

Date : January 31, 2019

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 19A18-PTH03-1-CC

Customer identification : Ylang Complete - Madagascar - Y1010787R

Type : Essential oil

Source : *Cananga odorata* var. *genuina* (Ylang-ylang)

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 : Lindsay Girard, B. Sc.

Analysis date : January 24, 2019

Checked and approved by :



Alexis St-Gelais, M. Sc., chimiste 2013-174

Note: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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

Refractive index: 1.5003 ± 0.0003 (20 °C)

CONCLUSION

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

ANALYSIS SUMMARY

Identification	DB-5 (%)	DB-WAX (%)	Classe
Isoamyl acetate	0.01	0.01*	Aliphatic ester
2-Methylbutyl acetate	0.01	[0.01]*	Aliphatic ester
3-Methyl-3-butenyl acetate	0.02	0.05*	Aliphatic ester
Prenyl acetate	0.08	0.08	Aliphatic ester
α -Pinene	0.10	0.10	Monoterpene
Camphene	tr	tr	Monoterpene
Benzaldehyde	0.01	0.02	Simple phenolic
Sabinene	0.05*	tr	Monoterpene
β -Pinene	[0.05]*	0.04	Monoterpene
6-Methyl-5-hepten-2-one	0.01		Aliphatic ketone
Myrcene	0.09	0.09	Monoterpene
(3Z)-Hexenyl acetate	0.04		Aliphatic ester
para-Methylanisole	2.79	2.73	Simple phenolic
(2E)-Hexenyl acetate	0.01	0.01	Aliphatic ester
meta-Methylanisole	0.01	0.01	Simple phenolic
Limonene	0.19*	[0.05]*	Monoterpene
1,8-Cineole	[0.19]*	0.15*	Monoterpenic ether
β -Phellandrene	[0.19]*	[0.15]*	Monoterpene
Benzyl alcohol	0.05	0.06	Simple phenolic
(Z)- β -Ocimene	0.01	0.01	Monoterpene
(E)- β -Ocimene	0.02	0.02	Monoterpene
cis-Linalool oxide (fur.)	0.01	0.03	Monoterpenic alcohol
trans-Linalool oxide (fur.)	0.02	0.03	Monoterpenic alcohol
Methyl benzoate	1.45	1.52*	Phenolic ester
2-Nonanol	7.13*	0.04	Aliphatic alcohol
Nonanal	[7.13]*	0.01	Aliphatic aldehyde
Linalool	[7.13]*	7.08	Monoterpenic alcohol
Phenylethyl alcohol	0.01	0.01	Simple phenolic
Benzeneacetonitrile	0.01	0.01	Simple phenolic
ortho-Dimethoxybenzene	0.02		Simple phenolic
para-Cresyl acetate	1.18*		Phenolic ester
Benzyl acetate	[1.18]*	1.31	Phenolic ester
Ethyl benzoate	0.06	0.06	Phenolic ester
Terpinen-4-ol	0.01	0.09*	Monoterpenic alcohol
α -Terpineol	0.20*	0.14	Monoterpenic alcohol
Methyl salicylate	[0.20]*	3.29*	Phenolic ester
Methylchavicol	0.13	0.33	Phenylpropanoid
Nerol	0.06	0.08*	Monoterpenic alcohol
Phenylethyl acetate	0.03	[0.08]*	Phenolic ester
Geraniol	1.42*	1.39	Monoterpenic alcohol
Linalyl acetate	[1.42]*	0.25	Monoterpenic ester
Chavicol	0.01	0.13*	Phenylpropanoid
Geranial	0.06	0.09	Monoterpenic aldehyde
(E)-Anethole	0.05	0.05	Phenylpropanoid
1-Nitro-2-phenylethane	0.06	0.13*	Simple phenolic
(E)-Cinnamyl alcohol	0.02	0.02	Phenylpropanoid
4-Vinylguaiaacol	0.03	0.03	Simple phenolic
Bicycloelemene	0.03	0.04	Sesquiterpene

