

GC/MS BATCH NUMBER: MQ0100

ESSENTIAL OIL: MAGNOLIA FLOWER
BOTANICAL NAME: MICHELIA ALBA
ORIGIN: CHINA

KEY CONSTITUENTS PRESENT IN THIS BATCH OF MAGNOLIA FLOWER OIL	%
LINALOOL	60.4
METHYL 2-METHYLBUTYRATE	4.2
β -ELEMENE	4.2
β -CARYOPHYLLENE	3.8
(E)- β -OCIMENE	2.2
METHYLEUGENOL	1.9
(Z)- β -OCIMENE	1.6
GERMACRENE D	1.4
α -HUMULENE	1.1
GERMACRENE A	1.0

Comments from Robert Tisserand: Exotic, intensely fruity, floral odor quality with hints of pear and white wine. Constituents are in expected amounts.

Date : February 22, 2018

CERTIFICATE OF ANALYSIS - GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 18B20-PTH1-1-CC

Customer identification : Magnolia Flower - China - MQ010078R

Type : Essential oil

Source : *Michelia x alba*

Customer : Plant Therapy

ANALYSIS

Method: PC-PA-014-17J19 - 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 : February 21, 2018

Checked and approved by :

Sylvain Mercier, M. Sc., chimiste 2014-005

Note: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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.

PHYSICOCHEMICAL DATA

Physical aspect: Light orange liquid

Refractive index: 1.4670 ± 0.0003 (20 °C)

CONCLUSION

No adulterant, contaminant or diluent has been detected using this method.

ANALYSIS SUMMARY

Identification	DB-5 (%)	DB-WAX (%)	Classe
Ethanol	0.02	0.02	Aliphatic alcohol
3-Buten-2-one	tr	tr	Aliphatic ketone
2-Methyl-3-buten-2-ol	0.01	0.01	Aliphatic alcohol
3-Methylfuran	tr	0.01	Furan
Methyl propionate	0.04	0.04	Aliphatic ester
1,3-Cyclohexadiene	tr		Alkene
Isovaleral	tr	tr	Aliphatic aldehyde
2-Methylbutyral	0.04	0.04	Aliphatic aldehyde
Methyl isobutyrate	0.01	0.01	Aliphatic ester
Methyl butyrate	0.06	0.06	Aliphatic ester
2-Methylbutanenitrile	tr		Aliphatic nitrile
Isoamyl alcohol	0.01	0.05*	Aliphatic alcohol
2-Methylbutanol	0.03	[0.05]*	Aliphatic alcohol
Methyl 2-methylbutyrate	4.24	4.26	Aliphatic ester
Ethyl 2-methylbutyrate	0.05	0.05	Aliphatic ester
Methyl tiglate	0.01	0.02*	Aliphatic ester
Hexanol	0.01	0.01	Aliphatic alcohol
2-Methylbutyric acid	0.36*	0.74*	Aliphatic acid
2-Heptanone	[0.36]*	0.01	Aliphatic ketone
Isovaleric acid	0.30	[0.74]*	Aliphatic acid
α -Thujene	0.01	tr	Monoterpene
Methyl hexanoate	0.02	0.03	Aliphatic ester
α -Pinene	0.15	0.15	Monoterpene
Methyl (3E)-hexenoate?	0.01		Aliphatic ester
Camphene	0.07	0.06	Monoterpene
β -Pinene	0.46*	0.40	Monoterpene
Sabinene	[0.46]*	0.06	Monoterpene
Geranic oxide	[0.46]*	0.01	Monoterpenic ether
cis-Carane	0.01*		Monoterpene
6-Methyl-5-hepten-2-one	[0.01]*	0.01	Aliphatic ketone
Myrcene	0.08*	0.07	Monoterpene
Dehydro-1,8-cineole	[0.08]*	[0.02]*	Monoterpenic ether
α -Terpinene	0.02	0.02	Monoterpene
para-Methylanisole	tr		Simple phenolic
para-Cymene	0.03	0.04	Monoterpene
Limonene	0.58*	0.13	Monoterpene
1,8-Cineole	[0.58]*	0.42	Monoterpenic ether
(Z)- β -Ocimene	1.64	1.65	Monoterpene
(E)- β -Ocimene	2.24	2.25	Monoterpene
γ -Terpinene	0.04	0.04	Monoterpene
cis-Sabinene hydrate	0.01	0.17*	Monoterpenic alcohol
cis-Linalool oxide (fur.)	0.12*	0.12	Monoterpenic alcohol
(2E)-Octenal?	[0.12]*		Aliphatic aldehyde
Terpinolene	0.03	0.04	Monoterpene
trans-Linalool oxide (fur.)	0.16	[0.17]*	Monoterpenic alcohol
Methyl benzoate	0.02	0.02	Phenolic ester
Rosefuran	0.01	0.02	Monoterpenic ether
trans-Sabinene hydrate	61.00	0.01	Monoterpenic alcohol

