CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 23D28-PTH01
Customer identification : Persian Lime - Mexico - PW0101R
Type : Essential oil
Source : *Citrus latifolia*
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 : Amélie Simard, Analyste
Analysis date : May 02, 2023

Checked and approved by :

_____
Alexis St-Gelais, Ph. D., Chimiste 2013-174

MÉTHODE CERTIFIÉE
✳ISO 17025:2017
CERTIFIED METHOD

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PHYSICOCHEMICAL DATA

Physical aspect: Bright yellow liquid
Refractive index: 1.4780 ± 0.0003 (20 °C; method PC-MAT-016)

CONCLUSION

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

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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	tr	Aliphatic alcohol
Nonane	0.01	Alkane
Tricyclene	0.02	Monoterpene
α-Thujene	0.44	Monoterpene
α-Pinene	1.96	Monoterpene
α-Fenchene	0.02	Monoterpene
Camphene	0.07	Monoterpene
Thuja-2,4(10)-diene	0.01	Monoterpene
Sabinene	0.91	Monoterpene
β-Pinene	9.35	Monoterpene
6-Methyl-5-hepten-2-one	0.03	Aliphatic ketone
Myrcene	1.41	Monoterpene
α-Phellandrene	0.07	Monoterpene
Pseudolimonene	0.01	Monoterpene
Octanal	0.02	Aliphatic aldehyde
Δ3-Carene	0.01	Monoterpene
α-Terpinene	0.41	Monoterpene
para-Cymene	0.75	Monoterpene
Limonene	57.02	Monoterpene
1,8-Cineole	0.38	Monoterpenic ether
(*Z*)-β-Ocimene	0.05	Monoterpene
(*E*)-β-Ocimene	0.08	Monoterpene
γ-Terpinene	12.86	Monoterpene
cis-Sabinene hydrate	0.02	Monoterpenic alcohol
Terpinolene	0.82	Monoterpene
trans-Sabinene hydrate	0.02	Monoterpenic alcohol
Linalool	0.21	Monoterpenic alcohol
Nonanal	0.02	Aliphatic aldehyde
endo-Fenchol	0.04	Monoterpenic alcohol
trans-para-Mentha-2,8-dien-1-ol	0.04	Monoterpenic alcohol
1-Terpineol	0.01	Monoterpenic alcohol
trans-Limonene oxide	0.01	Monoterpenic ether
Cosmene isomer II	0.01	Monoterpene
Camphor	0.01	Monoterpenic ketone
cis-β-Terpineol	0.03	Monoterpenic alcohol
Epoxyterpinolene	0.01	Monoterpenic ether
Citronellal	0.03	Monoterpenic aldehyde
Borneol	0.04	Monoterpenic alcohol
Isoneral	0.02	Monoterpenic aldehyde
α-Phellandren-8-ol	0.03	Monoterpenic alcohol
Isopinocamphone	0.01	Monoterpenic ketone
Terpinen-4-ol	0.52	Monoterpenic alcohol
Isogeranial	0.02	Monoterpenic aldehyde
para-Cymen-8-ol	0.02	Monoterpenic alcohol
α-Terpineol	1.00	Monoterpenic alcohol

