Date : December 10, 2020

Certificate of Analysis – GC Profiling

Sample identification

Internal code : 20L04-PTH08
Customer identification : Orange Sweet ORGANIC - O30110206R
Type : Essential oil
Source : *Citrus sinensis*
Customer : Plant Therapy

Analysis

Method: PC-MAT-014 ISO - Analysis of the composition of an essential oil or other volatile liquid by FAST GC-FID (in French); identifications validated by GC-MS.
Analyst : Fanny Charlier, B. Sc., chimiste à l'entraînement
Analysis date : December 07, 2020

Checked and approved by :

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

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Méthode certifiée ISO 17025:2017 Certified method

Laboratoire PhytoChemia
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PHYSICOCHEMICAL DATA

Physical aspect: Bright yellow liquid
Refractive index: 1.4735 ± 0.0003 (20 °C; method PC-MAT-016)

ISO 3140:2011 - OIL OF SWEET ORANGE, OBTAINED BY PHYSICAL EXTRACTION OF THE PEEL

Compound	Min. %	Max. %	Observed %	Complies?
β-Sinensal	0.01	0.06	0.02	Yes
Geranial	0.05	0.20	0.08	Yes
Valencene	0.01	0.40	0.03	Yes
Neral	0.03	0.10	0.06	Yes
Linalool	0.15	0.70	0.31	Yes
Decanal	0.1	0.7	0.2	Yes
Nonanal	0.01	0.06	0.04	Yes
Octanal	0.1	0.4	0.2	Yes
Limonene	93.0	96.0	93.1	Yes
Myrcene	1.5	3.5	1.9	Yes
Sabinene	0.2	0.8	0.2	Yes
β-Pinene	0.02	0.15	0.02	Yes
α-Pinene	0.4	0.8	0.6	Yes
Refractive index	1.4700	1.4760	1.4735	Yes

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
α-Pinene	0.56	Monoterpene
Camphene	tr	Monoterpene
β-Pinene	0.02	Monoterpene
Sabinene	0.22	Monoterpene
6-Methyl-5-hepten-2-one	0.04	Aliphatic ketone
Myrcene	1.86	Monoterpene
α-Phellandrene	0.04	Monoterpene
Octanal	0.25	Aliphatic aldehyde
Δ3-Carene	0.09	Monoterpene
para-Cymene	0.02	Monoterpene
β-Phellandrene	0.27	Monoterpene
Limonene	93.10	Monoterpene
(*Z*)-β-Ocimene	0.02	Monoterpene
(*E*)-β-Ocimene	0.03	Monoterpene
cis-Sabinene hydrate	0.01	Monoterpenic alcohol
Octanol	0.01	Aliphatic alcohol
Terpinolene	0.02	Monoterpene
Linalool	0.31	Monoterpenic alcohol
Nonanal	0.04	Aliphatic aldehyde
trans-para-Mentha-2,8-dien-1-ol	0.01	Monoterpenic alcohol
trans-Limonene oxide	0.02	Monoterpenic ether
Citronellal	0.04	Monoterpenic aldehyde
α-Terpineol	0.04	Monoterpenic alcohol
Decanal	0.17	Aliphatic aldehyde
Nerol	0.01	Monoterpenic alcohol
cis-Carveol	0.02	Monoterpenic alcohol
Neral	0.06	Monoterpenic aldehyde
Geraniol	0.01	Monoterpenic alcohol
Perillaldehyde	0.01	Monoterpenic aldehyde
Geranial	0.08	Monoterpenic aldehyde
Limonen-10-ol	0.01	Monoterpenic alcohol
Undecanal	0.02	Aliphatic aldehyde
α-Copaene	0.03	Sesquiterpene
Geranyl acetate	0.02	Monoterpenic ester
β-Elemene	0.01	Sesquiterpene
Dodecanal	0.04	Aliphatic aldehyde
β-Caryophyllene	0.03	Sesquiterpene
β-Copaene	0.02	Sesquiterpene
α-Humulene	0.01	Sesquiterpene
(*E*)-β-Farnesene	0.01	Sesquiterpene
Germacrene D	0.03	Sesquiterpene
Valencene	0.03	Sesquiterpene
α-Muurolene	0.02	Sesquiterpene
γ-Cadinene	0.02	Sesquiterpene
δ-Cadinene	0.05	Sesquiterpene

α-Elemol	0.01	Sesquiterpenic alcohol
Caryophyllene oxide	0.01	Sesquiterpenic ether
γ-Eudesmol	0.02	Sesquiterpenic alcohol
β-Sinensal	0.02	Sesquiterpenic aldehyde
α-Sinensal	0.01	Sesquiterpenic aldehyde
Myristic acid	0.01	Aliphatic acid
Nootkatone	0.01	Sesquiterpenic ketone
Palmitic acid	0.02	Aliphatic acid
Stearic acid	0.03	Aliphatic acid
Tetramethoxyflavone isomer	0.04	Flavonoid
Consolidated total	**97.88%**	

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.

