CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 22B01-PTH01
Customer identification : Rosemary ORGANIC - Spain - R50111221R
Type : Essential oil
Source : *Rosmarinus officinalis* ct. 1,8-Cineole
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 : Seydou Ka, Ph. D.
Analysis date : February 04, 2022

Checked and approved by :

_____
Alexis St-Gelais, Ph. D., 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Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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.

MÉTHODE CERTIFIÉE
✳ISO 17025:2017
CERTIFIED METHOD

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Essential oil, *Rosmarinus officinalis* ct. 1,8-Cineole
Internal code: 22B01-PTH01   Rosemary ORGANIC - Spain - R50111221R

Report prepared for
Plant Therapy

PHYSICOCHEMICAL DATA

Physical aspect: Faintly yellow liquid
Refractive index: 1.4669 ± 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-Ethylfuran	tr	Furan
(3Z)-Hexenol	0.01	Aliphatic alcohol
Hexanol	tr	Aliphatic alcohol
Bornylene	0.01	Monoterpene
Hashishene	0.02	Monoterpene
Tricyclene	0.16	Monoterpene
α-Thujene	0.19	Monoterpene
α-Pinene	12.15	Monoterpene
α-Fenchene	0.10	Monoterpene
Camphene	4.14	Monoterpene
Thuja-2,4(10)-diene	0.02	Monoterpene
Sabinene	0.07	Monoterpene
β-Pinene	7.09	Monoterpene
Dehydro-1,8-cineole	0.01	Monoterpenic ether
Octan-3-one	0.04	Aliphatic ketone
Myrcene	1.27	Monoterpene
Pseudolimonene	0.03	Monoterpene
α-Phellandrene	0.18	Monoterpene
Δ3-Carene	0.19	Monoterpene
α-Terpinene	0.43	Monoterpene
para-Cymene	1.52	Monoterpene
Limonene	2.88	Monoterpene
1,8-Cineole	45.14	Monoterpenic ether
(Z)-β-Ocimene	0.03	Monoterpene
(E)-β-Ocimene	0.05	Monoterpene
γ-Terpinene	0.59	Monoterpene
cis-Sabinene hydrate	0.05	Monoterpenic alcohol
cis-Linalool oxide (fur.)	0.01	Monoterpenic alcohol
Fenchone	0.01	Monoterpenic ketone
Terpinolene	0.30	Monoterpene
para-Cymenene	0.03	Monoterpene
trans-Sabinene hydrate	0.03	Monoterpenic alcohol
Linalool	0.68	Monoterpenic alcohol
endo-Fenchol	0.01	Monoterpenic alcohol
cis-para-Menth-2-en-1-ol	0.01	Monoterpenic alcohol
Camphor	10.89	Monoterpenic ketone
Camphene hydrate	0.06	Monoterpenic alcohol
Isoborneol	0.01	Monoterpenic alcohol
Pinocarvone	0.02	Monoterpenic ketone
Borneol	2.55	Monoterpenic alcohol
δ-Terpineol	0.33	Monoterpenic alcohol
Terpinen-4-ol	0.61	Monoterpenic alcohol
para-Cymen-8-ol	0.03	Monoterpenic alcohol
α-Terpineol	1.74	Monoterpenic alcohol
Myrtenal	0.01	Monoterpenic aldehyde

