

Date : May 04, 2021

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 21D20-ORA08

Customer identification : Ylang Ylang - Madagascar - 3 years - 011890A

Type : Essential oil

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

Customer : Organic Aromas Inc.

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

Analysis date : May 04, 2021

Checked and approved by :

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

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PHYSICOCHEMICAL DATA

Physical aspect: Yellow liquid

Refractive index: 1.5034 ± 0.0003 (20 °C; method PC-MAT-016)

CONCLUSION

No clear contaminant or diluent has been detected using this method. However, the sample contains plinol C, which is considered by some authors as being indicative of addition of foreign linalool. We recommend this observation is considered when evaluating this batch.

ANALYSIS SUMMARY – CONSOLIDATED CONTENTS

New readers of similar reports are encouraged to read table footnotes at least once.

Identification	%	Class
2-Methyl-3-buten-2-ol	0.01	Aliphatic alcohol
Ethyl acetate	0.01	Aliphatic ester
Prenol	tr	Aliphatic alcohol
Octane	tr	Alkane
Butyl acetate	tr	Aliphatic ester
Isoamyl acetate	0.01	Aliphatic ester
2-Methylbutyl acetate	0.01	Aliphatic ester
3-Methyl-3-butenyl acetate	0.02	Aliphatic ester
Prenyl acetate	0.08	Aliphatic ester
α -Pinene	0.16	Monoterpene
Camphene	0.01	Monoterpene
Benzaldehyde	0.02	Simple phenolic
β -Pinene	0.05	Monoterpene
Sabinene	0.01	Monoterpene
6-Methyl-5-hepten-2-one	0.02	Aliphatic ketone
Myrcene	0.09	Monoterpene
(3Z)-Hexenyl acetate	0.03	Aliphatic ester
para-Methylanisole	2.41	Simple phenolic
1,8-Cineole	0.16	Monoterpenic ether
Limonene	0.03	Monoterpene
Benzyl alcohol	0.05	Simple phenolic
(Z)- β -Ocimene	0.01	Monoterpene
(E)- β -Ocimene	0.02	Monoterpene
cis-Linalool oxide (fur.)	0.02	Monoterpenic alcohol
para-Cresol	0.04	Simple phenolic
trans-Linalool oxide (fur.)	0.02	Monoterpenic alcohol
Methyl benzoate	1.20	Phenolic ester
Linalool	6.17	Monoterpenic alcohol
Nonanal	0.01	Aliphatic aldehyde
Plinol (C?)	0.02	Monoterpenic alcohol
Benzeneacetonitrile	0.01	Simple phenolic
ortho-Dimethoxybenzene	0.02	Simple phenolic
Benzyl acetate	1.01	Phenolic ester
Ethyl benzoate	0.04	Phenolic ester
Terpinen-4-ol	0.01	Monoterpenic alcohol
Methyl salicylate	0.02	Phenolic ester
α -Terpineol	0.15	Monoterpenic alcohol
Methylchavicol	0.11	Phenylpropanoid
Nerol	0.04	Monoterpenic alcohol
Neral	0.03	Monoterpenic aldehyde
Phenylethyl acetate	0.02	Phenolic ester
Geraniol	1.30	Monoterpenic alcohol
Chavicol	0.01	Phenylpropanoid
Geranial	0.06	Monoterpenic aldehyde
(E)-Anethole	0.06	Phenylpropanoid