Benzyl butyrate	0.10	0.03	Phenolic ester
α -Cubebene	0.17	0.16	Sesquiterpene
Eugenol	0.68	0.71	Phenylpropanoid
Neryl acetate	0.04	0.06*	Monoterpenic ester
α -Ylangene	0.14	0.13	Sesquiterpene
α -Copaene	1.00	1.01	Sesquiterpene
β -Bourbonene	0.01	0.02	Sesquiterpene
β -Cubebene	0.02	0.13	Sesquiterpene
Geranyl acetate	7.20*	14.79*	Monoterpenic ester
β -Elemene	[7.20]*	14.34*	Sesquiterpene
Methyleugenol	0.05*	0.05*	Phenylpropanoid
α -Gurjunene	[0.05]*	0.02	Sesquiterpene
Isocaryophyllene	13.93	[14.34]*	Sesquiterpene
Caryophylla-4(12),8(13)-diene	0.09	[0.09]*	Sesquiterpene
allo-Aromadendrene	0.34	[1.52]*	Sesquiterpene
<i>trans</i> -Muurolo-3,5-diene	0.54*	0.22	Sesquiterpene
9-epi-Isocaryophyllene	[0.54]*	0.10	Sesquiterpene
(<i>E</i>)-Cinnamyl acetate	[0.54]*	0.46	Phenylpropanoid ester
α -Humulene	3.97	3.64	Sesquiterpene
(<i>E</i>)-Isoeugenol	0.04	[0.13]*	Phenylpropanoid
<i>cis</i> -Cadina-1(6),4-diene	0.01	0.01	Sesquiterpene
<i>cis</i> -Muurolo-4(15),5-diene	0.19	0.15	Sesquiterpene
<i>trans</i> -Cadina-1(6),4-diene	0.01	0.06	Sesquiterpene
γ -Muurolole	19.02	2.06	Sesquiterpene
<i>trans</i> -Muurolo-4(15),5-diene	[19.02]*	[19.39]	Sesquiterpene
Germacrene D	[19.02]*	[19.39]	Sesquiterpene
γ -Amorphene	0.03	19.39	Sesquiterpene
epi-Cubebol	0.46*	0.11	Sesquiterpenic alcohol
Prenyl benzoate	[0.46]*	0.36	Phenolic ester
α -Muurolole	1.09	1.80	Sesquiterpene
Unknown	1.03*		Sesquiterpene
(3 <i>Z</i> ,6 <i>E</i>)- α -Farnesene	[1.03]*	[0.06]*	Sesquiterpene
γ -Cadinene	11.54	1.14	Sesquiterpene
(3 <i>E</i> ,6 <i>E</i>)- α -Farnesene	[11.54]	[14.79]*	Sesquiterpene
<i>trans</i> -Calamenene	3.63*	0.02	Sesquiterpene
δ -Cadinene	[3.63]*	[3.29]*	Sesquiterpene
<i>trans</i> -Cadina-1,4-diene	0.23	0.22	Sesquiterpene
α -Calacorene	0.28*	0.04	Sesquiterpene
α -Cadinene	[0.28]*	0.25	Sesquiterpene
α -Elemol	0.07	0.10	Sesquiterpenic alcohol
Germacrene B	0.03	0.03	Sesquiterpene
β -Calacorene	0.01	0.02	Sesquiterpene
(<i>E</i>)-Nerolidol	0.15	0.28*	Sesquiterpenic alcohol
(3 <i>Z</i>)-Hexenyl benzoate	0.02	0.02	Phenolic ester
Spathulenol	0.06	0.09	Sesquiterpenic alcohol
Caryophyllene oxide	0.17*	0.11	Sesquiterpenic ether
Caryophyllene oxide isomer	[0.17]*	0.05	Sesquiterpenic ether
Unknown	0.09	0.06	Sesquiterpenic alcohol
Viridiflorol	0.08*	0.06	Sesquiterpenic alcohol
Unknown	[0.08]*	0.04	Oxygenated sesquiterpene
Guaiol	0.06	[0.13]*	Sesquiterpenic alcohol
Humulene epoxide II	0.14*	[0.05]*	Sesquiterpenic ether

