Hexyl 2-methylbutyrate	0.07	Aliphatic ester
Carvone	0.04	Monoterpenic ketone
Neral	0.02	Monoterpenic aldehyde
Hexyl isovalerate	0.01	Aliphatic ester
Linalyl acetate	31.77	Monoterpenic ester
Geraniol	0.37	Monoterpenic alcohol

Geranial	0.03	Monoterpenic aldehyde
2,6-Dimethyl-1,7-octadiene-3,6-diol	0.02	Monoterpenic alcohol
Bornyl acetate	0.12	Monoterpenic ester
Lavandulyl acetate	2.68	Monoterpenic ester
Thymol	0.02	Monoterpenic alcohol
Unknown	0.01	Oxygenated monoterpene
Hexyl tiglate	0.11	Aliphatic ester
Hodiendiol derivative	0.03	Oxygenated monoterpene
Unknown	0.01	Oxygenated monoterpene
Unknown	0.02	Oxygenated monoterpene
Neryl acetate	0.26	Monoterpenic ester
α -Copaene	0.02	Sesquiterpene
Daucene	0.01	Sesquiterpene
β -Bourbonene	0.03	Sesquiterpene
Geranyl acetate	0.46	Monoterpenic ester
7-epi-Sesquithujene	0.03	Sesquiterpene
β -Elemene	0.01	Sesquiterpene
Hexyl hexanoate	0.04	Aliphatic ester
α -Funebrene	0.01	Sesquiterpene
Isocaryophyllene	0.01	Sesquiterpene
Sesquithujene	0.05	Sesquiterpene
β -Caryophyllene	4.76	Sesquiterpene
<i>cis</i> - α -Bergamotene	0.09	Sesquiterpene
α -Santalene	0.51	Sesquiterpene
Coumarin	0.14	Coumarin