1-Nitro-2-phenylethane	0.03	Simple phenolic
δ -Elemene isomer	0.04	Sesquiterpene
Benzyl butyrate	0.10	Phenolic ester
α -Cubebene	0.19	Sesquiterpene
Eugenol	0.51	Phenylpropanoid
Neryl acetate	0.03	Monoterpenic ester
α -Ylangene	0.30	Sesquiterpene
α -Copaene	1.18	Sesquiterpene
β -Bourbonene	0.01	Sesquiterpene
β -Cubebene	0.14	Sesquiterpene
Geranyl acetate	6.42	Monoterpenic ester
β -Elemene	0.25	Sesquiterpene
Sibirene	0.01	Sesquiterpene
Cyperene	0.04	Sesquiterpene
Isocaryophyllene	0.01	Sesquiterpene
α -Gurjunene	0.01	Sesquiterpene
Methyleugenol	0.04	Phenylpropanoid
β -Caryophyllene	14.62	Sesquiterpene
Caryophylla-4(12),8(13)-diene	0.10	Sesquiterpene
β -Copaene	0.50	Sesquiterpene
Aromadendrene	0.07	Sesquiterpene
Isogermacrene D	0.08	Sesquiterpene
(<i>E</i>)-Cinnamyl acetate	0.48	Phenylpropanoid ester
α -Humulene	4.17	Sesquiterpene
(<i>E</i>)-Isoeugenol	0.03	Phenylpropanoid
allo-Aromadendrene	0.02	Sesquiterpene
<i>cis</i> -Muurolo-4(15),5-diene	0.01	Sesquiterpene
<i>cis</i> -Cadina-1(6),4-diene	0.14	Sesquiterpene
<i>trans</i> -Cadina-1(6),4-diene	0.31	Sesquiterpene
γ -Muurolo-ene	2.51	Sesquiterpene
Germacrene D	13.93	Sesquiterpene
<i>trans</i> -Muurolo-4(15),5-diene	0.06	Sesquiterpene
γ -Amorphene	0.45	Sesquiterpene
Prenyl benzoate	0.03	Phenolic ester
epi-Cubebol	0.05	Sesquiterpenic alcohol
Bicyclogermacrene	0.54	Sesquiterpene
(3 <i>Z</i> ,6 <i>E</i>)- α -Farnesene	0.04	Sesquiterpene
Methyl (<i>E</i>)-isoeugenol	0.03	Phenylpropanoid
α -Muurolo-ene	1.17	Sesquiterpene
δ -Amorphene	0.41	Sesquiterpene
Unknown	1.43	Sesquiterpene
δ -Guaiene	0.64	Sesquiterpene
(3 <i>E</i> ,6 <i>E</i>)- α -Farnesene	6.83	Sesquiterpene
Cubebol	0.07	Sesquiterpenic alcohol
γ -Cadinene	1.07	Sesquiterpene
<i>trans</i> -Calamenene	0.20	Sesquiterpene
δ -Cadinene	3.77	Sesquiterpene
Zonarene	0.25	Sesquiterpene
<i>trans</i> -Cadina-1,4-diene	0.21	Sesquiterpene
α -Cadinene	0.32	Sesquiterpene
α -Calacorene	0.04	Sesquiterpene
<i>cis</i> -Dracunculifoliol	0.02	Sesquiterpenic alcohol

α -Elemol	0.08	Sesquiterpenic alcohol
Germacrene B	0.03	Sesquiterpene
β -Calacorene	0.03	Sesquiterpene
(E)-Nerolidol	0.14	Sesquiterpenic alcohol
(3Z)-Hexenyl benzoate	0.09	Phenolic ester
Spathulenol	0.03	Sesquiterpenic alcohol
Caryophyllene oxide isomer	0.05*	Sesquiterpenic ether
Caryophyllene oxide	0.12	Sesquiterpenic ether
10-epi-Junanol	[0.05]*	Sesquiterpenic alcohol
Globulol	0.13	Sesquiterpenic alcohol
Unknown	0.03	Oxygenated sesquiterpene
Unknown	0.06	Sesquiterpenic alcohol
Viridiflorol	0.04	Sesquiterpenic alcohol
Guaiol	0.09	Sesquiterpenic alcohol
Copaborneol	0.06	Sesquiterpenic alcohol
Humulene epoxide II	0.05	Sesquiterpenic ether
10-epi-Cubenol	0.21	Sesquiterpenic alcohol
Junanol	0.33	Sesquiterpenic alcohol
(E)-Isoeugenyl acetate	0.01	Phenylpropanoid ester
1-epi-Cubenol	0.28	Sesquiterpenic alcohol
γ -Eudesmol	0.17	Sesquiterpenic alcohol
Cubenol	0.26	Sesquiterpenic alcohol
τ -Cadinol	0.45	Sesquiterpenic alcohol
τ -Muurolol	0.95	Sesquiterpenic alcohol
α -Muurolol	0.48	Sesquiterpenic alcohol
Unknown	0.29	Sesquiterpenic alcohol
α -Cadinol	1.81	Sesquiterpenic alcohol
cis-Calamenen-10-ol	0.03	Sesquiterpenic alcohol
trans-Calamenen-10-ol	0.07	Sesquiterpenic alcohol
Unknown	0.20	Oxygenated sesquiterpene
(2E,6Z)-Farnesol	0.03	Sesquiterpenic alcohol
(2Z,6E)-Farnesol	0.01	Sesquiterpenic alcohol
(2E,6E)-Farnesol	2.08	Sesquiterpenic alcohol
(2E,6E)-Farnesol	0.04	Sesquiterpenic aldehyde
Benzyl benzoate	6.97	Phenolic ester
Unknown	0.02	Unknown
(2E,6E)-Farnesyl acetate	1.85	Sesquiterpenic ester
Benzyl salicylate	1.85	Phenolic ester
Unknown	0.03	Unknown
Geranyl benzoate	0.19	Phenolic ester
Unknown	0.01	Unknown
Unknown	0.11	Unknown
Unknown	0.02	Unknown
Unknown	0.07	Unknown
Consolidated total	97.33%	