Hotrienol	[61.00]*	0.10	Monoterpenic alcohol
Linalool	[61.00]*	60.36	Monoterpenic alcohol
endo-Fenchol	[61.00]*	0.14*	Monoterpenic alcohol
Phenylethyl alcohol	[61.00]	0.39*	Simple phenolic
Methyl octanoate	0.02	0.02	Aliphatic ester
allo-Ocimene	0.05	0.04	Monoterpene
Linalyl methyl ether?	0.02		Monoterpenic ether
Camphor	0.01	0.01	Monoterpenic ketone
Camphene hydrate	0.01	8.22*	Monoterpenic alcohol
Nerol oxide	0.01	0.02*	Aliphatic ether
Borneol	0.06	1.92*	Monoterpenic alcohol
cis-Linalool oxide (pyr.)	0.02	0.02	Monoterpenic alcohol
Terpinen-4-ol	0.09	0.07	Monoterpenic alcohol
trans-Linalool oxide (pyr.)	[0.09]	0.01	Monoterpenic alcohol
α-Terpineol	0.49	[1.92]*	Monoterpenic alcohol
Hodiendiol	0.14	0.15	Monoterpenic alcohol
Methylchavicol	0.02	0.03	Phenylpropanoid
(3E,5E)-2,6-Dimethylocta-3,5,7-trien-2-ol	0.01	0.03	Monoterpenic alcohol
Nerol	0.12	0.16	Monoterpenic alcohol
Phenylethyl acetate	0.03	0.05	Phenolic ester
Geraniol	0.36	0.38	Monoterpenic alcohol
Undec-(5Z)-en-2-one	0.04	0.03	Aliphatic ketone
2,6-Dimethyl-1,7-octadiene-3,6-diol	0.02	0.03	Monoterpenic alcohol
Safrole	0.06	0.06	Phenylpropanoid
trans-Linalool oxide acetate (pyr.)	0.11	0.11	Monoterpenic ester
Indole	0.06	0.07	Indole
Methyl anthranilate	0.05	0.07	Phenolic ester
δ-Elemene isomer	0.02	[0.02]*	Sesquiterpene
α-Cubebene	0.14	0.14	Sesquiterpene
Hodiendiol derivative III	0.02		Oxygenated monoterpene
α-Copaene	0.55	0.54	Sesquiterpene
cis-β-Elemene	0.15	[0.14]*	Sesquiterpene
β-Cubebene	0.07	0.06	Sesquiterpene
β-Elemene	4.21	[8.22]*	Sesquiterpene
Methyleugenol	1.85	1.83	Phenylpropanoid
β-Caryophyllene	3.83	[8.22]*	Sesquiterpene
cis-α-Bergamotene	0.16	0.15	Sesquiterpene
β-Copaene	0.04	0.05	Sesquiterpene
trans-α-Bergamotene	0.32	[8.22]*	Sesquiterpene
Phenylethyl butyrate?	0.04*		Phenolic ester
α-Guaiene	[0.04]*	[8.22]*	Sesquiterpene
9-epi-Isocaryophyllene	0.02	0.02	Sesquiterpene
epi-β-Santalene	1.03*	0.02	Sesquiterpene
α-Humulene	[1.03]*	1.14*	Sesquiterpene
allo-Aromadendrene	0.03	0.04	Sesquiterpene
(E)-β-Farnesene	0.08	0.06	Sesquiterpene
trans-Cadina-1(6),4-diene	0.03	[1.14]*	Sesquiterpene
Selina-4,11-diene	0.18	0.19	Sesquiterpene
γ-Murolene	0.11	0.30*	Sesquiterpene
Germacrene D	1.36	[1.92]*	Sesquiterpene
β-Selinene	1.00*	0.85	Sesquiterpene