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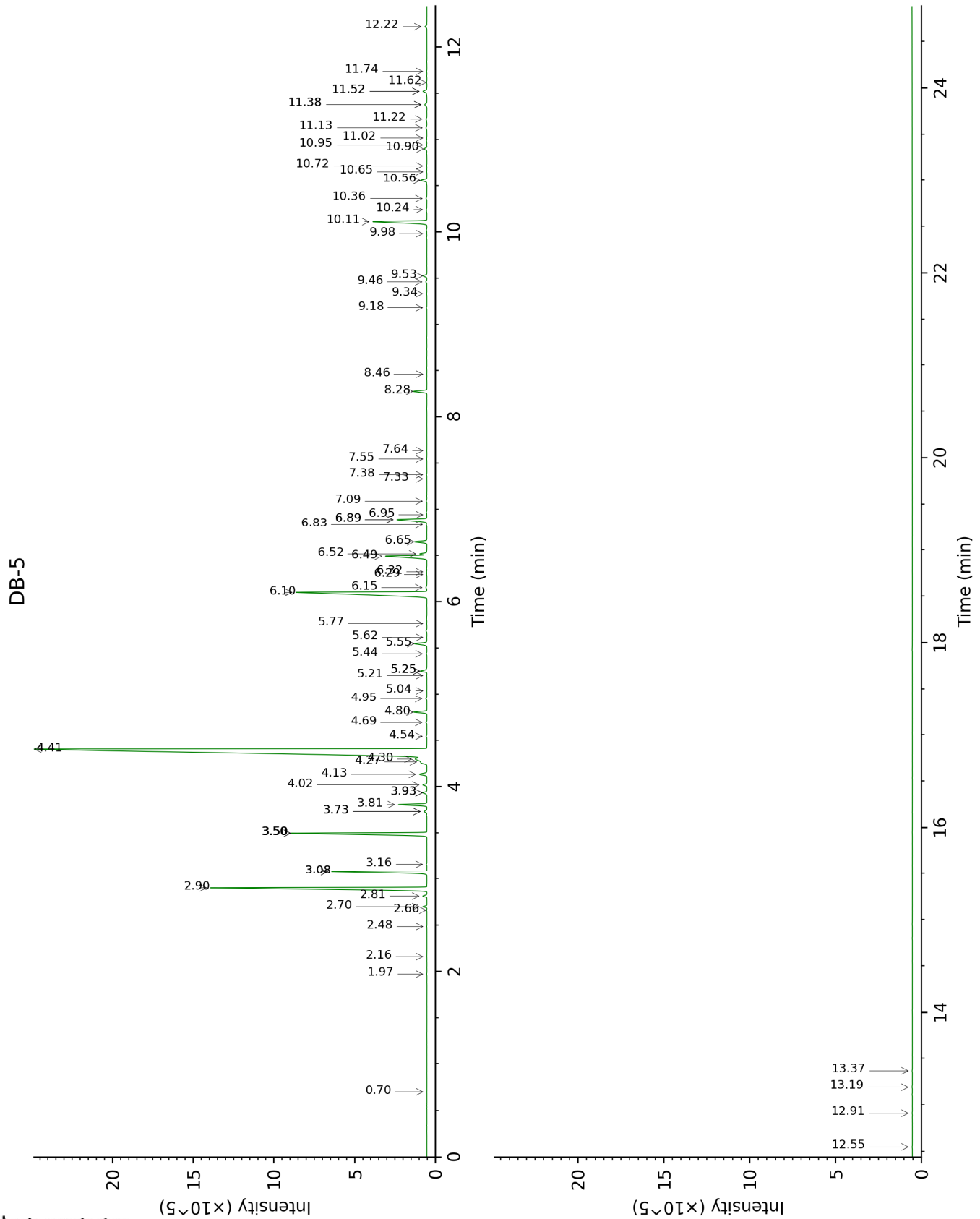|		
Myrtenol	0.01	Monoterpenic alcohol
Verbenone	0.03	Monoterpenic ketone
trans-Carveol	tr	Monoterpenic alcohol
Bornyl formate	0.02	Monoterpenic ester
Citronellol	0.01	Monoterpenic alcohol
Carvone	tr	Monoterpenic ketone
Bornyl acetate	0.69	Monoterpenic ester
Unknown	0.01	Oxygenated monoterpene
α-Cubebene	0.03	Sesquiterpene
Eugenol	0.02	Phenylpropanoid
α-Ylangene	0.06	Sesquiterpene
α-Copaene	0.20	Sesquiterpene
Methyleugenol	0.01	Phenylpropanoid
β-Caryophyllene	3.16	Sesquiterpene
β-Copaene	0.03	Sesquiterpene
Aromadendrene	0.05	Sesquiterpene
α-Humulene	0.35	Sesquiterpene
allo-Aromadendrene	0.01	Sesquiterpene
(*E*)-β-Farnesene	0.01	Sesquiterpene
γ-Muurolene	0.16	Sesquiterpene
α-Amorphene	0.01	Sesquiterpene
β-Selinene	0.01	Sesquiterpene
α-Selinene	0.07	Sesquiterpene
α-Muurolene	0.05	Sesquiterpene
β-Bisabolene	0.06	Sesquiterpene
γ-Cadinene	0.09	Sesquiterpene
trans-Calamenene	0.03	Sesquiterpene
δ-Cadinene	0.23	Sesquiterpene
trans-Cadina-1,4-diene	0.02	Sesquiterpene
α-Calacorene	0.02	Sesquiterpene
Caryophyllene oxide	0.10	Sesquiterpenic ether
Humulene epoxide II	0.01	Sesquiterpenic ether
Caryophylladienol II	0.01	Sesquiterpenic alcohol
14-Hydroxy-(*Z*)-caryophyllene	0.02	Sesquiterpenic alcohol
14-Hydroxy-(*E*)-caryophyllene	0.01	Sesquiterpenic alcohol
Consolidated total	**99.32%**	