Copaborneol	[0.14]*	0.55*	Sesquiterpenic alcohol
(E)-Isoeugenyl acetate	0.36*	0.01	Phenylpropanoid ester
Junenol	[0.36]*	0.26	Sesquiterpenic alcohol
10-epi-Cubenol	[0.36]*	0.10	Sesquiterpenic alcohol
1-epi-Cubenol	0.22	[0.28]*	Sesquiterpenic alcohol
Cubenol	0.12	0.15	Sesquiterpenic alcohol
τ-Muurolol	1.32*	0.74	Sesquiterpenic alcohol
τ-Cadinol	[1.32]*	[0.55]*	Sesquiterpenic alcohol
α-Muurolol	0.38	0.29	Sesquiterpenic alcohol
Unknown	0.24	0.20	Sesquiterpenic alcohol
α-Cadinol	1.48	1.51	Sesquiterpenic alcohol
cis-Calamenen-10-ol	0.01	0.05*	Sesquiterpenic alcohol
trans-Calamenen-10-ol	0.01	0.01	Sesquiterpenic alcohol
Bulnesol	0.04	0.05	Sesquiterpenic alcohol
Unknown	0.16	0.17	Oxygenated sesquiterpene
(2E,6Z)-Farnesol	0.02	[0.05]*	Sesquiterpenic alcohol
(2E,6E)-Farnesol	1.96	1.96	Sesquiterpenic alcohol
(2E,6E)-Farnesal	0.03	0.04	Sesquiterpenic aldehyde
Benzyl benzoate	6.34	6.36	Phenolic ester
(2E,6E)-Farnesyl acetate	1.60	1.60	Sesquiterpenic ester
Benzyl salicylate	1.64	1.65	Phenolic ester
Geranyl benzoate	0.15	0.15	Phenolic ester
Unknown	0.09		Unknown
Total identified	97.83%	97.24%	

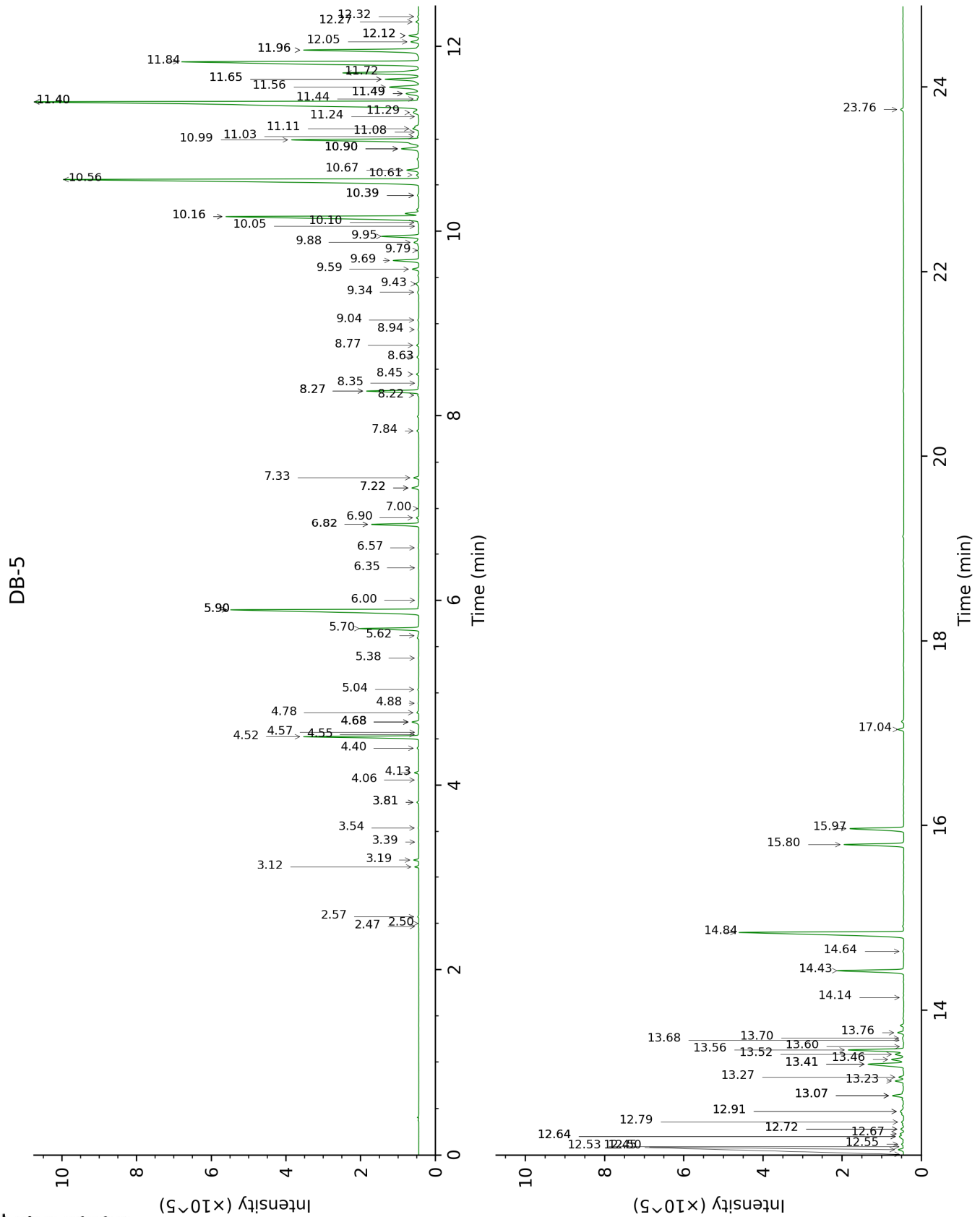
*: Two or more compounds are coeluting on this column