α -Amorphene	[1.00]*	[0.30]*	Sesquiterpene
Phenylethyl isovalerate	0.26		Phenolic ester
α -Selinene	0.88	[0.74]*	Sesquiterpene
α -Muurolene	0.18	0.10	Sesquiterpene
Germacrene A	1.27*	1.03*	Sesquiterpene
Methyl (<i>E</i>)-isoeugenol	[1.27]*	0.42	Phenylpropanoid
β -Bisabolene	0.41	0.42	Sesquiterpene
Cubebol	0.22*	0.05	Sesquiterpenic alcohol
γ -Cadinene	[0.22]*	[1.03]*	Sesquiterpene
(3 <i>E</i> ,6 <i>E</i>)- α -Farnesene	0.11	0.18	Sesquiterpene
Zonarene	1.23*	0.88	Sesquiterpene
<i>trans</i> -Calamenene	[1.23]*	0.04	Sesquiterpene
Unknown	[1.23]*		Sesquiterpene
δ -Cadinene	[1.23]*	[1.03]*	Sesquiterpene
<i>trans</i> -Cadina-1,4-diene	0.09	0.09	Sesquiterpene
α -Cadinene	0.02	0.01	Sesquiterpene
α -Calacorene	0.04	[0.39]*	Sesquiterpene
α -Elemol	0.10*	0.01	Sesquiterpenic alcohol
Isocaryophyllene epoxide B	[0.10]*	[0.39]*	Sesquiterpenic ether
Elemicin	0.04	0.07*	Phenylpropanoid
(<i>E</i>)-Nerolidol	0.47	0.54*	Sesquiterpenic alcohol
Caryophyllene oxide	0.60	0.64	Sesquiterpenic ether
Humulene epoxide II	0.14*	0.12	Sesquiterpenic ether
Unknown	[0.14]*		Oxygenated sesquiterpene
Junenol	0.13	0.08	Sesquiterpenic alcohol
1- <i>epi</i> -Cubenol	0.11	[0.54]*	Sesquiterpenic alcohol
τ -Muurolol	0.58*	0.24	Sesquiterpenic alcohol
τ -Cadinol	[0.58]*	0.32	Sesquiterpenic alcohol
α -Muurolol	0.08	0.04	Sesquiterpenic alcohol
α -Cadinol	0.35*	0.10	Sesquiterpenic alcohol
Phenylethyl hexanoate	[0.35]*		Phenolic ester
Selin-11-en-4 α -ol	[0.35]*	0.25	Sesquiterpenic alcohol
(3 <i>Z</i>)-Caryophylla-3,8(13)-dien-5 β -ol	0.16	0.17	Sesquiterpenic alcohol
Germacre-4(15),5,10(14)-trien-1 β -ol?	0.08		Sesquiterpenic alcohol
Unknown	0.15	0.25	Aliphatic ester
Unknown	0.17	0.14	Aliphatic ester
Nonadecane	0.05	0.08	Alkane
Methyl palmitate	0.04	[0.07]*	Aliphatic ester
Methyl linoleate	0.37	0.36	Aliphatic ester
Methyl α -linolenate	0.22	0.19	Aliphatic ester
Total identified	97.22%	95.38%	

