Date : October 30, 2019

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 19J29-PTH02-1-CC
Customer identification : Nutmeg - Indonesia - N4010599R
Type : Essential oil
Source : *Myristica fragrans*
Customer : Plant Therapy

ANALYSIS

Method: PC-PA-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 : Lindsay Girard, B. Sc.
Analysis date : October 30, 2019

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Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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.

Laboratoire PhytoChemia

PHYSICOCHEMICAL DATA

Physical aspect: Faintly yellow liquid
Refractive index: 1.4828 ± 0.0003 (20 ℃)

ISO 3215:1999 - OIL OF NUTMEG, INDONESIAN TYPE

Compound	Min. %	Max. %	Observed %	Complies?
Myristicin	5.0	12.0	9.7	Yes
Safrole	1.0	2.5	1.7	Yes
Terpinen-4-ol	2.0	6.0	4.5	Yes
γ-Terpinene	2.0	6.0	4.0	Yes
Limonene	2.0	7.0	4.3	Yes
Δ3-Carene	0.5	2.0	1.1	Yes
Sabinene	14	29	20	Yes
β-Pinene	13	18	13	Yes
α-Pinene	15	28	21	Yes
Refractive index	1.4750	1.4850	1.4828	Yes

CONCLUSION

No adulterant, contaminant or diluent has been detected using this method. The oil complies with the ISO standard for Indonesian nutmeg oil.

Laboratoire
Ph⋆toChemia

Plus que des analyses... des conseils

ANALYSIS SUMMARY – CONSOLIDATED CONTENTS

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

Identification	%	Classe
Isovaleral	tr	Aliphatic aldehyde
2-Methylbutyral	tr	Aliphatic aldehyde
Toluene	tr	Simple phenolic
Tricyclene	0.02	Monoterpene
α-Thujene	1.82	Monoterpene
α-Pinene	21.33	Monoterpene
α-Fenchene	0.05	Monoterpene
Camphene	0.28	Monoterpene
β-Pinene	12.60	Monoterpene
Sabinene	20.31	Monoterpene
Myrcene	2.32	Monoterpene
α-Phellandrene	0.79	Monoterpene
Δ3-Carene	1.10	Monoterpene
α-Terpinene	2.52	Monoterpene
para-Cymene	0.75	Monoterpene
1,8-Cineole	2.31	Monoterpenic ether
Limonene	4.26	Monoterpene
(Z)-β-Ocimene	0.01	Monoterpene
(Z)-β-Ocimene	0.01	Monoterpene
(E)-β-Ocimene	0.03	Monoterpene
γ-Terpinene	3.97	Monoterpene
cis-Sabinene hydrate	0.42	Monoterpenic alcohol
Terpinolene	1.67	Monoterpene
para-Cymenene	0.05	Monoterpene
trans-Sabinene hydrate	0.28	Monoterpenic alcohol
Unknown	0.04	Oxygenated monoterpene
Linalool	0.17	Monoterpenic alcohol
Unknown	0.01	Oxygenated monoterpene
cis-para-Menth-2-en-1-ol	0.21	Monoterpenic alcohol
trans-Pinocarveol	0.01	Monoterpenic alcohol
trans-para-Menth-2-en-1-ol	0.14	Monoterpenic alcohol
Epoxyterpinolene	0.03	Monoterpenic ether
Borneol	0.02	Monoterpenic alcohol
δ-Terpineol	0.01	Monoterpenic alcohol
Terpinen-4-ol	4.51	Monoterpenic alcohol
para-Cymen-8-ol	0.03	Monoterpenic alcohol
α-Terpineol	0.58	Monoterpenic alcohol
cis-Piperitol	0.07	Monoterpenic alcohol
trans-Piperitol	0.08	Monoterpenic alcohol
Citronellol	0.02	Monoterpenic alcohol
Unknown	0.01	Oxygenated monoterpene
Geraniol	0.05	Monoterpenic alcohol
Linalyl acetate	0.01	Monoterpenic ester
trans-Ascaridole glycol	0.02	Monoterpenic alcohol
Bornyl acetate	0.10	Monoterpenic ester
Safrole	1.71	Phenylpropanoid
Cuminol	0.03	Monoterpenic alcohol

