

Date : November 13, 2020

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 20J30-AOI05

Customer identification : Lemon - South Africa - LEM-204

Type : Essential oil

Source : *Citrus x limon*

Customer : Angies Organics 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 : Benoit Roger, Ph. D.

Analysis date : November 09, 2020

Checked and approved by :



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

Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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. The results only describe the samples that were submitted to the assays.

PHYSICOCHEMICAL DATA

Physical aspect: Light yellow liquid

Refractive index: 1.4746 ± 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
Octane	tr	Alkane
Heptanal	0.01	Aliphatic aldehyde
Tricyclene	0.01	Monoterpene
α -Thujene	0.37	Monoterpene
α -Pinene	1.73	Monoterpene
Camphene	0.05	Monoterpene
α -Fenchene	tr	Monoterpene
β -Pinene	10.16	Monoterpene
Sabinene	1.79	Monoterpene
6-Methyl-5-hepten-2-one	0.01	Aliphatic ketone
Myrcene	1.46	Monoterpene
Pseudolimonene	tr	Monoterpene
α -Phellandrene	0.03	Monoterpene
Octanal	0.05	Aliphatic aldehyde
Δ^3 -Carene	0.01	Monoterpene
α -Terpinene	0.14	Monoterpene
para-Cymene	0.70	Monoterpene
Limonene	67.91	Monoterpene
1,8-Cineole	0.85*	Monoterpenic ether
β -Phellandrene	[0.85]*	Monoterpene
(Z)- β -Ocimene	0.05	Monoterpene
(E)- β -Ocimene	0.11	Monoterpene
γ -Terpinene	7.42	Monoterpene
cis-Sabinene hydrate	0.04	Monoterpenic alcohol
Terpinolene	0.32	Monoterpene
trans-Sabinene hydrate	0.04	Monoterpenic alcohol
Linalool	0.10	Monoterpenic alcohol
Nonanal	0.07	Aliphatic aldehyde
trans-para-Mentha-2,8-dien-1-ol	0.01	Monoterpenic alcohol
cis-Limonene oxide	0.05	Monoterpenic ether
cis-para-Mentha-2,8-dien-1-ol	0.01	Monoterpenic alcohol
trans-Limonene oxide	0.04	Monoterpenic ether
Camphor	0.01	Monoterpenic ketone
Epoxyterpinolene	0.02	Monoterpenic ether
Citronellal	0.05	Monoterpenic aldehyde
Borneol	0.01	Monoterpenic alcohol
Terpinen-4-ol	0.04	Monoterpenic alcohol
Isogeranial	0.01	Monoterpenic aldehyde
α -Terpineol	0.17	Monoterpenic alcohol
Decanal	0.03	Aliphatic aldehyde
2,3-Epoxyneral?	0.02	Monoterpenic aldehyde
Nerol	0.05	Monoterpenic alcohol
2,3-Epoxygeranial?	0.04	Monoterpenic aldehyde
Neral	0.65	Monoterpenic aldehyde
Geraniol	0.03	Monoterpenic alcohol