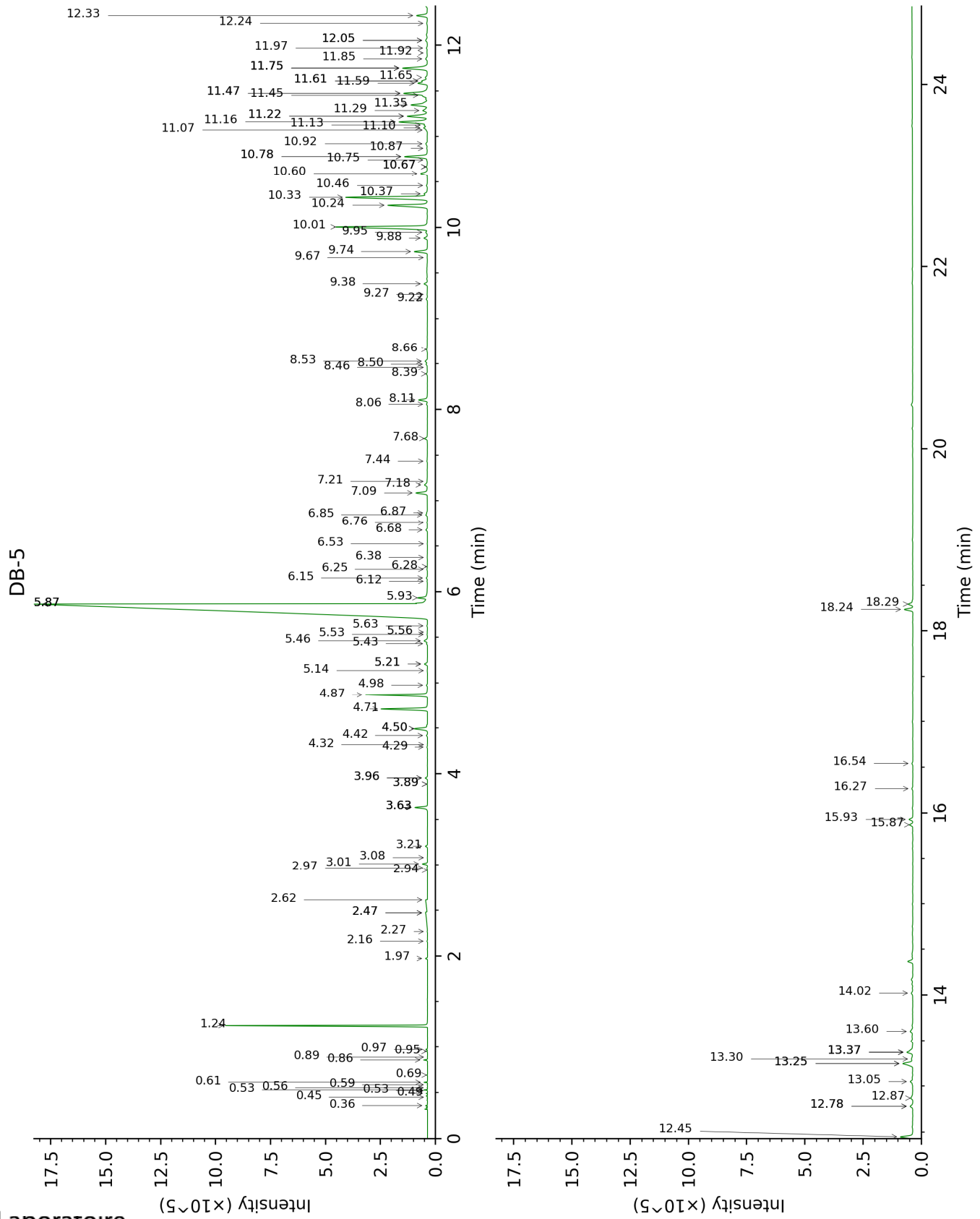
*: Two or more compounds are coeluting on this column