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γ-Terpineol	0.01	Monoterpenic alcohol
Decanal	0.05	Aliphatic aldehyde
trans-Carveol	0.01	Monoterpenic alcohol
2,3-Epoxyneral?	0.03	Monoterpenic aldehyde
Nerol	0.17	Monoterpenic alcohol
2,3-Epoxygeranial?	0.05	Monoterpenic aldehyde
Neral	1.34	Monoterpenic aldehyde
Geraniol	0.18	Monoterpenic alcohol
Unknown	0.01	Unknown
Geranial	1.99	Monoterpenic aldehyde
Unknown	0.02	Oxygenated monoterpene
Undecanal	0.02	Aliphatic aldehyde
para-Mentha-1,8-diene-4-hydroperoxide	0.01	Monoterpenic peroxide
δ-Elemene	0.08	Sesquiterpene
Unknown	0.02	Unknown
Citronellyl acetate	0.02	Monoterpenic ester
Neryl acetate	0.89	Monoterpenic ester
Geranyl acetate	0.24	Monoterpenic ester
β-Elemene	0.07	Sesquiterpene
Dodecanal	0.03	Aliphatic aldehyde
β-Caryophyllene	0.02	Sesquiterpene
cis-α-Bergamotene	0.08	Sesquiterpene
α-Santalene	0.03	Sesquiterpene
γ-Elemene	0.02	Sesquiterpene
trans-α-Bergamotene	1.11	Sesquiterpene
α-Humulene	0.05	Sesquiterpene
β-Santalene	0.06	Sesquiterpene
(*E*)-β-Farnesene	0.08	Sesquiterpene
Germacrene D	0.06	Sesquiterpene
Unknown	0.04	Sesquiterpene
γ-Curcumene	0.01	Sesquiterpene
β-Selinene	0.02	Sesquiterpene
trans-β-Bergamotene	0.05	Sesquiterpene
Bicyclogermacrene	0.03	Sesquiterpene
(3*Z*,6*E*)-α-Farnesene	0.05	Sesquiterpene
(*Z*)-α-Bisabolene	0.14	Sesquiterpene
γ-Cadinene	0.07	Sesquiterpene
β-Bisabolene	1.48	Sesquiterpene
(3*E*,6*E*)-α-Farnesene	0.03	Sesquiterpene
δ-Cadinene	0.02	Sesquiterpene
Selina-4(15),7(11)-diene	0.02	Sesquiterpene
(*E*)-α-Bisabolene	0.05	Sesquiterpene
Germacrene B	0.14	Sesquiterpene
Caryophyllenyl alcohol	0.01	Sesquiterpenic alcohol
Caryophyllene oxide	0.01	Sesquiterpenic ether
Alismol	0.02	Sesquiterpenic alcohol
Unknown	0.02	Sesquiterpenic alcohol
Unknown	0.03	Oxygenated sesquiterpene
Unknown	0.07	Oxygenated sesquiterpene
α-Bisabolol	0.08	Sesquiterpenic alcohol
Herniarin	0.05	Coumarin
(2*E*,6*Z*)-Farnesal	0.02	Sesquiterpenic aldehyde

