CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 20K02-PTH05
Customer identification : Nutmeg - N401082010R
Type : Essential oil
Source : *Myristica fragrans*
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 : November 03, 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Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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.

MÉTHODE CERTIFIÉE
✳ISO 17025:2017
CERTIFIED METHOD

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PHYSICOCHEMICAL DATA

Physical aspect: Faintly yellow liquid
Refractive index: 1.4830 ± 0.0003 (20 °C; method PC-MAT-016)

ISO 3215:1999 - OIL OF NUTMEG, INDONESIAN TYPE

Compound	Min. %	Max. %	Observed %	Complies?
Myristicin	5.0	12.0	9.9	Yes
Safrole	1.0	2.5	1.6	Yes
Terpinen-4-ol	2.0	6.0	4.1	Yes
γ-Terpinene	2.0	6.0	3.7	Yes
Limonene	2.0	7.0	3.8	Yes
Δ3-Carene	0.5	2.0	1.2	Yes
Sabinene	14	29	19	Yes
β-Pinene	13	18	15	Yes
α-Pinene	15	28	21	Yes
Refractive index	1.4750	1.4850	1.4830	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
Isovaleral	tr	Aliphatic aldehyde
2-Methylbutyral	tr	Aliphatic aldehyde
Toluene	tr	Simple phenolic
Nonane	tr	Alkane
Bornylene	tr	Monoterpene
Tricyclene	0.02	Monoterpene
α-Thujene	1.56	Monoterpene
α-Pinene	21.40	Monoterpene
α-Fenchene	0.06	Monoterpene
Camphene	0.31	Monoterpene
Thuja-2,4(10)-diene	0.01	Monoterpene
meta-Cymene	0.03	Monoterpene
β-Pinene	15.06	Monoterpene
Sabinene	19.33	Monoterpene
Octen-3-ol	0.01	Aliphatic alcohol
6-Methyl-5-hepten-2-one	0.03	Aliphatic ketone
Myrcene	2.27	Monoterpene
2-Carene	0.01	Monoterpene
α-Phellandrene	0.80	Monoterpene
Pseudolimonene	0.05	Monoterpene
Δ3-Carene	1.21	Monoterpene
α-Terpinene	2.53	Monoterpene
Carvomenthene	0.02	Aliphatic alcohol
para-Cymene	0.74	Monoterpene
Limonene	3.77	Monoterpene
1,8-Cineole	2.10	Monoterpenic ether
(*Z*)-β-Ocimene	0.03	Monoterpene
(*E*)-β-Ocimene	0.04	Monoterpene
γ-Terpinene	3.69	Monoterpene
cis-Sabinene hydrate	0.27	Monoterpenic alcohol
Unknown	0.01	Oxygenated monoterpene
Terpinolene	1.63	Monoterpene
para-Cymenene	0.06	Monoterpene
trans-Sabinene hydrate	0.21	Monoterpenic alcohol
Unknown	0.05	Oxygenated monoterpene
Linalool	0.24	Monoterpenic alcohol
Unknown	0.01	Monoterpenic alcohol
endo-Fenchol	0.04	Monoterpenic alcohol
cis-para-Menth-2-en-1-ol	0.14	Monoterpenic alcohol
trans-para-Menth-2-en-1-ol	0.09	Monoterpenic alcohol
Epoxyterpinolene	0.01	Monoterpenic ether
Pinocarvone	0.01	Monoterpenic ketone
Borneol	0.01	Monoterpenic alcohol
δ-Terpineol	0.01	Monoterpenic alcohol
Terpinen-4-ol	4.08	Monoterpenic alcohol