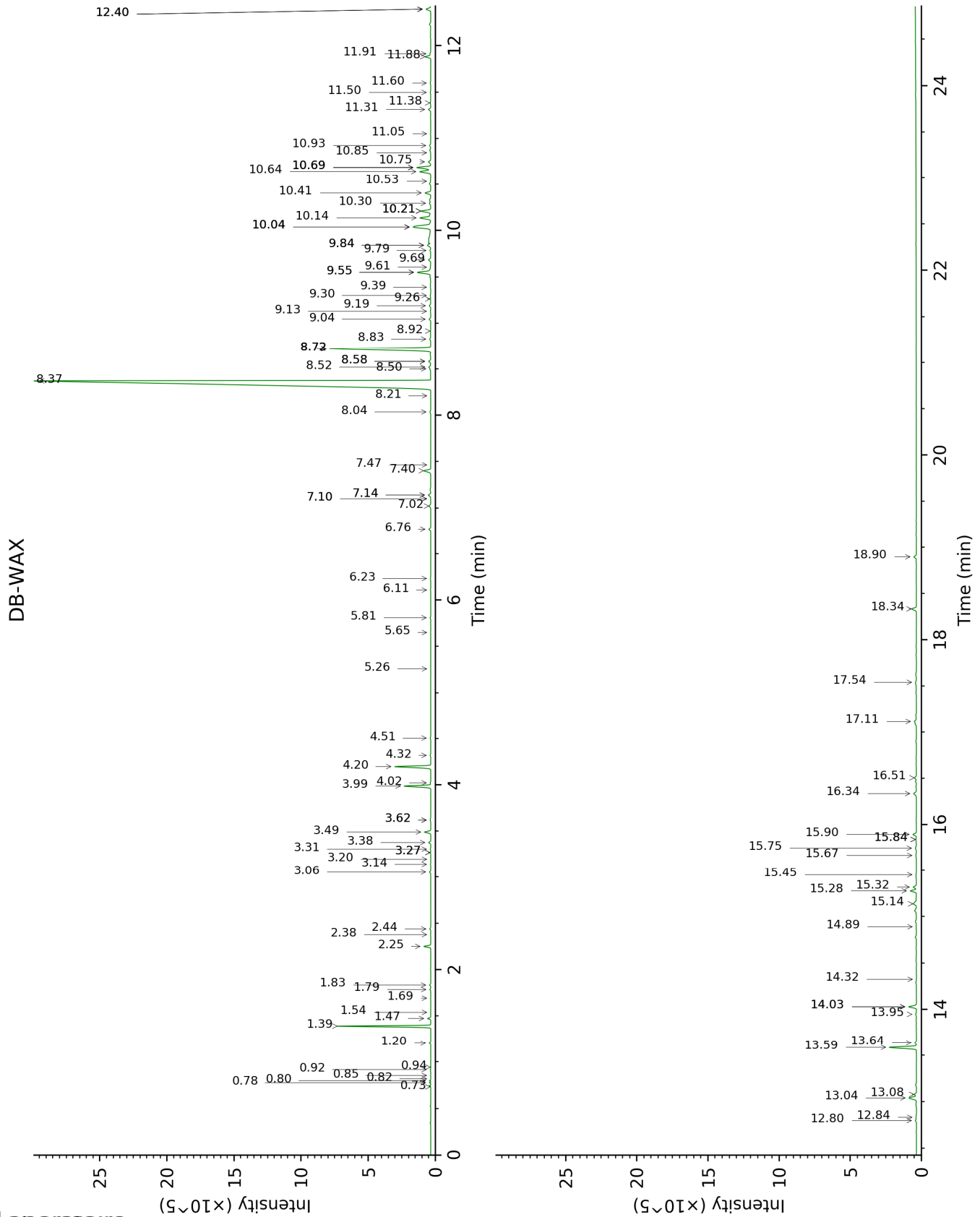
[xx]: Duplicate percentage due to coelutions, not taken account in the identified total