Geranial	1.13	Monoterpenic aldehyde
Limonen-10-ol	0.01	Monoterpenic alcohol
Undecanal	0.02	Aliphatic aldehyde
Citronellyl acetate	0.03	Monoterpenic ester
Neryl acetate	0.43	Monoterpenic ester
Geranyl acetate	0.20	Monoterpenic ester
Dodecanal	0.01	Aliphatic aldehyde
β -Caryophyllene	0.22	Sesquiterpene
<i>cis</i> - α -Bergamotene	0.04	Sesquiterpene
<i>trans</i> - α -Bergamotene	0.42	Sesquiterpene
α -Humulene	0.02	Sesquiterpene
Neryl propionate	0.01	Monoterpenic ester
(<i>E</i>)- β -Farnesene	0.04	Sesquiterpene
β -Santalene	0.02	Sesquiterpene
<i>trans</i> - β -Bergamotene	0.03	Sesquiterpene
Valencene	0.02	Sesquiterpene
Bicyclogermacrene	0.01	Sesquiterpene
(<i>Z</i>)- α -Bisabolene	0.08	Sesquiterpene
β -Bisabolene	0.61	Sesquiterpene
(<i>Z</i>)- γ -Bisabolene	0.01	Sesquiterpene
(<i>E</i>)- α -Bisabolene	0.02	Sesquiterpene
Spathulenol	0.06	Sesquiterpenic alcohol
Caryophyllene oxide	0.02	Sesquiterpenic ether
Caryophyllene oxide isomer	0.01	Sesquiterpenic ether
Unknown	0.03	Oxygenated sesquiterpene
Unknown	0.02	Oxygenated sesquiterpene
α -Bisabolol	0.03	Sesquiterpenic alcohol
Myristic acid	0.05	Aliphatic acid
Citropten	0.05	Furanocoumarin
Palmitic acid	0.18	Aliphatic acid
Linoleic acid	0.14	Aliphatic acid
Oleic acid	0.15	Aliphatic acid
<i>cis</i> -Vaccenic acid?	0.06	Aliphatic acid
Stearic acid	0.07	Aliphatic acid
Consolidated total	98.91%	

*: 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

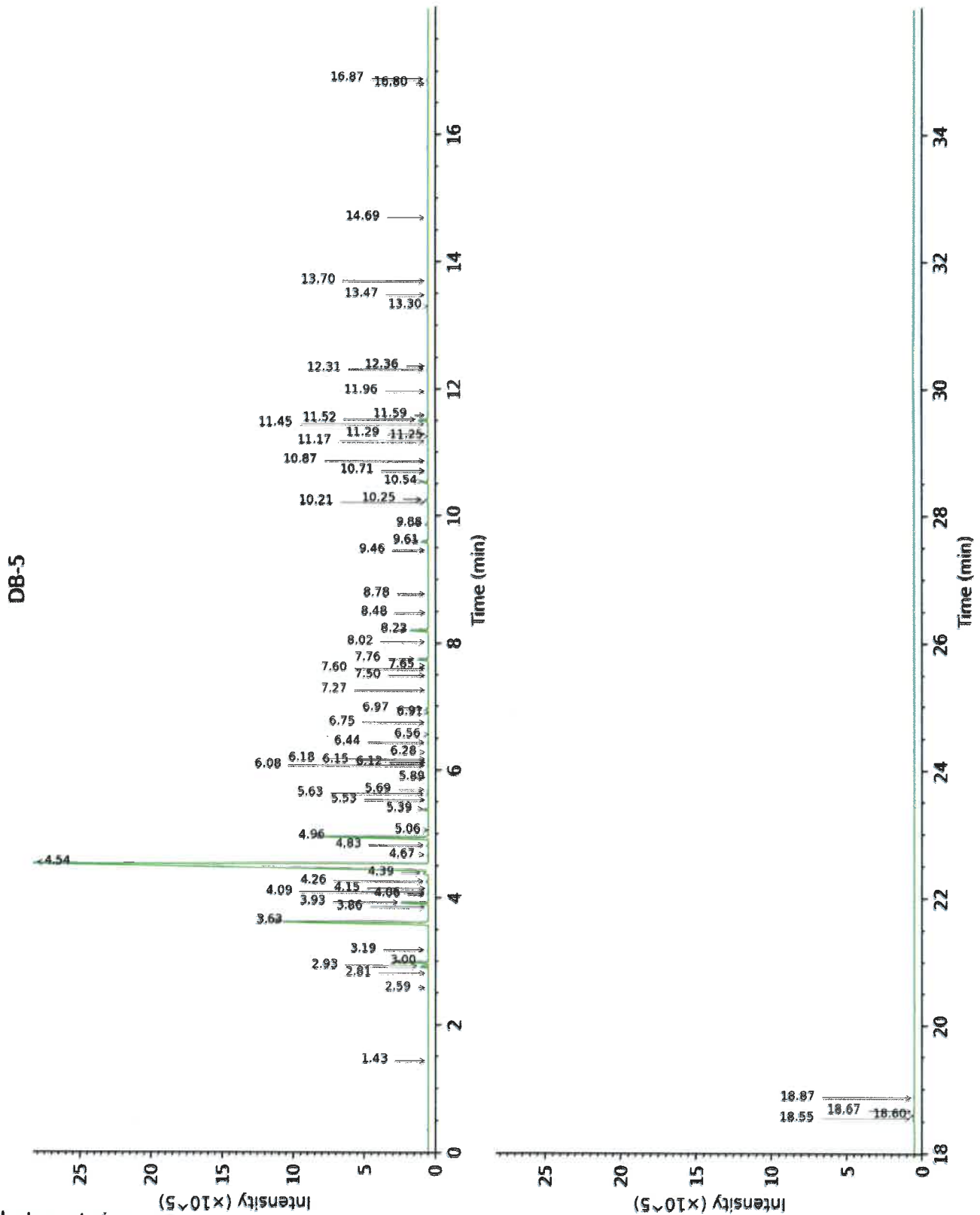
tr: The compound has been detected below 0.005% of total signal.