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Cryptone	0.01	Normonoterpenic ketone
para-Cymen-8-ol	0.04	Monoterpenic alcohol
α-Terpineol	0.65	Monoterpenic alcohol
cis-Piperitol	0.02	Monoterpenic alcohol
Myrtenol	0.02	Monoterpenic alcohol
trans-Piperitol	0.06	Monoterpenic alcohol
endo-Fenchyl acetate	0.01	Monoterpenic ester
Citronellol	0.01	Monoterpenic alcohol
Unknown	0.01	Oxygenated monoterpene
Unknown	0.01	Unknown
Geraniol	0.03	Monoterpenic alcohol
trans-Ascaridole glycol	0.01	Monoterpenic alcohol
Safrole	1.55	Phenylpropanoid
Bornyl acetate	0.03	Monoterpenic ester
Terpinen-4-yl acetate	0.03	Monoterpenic ester
Thymol	0.04	Monoterpenic alcohol
Unknown	0.24	Simple phenolic
Unknown	0.01	Monoterpenic alcohol
Unknown	0.01	Unknown
α-Terpinyl acetate	0.14	Monoterpenic ester
α-Cubebene	0.06	Sesquiterpene
Eugenol	0.35	Phenylpropanoid
Citronellyl acetate	0.08	Monoterpenic ester
Neryl acetate	0.03	Monoterpenic ester
α-Copaene	0.26	Sesquiterpene
Geranyl acetate	0.17	Monoterpenic ester
β-Cubebene	0.01	Sesquiterpene
Vanillin	0.01	Simple phenolic
Methyleugenol	0.27	Phenylpropanoid
(*Z*)-Isoeugenol	0.02	Phenylpropanoid
β-Caryophyllene	0.09	Sesquiterpene
trans-α-Bergamotene	0.08	Sesquiterpene
(*E*)-Isoeugenol	0.82	Phenylpropanoid
(*E*)-β-Farnesene	0.03	Sesquiterpene
trans-Cadina-1(6),4-diene	0.01	Sesquiterpene
γ-Muurolene	0.02	Sesquiterpene
Germacrene D	0.04	Sesquiterpene
Bicyclogermacrene	0.03	Sesquiterpene
α-Muurolene	0.06	Sesquiterpene
β-Bisabolene	0.05	Sesquiterpene
γ-Cadinene	0.01	Sesquiterpene
(3*E*,6*E*)-α-Farnesene	0.04	Sesquiterpene
Myristicin	9.94	Phenylpropanoid
trans-Cadina-1,4-diene	0.03	Sesquiterpene
δ-Cadinene	0.01	Sesquiterpene
Elemicin	0.29	Phenylpropanoid
Caryophyllene oxide	0.01	Sesquiterpenic ether
Methoxyeugenol	0.40	Phenylpropanoid
Unknown	0.03	Phenylpropanoid
(*E*)-Isoelemicin	0.02	Phenylpropanoid
Unknown	0.01	Unknown
Myristic acid	0.21	Aliphatic acid