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

Note: no correction factor was applied

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	0.36	495	0.02	0.92	906	0.02
3-Buten-2-one	0.45	575	tr	0.94	910	tr
2-Methyl-3-buten-2-ol	0.49	605	0.01	1.69	1016	0.01
3-Methylfuran	0.52	616	tr	0.73	854	0.01
Methyl propionate	0.53	619	0.04	0.78	871	0.04
1,3-Cyclohexadiene	0.56	627	tr			
Isovaleral	0.59	638	tr	0.82	886	tr
2-Methylbutyral	0.62	648	0.04	0.80	879	0.04
Methyl isobutyrate	0.69	675	0.01	0.86	895	0.01
Methyl butyrate	0.86	714	0.06	1.20	952	0.06
2-Methylbutanenitrile	0.89	718	tr			
Isoamyl alcohol	0.95	727	0.01	3.62*	1178	0.05
2-Methylbutanol	0.97	730	0.03	3.62*	1178	[0.05]
Methyl 2-methylbutyrate	1.24	770	4.24	1.39	982	4.26
Ethyl 2-methylbutyrate	1.97	844	0.05	1.79	1025	0.05
Methyl tiglate	2.16	860	0.01	3.27*	1151	0.02
Hexanol	2.27	869	0.01	5.65	1323	0.01
2-Methylbutyric acid	2.47*	886	0.36	10.21*	1667	0.74
2-Heptanone	2.47*	886	[0.36]	3.20	1146	0.01
Isovaleric acid	2.62	898	0.30	10.21*	1667	[0.74]
α -Thujene	2.94	920	0.01	1.54	1002	tr
Methyl hexanoate	2.97	922	0.02	3.31	1154	0.03
α -Pinene	3.01	925	0.15	1.47	995	0.15
Methyl (3E)-hexenoate?	3.08	930	0.01			
Camphene	3.21	938	0.07	1.84	1030	0.06
β -Pinene	3.63*	966	0.46	2.25	1069	0.40
Sabinene	3.63*	966	[0.46]	2.44	1086	0.06
Geranic oxide	3.63*	966	[0.46]	2.38	1081	0.01
cis-Carane	3.89*	983	0.01			
6-Methyl-5-hepten-2-one	3.89*	983	[0.01]	5.26	1295	0.01
Myrcene	3.96*	988	0.08	3.06	1135	0.07
Dehydro-1,8-cineole	3.96*	988	[0.08]	3.27*	1151	[0.02]
α -Terpinene	4.29	1010	0.02	3.14	1141	0.02
para-Methylanisole	4.32	1012	tr			
para-Cymene	4.42	1018	0.03	4.32	1228	0.04
Limonene	4.50*	1022	0.58	3.38	1159	0.13
1,8-Cineole	4.50*	1022	[0.58]	3.49	1168	0.42
(Z)- β -Ocimene	4.71	1036	1.64	3.99	1205	1.65
(E)- β -Ocimene	4.87	1046	2.24	4.20	1220	2.25
γ -Terpinene	4.98	1053	0.04	4.02	1207	0.04