Laboratoire PhytoChemia

Plus que des analyses... des conseils

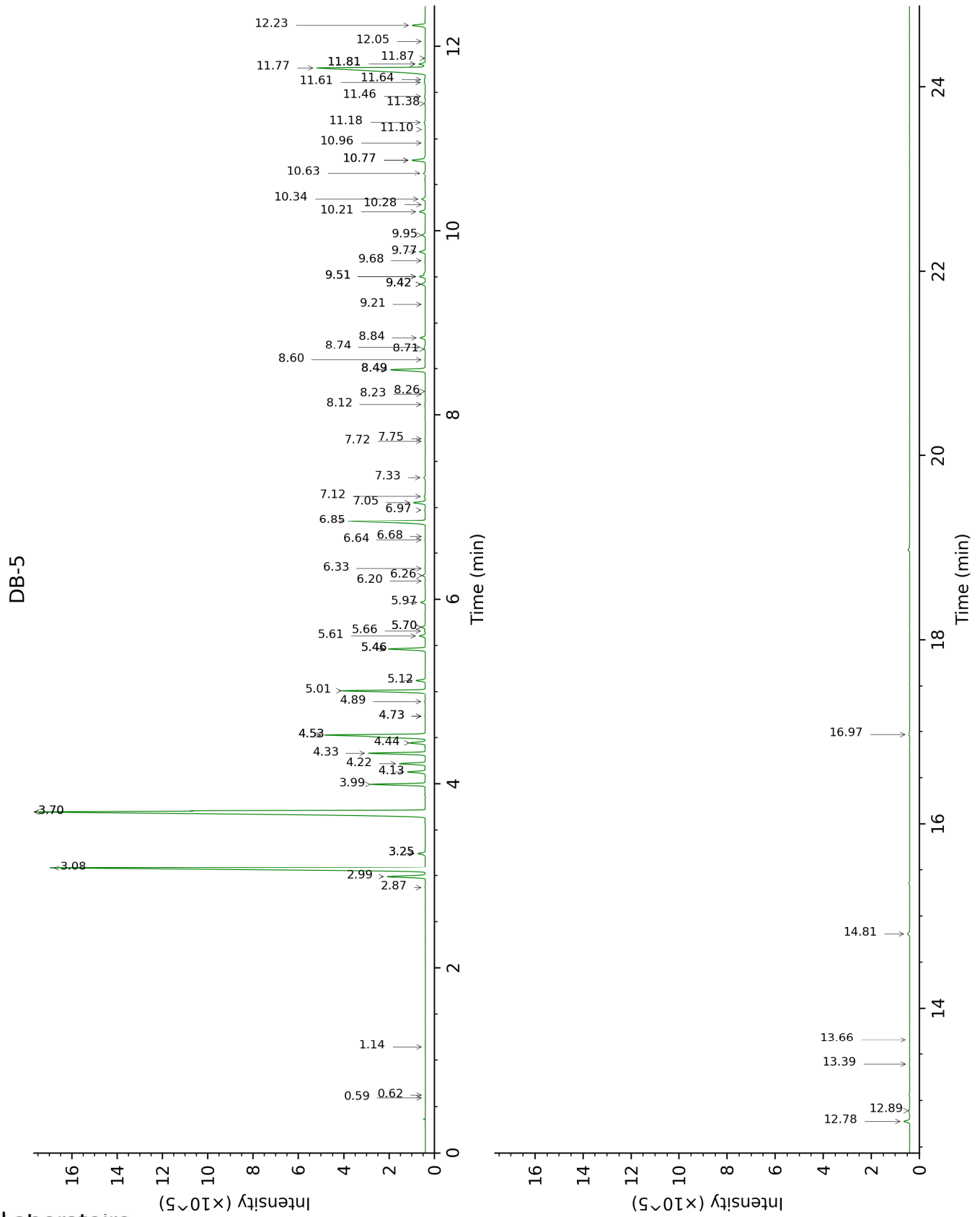|		
Terpinen-4-yl acetate	0.04	Monoterpenic ester
Thymol	0.06	Monoterpenic alcohol
Unknown	0.26	Simple phenolic
Unknown	0.02	Unknown
α-Terpinyl acetate	0.15	Monoterpenic ester
α-Cubebene	0.07	Sesquiterpene
Citronellyl acetate	0.07	Monoterpenic ester
Eugenol	0.33	Phenylpropanoid
Neryl acetate	0.02	Monoterpenic ester
α-Copaene	0.31	Sesquiterpene
Geranyl acetate	0.19	Monoterpenic ester
Methyleugenol	0.31	Phenylpropanoid
(*Z*)-Isoeugenol	0.01	Phenylpropanoid
β-Caryophyllene	0.19	Sesquiterpene
trans-α-Bergamotene	0.09	Sesquiterpene
(*E*)-Isoeugenol	0.71	Phenylpropanoid
α-Humulene	0.03	Sesquiterpene
(*E*)-β-Farnesene	0.02	Sesquiterpene
γ-Muurolene	0.01	Sesquiterpene
Germacrene D	0.08	Sesquiterpene
Bicyclogermacrene	0.03	Sesquiterpene
α-Muurolene	0.06	Sesquiterpene
β-Bisabolene	0.06	Sesquiterpene
(3*E*,6*E*)-α-Farnesene	0.05	Sesquiterpene
Myristicin	9.70	Phenylpropanoid
δ-Cadinene	0.11	Sesquiterpene
trans-Calamenene	0.01	Sesquiterpene
trans-Cadina-1,4-diene	0.03	Sesquiterpene
(*E*)-α-Bisabolene	0.01	Sesquiterpene
Elemicin	0.67	Phenylpropanoid
Methoxyeugenol	0.29	Phenylpropanoid
Unknown	0.06	Phenylpropanoid
(*E*)-Isoelemicin	0.02	Phenylpropanoid
Unknown	0.01	Unknown
Myristic acid	0.15	Aliphatic acid
Palmitic acid	0.06	Aliphatic acid
Consolidated total	**99.07%**	