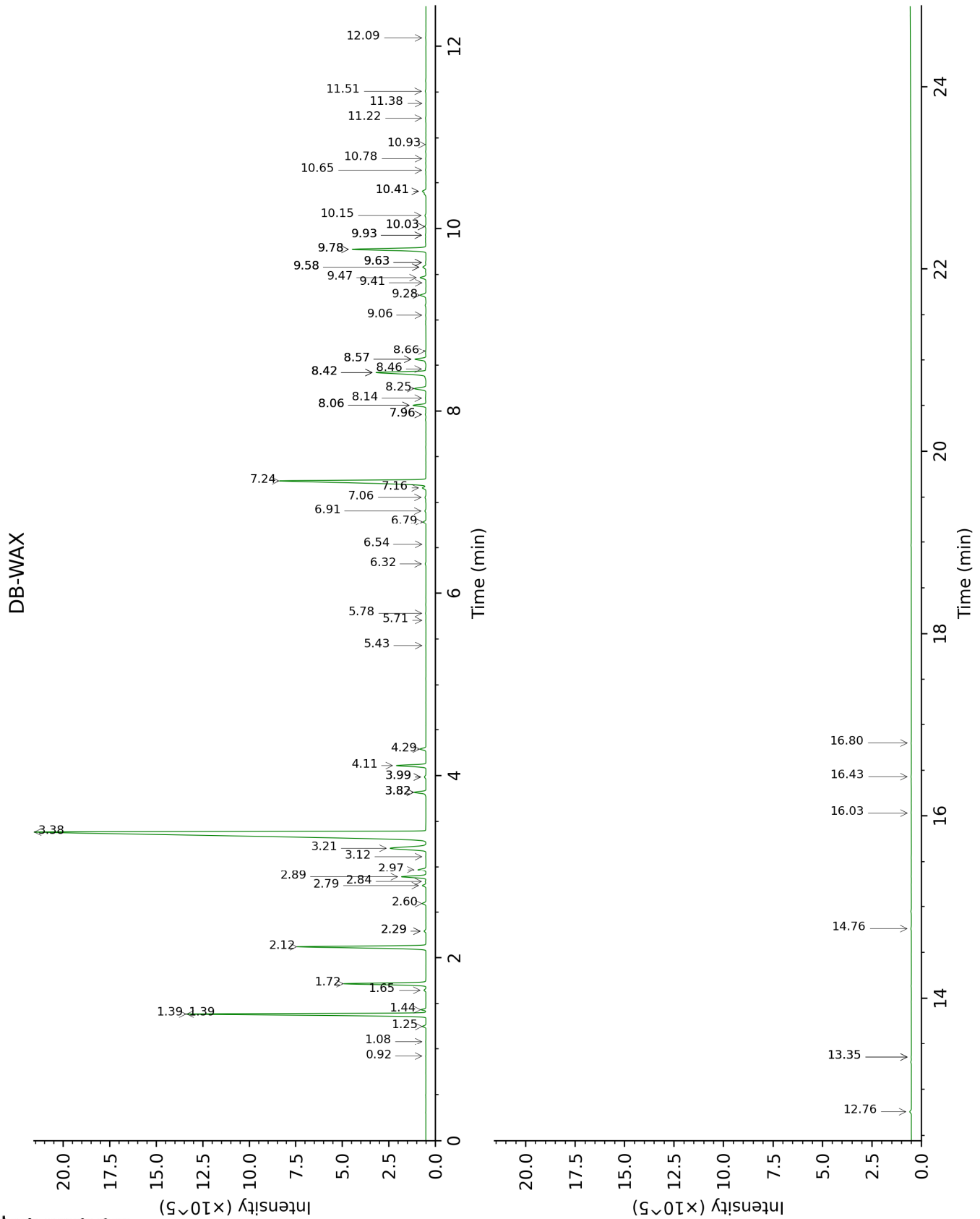tr: The compound has been detected below 0.005% of total signal.