<i>cis</i> -Sabinene hydrate	5.14	1063	0.01	7.14*	1430	0.17
<i>cis</i> -Linalool oxide (fur.)	5.21*	1067	0.12	6.76	1402	0.12
(2 <i>E</i>)-Octenal?	5.21*	1067	[0.12]			
Terpinolene	5.43	1081	0.03	4.51	1241	0.04
<i>trans</i> -Linalool oxide (fur.)	5.46	1083	0.16	7.14*	1430	[0.17]
Methyl benzoate	5.53	1088	0.02	8.92	1564	0.02
Rosefuran	5.56	1089	0.01	6.23	1364	0.02
<i>trans</i> -Sabinene hydrate	5.63†	1094	61.00	8.21	1510	0.01
Hotrienol	5.87*†	1109	[61.00]	9.04	1574	0.10
Linalool	5.87*†	1109	[61.00]	8.37	1522	60.36
endo-Fenchol	5.87*†	1109	[61.00]	8.58*	1538	0.14
Phenylethyl alcohol	5.93†	1113	[61.00]	12.40*	1853	0.39
Methyl octanoate	6.12	1124	0.02	6.11	1356	0.02
allo-Ocimene	6.15	1127	0.05	5.81	1334	0.04
Linalyl methyl ether?	6.25	1133	0.02			
Camphor	6.28	1135	0.01	7.47	1454	0.01
Camphene hydrate	6.38	1141	0.01	8.72*	1549	8.22
Nerol oxide	6.52	1151	0.01	7.10*	1427	0.02
Borneol	6.68	1160	0.06	10.04*	1653	1.92
<i>cis</i> -Linalool oxide (pyr.)	6.76	1166	0.02	10.53	1693	0.02
Terpinen-4-ol	6.85†	1171	0.09	8.83	1557	0.07
<i>trans</i> -Linalool oxide (pyr.)	6.87†	1173	[0.09]	10.85	1720	0.01
α-Terpineol	7.09	1187	0.49	10.04*	1653	[1.92]
Hodiendiol	7.18	1192	0.14	13.08	1914	0.15
Methylchavicol	7.22	1195	0.02	9.61	1618	0.03
(3 <i>E</i> ,5 <i>E</i>)-2,6-Dimethylocta-3,5,7-trien-2-ol	7.44	1209	0.01	11.60	1783	0.03
Nerol	7.68	1226	0.12	11.31	1759	0.16
Phenylethyl acetate	8.06	1251	0.03	11.38	1765	0.05
Geraniol	8.11	1254	0.36	11.88	1808	0.38
Undec-(5 <i>Z</i>)-en-2-one	8.39	1273	0.04	9.13	1580	0.03
2,6-Dimethyl-1,7-octadiene-3,6-diol	8.46	1278	0.02	14.89	2084	0.03
Safrole	8.50	1280	0.06	11.92	1810	0.06
<i>trans</i> -Linalool oxide acetate (pyr.)	8.53	1282	0.11	9.19	1585	0.11
Indole	8.66	1291	0.06	17.54	2357	0.07
Methyl anthranilate	9.22	1330	0.05	15.67	2161	0.07
δ-Elemene isomer	9.27	1333	0.02	7.10*	1427	[0.02]
α-Cubebene	9.38	1341	0.14	7.02	1422	0.14
Hodiendiol derivative III	9.67	1362	0.02			
α-Copaene	9.74	1366	0.55	7.40	1450	0.54