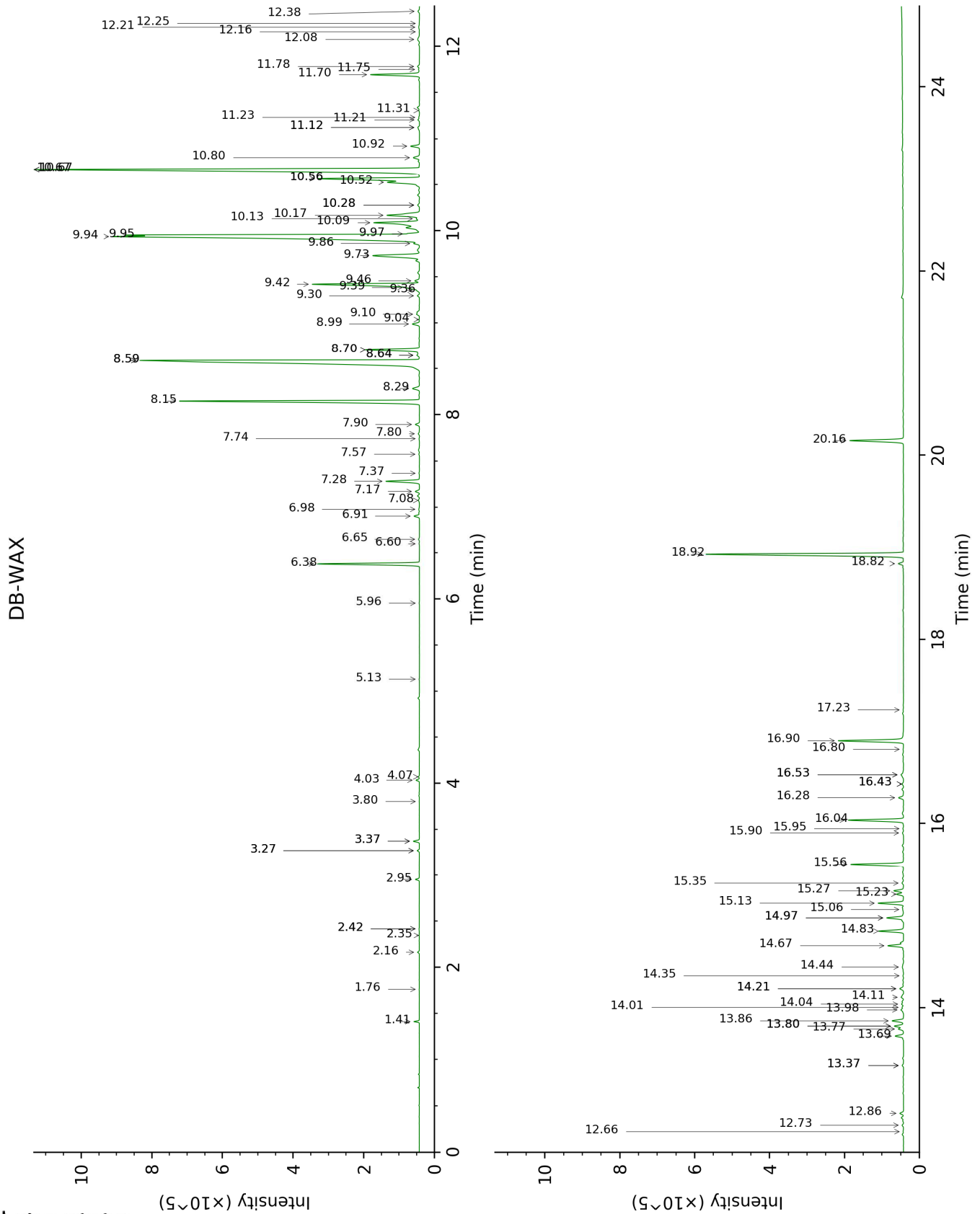
[xx]: Duplicate percentage due to coelutions, not taken account in the identified total