<i>trans</i> - α -Bergamotene	0.15	Sesquiterpene
<i>cis</i> - β -Bergamotene?	0.05	Sesquiterpene
Sesquisabinene A	0.03	Sesquiterpene
epi- β -Santalene	0.02	Sesquiterpene
α -Humulene	0.15	Sesquiterpene
Lavandulyl butyrate?	0.11	Monoterpenic ester
(<i>E</i>)- β -Farnesene	1.38	Sesquiterpene
β -Santalene	0.02	Sesquiterpene
Germacrene D	0.44	Sesquiterpene
<i>trans</i> - β -Bergamotene	0.06	Sesquiterpene
Isodaucene	0.02	Sesquiterpene
β -Bisabolene	0.02	Sesquiterpene
γ -Cadinene	0.24	Sesquiterpene
Lavandulyl isovalerate	0.01	Monoterpenic ester
Unknown	0.06	Oxygenated sesquiterpene
δ -Cadinene	0.02	Sesquiterpene
β -Sesquiphellandrene	0.02	Sesquiterpene
Isocaryophyllene epoxide B	0.03	Sesquiterpenic ether
Caryophyllene oxide isomer	0.02	Sesquiterpenic ether
Dendrolasin	0.01	Sesquiterpenic ether
Caryophyllene oxide	0.25	Sesquiterpenic ether
τ -Cadinol	0.09	Sesquiterpenic alcohol
(3 <i>Z</i>)-Caryophylla-3,8(13)-dien-5 β -ol	0.01	Sesquiterpenic alcohol
<i>cis</i> -14-nor-Muurool-5-en-4-one?	0.01	Norsesquiterpenic ketone
Herniarin	0.01	Coumarin
Consolidated total	98.85%	

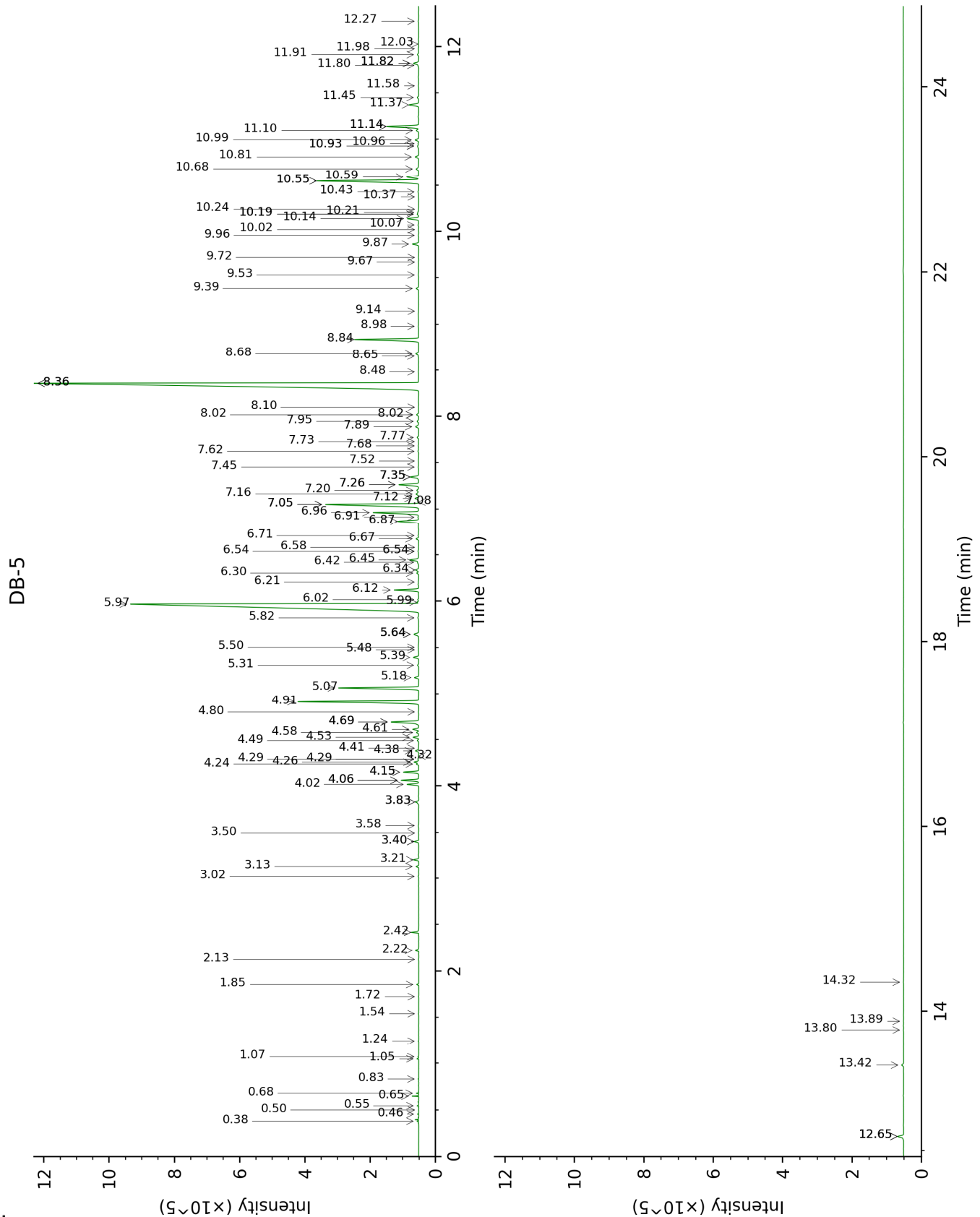
tr: The compound has been detected below 0.005% of total signal.