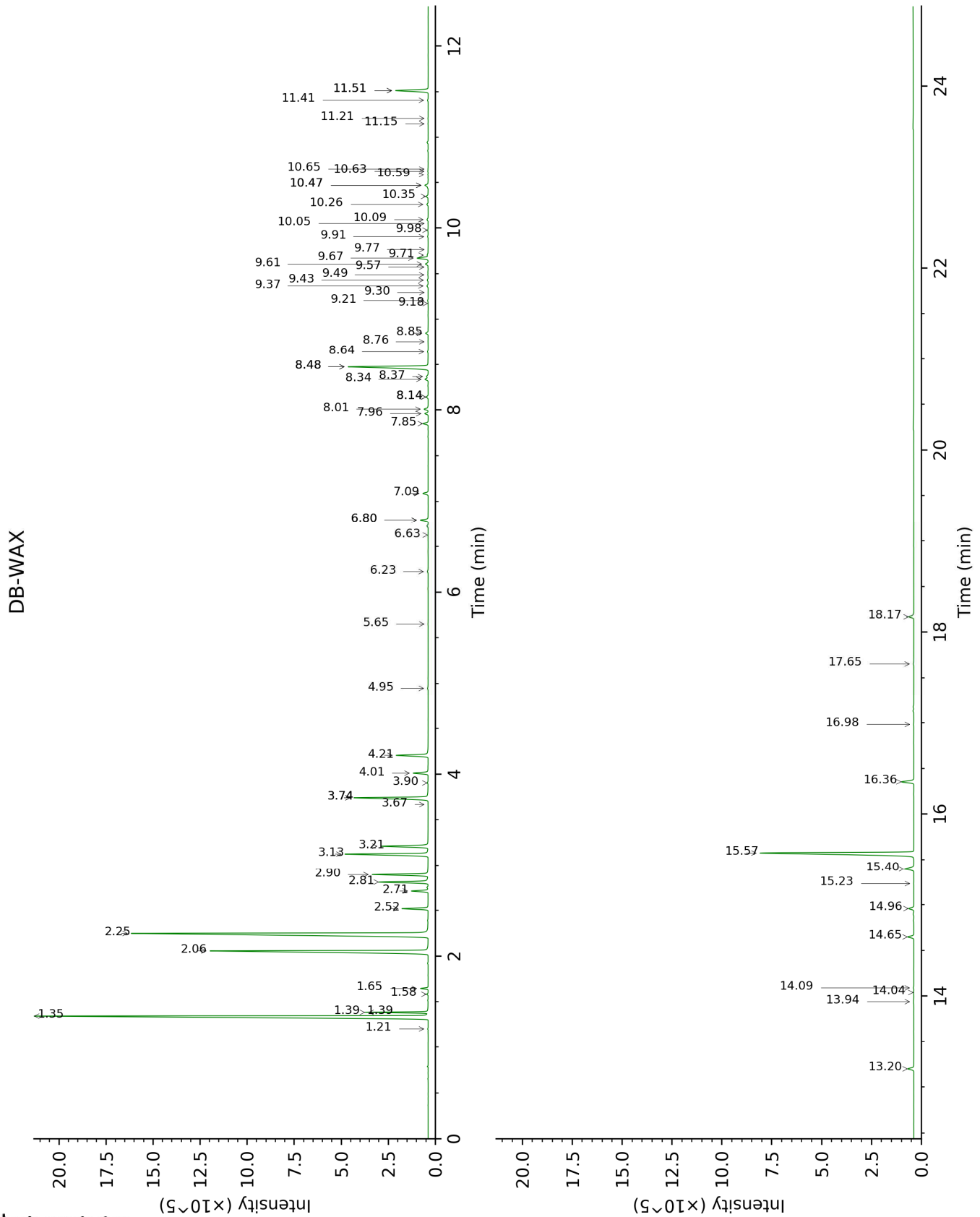tr: The compound has been detected below 0.005% of total signal.