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	%
Isoamyl acetate	2.47	876	0.01	2.42*	1092	0.01
2-Methylbutyl acetate	2.50	879	0.01	2.42*	1092	[0.01]
3-Methyl-3-butenyl acetate	2.57	885	0.02	3.27*	1160	0.05
Prenyl acetate	3.12	924	0.08	4.03	1220	0.08
α -Pinene	3.19	929	0.10	1.41	994	0.10
Camphene	3.39	942	tr	1.76	1030	tr
Benzaldehyde	3.54	952	0.01	7.37	1459	0.02
Sabinene	3.82*	970	0.05	2.35	1085	tr
β -Pinene	3.82*	970	[0.05]	2.16	1067	0.04
6-Methyl-5-hepten-2-one	4.06	986	0.01			
Myrcene	4.14	991	0.09	2.95	1135	0.09
(3Z)-Hexenyl acetate	4.40	1008	0.04			
para-Methylanisole	4.52	1016	2.79	6.38	1385	2.73
(2E)-Hexenyl acetate	4.55	1018	0.01	5.13	1305	0.01
meta-Methylanisole	4.57	1019	0.01	6.60	1401	0.01
Limonene	4.68*	1026	0.19	3.27*	1160	[0.05]
1,8-Cineole	4.68*	1026	[0.19]	3.37*	1168	0.15
β -Phellandrene	4.68*	1026	[0.19]	3.37*	1168	[0.15]
Benzyl alcohol	4.78	1032	0.05	11.78	1817	0.06
(Z)- β -Ocimene	4.88	1039	0.01	3.80	1203	0.01
(E)- β -Ocimene	5.04	1049	0.02	4.07	1223	0.02
cis-Linalool oxide (fur.)	5.38	1070	0.01	6.65	1405	0.03
trans-Linalool oxide (fur.)	5.62	1085	0.02	6.98	1430	0.03
Methyl benzoate	5.70	1090	1.45	8.70*	1561	1.52
2-Nonanol	5.90*	1103	7.13	7.80	1491	0.04
Nonanal	5.90*	1103	[7.13]	5.96	1354	0.01
Linalool	5.90*	1103	[7.13]	8.15	1518	7.08
Phenylethyl alcohol	6.00	1110	0.01	12.16	1850	0.01
Benzeneacetonitrile	6.35	1132	0.01	12.25	1858	0.01
ortho-Dimethoxybenzene	6.57	1146	0.02			
para-Cresyl acetate	6.82*	1162	1.18			
Benzyl acetate	6.82*	1162	[1.18]	10.17	1679	1.31
Ethyl benzoate	6.90	1168	0.06	9.36	1613	0.06
Terpinen-4-ol	7.00	1174	0.01	8.64*	1557	0.09
α -Terpineol	7.22*	1189	0.20	9.86	1654	0.14
Methyl salicylate	7.22*	1189	[0.20]	10.56*	1712	3.29
Methylchavicol	7.33	1196	0.13	9.39	1615	0.33
Nerol	7.84	1230	0.06	11.12*	1760	0.08
Phenylethyl acetate	8.22	1256	0.03	11.12*	1760	[0.08]
Geraniol	8.27*	1259	1.42	11.70	1809	1.39