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

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DB-WAX

Time (min)

Intensity (×10^5)

Time (min)

Intensity (×10^5)

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FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
2-Ethylfuran	0.70	701	tr	0.92	918	tr
(3*Z*)-Hexenol	1.97	858	0.01	5.78	1346	0.01
Hexanol	2.16	875	tr	5.43	1320	tr
Bornylene	2.48	903	0.01	1.08	944	tr
Hashishene	2.66	916	0.02	1.39*	993	12.10
Tricyclene	2.70	918	0.16	1.25	971	0.16
α-Thujene	2.81	926	0.19	1.44	999	0.20
α-Pinene	2.90	932	12.15	1.39*	993	[12.10]
α-Fenchene	3.08*	944	4.26	1.65	1020	0.10
Camphene	3.08*	944	[4.26]	1.72	1027	4.14
Thuja-2,4(10)-diene	3.16	950	0.02	2.29*	1083	0.09
Sabinene	3.50*	972	7.19	2.29*	1083	[0.09]
β-Pinene	3.50*	972	[7.19]	2.12	1066	7.09
Dehydro-1,8-cineole	3.73*	988	0.16	3.12	1151	0.01
Octan-3-one	3.73*	988	[0.16]	3.99*	1218	0.09
Myrcene	3.81	993	1.27	2.89	1133	1.26
Pseudolimonene	3.93*	1002	0.21	2.84	1129	0.03
α-Phellandrene	3.93*	1002	[0.21]	2.79	1125	0.18
Δ3-Carene	4.02	1008	0.19	2.60	1110	0.19
α-Terpinene	4.13	1015	0.43	2.97	1139	0.43
para-Cymene	4.27†	1023	49.52	4.11	1228	1.52
Limonene	4.30†	1025	[49.52]	3.21	1158	2.88
1,8-Cineole	4.40†	1032	[49.52]	3.38	1172	45.14
(*Z*)-β-Ocimene	4.54	1041	0.03	3.82*	1206	0.63
(*E*)-β-Ocimene	4.69	1050	0.05	3.99*	1218	[0.09]
γ-Terpinene	4.80	1057	0.59	3.82*	1206	[0.63]
cis-Sabinene hydrate	4.95	1066	0.05	6.91	1428	0.06
cis-Linalool oxide (fur.)	5.04	1072	0.01	6.54	1400	tr
Fenchone	5.20	1083	0.01	5.71	1340	tr
Terpinolene	5.25*	1086	0.34	4.29	1241	0.30
para-Cymenene	5.25*	1086	[0.34]	6.32	1385	0.03
trans-Sabinene hydrate	5.44	1098	0.03	7.96*	1507	0.03
Linalool	5.55	1104	0.68	8.06*	1514	0.68
endo-Fenchol	5.62	1109	0.01	8.42*	1542	3.25
cis-para-Menth-2-en-1-ol	5.77	1118	0.01	8.14	1521	0.05
Camphor	6.10	1140	10.89	7.24	1452	10.88
Camphene hydrate	6.15	1143	0.06	8.46	1545	0.03
Isoborneol	6.29	1152	0.01	9.41	1620	0.01
Pinocarvone	6.32	1154	0.02	7.96*	1507	[0.03]
Borneol	6.49	1165	2.55	9.78*	1650	4.31
δ-Terpineol	6.52	1167	0.33	9.47	1625	0.33