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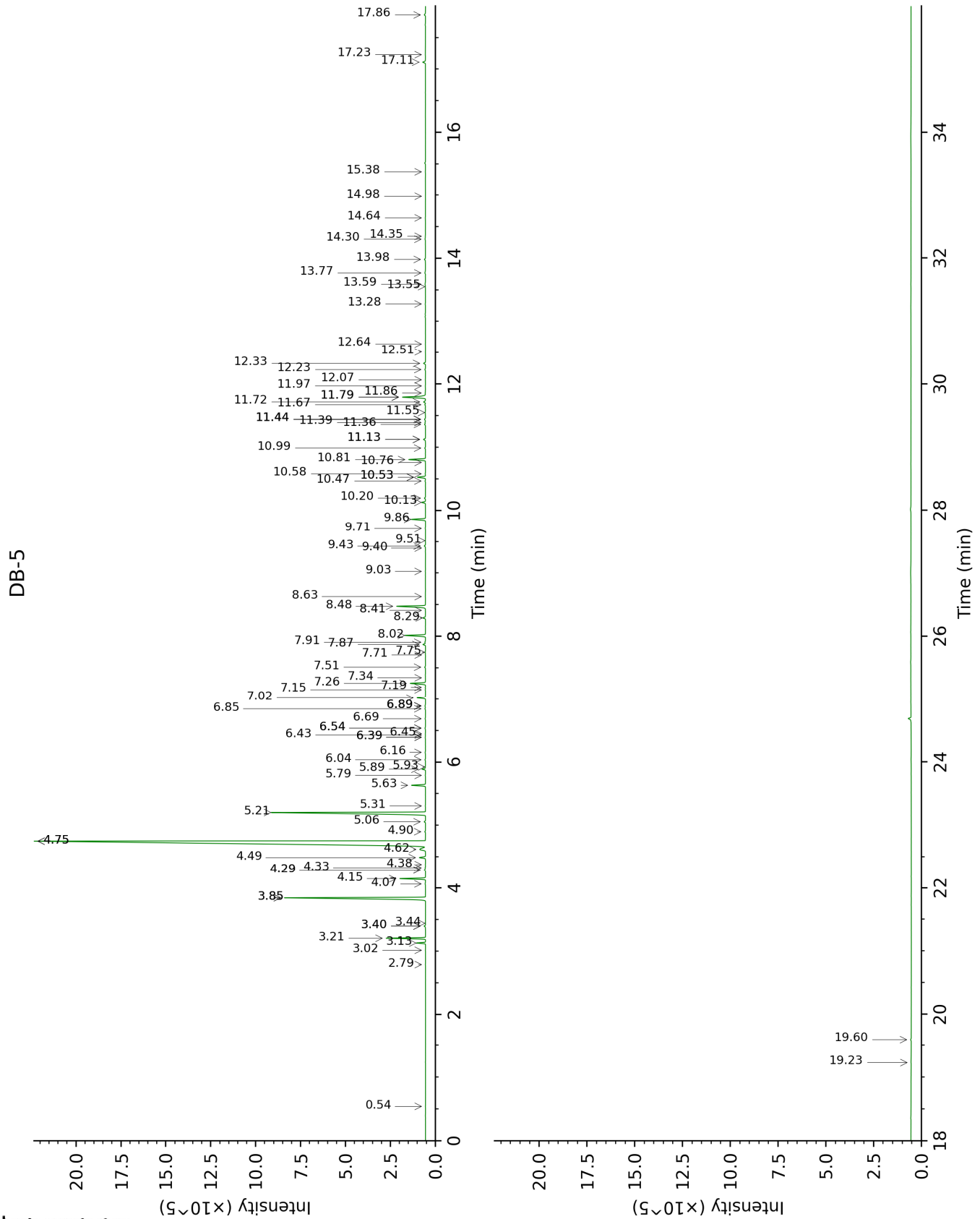|		
(2*E*,6*E*)-Farnesal	0.02	Sesquiterpenic aldehyde
Myristic acid	0.01	Aliphatic acid
Hexadecanal	0.02	Aliphatic aldehyde
Citropten	0.22	Furanocoumarin
Palmitic acid	0.01	Aliphatic acid
Bergapten	0.13	Furanocoumarin
Stearic acid	0.02	Aliphatic acid
Isopimpinellin	0.05	Furanocoumarin
Consolidated total	**98.52%**	