<i>cis</i> -β-Elemene	9.88	1376	0.15	8.58*	1538	[0.14]
β-Cubebene	9.95	1381	0.07	8.04	1496	0.06
β-Elemene	10.01	1385	4.21	8.72*	1549	[8.22]
Methyleugenol	10.24	1402	1.85	13.59	1960	1.83
β-Caryophyllene	10.33	1408	3.83	8.72*	1549	[8.22]
<i>cis</i> -α-Bergamotene	10.37	1411	0.16	8.52	1534	0.15
β-Copaene	10.46	1418	0.04	8.50	1532	0.05
<i>trans</i> -α-Bergamotene	10.60	1428	0.32	8.72*	1549	[8.22]
Phenylethyl butyrate?	10.67*	1434	0.04			
α-Guaiene	10.67*	1434	[0.04]	8.72*	1549	[8.22]
9-epi-Isocaryophyllene	10.75	1439	0.02	9.39	1601	0.02
epi-β-Santalene	10.78*	1442	1.03	9.26	1591	0.02
α-Humulene	10.78*	1442	[1.03]	9.55*	1614	1.14
allo-Aromadendrene	10.87	1449	0.03	9.30	1594	0.04
(<i>E</i>)-β-Farnesene	10.92	1452	0.08	9.79	1633	0.06
<i>trans</i> -Cadina-1(6),4-diene	11.07	1464	0.03	9.55*	1614	[1.14]
Selina-4,11-diene	11.10	1465	0.18	9.68	1625	0.19
γ-Murolene	11.13	1468	0.11	9.84*	1637	0.30
Germacrene D	11.16	1470	1.36	10.04*	1653	[1.92]
β-Selinene	11.22*	1475	1.00	10.14	1661	0.85
α-Amorphene	11.22*	1475	[1.00]	9.84*	1637	[0.30]
Phenylethyl isovalerate	11.29	1479	0.26			
α-Selinene	11.35	1484	0.88	10.21*	1667	[0.74]
α-Murolene	11.45	1492	0.18	10.30	1674	0.10
Germacrene A	11.48*	1493	1.27	10.69*	1706	1.03
Methyl (<i>E</i>)-isoeugenol	11.48*	1493	[1.27]	15.28	2123	0.42
β-Bisabolene	11.59	1502	0.41	10.41	1683	0.42
Cubebol	11.61*	1504	0.22	12.84	1891	0.05
γ-Cadinene	11.61*	1504	[0.22]	10.69*	1706	[1.03]
(3 <i>E</i> ,6 <i>E</i>)-α-Farnesene	11.65	1507	0.11	10.75	1711	0.18
Zonarene	11.75*	1515	1.23	10.64	1702	0.88
<i>trans</i> -Calamenene	11.75*	1515	[1.23]	11.50	1774	0.04
Unknown [m/z 161, 81 (93), 105 (66), 93 (60), 119 (60), 204 (54)...]	11.75*	1515	[1.23]			
δ-Cadinene	11.75*	1515	[1.23]	10.69*	1706	[1.03]
<i>trans</i> -Cadina-1,4-diene	11.85	1522	0.09	10.93	1726	0.09
α-Cadinene	11.92	1528	0.02	11.05	1737	0.01
α-Calacorene	11.97	1532	0.04	12.40*	1853	[0.39]
α-Elemol	12.05*	1538	0.10	14.32	2030	0.01
Isocaryophyllene epoxide B	12.05*	1538	[0.10]	12.40*	1853	[0.39]
Elemicin	12.24	1553	0.04	15.84*†	2178	0.07

(E)-Nerolidol	12.33	1560	0.47	14.03*	2002	0.54
Caryophyllene oxide	12.45	1569	0.60	13.04	1910	0.64
Humulene epoxide II	12.78*	1595	0.14	13.64	1965	0.12
Unknown [m/z 43, 81 (97), 135 (71), 95 (62), 204 (61), 71 (59), 207 (56)... 222 (3)]	12.78*	1595	[0.14]			
Junenol	12.87	1602	0.13	13.95	1994	0.08
1-epi-Cubenol	13.05	1617	0.11	14.03*	2002	[0.54]
τ-Muurolol	13.25*	1633	0.58	15.32	2127	0.24
τ-Cadinol	13.25*	1633	[0.58]	15.14	2109	0.32
α-Muurolol	13.30	1637	0.08	15.45	2140	0.04
α-Cadinol	13.37*	1643	0.35	15.75	2169	0.10
Phenylethyl hexanoate	13.37*	1643	[0.35]			
Selin-11-en-4α-ol	13.37*	1643	[0.35]	15.90	2184	0.25
(3Z)-Caryophylla-3,8(13)-dien-5β-ol	13.60	1663	0.16	17.11	2311	0.17
Germacra-4(15),5,10(14)-trien-1β-ol?	14.02	1697	0.08			
Unknown [m/z 43, 67 (85), 81 (70), 79 (53), 95 (46), 55 (39), 41 (37)...]	15.87	1860	0.15	16.34	2230	0.25
Unknown [m/z 79, 43 (84), 67 (55), 93 (50), 95 (41), 80 (35)...]	15.93	1865	0.17	16.51	2247	0.14
Nonadecane	16.27	1895	0.05	12.80	1888	0.08
Methyl palmitate	16.54	1921	0.04	15.84*†	2178	[0.07]
Methyl linoleate	18.24	2085	0.37	18.34	2444	0.36
Methyl α-linolenate	18.29	2091	0.22	18.90	2508	0.19
Total identified		97.22%			95.38%	
Total reported		97.53%			95.76%	

*: Two or more compounds are coeluting on this column

[xx]: Duplicate percentage due to coelutions, not taken account in the identified 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