Note: no correction factor was applied

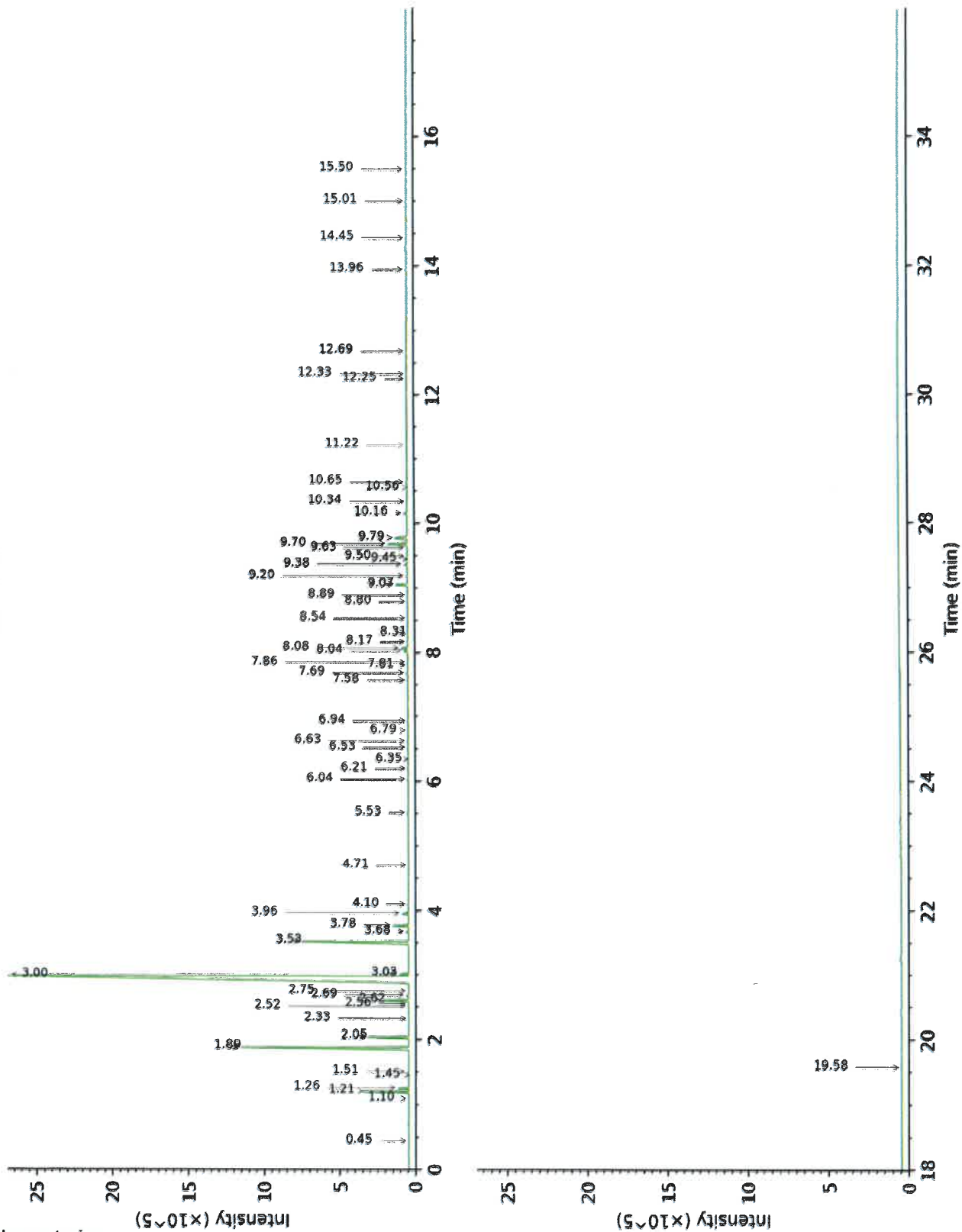
About "consolidated" data: The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm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