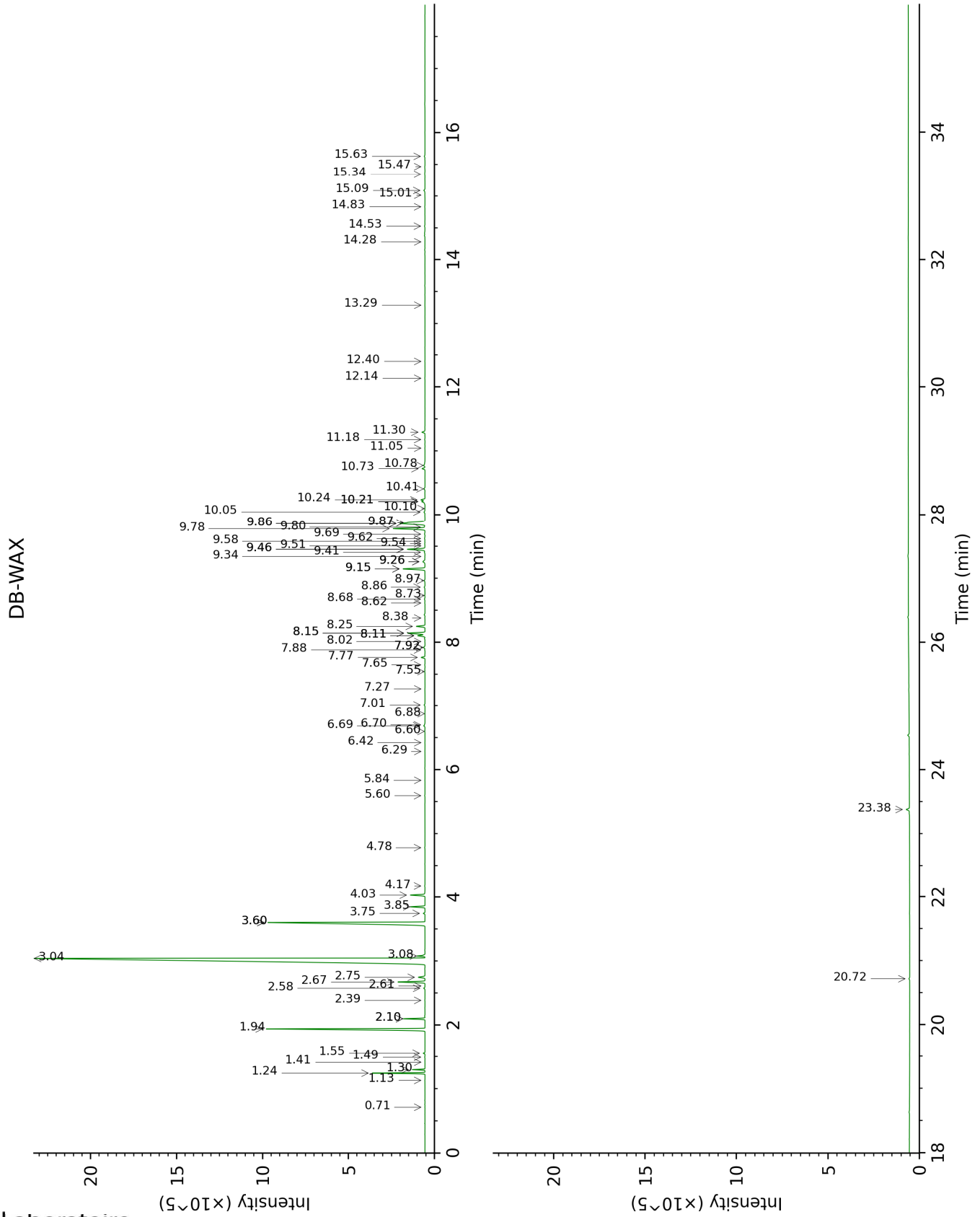tr: The compound has been detected below 0.005% of total signal.

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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This page was intentionally left blank. The following pages present the complete data of the analysis.

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DB-5

Time (min)

Intensity (×10^5)

Time (min)

Intensity (×10^5)

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DB-WAX

Time (min)

Intensity (×10^5)

15.63
15.34 — 15.47
15.09 — 15.01
14.83
14.53
14.28

13.29

12.40
12.14

11.18 — 11.30
11.05
10.73 — 10.78
10.41
10.24 — 10.21
10.10
10.05
9.86 — 9.80 — 9.87
9.78
9.69 — 9.62
9.58 — 9.54
9.46 — 9.51 — 9.41
9.34
9.15 — 9.26
8.86 — 8.97
8.68 — 8.73
8.62
8.38
8.25
8.15 — 8.11
8.02
7.88 — 7.92
7.77
7.65
7.55
7.27
7.01 — 6.88
6.69 — 6.70 — 6.60
6.42 — 6.29

5.84
5.60

4.78

4.03 — 4.17
3.85
3.75
3.60
3.04 — 3.08
2.58 — 2.67 — 2.75 — 2.61
2.39
2.10
1.94
1.24 — 1.41 — 1.55 — 1.49 — 1.30
1.13
0.71

Time (min)

Intensity (×10^5)