*: 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.

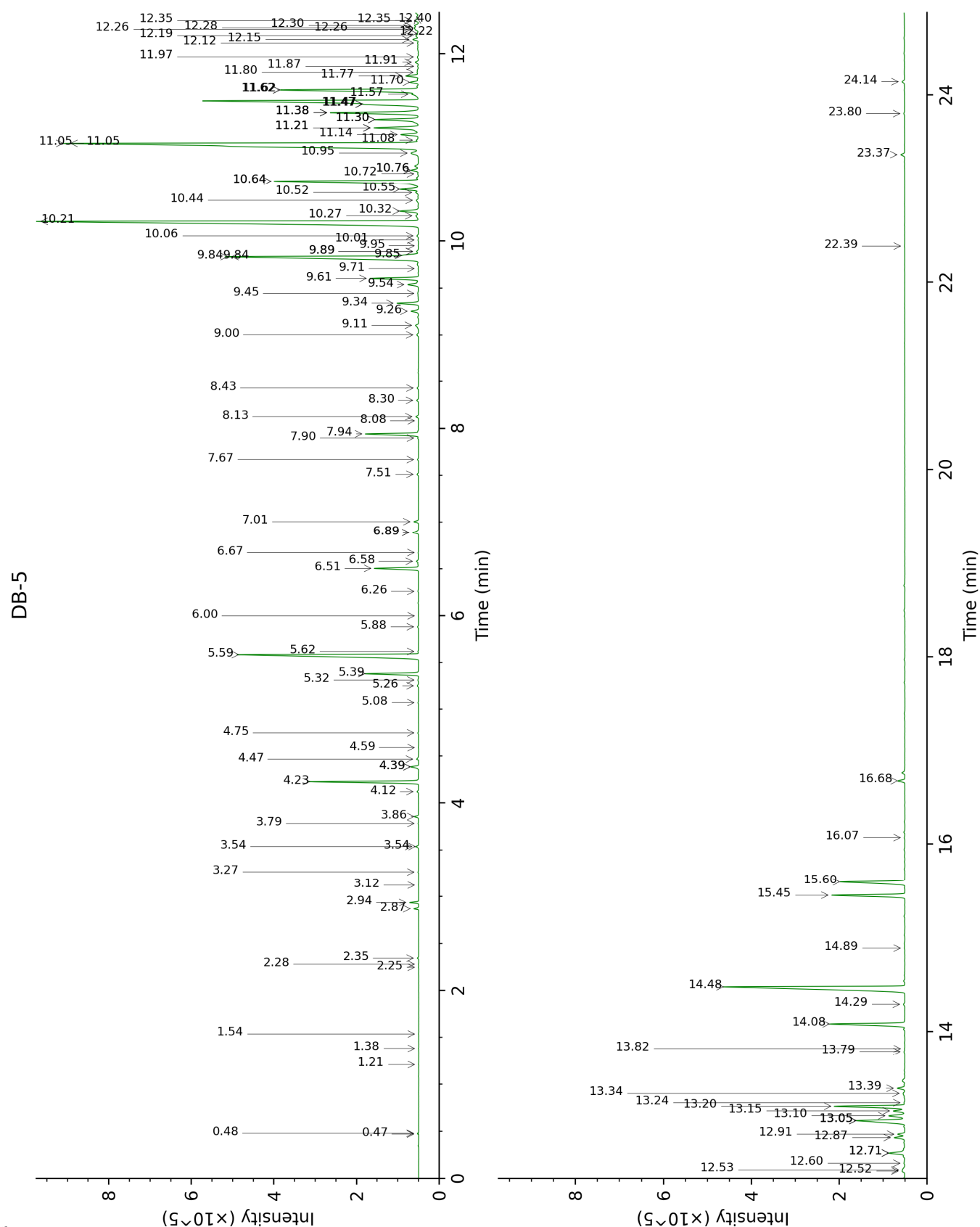
Note: no correction factor was applied

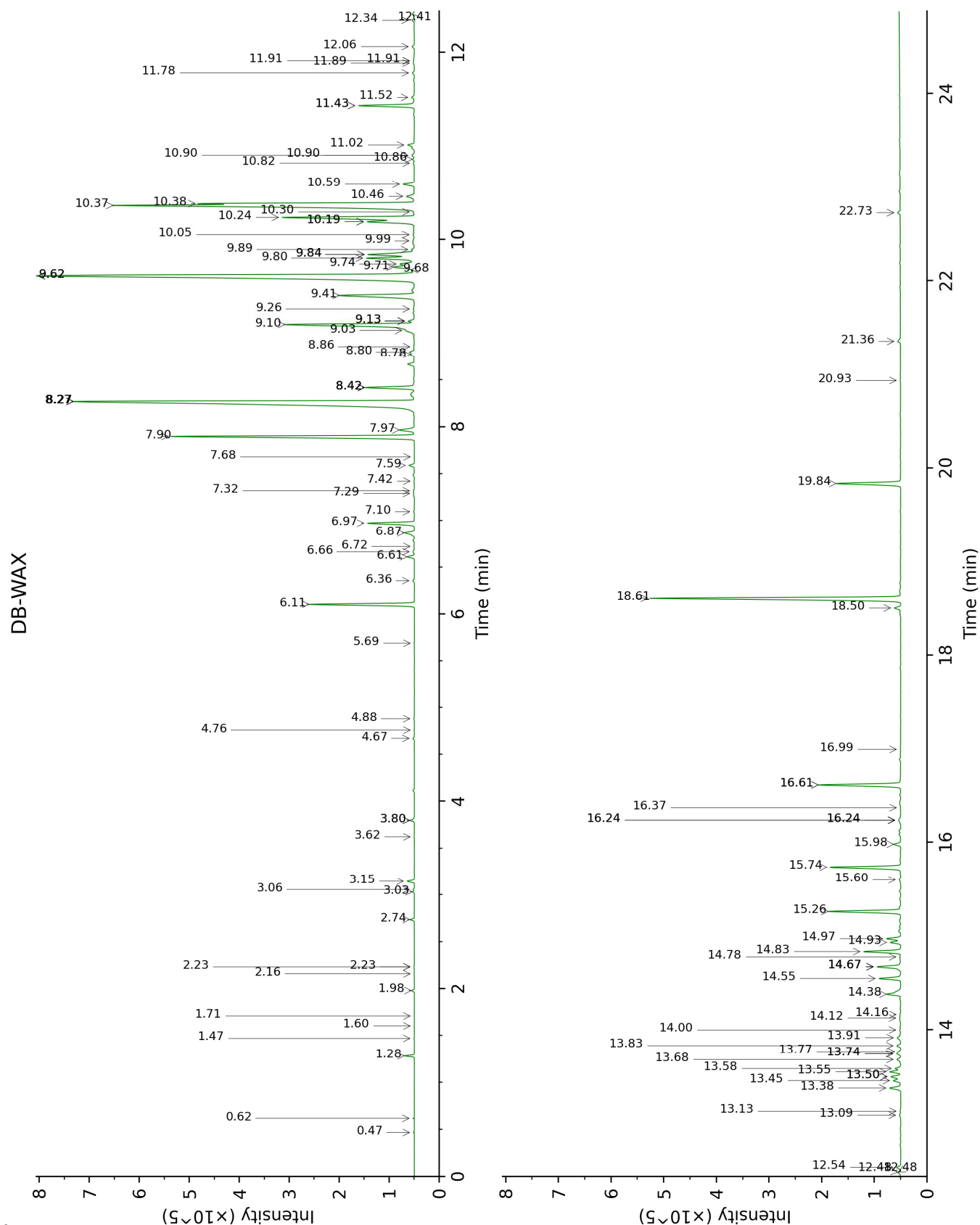
About "consolidated" data: The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies

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.