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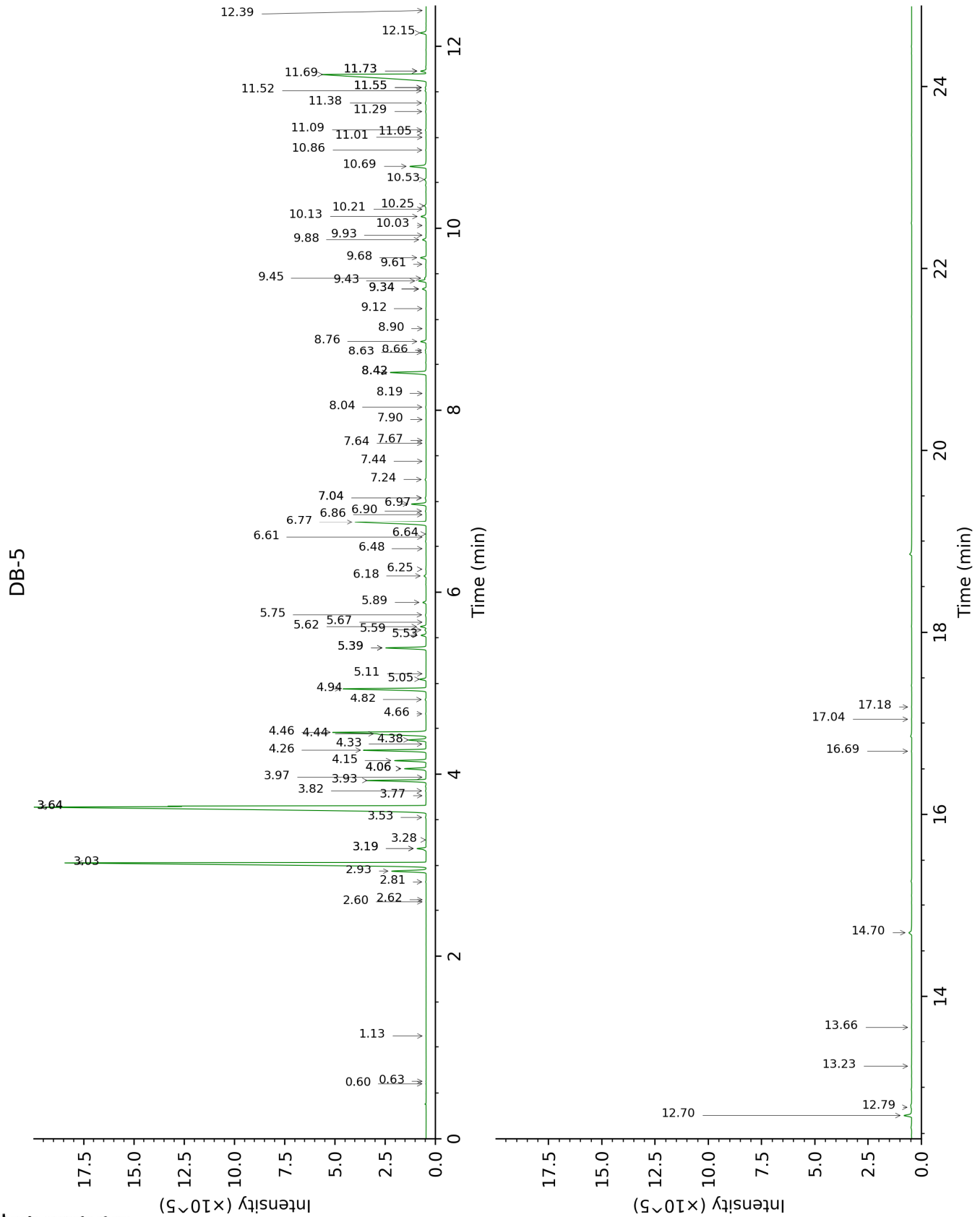|		
meta-Camphorene	0.02	Diterpene
para-Camphorene	0.02	Diterpene
13-epi-Manoyl oxide	0.01	Diterpenic ether
Consolidated total	**98.39%**	