DB-WAX



FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Octane	1.43	803	tr	0.45	785	0.01
Heptanal	2.59	902	0.01	2.75	1147	0.01
Tricyclene	2.82	918	0.01	1.10	974	0.01
α -Thujene	2.93	925	0.37	1.26	1003	0.37
α -Pinene	3.00	930	1.73	1.21	994	1.71
Camphene	3.19*	943	0.06	1.51	1029	0.05
α -Fenchene	3.19*	943	[0.06]	1.45	1023	tr
β -Pinene	3.63*	972	12.06	1.89	1069	10.16
Sabinene	3.63*	972	[12.06]	2.05	1086	1.79
6-Methyl-5-hepten-2-one	3.86	988	0.01	4.71	1301	0.01
Myrcene	3.93	992	1.46	2.62	1136	1.46
Pseudolimonene	4.06*	1001	0.03	2.56	1131	tr
α -Phellandrene	4.06*	1001	[0.03]	2.52	1128	0.03
Octanal	4.09	1003	0.05	4.10	1254	0.04
Δ^3 -Carene	4.15	1007	0.01	2.33	1113	0.01
α -Terpinene	4.26	1014	0.14	2.69	1142	0.14
para-Cymene	4.39	1022	0.70	3.78	1230	0.76
Limonene	4.54*	1032	68.76	3.00	1167	67.91
1,8-Cineole	4.54*	1032	[68.76]	3.03*	1170	0.31
β -Phellandrene	4.54*	1032	[68.76]	3.03*	1170	[0.31]
(Z)- β -Ocimene	4.68	1040	0.05	3.53*	1211	7.42
(E)- β -Ocimene	4.83	1050	0.11	3.68	1222	0.11
γ -Terpinene	4.96	1059	7.42	3.53*	1211	[7.42]
cis-Sabinene hydrate	5.06	1064	0.04	6.53	1430	0.05
Terpinolene	5.39	1086	0.32	3.96	1243	0.31
trans-Sabinene hydrate	5.53	1095	0.04	7.58	1509	0.04
Linalool	5.63	1101	0.10	7.69	1518	0.10
Nonanal	5.69	1105	0.07	5.53	1356	0.07
trans-para-Mentha-2,8-dien-1-ol	5.89	1118	0.01	8.54	1584	0.01
cis-Limonene oxide	6.08	1130	0.05	6.04	1394	0.05
cis-para-Mentha-2,8-dien-1-ol	6.12	1133	0.01	9.07*	1626	0.67
trans-Limonene oxide	6.15	1135	0.04	6.21	1406	0.04
Camphor	6.18	1136	0.01	6.79	1450	0.01
Epoxyterpinolene	6.28	1143	0.02	6.35	1416	0.02
Citronellal	6.44	1154	0.05	6.63	1438	0.05
Borneol	6.56	1161	0.01	9.38*	1652	0.19
Terpinen-4-ol	6.75	1174	0.04	8.17	1555	0.05
Isogeranial	6.91	1184	0.01	7.81	1527	0.01
α -Terpineol	6.97	1188	0.17	9.38*	1652	[0.19]
Decanal	7.27	1207	0.03	6.94	1461	0.04