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	%
2-Methyl-3-buten-2-ol	0.47	600	0.01	1.47	1014	0.01
Ethyl acetate	0.48	606	0.01	0.62	852	0.01
Prenol	1.21	778	tr	4.76	1288	0.01
Octane	1.38	804	tr	0.47	784	0.01
Butyl acetate	1.54	818	tr	1.71	1038	tr
Isoamyl acetate	2.25	879	0.01	2.23*	1091	0.01
2-Methylbutyl acetate	2.28	882	0.01	2.23*	1091	[0.01]
3-Methyl-3-butenyl acetate	2.34	888	0.02	3.06	1159	0.03
Prenyl acetate	2.87	927	0.08	3.80*	1217	0.11
α -Pinene	2.94	932	0.16	1.28	991	0.16
Camphene	3.12	944	0.01	1.60	1027	tr
Benzaldehyde	3.27	954	0.02	7.10	1457	0.02
β -Pinene	3.54*	972	0.06	1.98	1065	0.05
Sabinene	3.54*	972	[0.06]	2.16	1083	0.01
6-Methyl-5-hepten-2-one	3.78	989	0.02	4.88	1298	0.02
Myrcene	3.86	994	0.09	2.74	1133	0.08
(3Z)-Hexenyl acetate	4.12	1011	0.03	4.67	1282	0.03
para-Methylanisole	4.23	1018	2.41	6.10	1384	2.44
1,8-Cineole	4.39*	1028	0.19	3.14	1166	0.16
Limonene	4.39*	1028	[0.19]	3.03	1157	0.03
Benzyl alcohol	4.47	1033	0.05	11.52	1816	0.08
(Z)- β -Ocimene	4.59	1041	0.01	3.62	1204	0.01
(E)- β -Ocimene	4.75	1051	0.02	3.80*	1217	[0.11]
cis-Linalool oxide (fur.)	5.08	1072	0.02	6.36	1402	0.05
para-Cresol	5.26	1083	0.04	13.74*	2019	0.13
trans-Linalool oxide (fur.)	5.32	1087	0.02	6.72	1429	0.01
Methyl benzoate	5.39	1091	1.20	8.42*	1559	1.24
Linalool	5.59	1104	6.17	7.90	1518	6.23
Nonanal	5.62	1106	0.01	5.69	1353	0.01
Plinol (C?)	5.88	1123	0.02	8.27*	1547	15.14
Benzeneacetonitrile	6.00	1131	0.01	11.91*	1850	0.04
ortho-Dimethoxybenzene	6.26	1147	0.02			
Benzyl acetate	6.51	1163	1.01	9.84*†	1673	[2.73]
Ethyl benzoate	6.58	1168	0.04	9.13*	1615	0.16
Terpinen-4-ol	6.67	1174	0.01	8.42*	1559	[1.24]
Methyl salicylate	6.89*	1188	0.18	10.30	1710	0.02
α -Terpineol	6.89*	1188	[0.18]	9.62*	1654	16.40
Methylchavicol	7.01	1196	0.11	9.13*	1615	[0.16]
Nerol	7.51	1229	0.04	10.86	1759	0.04
Neral	7.67	1240	0.03	9.26	1626	0.04