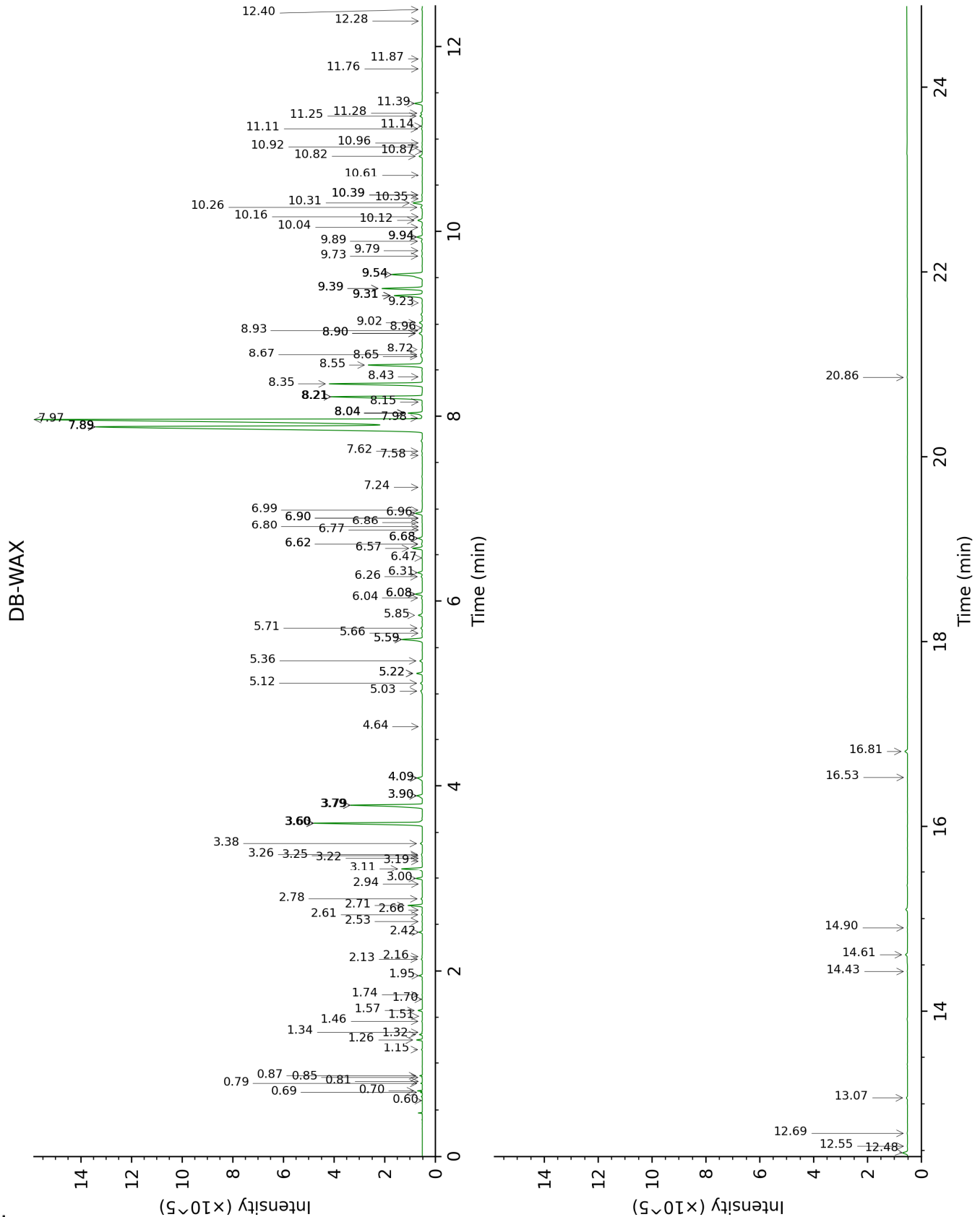
Note: no correction factor was applied

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.

This page was intentionally left blank. The following pages present the complete data of the analysis.





FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Ethanol	0.38	499	0.02	0.78	906	0.03
Methacrolein	0.46	538	0.01	0.60	844	tr
3-Buten-2-one	0.50	573	tr	0.81	910	tr
2-Methyl-3-buten-2-ol	0.54	606	0.02	1.46	1012	0.02
Isovaleral	0.65	640	0.08	0.70	886	0.08
2-Methylbutyral	0.68	650	0.03	0.69	879	0.03
2-Ethylfuran	0.83	701	0.01	0.85	917	0.01
Isoamyl alcohol	1.05	732	0.03	3.26	1178	0.04
2-Methylbutanol	1.07	735	0.02	3.25	1177	0.02
Toluene	1.24	759	0.01	1.34	1000	0.01
Hexanal	1.54	799	0.01	1.74	1042	0.01
Butyl acetate	1.72	816	0.01	1.70	1037	0.01
Methyl hexyl ether	1.86	827	0.05	0.87	920	0.05
(2E)-Hexenal	2.13	849	0.01	3.22	1175	0.01
(3Z)-Hexenol	2.22	857	0.10	5.59*	1350	1.01
Hexanol	2.42	872	0.22	5.22*	1323	0.25
Tricyclene	3.02	918	0.02	1.15	969	0.02
α-Thujene	3.13	926	0.08	1.32	998	0.08
α-Pinene	3.21	930	0.18	1.26	989	0.17
Camphene	3.40*	943	0.16	1.58	1024	0.14
α-Fenchene	3.40*	943	[0.16]	1.51	1018	tr
Thuja-2,4(10)-diene	3.50	949	0.01	2.13	1082	0.04
Butyl isobutyrate	3.58	955	0.03	2.53	1118	0.02
β-Pinene	3.83*	971	0.16	1.95	1063	0.12
Sabinene	3.83*	971	[0.16]	2.16	1085	0.03
Octen-3-ol	4.02	984	0.40	6.57	1421	0.41
Dehydro-1,8-cineole	4.06*	987	0.63	2.94	1151	0.01
Octan-3-one	4.06*	987	[0.63]	3.80*	1220	3.66
<i>trans</i> -Dehydroxylinalool oxide	4.15*	992	0.54	3.19	1172	0.02
Myrcene	4.15*	992	[0.54]	2.71	1132	0.54
Butyl butyrate	4.24	998	0.07	3.38	1188	0.08
Octan-3-ol	4.26	1000	0.18	5.85	1368	0.19
α-Phellandrene	4.29*†	1002	0.06	2.61	1124	0.03
Pseudolimonene	4.29*†	1002	[0.06]	2.66	1128	0.02
<i>cis</i> -Dehydroxylinalool oxide	4.32†	1004	[0.06]	3.60*	1205	5.03
Δ3-Carene	4.38	1007	0.13	2.42	1109	0.12
(3Z)-Hexenyl acetate	4.41	1009	0.02	4.64	1285	tr
α-Terpinene	4.49	1014	0.06	2.78	1138	0.06
Hexyl acetate	4.53	1016	0.21	4.09*	1242	0.29
meta-Cymene	4.58	1020	0.09	3.90*	1228	0.29
para-Cymene	4.61	1022	0.23	3.90*	1228	[0.29]

Limonene	4.69*	1027	1.19	3.00	1156	0.25
1,8-Cineole	4.69*	1027	[1.19]	3.11	1165	0.94
Lavender lactone	4.80	1034	0.02	8.96	1603	0.04
(Z)- β -Ocimene	4.91	1040	4.86	3.60*	1205	[5.03]
(E)- β -Ocimene	5.07	1050	3.03	3.80*	1220	[3.66]
γ -Terpinene	5.18	1057	0.16	3.60*	1205	[5.03]
<i>cis</i> -Sabinene hydrate	5.31	1065	0.05	6.68*	1429	0.20
<i>cis</i> -Linalool oxide (fur.)	5.40	1071	0.21	6.31	1402	0.21
Octanol	5.48	1076	0.02	7.98	1527	0.03
α -Pinene oxide analog	5.50	1077	0.02	5.22*	1323	[0.25]
<i>trans</i> -Linalool oxide (fur.)	5.64*	1086	0.24	6.68*	1429	[0.20]
para-Cymenene	5.64*	1086	[0.24]	6.04	1382	0.05