Linalyl acetate	8.27*	1259	[1.42]	8.28	1529	0.25
Chavicol	8.35	1265	0.01	16.53*	2274	0.13
Geranial	8.45	1272	0.06	10.13	1676	0.09
(E)-Anethole	8.63	1284	0.05	11.21	1767	0.05
1-Nitro-2-phenylethane	8.77	1294	0.06	14.21*	2040	0.13
(E)-Cinnamyl alcohol	8.94	1305	0.02	15.95	2213	0.02
4-Vinylguaiaicol	9.04	1309	0.03	15.06	2124	0.03
Bicycloelemene	9.34	1330	0.03	7.08	1437	0.04
Benzyl butyrate	9.43	1337	0.10	11.75	1814	0.03
α-Cubebene	9.59	1348	0.17	6.90	1424	0.16
Eugenol	9.68	1355	0.68	14.83	2100	0.71
Neryl acetate	9.79	1362	0.04	10.28*	1688	0.06
α-Ylangene	9.88	1368	0.14	7.17	1444	0.13
α-Copaene	9.94	1373	1.00	7.28	1452	1.01
β-Bourbonene	10.05	1381	0.01	7.57	1474	0.02
β-Cubebene	10.10	1384	0.02	7.90	1498	0.13
Geranyl acetate	10.16*†	1388	7.20	10.67*	1721	14.79
β-Elemene	10.16*†	1388	[7.20]	8.59*	1552	14.34
Methyleugenol	10.39*	1404	0.05	13.37*	1961	0.05
α-Gurjunene	10.39*	1404	[0.05]	7.74	1487	0.02
Isocaryophyllene	10.56	1417	13.93	8.59*	1552	[14.34]
Caryophylla-4(12),8(13)-diene	10.61	1421	0.09	8.64*	1557	[0.09]
allo-Aromadendrene	10.67	1425	0.34	8.70*	1561	[1.52]
trans-Muurola-3,5-diene	10.90*	1443	0.54	8.99	1584	0.22
9-epi-Isocaryophyllene	10.90*	1443	[0.54]	9.10	1592	0.10
(E)-Cinnamyl acetate	10.90*	1443	[0.54]	14.67	2085	0.46
α-Humulene	10.99	1450	3.97	9.42	1618	3.64
(E)-Isoeugenol	11.03	1452	0.04	16.53*	2274	[0.13]
cis-Cadina-1(6),4-diene	11.08	1456	0.01	9.04	1588	0.01
cis-Muurola-4(15),5-diene	11.11	1459	0.19	9.46	1621	0.15
trans-Cadina-1(6),4-diene	11.24	1469	0.01	9.30	1608	0.06
γ-Muurolole	11.29†	1472	19.02	9.73	1644	2.06
trans-Muurola-4(15),5-diene	11.40*†	1480	[19.02]	9.95†	1662	[19.39]
Germacrene D	11.40*†	1480	[19.02]	9.94†	1660	[19.39]
γ-Amorphene	11.44	1483	0.03	9.97†	1663	19.39
epi-Cubebol	11.49*	1487	0.46	12.08	1843	0.11
Prenyl benzoate	11.49*	1487	[0.46]	13.86	2006	0.36
α-Muurolole	11.56	1492	1.09	10.09	1673	1.80
Unknown [m/z 119, 41 (95), 123 (53), 80 (49), 161 (44), 105	11.65*	1499	1.03			