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.

Laboratoire
PhytoChemia

Plus que des analyses... des conseils

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

Laboratoire
PhytoChemia

Plus que des analyses... des conseils

DB-5

DB-WAX

Laboratoire
PhytoChemia

Plus que des analyses... des conseils

FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Isovaleral	0.59	641	tr			
2-Methylbutyral	0.62	652	tr			
Toluene	1.14	760	tr	1.39*	1003	1.86
Tricyclene	2.87	918	0.02	1.20	974	0.02
α-Thujene	2.99	925	1.82	1.39*	1003	[1.86]
α-Pinene	3.08	932	21.33	1.35	996	21.09
α-Fenchene	3.25*	942	0.34	1.58	1023	0.05
Camphene	3.25*	942	[0.34]	1.65	1029	0.28
β-Pinene	3.70*	972	32.89	2.06	1069	12.60
Sabinene	3.70*	972	[32.89]	2.25	1088	20.31
Myrcene	3.99	992	2.32	2.81	1135	2.29
α-Phellandrene	4.13	1000	0.79	2.72	1127	0.72
Δ3-Carene	4.22	1006	1.10	2.52	1112	1.10
α-Terpinene	4.33	1014	2.52	2.90	1142	2.55
para-Cymene	4.44	1020	0.75	4.01	1228	0.74
1,8-Cineole	4.53*	1026	6.58	3.21	1167	2.31
Limonene	4.53*	1026	[6.58]	3.13	1160	4.26
(Z)-β-Ocimene	4.73*	1039	0.02	3.67	1203	0.01
(Z)-β-Ocimene	4.73*	1039	[0.02]	3.74*	1208	3.98
(E)-β-Ocimene	4.89	1049	0.03	3.90	1220	0.05
γ-Terpinene	5.01	1057	3.97	3.74*	1208	[3.98]
cis-Sabinene hydrate	5.12	1064	0.42	6.80*	1427	0.41
Terpinolene	5.46*	1086	1.71	4.21	1243	1.67
para-Cymenene	5.46*	1086	[1.71]	6.23	1385	0.05
trans-Sabinene hydrate	5.61	1094	0.28	7.85	1507	0.27
Unknown [m/z 95, 152 (20), 67 (17), 96 (16), 41 (12)]	5.66	1098	0.04	4.95	1299	0.04
Linalool	5.70*	1101	0.18	7.96	1516	0.17
Unknown [m/z 95, 150 (45), 110 (35), 107 (23), 109 (21)]	5.70*	1101	[0.18]	5.65	1343	0.01
cis-para-Menth-2-en-1-ol	5.97	1118	0.21	8.01	1519	0.23
trans-Pinocarveol	6.20	1133	0.01	9.18	1611	0.01
trans-para-Menth-2-en-1-ol	6.26	1137	0.14	8.85	1585	0.13
Epoxyterpinolene	6.34	1142	0.03	6.63	1414	0.01
Borneol	6.64	1162	0.02	9.77	1659	0.01
δ-Terpineol	6.68	1165	0.01	9.30	1621	0.01
Terpinen-4-ol	6.85	1176	4.51	8.48*	1556	4.72
para-Cymen-8-ol	6.97	1184	0.03	11.41	1798	0.04
α-Terpineol	7.05	1189	0.58	9.67	1652	0.61
cis-Piperitol	7.12	1194	0.07	9.43	1632	0.05
trans-Piperitol	7.32	1207	0.08	10.26	1700	0.07
Citronellol	7.72	1235	0.02	10.65	1734	0.01