Terpinolene	5.64*	1086	[0.24]	4.09*	1242	[0.29]
Rosefuran	5.82	1097	0.05	5.71	1358	0.07
Linalool	5.97	1107	28.96	7.89*†	1520	60.86
(Z)-6-Methyl-3,5-heptadien-2-one	5.99	1108	0.05	8.04*	1531	0.66
β -Thujone	6.02	1110	0.03	6.08*	1385	0.32
Octen-3-yl acetate	6.12	1116	0.91	5.59*	1350	[1.01]
α -Campholenal	6.21	1122	0.03	6.77	1436	0.01
Octan-3-yl acetate	6.30	1128	0.07	5.03	1310	0.08
allo-Ocimene	6.34	1130	0.14	5.36	1333	0.12
(Z)-Myroxide	6.42	1135	0.05	6.62*	1424	0.05
Camphor	6.45	1137	0.40	6.96	1450	0.35
(E)-Myroxide	6.54*	1143	0.03	6.90*	1446	0.02
<i>trans</i> -Verbenol	6.54*	1143	[0.03]	9.31*	1632	1.48
Unknown [m/z 95, 43 (74), 109 (72), 82 (62), 110 (50)... 152 (14)]	6.58	1146	0.01	6.80	1438	0.01
Hexyl isobutyrate	6.67	1151	0.10	5.12	1316	0.08
Nerol oxide	6.71	1154	0.03	6.62*	1424	[0.05]
Borneol	6.87	1164	0.93	9.54*	1650	2.12
<i>cis</i> -Linalool oxide (pyr.)	6.91	1166	0.04	10.04	1691	0.04
Lavandulol	6.96	1170	1.88	9.39*	1638	1.88
Terpinen-4-ol	7.05*	1175	4.67	8.35	1556	4.55
(3E,5Z)-Undeca-1,3,5-triene	7.05*	1175	[4.67]	5.66	1354	0.03
<i>trans</i> -Linalool oxide (pyr.)	7.08	1177	0.02	10.35	1717	0.02
Cryptone	7.12†	1179	0.28	8.90*	1599	0.18
meta-Cymen-8-ol	7.16†	1182	[0.28]	11.25	1794	0.12
para-Cymen-8-ol	7.20	1185	0.09	11.28	1796	0.08
α -Terpineol	7.26*	1189	0.82	9.54*	1650	[2.12]
Myrtenal	7.26*	1189	[0.82]	8.43	1562	0.03
Myrtenol	7.35*	1194	0.36	10.61	1739	0.02

Hodiendiol (2,6-dimethylocta-3,7-diene-2,6-diol)	7.35*	1194	[0.36]	12.55	1909	0.01
Hexyl butyrate	7.35*	1194	[0.36]	6.08*	1385	[0.32]
Verbenone	7.45	1201	0.03	9.39*	1638	[1.88]
Unknown [m/z 43, 71 (66), 59 (52), 41 (47), 68 (46)...]	7.52	1205	0.03	10.92	1765	0.03
(3E,5E)-2,6-Dimethylocta-3,5,7-trien-2-ol	7.62	1212	0.03	11.11	1782	0.04
Octyl acetate	7.68	1216	0.02	6.86	1442	0.02
<i>trans</i> -Carveol	7.73	1219	0.02	11.14	1784	0.03
Bornyl formate	7.77	1222	0.06	7.89*†	1520	[60.86]
Nerol	7.89	1230	0.15	10.82	1757	0.17
Hexyl 2-methylbutyrate	7.95	1234	0.07	6.26	1398	0.06
Carvone	8.02*	1238	0.09	9.74	1666	0.04
Neral	8.02*	1238	[0.09]	9.23	1625	0.02
Hexyl isovalerate	8.10	1244	0.01	6.47	1413	0.02
Linalyl acetate	8.36*	1261	32.32	7.97†	1526	[60.86]
Geraniol	8.36*	1261	[32.32]	11.39	1806	0.37
Geranial	8.48	1269	0.03	9.90	1679	0.06
2,6-Dimethyl-1,7-octadiene-3,6-diol	8.65	1281	0.02	14.43	2087	0.01
Bornyl acetate	8.68	1282	0.12	8.04*	1531	[0.66]
Lavandulyl acetate	8.84	1293	2.68	8.55	1572	2.68
Thymol	8.98	1302	0.02	14.90	2134	0.01
Unknown [m/z 150, 107 (98), 91 (79), 108 (61)]	9.14	1314	0.01	11.76	1839	0.02