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Terpinen-4-ol	6.65	1175	0.61	8.57*	1554	0.65
para-Cymen-8-ol	6.83	1187	0.03	11.51	1795	0.03
α-Terpineol	6.89*	1191	1.76	9.78*	1650	[4.31]
Myrtenal	6.89*	1191	[1.76]	8.66	1560	0.01
Myrtenol	6.94	1194	0.01	10.93	1745	tr
Verbenone	7.09	1204	0.03	9.63*	1638	0.03
trans-Carveol	7.33	1220	tr	11.38	1784	tr
Bornyl formate	7.38	1223	0.02	8.06*	1514	[0.68]
Citronellol	7.55	1234	0.01	10.78	1732	0.01
Carvone	7.64	1240	tr	10.02*	1670	0.05
Bornyl acetate	8.28	1283	0.69	8.25	1529	0.71
Unknown [m/z 43, 93 (66), 91 (44), 41 (38), 69 (35)... 152? (1)]	8.46	1296	0.01			
α-Cubebene	9.18	1346	0.03	6.79	1419	0.15
Eugenol	9.34	1357	0.02	14.76	2095	0.04
α-Ylangene	9.46	1366	0.06	7.06	1439	0.06
α-Copaene	9.53	1371	0.20	7.16	1447	0.20
Methyleugenol	9.98	1403	0.01	13.35*	1961	0.01
β-Caryophyllene	10.11	1412	3.16	8.42*	1542	[3.25]
β-Copaene	10.24	1422	0.03	8.42*	1542	[3.25]
Aromadendrene	10.36	1431	0.05	8.57*	1554	[0.65]
α-Humulene	10.56	1446	0.35	9.28	1609	0.36
allo-Aromadendrene	10.66	1453	0.01	9.06	1592	0.02
(*E*)-β-Farnesene	10.72	1458	0.01	9.58*	1634	0.20
γ-Muurolene	10.90	1472	0.16	9.58*	1634	[0.20]
α-Amorphene	10.95	1475	0.01	9.63*	1638	[0.03]
β-Selinene	11.02	1480	0.01	9.93*	1662	0.03
α-Selinene	11.13	1488	0.07	9.93*	1662	[0.03]
α-Muurolene	11.22	1496	0.05	10.02*	1670	[0.05]
β-Bisabolene	11.38*	1507	0.14	10.15	1680	0.06
γ-Cadinene	11.38*	1507	[0.14]	10.41*	1701	0.22
trans-Calamenene	11.52*	1519	0.25	11.22	1770	0.03
δ-Cadinene	11.52*	1519	[0.25]	10.41*	1701	[0.22]
trans-Cadina-1,4-diene	11.62	1526	0.02	10.65	1722	0.03
α-Calacorene	11.74	1536	0.02	12.09	1846	0.01
Caryophyllene oxide	12.22	1574	0.10	12.76	1906	0.10
Humulene epoxide II	12.55	1600	0.01	13.35*	1961	[0.01]
Caryophylladienol II	12.91	1629	0.01	16.03	2223	0.01
14-Hydroxy-(*Z*)-caryophyllene	13.19	1652	0.02	16.43	2264	0.02
14-Hydroxy-(*E*)-caryophyllene	13.37	1667	0.01	16.80	2303	0.01
Total identified		**99.44%**			**99.29%**	
Total reported		**99.45%**			**99.29%**	

*: 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

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