23.38
20.72

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FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
2-Methyl-3-buten-2-ol	0.54	606	tr	1.41	1013	0.01
Nonane	2.79	904	0.01	0.71	897	tr
Tricyclene	3.02	919	0.02	1.13	972	0.01
α-Thujene	3.13	926	0.44	1.30	1001	0.45
α-Pinene	3.21	931	1.96	1.24	992	1.97
α-Fenchene	3.40*	944	0.09	1.49	1021	0.02
Camphene	3.40*	944	[0.09]	1.55	1027	0.07
Thuja-2,4(10)-diene	3.44	947	0.01	2.10*	1084	0.96
Sabinene	3.85*	973	10.26	2.10*	1084	[0.96]
β-Pinene	3.85*	973	[10.26]	1.94	1068	9.35
6-Methyl-5-hepten-2-one	4.07	988	0.03	4.78	1303	0.02
Myrcene	4.15	993	1.41	2.67	1135	1.42
α-Phellandrene	4.29*	1002	0.10	2.58	1127	0.07
Pseudolimonene	4.29*	1002	[0.10]	2.61	1130	0.01
Octanal	4.33	1005	0.02	4.17	1255	0.02
Δ3-Carene	4.38	1008	0.01	2.39	1111	0.01
α-Terpinene	4.49	1015	0.41	2.75	1141	0.42
para-Cymene	4.62	1023	0.75	3.85	1230	0.74
Limonene	4.75*	1031	57.17	3.04	1165	57.02
1,8-Cineole	4.75*	1031	[57.17]	3.08	1168	0.38
(Z)-β-Ocimene	4.90	1041	0.05	3.60*	1211	12.96
(E)-β-Ocimene	5.06	1050	0.08	3.75	1222	0.08
γ-Terpinene	5.20	1060	12.86	3.60*	1211	[12.96]
cis-Sabinene hydrate	5.31	1066	0.02	6.60	1428	0.02
Terpinolene	5.64	1086	0.82	4.03	1244	0.82
trans-Sabinene hydrate	5.79	1096	0.02	7.65	1507	0.02
Linalool	5.89	1102	0.21	7.77	1516	0.21
Nonanal	5.93	1105	0.02	5.60	1354	0.02
endo-Fenchol	6.04	1112	0.04	8.11*	1543	0.46
trans-para-Mentha-2,8-dien-1-ol	6.16	1119	0.04	8.62	1583	0.01
1-Terpineol	6.39*	1134	0.03	8.02	1536	0.01
trans-Limonene oxide	6.39*	1134	[0.03]	6.29	1404	0.01
Cosmene isomer II	6.43	1137	0.01	5.84	1371	0.01
Camphor	6.45	1138	0.01	6.88	1449	0.01
cis-β-Terpineol	6.54*	1144	0.05	8.68	1588	0.03
Epoxyterpinolene	6.54*	1144	[0.05]	6.42	1415	0.01
Citronellal	6.69	1153	0.03	6.70	1436	0.02
Borneol	6.85	1163	0.04	9.41	1647	0.04
Isoneral	6.89*	1166	0.06	7.55	1499	0.02
α-Phellandren-8-ol	6.89*	1166	[0.06]	9.80	1680	0.03

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Isopinocamphone	6.89*	1166	[0.06]	7.27	1479	0.01
Terpinen-4-ol	7.02	1174	0.52	8.25	1554	0.51
Isogeranial	7.15	1183	0.02	7.88	1526	0.02
para-Cymen-8-ol	7.19	1185	0.02	11.18	1797	0.02
α-Terpineol	7.26	1189	1.00	9.46*	1651	1.08
γ-Terpineol	7.34	1195	0.01	9.51	1656	0.01
Decanal	7.51	1206	0.05	7.01	1459	0.05
trans-Carveol	7.71	1218	0.01	11.05	1785	0.01
2,3-Epoxyneral?	7.75	1221	0.03			
Nerol	7.87	1230	0.17	10.73	1758	0.18
2,3-Epoxygeranial?	7.91	1232	0.05			
Neral	8.02	1239	1.34	9.15*	1626	1.38
Geraniol	8.29	1258	0.18	11.30	1807	0.20
Unknown [m/z 43, 128 (61), 79 (60), 127 (52), 58 (50)...]	8.41	1266	0.01			
Geranial	8.48	1270	1.99	9.78	1678	1.98
Unknown [m/z 95, 67 (45), 41 (42), 110 (42), 43 (41), 59 (36)]	8.63	1280	0.02	12.14	1882	0.02
Undecanal	9.03	1307	0.02	8.38	1565	0.02
para-Mentha-1,8-diene-4-hydroperoxide	9.40	1333	0.01			
δ-Elemene	9.43	1335	0.08	6.69	1434	0.08
Unknown [m/z 133, 105 (45), 91 (38), 119 (36)... 150 (3)]	9.51	1341	0.02			
Citronellyl acetate	9.71	1355	0.02	9.15*	1626	[1.38]
Neryl acetate	9.86	1365	0.89	9.87*†	1685	[2.57]
Geranyl acetate	10.13	1384	0.24	10.21*	1714	0.25
β-Elemene	10.20	1389	0.07	8.11*	1543	[0.46]
Dodecanal	10.47	1408	0.03	9.62	1665	0.04
β-Caryophyllene	10.53*	1413	0.55	8.15*	1546	1.12
cis-α-Bergamotene	10.53*	1413	[0.55]	7.92*	1528	0.11
α-Santalene	10.58	1417	0.03	7.92*	1528	[0.11]
γ-Elemene	10.76	1430	0.02	8.73	1592	0.02
trans-α-Bergamotene	10.81	1434	1.11	8.15*	1546	[1.12]
α-Humulene	10.99	1447	0.05	8.97	1611	0.06
β-Santalene	11.13*	1457	0.14	8.86	1602	0.06
(E)-β-Farnesene	11.13*	1457	[0.14]	9.26*	1635	0.20
Germacrene D	11.36	1475	0.06	9.46*	1651	[1.08]
Unknown [m/z 91, 93 (92), 105 (71), 77 (69), 79 (68), 133 (63)... 204 (32)]	11.39	1477	0.04	9.58	1661	0.01
γ-Curcumene	11.44*	1481	0.08	9.34	1642	0.01
β-Selinene	11.44*	1481	[0.08]	9.54	1658	0.02