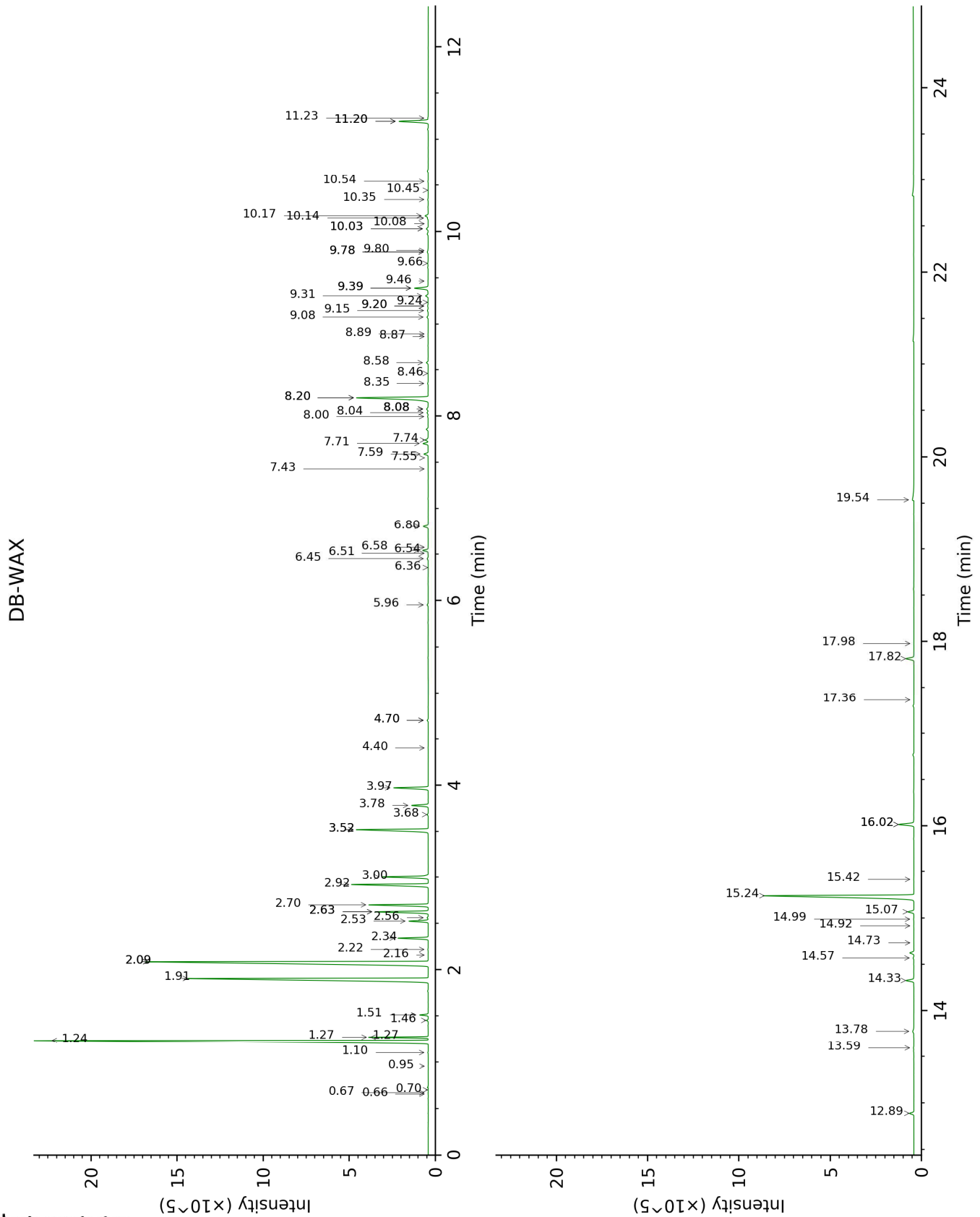tr: The compound has been detected below 0.005% of total signal.