2,3-Epoxyneral?	7.50	1223	0.02			
Nerol	7.60	1230	0.05	10.65	1758	0.05
2,3-Epoxygeranial?	7.65	1233	0.04			
Neral	7.76	1241	0.65	9.07*	1626	[0.67]
Geraniol	8.02	1259	0.03	11.22	1808	0.04
Geranial	8.22	1272	1.13	9.70*	1678	1.14
Limonen-10-ol	8.48	1290	0.01	12.69	1942	0.01
Undecanal	8.78	1307	0.02	8.31	1566	0.02
Citronellyl acetate	9.46	1355	0.03	9.07*	1626	[0.67]
Neryl acetate	9.61	1366	0.43	9.79*	1685	1.05
Geranyl acetate	9.88	1385	0.20	10.16	1717	0.20
Dodecanal	10.21	1409	0.01	9.63	1672	0.01
β -Caryophyllene	10.25*	1412	0.24	8.04	1545	0.22
<i>cis</i> - α -Bergamotene	10.25*	1412	[0.24]	7.86	1531	0.04
<i>trans</i> - α -Bergamotene	10.54	1433	0.42	8.08	1548	0.39
α -Humulene	10.71*	1446	0.03	8.89	1612	0.02
Neryl propionate	10.71*	1446	[0.03]	10.56	1751	0.01
(<i>E</i>)- β -Farnesene	10.87*	1458	0.06	9.20*	1637	0.07
β -Santalene	10.87*	1458	[0.06]	8.80	1604	0.02
<i>trans</i> - β -Bergamotene	11.17	1481	0.03	9.20*	1637	[0.07]
Valencene	11.25	1487	0.02	9.45	1658	0.01
Bicyclogermacrene	11.29	1490	0.01	9.70*	1678	[1.14]
(<i>Z</i>)- α -Bisabolene	11.45	1501	0.08			
β -Bisabolene	11.52	1507	0.61	9.79*	1685	[1.05]
(<i>Z</i>)- γ -Bisabolene	11.59	1512	0.01	9.50	1662	0.03
(<i>E</i>)- α -Bisabolene	11.96	1542	0.02	10.34	1732	0.02
Spathulenol	12.31	1569	0.06	13.96	2064	0.06
Caryophyllene oxide	12.36*	1573	0.03	12.33	1908	0.02
Caryophyllene oxide isomer	12.36*	1573	[0.03]	12.25	1900	0.01
Unknown [m/z 94, 43 (89), 41 (67), 122 (46), 69 (41)...222]	13.30	1649	0.03	14.44	2112	0.03
Unknown [m/z 69, 95 (100), 41 (89), 109 (68), 67 (61)...222]	13.47	1664	0.02	15.50	2220	0.01
α -Bisabolol	13.70	1682	0.03	15.01	2169	0.04
Myristic acid	14.69	1768	0.05	19.58	2690	0.05
Citropten	16.80	1961	0.05			
Palmitic acid	16.87	1967	0.18			
Linoleic acid	18.55	2134	0.14			
Oleic acid	18.60	2140	0.15			
<i>cis</i> -Vaccenic acid?	18.67	2147	0.06			
Stearic acid	18.87	2167	0.07			
Total identified		98.95%			97.55%	
Total reported		99.01%			97.59%	

*: Two or more compounds are coeluting on this column

[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

R.T.: Retention time (minutes)

R.I.: Retention index