Laboratoire
PhytoChemia

Plus que des analyses... des conseils

Unknown [m/z 137, 152 (28), 43 (25), 91 (24), 109 (23), 119 (19)]	7.74	1237	0.01	11.21	1781	0.01
Geraniol	8.12	1257	0.05	11.51*	1807	1.76
Linalyl acetate	8.23	1265	0.01	8.14*	1530	0.11
trans-Ascaridole glycol	8.26	1267	0.02	14.04	2039	0.02
Bornyl acetate	8.49*	1282	1.82	8.14*	1530	[0.11]
Safrole	8.49*	1282	[1.82]	11.51*	1807	[1.76]
Cuminol	8.60	1290	0.03	14.09	2044	0.03
Terpinen-4-yl acetate	8.71	1298	0.04	8.64	1569	0.04
Thymol	8.74	1299	0.06	14.96	2129	0.28
Unknown [m/z 121, 178 (20), 77 (13), 122 (10)]	8.84	1306	0.26	8.48*	1556	[4.72]
Unknown [m/z 149, 178 (41), 121 (36), 91 (30), 55 (21)]	9.20	1332	0.02	8.76	1578	0.01
α-Terpinyl acetate	9.42*	1347	0.22	9.61	1646	0.15
α-Cubebene	9.42*	1347	[0.22]	6.80*	1427	[0.41]
Citronellyl acetate	9.51*	1353	0.30	9.37	1627	0.07
Eugenol	9.51*	1353	[0.30]	14.65	2098	0.33
Neryl acetate	9.68	1366	0.02	10.05	1683	0.01
α-Copaene	9.77	1372	0.31	7.09	1449	0.30
Geranyl acetate	9.95	1385	0.19	10.47*	1718	0.23
Methyleugenol	10.21	1403	0.31	13.20	1960	0.34
(*Z*)-Isoeugenol	10.28	1409	0.01	15.23	2157	0.01
β-Caryophyllene	10.34	1413	0.19	8.34	1545	0.18
trans-α-Bergamotene	10.63	1435	0.09	8.37	1547	0.10
(*E*)-Isoeugenol	10.77*	1445	0.72	16.36	2271	0.71
α-Humulene	10.77*	1445	[0.72]	9.21	1614	0.03
(*E*)-β-Farnesene	10.96	1459	0.02	9.49	1637	0.02
γ-Muurolene	11.10	1470	0.01	9.57	1644	0.02
Germacrene D	11.18	1476	0.08	9.70	1654	0.07
Bicyclogermacrene	11.38	1491	0.03	9.91	1671	0.03
α-Muurolene	11.46	1497	0.06	9.98	1677	0.03
β-Bisabolene	11.61	1508	0.06	10.09	1686	0.07
(3*E*,6*E*)-α-Farnesene	11.64	1511	0.05	10.47*	1718	[0.23]
Myristicin	11.77†	1521	9.94	15.58	2191	9.70
δ-Cadinene	11.81*†	1524	[9.94]	10.35	1707	0.11
trans-Calamenene	11.81*†	1524	[9.94]	11.15	1776	0.01
trans-Cadina-1,4-diene	11.87	1529	0.03	10.59	1728	0.02
(*E*)-α-Bisabolene	12.06	1543	0.01	10.63	1731	0.02
Elemicin	12.23	1557	0.67	15.40	2173	0.70
Methoxyeugenol	12.78	1600	0.29	18.17	2468	0.32
Unknown [m/z	12.89	1610	0.06	13.94	2030	0.04

Laboratoire PhytoChemia

Plus que des analyses... des conseils

	R.T.	R.I.	%	R.T.	R.I.	%
165, 121 (81), 181 (25), 238 (25)]						
(*E*)-Isoelemicin	13.39	1651	0.02	16.98	2338	0.03
Unknown [m/z 179, 236 (36), 119 (19), 205 (19), 91 (11)]	13.66	1673	0.01	17.65	2410	0.04
Myristic acid	14.81	1771	0.15			
Palmitic acid	16.97	1969	0.06			
Total identified	**98.66%**			**98.56%**		
Total reported	**99.06%**			**98.73%**		

*: 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

Laboratoire PhytoChemia

Plus que des analyses... des conseils