Phenylethyl acetate	7.90	1255	0.02	10.82	1755	0.03
Geraniol	7.94	1258	1.30	11.43*	1808	1.37
Chavicol	8.08	1267	0.01	16.24*	2270	0.11
Geranial	8.13	1270	0.06	9.90	1677	0.07
(E)-Anethole	8.30	1282	0.06	10.90*	1762	0.07
1-Nitro-2-phenylethane	8.43	1291	0.03	14.00	2044	0.03
δ-Elemene isomer	9.00	1330	0.04	6.66	1425	0.05
Benzyl butyrate	9.11	1338	0.10	11.43*	1808	[1.37]
α-Cubebene	9.26	1348	0.19	6.61	1421	0.18
Eugenol	9.34	1354	0.51	14.55	2097	0.56
Neryl acetate	9.44	1362	0.03	9.99	1685	0.05
α-Ylangene	9.54	1368	0.30	6.87	1440	0.32
α-Copaene	9.60	1373	1.18	6.98	1448	1.19
β-Bourbonene	9.71	1380	0.01	7.32	1474	0.03
β-Cubebene	9.84*	1389	6.56	7.59	1494	0.14
Geranyl acetate	9.84*	1389	[6.56]	10.38†	1718	[13.10]
β-Elemene	9.85	1390	0.25	8.27*	1547	[15.14]
Sibirene	9.89*	1393	0.05	7.68	1501	0.01
Cyperene	9.89*	1393	[0.05]	7.29	1472	0.04
Isocaryophyllene	9.95	1398	0.01	7.97	1523	0.47
α-Gurjunene	10.01	1402	0.01	7.42	1482	0.01
Methyleugenol	10.06	1405	0.04	13.09	1958	0.05
β-Caryophyllene	10.21	1416	14.62	8.27*	1547	[15.14]
Caryophylla-4(12),8(13)-diene	10.27	1421	0.10	8.42*	1559	[1.24]
β-Copaene	10.32	1425	0.50	8.27*	1547	[15.14]
Aromadendrene	10.44	1433	0.07	8.42*	1559	[1.24]
Isogermacrene D	10.52	1440	0.08	8.78	1586	0.10
(E)-Cinnamyl acetate	10.56	1442	0.48	14.38	2081	0.50
α-Humulene	10.64*	1449	4.19	9.10	1612	4.17
(E)-Isoeugenol	10.64*	1449	[4.19]	16.24*	2270	[0.11]
allo-Aromadendrene	10.72	1455	0.02	8.86	1593	0.03
cis-Muurolo-4(15),5-diene	10.76*	1458	0.21	9.13*	1615	[0.16]
cis-Cadina-1(6),4-diene	10.76*	1458	[0.21]	8.80	1588	0.14
trans-Cadina-1(6),4-diene	10.94	1471	0.31	9.03	1607	0.24
γ-Muurolole	11.05*	1479	16.44	9.41	1637	2.51
Germacrene D	11.05*	1479	[16.44]	9.62*	1654	[16.40]
trans-Muurolo-4(15),5-diene	11.08	1482	0.06	9.68	1660	0.07
γ-Amorphene	11.14	1486	0.45	9.62*	1654	[16.40]
Prenyl benzoate	11.21*	1491	1.35	13.50*	1996	0.29
epi-Cubebol	11.21*	1491	[1.35]	11.78	1839	0.05
Bicyclgermacrene	11.21*	1491	[1.35]	9.84*†	1673	[2.73]
(3Z,6E)-α-Farnesene	11.30*	1498	1.24	10.05	1690	0.04
Methyl (E)-isoeugenol	11.30*	1498	[1.24]	14.78	2120	0.03

α -Murolene	11.30*	1498	[1.24]	9.80†	1670	2.73
δ -Amorphene	11.38*	1503	2.48	9.74	1665	0.41
Unknown [m/z 119, 41 (95), 123 (53), 80 (49), 161 (44), 105 (42)... 204 (2)]	11.38*	1503	[2.48]			
δ -Guaiene	11.38*	1503	[2.48]	9.71	1662	0.64
(3E,6E)- α -Farnesene	11.47*†	1510	7.96	10.36†	1716	13.10
Cubebol	11.47*†	1510	[7.96]	12.34	1889	0.07
γ -Cadinene	11.47*†	1510	[7.96]	10.19*	1702	1.32
<i>trans</i> -Calamenene	11.57	1519	0.20	11.02	1772	0.18
δ -Cadinene	11.62*	1522	4.02	10.24	1705	3.77
Zonarene	11.62*	1522	[4.02]	10.19*	1702	[1.32]
<i>trans</i> -Cadina-1,4-diene	11.70	1529	0.21	10.46	1725	0.26
α -Cadinene	11.77	1534	0.32	10.59	1736	0.30
α -Calacorene	11.80	1537	0.04	11.89	1848	0.03
<i>cis</i> -Dracunculifolol	11.87	1542	0.02	11.91*	1850	[0.04]
α -Elemol	11.91	1546	0.08	13.83	2028	0.11
Germacrene B	11.97	1550	0.03	10.90*	1762	[0.07]
β -Calacorene	12.12	1562	0.03	12.41	1895	0.06
(<i>E</i>)-Nerolidol	12.15	1565	0.14	13.58	2004	0.14
(3Z)-Hexenyl benzoate	12.19	1568	0.09	14.12	2056	0.08
Spathulenol	12.22	1570	0.03	14.16	2060	0.02
Caryophyllene oxide isomer	12.26*†	1573	0.29	12.48*	1902	0.09
Caryophyllene oxide	12.26*†	1573	[0.29]	12.54	1906	0.12
10-epi-Junenol	12.28†	1574	[0.29]	12.48*	1902	[0.09]
Globulol	12.30†	1576	[0.29]	13.68	2013	0.13
Unknown [m/z 161, 105 (84), 43 (80), 119 (72), 93 (62), 121 (54)... 204 (38), 222 (2)]	12.35*	1580	0.10	13.76	2022	0.03
Unknown cadinol or murolol analog [m/z 161, 119 (77), 120 (76), 105 (73), 93 (57)... 204 (36)]	12.35*	1580	[0.10]	12.06	1864	0.06
Viridiflorol	12.40	1584	0.04	13.74*	2019	[0.13]
Guaïol	12.52	1593	0.09	13.92	2036	0.13
Copaborneol	12.53	1594	0.06	14.67*	2110	0.69
Humulene epoxide II	12.60	1600	0.05	13.13	1962	0.03
10-epi-Cubenol	12.71*	1609	0.47	13.45	1992	0.21
Junenol	12.71*	1609	[0.47]	13.38	1985	0.33
(<i>E</i>)-Isoeugenyl acetate	12.71*	1609	[0.47]	16.99	2351	0.01
1-epi-Cubenol	12.87	1622	0.28	13.55	2001	0.28
γ -Eudesmol	12.91	1625	0.17	14.67*	2110	[0.69]