Hexyl tiglate	9.39	1331	0.11	8.67†	1580	[0.15]
Hodiendiol derivative	9.53	1341	0.03	12.69	1922	0.03
Unknown [m/z 43, 79 (47), 71 (31), 94 (27), 81 (23), 41 (22)... 197 (0)]	9.67	1351	0.01	10.87	1761	0.01
Unknown [m/z 43, 79 (46), 71 (30), 94 (25), 41 (23), 81 (21)... 197 (0)]	9.72	1355	0.02	10.96	1769	0.02
Neryl acetate	9.86	1365	0.26	9.94*	1683	0.26
α-Copaene	9.96	1371	0.02	6.90*	1446	[0.02]
Daucene	10.02	1376	0.01	6.99	1452	0.03
β-Bourbonene	10.07	1379	0.03	7.24	1470	0.04
Geranyl acetate	10.14	1384	0.46	10.31	1714	0.46
7-epi-Sesquithujene	10.19*†	1388	0.10	7.62	1500	0.03
β-Elemene	10.19*†	1388	[0.10]	8.16	1541	0.01
Hexyl hexanoate	10.20†	1389	[0.10]	8.65†	1579	0.15
α-Funebrene	10.24	1391	0.01	7.58	1496	0.02

Isocaryophyllene	10.37	1401	0.01	7.89*†	1520	[60.86]
Sesquithujene	10.43	1404	0.05	7.89*†	1520	[60.86]
β-Caryophyllene	10.55*	1413	4.85	8.21*	1545	4.92
cis-α-Bergamotene	10.55*	1413	[4.85]	8.04*	1531	[0.66]
α-Santalene	10.59	1417	0.51	8.04*	1531	[0.66]
Coumarin	10.68	1423	0.14	16.81	2332	0.14
trans-α-Bergamotene	10.81	1433	0.15	8.21*	1545	[4.92]
cis-β-Bergamotene?	10.93*	1442	0.08			
Sesquisabinene A	10.93*	1442	[0.08]	8.93	1601	0.03
epi-β-Santalene	10.96	1444	0.02	8.72	1585	0.07
α-Humulene	11.00	1447	0.15	9.02	1608	0.15
Lavandulyl butyrate?	11.10	1454	0.11	10.26	1709	0.08
(E)-β-Farnesene	11.14*	1457	1.39	9.31*	1632	[1.48]
β-Santalene	11.14*	1457	[1.39]	8.90*	1599	[0.18]
Germacrene D	11.37	1475	0.44	9.54*	1650	[2.12]
trans-β-Bergamotene	11.45	1481	0.06	9.31*	1632	[1.48]
Isodaucene	11.58	1490	0.02	9.79	1671	0.04
β-Bisabolene	11.80	1506	0.02	9.94*	1683	[0.26]
γ-Cadinene	11.82*	1508	0.25	10.12	1698	0.24
Lavandulyl isovalerate	11.82*	1508	[0.25]	10.39*	1721	0.04
Unknown [m/z 121, 93 (56), 91 (12), 94 (11), 122 (10)...220]	11.91	1516	0.06	13.07	1957	0.05
δ-Cadinene	11.98	1520	0.02	10.16	1701	0.02
β-Sesquiphellandrene	12.03	1524	0.02	10.39*	1721	[0.04]
Isocaryophyllene epoxide B	12.27	1544	0.03	11.87	1848	0.02
Caryophyllene oxide isomer	12.65*	1573	0.29	12.40	1895	0.02
Dendrolasin	12.65*	1573	[0.29]	12.28	1884	0.01
Caryophyllene oxide	12.65*	1573	[0.29]	12.48	1902	0.25
τ-Cadinol	13.42	1635	0.09	14.61	2105	0.09
(3Z)-Caryophylla-3,8(13)-dien-5β-ol	13.80	1666	0.01	16.53	2302	0.01
cis-14-nor-Muurolo-5-en-4-one?	13.90	1674	0.01			
Herniarin	14.32	1709	0.01	20.86	2807	0.02
Total identified		99.07%			98.54%	
Total reported		99.21%			98.68%	

*: 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