(42)... 204 (2)]						
(3Z,6E)- α -Farnesene	11.65*	1499	[1.03]	10.28*	1688	[0.06]
γ -Cadinene	11.72†	1504	11.54	10.52	1709	1.14
(3E,6E)- α -Farnesene	11.84†	1513	[11.54]	10.67*	1721	[14.79]
<i>trans</i> -Calamenene	11.96*	1523	3.63	11.31	1776	0.02
δ -Cadinene	11.96*	1523	[3.63]	10.56*	1712	[3.29]
<i>trans</i> -Cadina-1,4-diene	12.05	1530	0.23	10.80	1732	0.22
α -Calacorene	12.12*	1536	0.28	12.21	1855	0.04
α -Cadinene	12.12*	1536	[0.28]	10.92	1743	0.25
α -Elemol	12.27	1547	0.07	14.11	2031	0.10
Germacrene B	12.32	1552	0.03	11.23	1769	0.03
β -Calacorene	12.44	1561	0.01	12.66	1895	0.02
(<i>E</i>)-Nerolidol	12.50	1565	0.15	13.80*	2001	0.28
(3Z)-Hexenyl benzoate	12.53	1568	0.02	14.35	2054	0.02
Spathulenol	12.56	1570	0.06	14.44	2063	0.09
Caryophyllene oxide	12.64*	1577	0.17	12.86	1913	0.11
Caryophyllene oxide isomer	12.64*	1577	[0.17]	12.73	1901	0.05
Unknown cadinol or muurolol analog [m/z 161, 119 (77), 120 (76), 105 (73), 93 (57)... 204 (36)]	12.67	1579	0.09	12.38	1870	0.06
Viridiflorol	12.72*	1583	0.08	14.04	2024	0.06
Unknown [m/z 161, 105 (84), 43 (80), 119 (72), 93 (62), 121 (54)... 204 (38), 222 (2)]	12.72*	1583	[0.08]	14.00	2021	0.04
Guaiol	12.79	1589	0.06	14.21*	2040	[0.13]
Humulene epoxide II	12.91*	1598	0.14	13.37*	1961	[0.05]
Copaborneol	12.91*	1598	[0.14]	14.97*	2115	0.55
(<i>E</i>)-Isoeugenyl acetate	13.08*	1611	0.36	17.23	2349	0.01
Junenol	13.08*	1611	[0.36]	13.69	1991	0.26
10-epi-Cubenol	13.08*	1611	[0.36]	13.98	2018	0.10
1-epi-Cubenol	13.23	1624	0.22	13.80*	2001	[0.28]
Cubenol	13.27	1628	0.12	13.77	1998	0.15
τ -Muurolol	13.41*	1639	1.32	15.13	2131	0.74
τ -Cadinol	13.41*	1639	[1.32]	14.97*	2115	[0.55]
α -Muurolol	13.46	1644	0.38	15.27	2144	0.29
Unknown cadinol analog II [m/z 95, 121 (73), 43 (57), 79 (43), 161 (43), 109 (40)... 204 (35), 222 (2)]	13.52	1648	0.24	15.23	2141	0.20
α -Cadinol	13.56	1652	1.48	15.56	2174	1.51

<i>cis</i> -Calamenen-10-ol	13.60	1655	0.01	16.43*	2263	0.05
<i>trans</i> -Calamenen-10-ol	13.68	1661	0.01	16.80	2303	0.01
Bulnesol	13.70	1663	0.04	15.35	2153	0.05
Unknown [m/z 123, 95 (31), 81 (29), 105 (27)... 222 (5)]	13.76	1668	0.16	16.28	2248	0.17
(2 <i>E</i> ,6 <i>Z</i>)-Farnesol	14.14	1699	0.02	16.43*	2263	[0.05]
(2 <i>E</i> ,6 <i>E</i>)-Farnesol	14.43	1724	1.96	16.90	2313	1.96
(2 <i>E</i> ,6 <i>E</i>)-Farnesal	14.64	1742	0.03	15.90	2208	0.04
Benzyl benzoate	14.84	1760	6.34	18.92	2538	6.36
(2 <i>E</i> ,6 <i>E</i>)-Farnesyl acetate	15.80	1845	1.60	16.04	2223	1.60
Benzyl salicylate	15.97	1861	1.64	20.16	2684	1.65
Geranyl benzoate	17.04	1960	0.15	18.82	2526	0.15
Unknown [m/z 69, 83 (59), 81 (56), 137 (48), 41 (29), 139 (28)...]	23.76	2699	0.09			
Total identified		97.83%			97.24%	
Total reported		98.41%			97.70%	

*: 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