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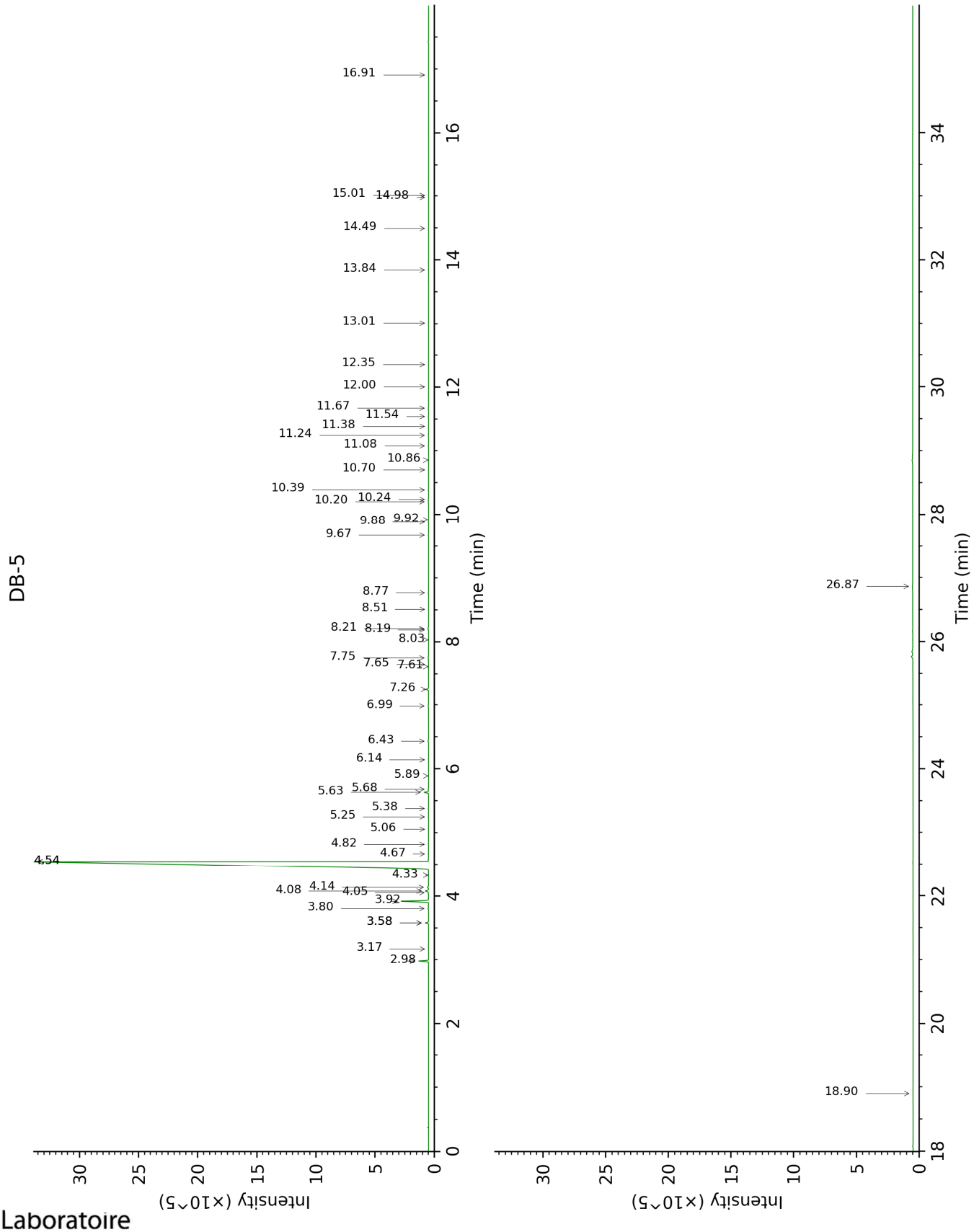
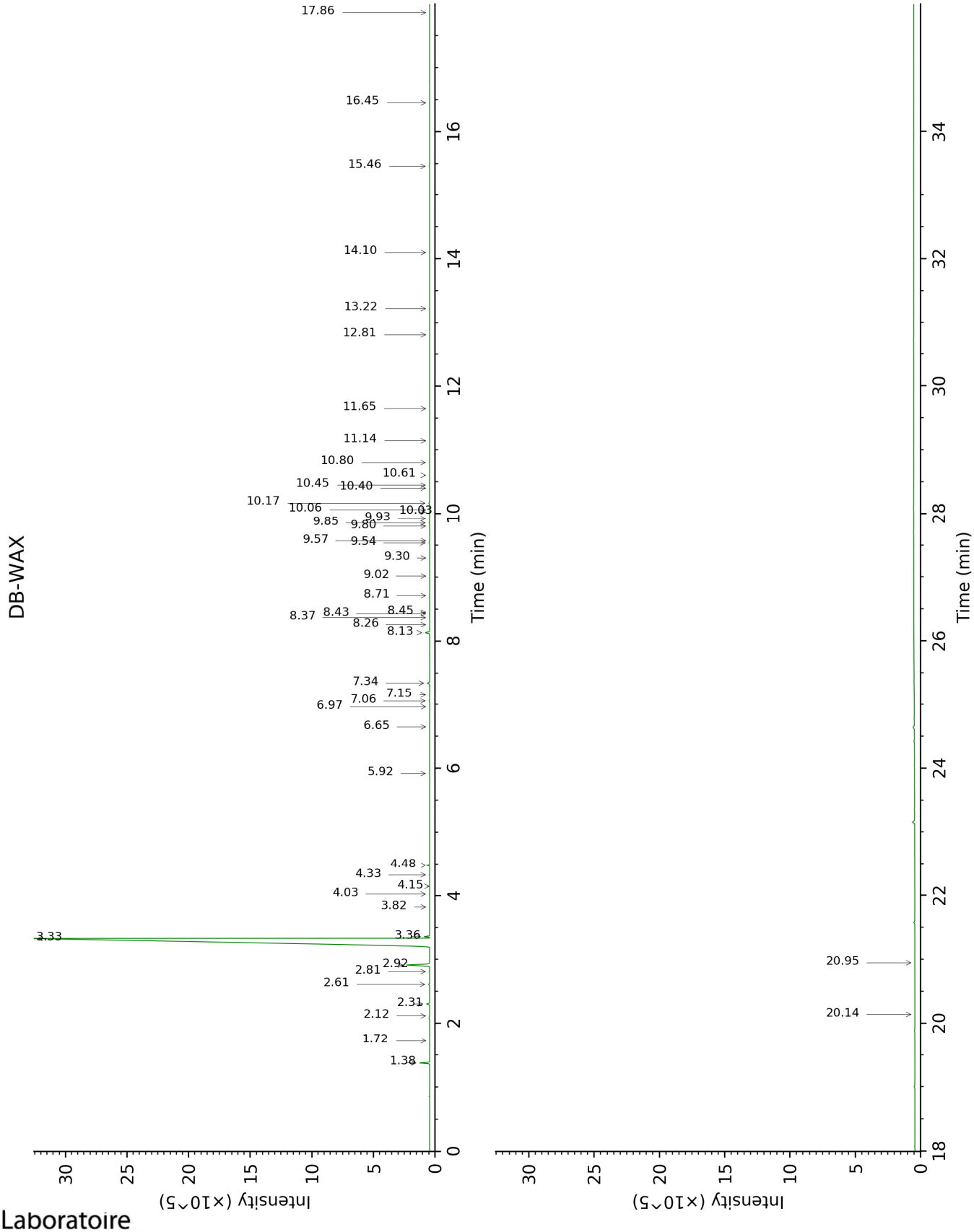