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

DB-WAX

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FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Isovaleral	0.60	642	tr	0.67	883	tr
2-Methylbutyral	0.63	652	tr	0.66	877	tr
Toluene	1.13	759	tr	1.27*	1000	1.57
Nonane	2.60	903	tr	0.70	896	tr
Bornylene	2.62	904	tr	0.96	944	tr
Tricyclene	2.82	918	0.02	1.10	970	0.01
α-Thujene	2.93	925	1.56	1.27*	1000	[1.57]
α-Pinene	3.03	932	21.40	1.24	995	21.35
α-Fenchene	3.19*	942	0.38	1.46	1020	0.06
Camphene	3.19*	942	[0.38]	1.51	1026	0.31
Thuja-2,4(10)-diene	3.28	949	0.01	2.09*	1086	19.34
meta-Cymene	3.53	965	0.03	2.63*	1133	2.27
β-Pinene	3.64*†	973	34.46	1.91	1067	15.06
Sabinene	3.64*†	973	[34.46]	2.09*	1086	[19.34]
Octen-3-ol	3.77	981	0.01	6.51	1423	0.01
6-Methyl-5-hepten-2-one	3.82	985	0.03	4.70*	1295	0.05
Myrcene	3.93	992	2.27	2.63*	1133	[2.27]
2-Carene	3.97	995	0.01	2.16	1094	0.01
α-Phellandrene	4.06*	1001	0.84	2.53	1125	0.80
Pseudolimonene	4.06*	1001	[0.84]	2.56	1128	0.05
Δ3-Carene	4.15	1007	1.21	2.34	1110	1.19
α-Terpinene	4.26	1014	2.53	2.70	1139	2.53
Carvomenthene	4.33	1018	0.02	2.22	1100	0.02
para-Cymene	4.38	1021	0.74	3.78	1226	0.75
Limonene	4.44†	1025	5.84	2.92	1157	3.77
1,8-Cineole	4.46†	1026	[5.84]	3.00	1164	2.10
(Z)-β-Ocimene	4.66	1039	0.03	3.52*	1206	3.71
(E)-β-Ocimene	4.82	1049	0.04	3.68	1218	0.04
γ-Terpinene	4.94	1057	3.69	3.52*	1206	[3.71]
cis-Sabinene hydrate	5.05	1064	0.27	6.54	1425	0.27
Unknown [m/z 79, 93 (60), 43 (40), 94 (35), 137 (33), 77 (26), 91 (20), 152 (18)]	5.11	1068	0.01	4.40	1272	0.01
Terpinolene	5.39*	1085	1.68	3.97	1240	1.63
para-Cymenene	5.39*	1085	[1.68]	5.96	1382	0.06
trans-Sabinene hydrate	5.53	1094	0.21	7.59	1504	0.22
Unknown [m/z 95, 152 (20), 67 (17), 96 (16), 41 (12)]	5.59	1098	0.05	4.70*	1295	[0.05]
Linalool	5.62	1100	0.24	7.70	1513	0.25
Unknown [m/z 119, 109 (94), 43	5.67	1103	0.01	8.08*	1542	0.11

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(61), 95 (56), 91 (48), 77 (32), 152 (32), 137 (31), 134 (24)]

Compound						
endo-Fenchol	5.75	1108	0.04	8.04	1539	0.07
cis-para-Menth-2-en-1-ol	5.89	1117	0.14	7.74	1516	0.18
trans-para-Menth-2-en-1-ol	6.18	1136	0.09	8.58	1582	0.10
Epoxyterpinolene	6.25	1141	0.01	6.36	1411	0.01
Pinocarvone	6.48	1155	0.01	7.55	1501	0.01
Borneol	6.60	1164	0.01	9.39*	1647	0.73
δ-Terpineol	6.64	1166	0.01	9.15	1627	0.04
Terpinen-4-ol	6.77	1174	4.08	8.20*	1552	4.31
Cryptone	6.86	1180	0.01	8.87	1604	0.01
para-Cymen-8-ol	6.90	1182	0.04	11.20*	1799	1.60
α-Terpineol	6.98	1188	0.65	9.39*	1647	[0.73]
cis-Piperitol	7.04*	1192	0.07	9.20*	1631	0.03
Myrtenol	7.04*	1192	[0.07]	10.54	1743	0.02
trans-Piperitol	7.24	1205	0.06	10.03*	1700	0.10
endo-Fenchyl acetate	7.44	1218	0.01	6.58	1428	0.01
Citronellol	7.64	1232	0.01	10.45	1735	0.01
Unknown [m/z 137, 152 (28), 43 (25), 91 (24), 109 (23), 119 (19)]	7.67	1234	0.01			
Unknown [m/z 43, 109 (63), 71 (50), 81 (31), 55 (29), 85 (26)...]	7.90	1249	0.01			
Geraniol	8.04	1259	0.03	11.23	1802	0.03
trans-Ascaridole glycol	8.18	1269	0.01	13.78	2037	0.11
Safrole	8.42*	1285	1.68	11.20*	1799	[1.60]
Bornyl acetate	8.42*	1285	[1.68]	8.00	1536	0.03
Terpinen-4-yl acetate	8.64	1300	0.03	8.35	1564	0.03
Thymol	8.66	1301	0.04	14.73	2131	0.01
Unknown [m/z 121, 178 (20), 77 (13), 122 (10)]	8.76	1305	0.24	8.20*	1552	[4.31]
Unknown [m/z 97, 112 (92), 83 (62), 43 (44), 41 (25)... 170? (4)]	8.90	1315	0.01	14.57	2115	0.04
Unknown [m/z 149, 178 (41), 121 (36), 91 (30), 55 (21)]	9.12	1330	0.01	8.46	1572	0.01
α-Terpinyl acetate	9.34*	1346	0.18	9.31	1640	0.14
α-Cubebene	9.34*	1346	[0.18]	6.45	1419	0.06