Cubenol	13.05*	1637	1.65	13.50*	1996	[0.29]
τ -Cadinol	13.05*	1637	[1.65]	14.67*	2110	[0.69]
τ -Muurolol	13.05*	1637	[1.65]	14.83	2126	0.95
α -Muurolol	13.10	1641	0.48	14.97	2140	0.36
Unknown cadinol analog II [m/z 95, 121 (73), 43 (57), 79 (43), 161 (43), 109 (40)... 204 (35), 222 (2)]	13.15	1645	0.29	14.93	2136	0.26
α -Cadinol	13.20	1649	1.81	15.26	2169	1.85
<i>cis</i> -Calamenen-10-ol	13.24	1652	0.03	16.24*	2270	[0.11]
<i>trans</i> -Calamenen-10-ol	13.34	1661	0.07	16.61*	2310	2.13
Unknown [m/z 123, 95 (31), 81 (29), 105 (27)... 222 (5)]	13.39	1665	0.20	15.98	2243	0.19
(2E,6Z)-Farnesol	13.79	1698	0.03	16.24*	2270	[0.11]
(2Z,6E)-Farnesol	13.82	1700	0.01	16.37	2284	0.01
(2E,6E)-Farnesol	14.08	1723	2.08	16.61*	2310	[2.13]
(2E,6E)-Farnesal	14.29	1741	0.04	15.60	2203	0.05
Benzyl benzoate	14.48	1757	6.97	18.61	2532	6.75
Unknown [m/z 121, 107 (86), 81 (71), 93 (71), 59 (68), 43 (67)...]	14.89	1793	0.02			
(2E,6E)-Farnesyl acetate	15.45	1844	1.85	15.74	2218	1.82
Benzyl salicylate	15.60	1857	1.85	19.84	2677	1.76
Unknown [m/z 123, 81 (47), 43 (35), 91 (30), 41 (27), 79 (24)...]	16.07	1900	0.03	20.93	2813	0.01
Geranyl benzoate	16.68	1958	0.19	18.50	2520	0.18
Unknown [m/z 326, 311 (47), 327 (22), 202 (16), 137 (15)...]	22.39	2574	0.01			
Unknown [m/z 69, 83 (59), 81 (56), 137 (48), 41 (29), 139 (28)...]	23.37	2696	0.11	21.36	2867	0.09
Unknown [m/z 69, 81 (44), 147 (31), 41 (26), 119 (26), 93 (24)...]	23.80	2752	0.02			
Unknown [m/z 69, 81 (42), 147 (26), 119 (25), 93 (25), 41 (24)...]	24.14	2796	0.07	22.73	3049	0.07
Total identified		97.30%			96.79%	

Total reported	98.05%	97.50%
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*: 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