DB-5
16.91
15.01
14.98
14.49
13.84
13.01
12.35
12.00
11.67
11.54
11.38
11.24
11.08
10.86
10.70
10.39
10.20
10.24
9.88
9.92
9.67
8.77
8.51
8.21
8.19
8.03
7.75
7.65
7.61
7.26
6.99
6.43
6.14
5.89
5.63
5.68
5.38
5.25
5.06
4.82
4.67
4.54
4.33
4.08
4.14
4.05
3.92
3.80
3.58
3.17
2.98
26.87
18.90
Time (min)
Intensity (×10^5)


DB-WAX
17.86
16.45
15.46
14.10
13.22
12.81
11.65
11.14
10.80
10.61
10.45
10.40
10.17
10.06
10.03
9.93
9.85
9.80
9.57
9.54
9.30
9.02
8.71
8.37
8.43
8.45
8.26
8.13
7.34
7.15
7.06
6.97
6.65
5.92
4.48
4.33
4.15
4.03
3.82
3.36
3.33
2.92
2.81
2.61
2.31
2.12
1.72
1.38
20.95
20.14
Time (min)
Intensity (×10^5)

FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
α-Pinene	2.98	930	0.56	1.38	990	0.57
Camphene	3.17	943	tr	1.72	1026	0.01
β-Pinene	3.58*	970	0.22	2.12	1065	0.02
Sabinene	3.58*	970	[0.22]	2.31	1084	0.22
6-Methyl-5-hepten-2-one	3.80	985	0.04			
Myrcene	3.92	992	1.86	2.92	1134	1.86
α-Phellandrene	4.05	1001	0.04	2.81	1126	0.04
Octanal	4.08	1003	0.25	4.48	1252	0.23
Δ3-Carene	4.14	1007	0.09	2.61	1110	0.09
para-Cymene	4.33	1018	0.02	4.15	1228	0.01
β-Phellandrene	4.54*	1032	94.10	3.36	1169	0.27
Limonene	4.54*	1032	[94.10]	3.33	1166	93.10
(*Z*)-β-Ocimene	4.67	1040	0.02	3.82	1204	0.01
(*E*)-β-Ocimene	4.82	1049	0.03	4.02	1219	0.02
cis-Sabinene hydrate	5.06	1064	0.01	6.97	1431	0.01
Octanol	5.25	1076	0.01	8.26	1528	0.02
Terpinolene	5.38	1085	0.02	4.33	1241	0.02
Linalool	5.64	1101	0.31	8.13	1518	0.33
Nonanal	5.68	1104	0.04	5.92	1355	0.03
trans-para-Mentha-2,8-dien-1-ol	5.89	1117	0.01	9.02	1587	0.01
trans-Limonene oxide	6.14	1134	0.02	6.65	1407	0.01
Citronellal	6.44	1152	0.04	7.06	1438	0.05
α-Terpineol	6.99	1188	0.04	9.85	1654	0.05
Decanal	7.26	1206	0.17	7.34	1459	0.17
Nerol	7.61	1230	0.01	11.14	1761	0.01
cis-Carveol	7.65	1233	0.02			
Neral	7.75	1240	0.06	9.54	1628	0.05
Geraniol	8.03	1259	0.01	11.65	1804	0.01
Perillaldehyde	8.19	1270	0.01	10.80	1732	0.06
Geranial	8.21	1271	0.08	10.17	1679	0.07
Limonen-10-ol	8.51	1292	0.01	13.22	1944	0.02
Undecanal	8.77	1305	0.02	8.71	1563	0.01
α-Copaene	9.67	1369	0.03	7.15	1445	0.03
Geranyl acetate	9.88	1384	0.02	10.61	1715	0.03
β-Elemene	9.92	1387	0.01	8.45	1543	0.01
Dodecanal	10.20	1408	0.04	10.03	1668	0.04
β-Caryophyllene	10.24	1410	0.03	8.43	1541	0.02
β-Copaene	10.39	1421	0.02	8.37	1536	0.02
α-Humulene	10.70	1445	0.01	9.30	1609	0.01
(*E*)-β-Farnesene	10.86	1456	0.01	9.57	1631	0.01
Germacrene D	11.08	1473	0.03	9.80	1649	0.03
Valencene	11.24	1486	0.03	9.92	1659	0.03
α-Muurolene	11.38	1496	0.02	10.06	1670	0.02
γ-Cadinene	11.54	1508	0.02	10.40	1698	0.01
δ-Cadinene	11.67	1518	0.05	10.45	1702	0.04

α-Elemol	12.00	1544	0.01	14.10	2026	0.02
Caryophyllene oxide	12.35	1572	0.01	12.81	1907	0.01
γ-Eudesmol	13.01	1625	0.02			
β-Sinensal	13.84	1694	0.02	15.46	2159	0.08
α-Sinensal	14.50	1750	0.01	16.45	2260	0.02
Myristic acid	14.98	1792	0.01	20.14	2672	0.01
Nootkatone	15.01	1795	0.01	17.86	2411	0.01
Palmitic acid	16.91	1969	0.02	20.95	2770	0.01
Stearic acid	18.90	2166	0.03			
Tetramethoxyflavone isomer	26.87	3117	0.04			
Total identified		**98.59%**			**97.83%**	
Total reported		**98.59%**			**97.83%**	

*: 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