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Eugenol	9.42	1352	0.35	14.33	2090	0.43
Citronellyl acetate	9.45	1354	0.08	9.08	1622	0.06
Neryl acetate	9.61	1365	0.03	9.80	1680	0.01
α-Copaene	9.68	1370	0.26	6.80	1445	0.26
Geranyl acetate	9.88	1384	0.17	10.17	1712	0.17
β-Cubebene	9.92	1387	0.01	7.43	1492	0.01
Vanillin	10.03	1395	0.01	17.98	2478	0.01
Methyleugenol	10.13	1402	0.27	12.89	1953	0.22
(*Z*)-Isoeugenol	10.21	1408	0.02	14.92	2150	0.01
β-Caryophyllene	10.25	1411	0.09	8.08*	1542	[0.11]
trans-α-Bergamotene	10.53	1432	0.08	8.08*	1542	[0.11]
(*E*)-Isoeugenol	10.69	1444	0.82	16.02*	2263	0.84
(*E*)-β-Farnesene	10.86	1457	0.03	9.24	1634	0.01
trans-Cadina-1(6),4-diene	11.00	1467	0.01	8.90	1607	0.01
γ-Muurolene	11.05	1471	0.02	9.20*	1631	[0.03]
Germacrene D	11.08	1473	0.04	9.46	1653	0.01
Bicyclogermacrene	11.29	1488	0.03	9.78*	1679	0.05
α-Muurolene	11.38	1495	0.06	9.66	1669	0.03
β-Bisabolene	11.52	1506	0.05	9.78*	1679	[0.05]
γ-Cadinene	11.55*	1508	0.05	10.03*	1700	[0.10]
(3*E*,6*E*)-α-Farnesene	11.55*	1508	[0.05]	10.14	1709	0.04
Myristicin	11.69	1520	9.94	15.24	2182	9.72
trans-Cadina-1,4-diene	11.73*	1522	0.23	10.35	1726	0.03
δ-Cadinene	11.73*	1522	[0.23]	10.08	1704	0.01
Elemicin	12.15	1555	0.29	15.07	2165	0.31
Caryophyllene oxide	12.39	1575	0.01			
Methoxyeugenol	12.70	1599	0.40	17.82	2459	0.44
Unknown [m/z 165, 121 (81), 181 (25), 238 (25)]	12.78	1606	0.03	13.59	2019	0.02
(*E*)-Isoelemicin	13.23	1643	0.02			
Unknown [m/z 179, 236 (36), 119 (19), 205 (19), 91 (11)]	13.66	1679	0.01	17.36	2408	0.01
Myristic acid	14.70	1768	0.21	19.54	2661	0.25
meta-Camphorene	16.69	1950	0.02	14.99	2157	0.02
para-Camphorene	17.04	1983	0.02	15.42	2200	0.01
13-epi-Manoyl oxide	17.18	1996	0.01	16.02*	2263	[0.84]
Total identified	**98.34%**			**98.14%**		
Total reported	**98.74%**			**98.23%**		

*: 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, *Myristica fragrans*
Internal code: 20K02-PTH05

Nutmeg - N401082010R

Report prepared for
Plant Therapy

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

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