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trans-β-Bergamotene	11.44*	1481	[0.08]	9.26*	1635	[0.20]
Bicyclogermacrene	11.55	1489	0.03	9.69	1671	0.03
(3*Z*,6*E*)-α-Farnesene	11.67	1498	0.05	9.87*†	1685	[2.57]
(*Z*)-α-Bisabolene	11.72	1501	0.14	9.86*†	1684	2.57
γ-Cadinene	11.79*	1507	1.75	10.05	1700	0.07
β-Bisabolene	11.79*	1507	[1.75]	9.86*†	1684	[2.57]
(3*E*,6*E*)-α-Farnesene	11.86	1512	0.03	10.21*	1714	[0.25]
δ-Cadinene	11.97	1521	0.02	10.10	1704	0.01
Selina-4(15),7(11)-diene	12.07	1528	0.02	10.24	1716	0.25
(*E*)-α-Bisabolene	12.23	1541	0.05	10.41	1731	0.08
Germacrene B	12.33	1549	0.14	10.78	1762	0.12
Caryophyllenyl alcohol	12.51	1563	0.01	13.29	1989	0.01
Caryophyllene oxide	12.64	1574	0.01	12.40	1906	0.01
Alismol	13.28	1624	0.02	15.34	2192	0.03
Unknown cadinol analog II [m/z 95, 121 (73), 43 (57), 79 (43), 161 (43), 109 (40)... 204 (35), 222 (2)]	13.55	1647	0.02	14.83	2140	0.02
Unknown [m/z 94, 43 (89), 41 (67), 122 (46), 69 (41)...222]	13.59	1650	0.03	14.53	2109	0.04
Unknown [m/z 69, 95 (100), 41 (89), 109 (68), 67 (61)...222]	13.77	1665	0.07	15.63	2222	0.05
α-Bisabolol	13.98	1682	0.08	15.08	2166	0.09
Herniarin	14.30	1709	0.05	20.72	2809	0.06
(2*E*,6*Z*)-Farnesal	14.35	1713	0.02	15.01	2158	0.01
(2*E*,6*E*)-Farnesal	14.64	1738	0.02	15.47	2204	0.01
Myristic acid	14.98	1768	0.01			
Hexadecanal	15.38	1802	0.02	14.28†	2085	0.01
Citropten	17.11	1962	0.22	23.38	3166	0.23
Palmitic acid	17.23	1973	0.01			
Bergapten	17.86	2034	0.13			
Stearic acid	19.23	2172	0.02			
Isopimpinellin	19.60	2211	0.05			
Total identified	**98.78%**			**98.72%**		
Total reported	**98.98%**			**98.85%**		

*: 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

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Essential oil, *Citrus latifolia*
Internal code: 23D28-PTH01

Persian Lime - Mexico - PW0101R

Report prepared for
Plant Therapy

R.T.: Retention time (minutes)
R.I.: Retention index

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