CERTIFICATE OF ANALYSIS - GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 24H13-NPA01
Customer Identification : Item: Mentha piperita - India - Lot: NPS00168
Type : Essential Oil
Source : *Mentha x piperita*
Customer : Nature Packaged

Checked an approved by:

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

Notes: 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.

This report is an update from the first version issued on 2024-08-26 to format it for online publication.

ISO 17025:2017
MÉTHODE CERTIFIÉE
CERTIFIED METHOD

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GAS CHROMATOGRAPHIC ANALYSIS

Method : PC-MAT-014 - Analysis of the composition of an essential oil or other volatile liquide by FAST GC-FID
⚹ISO
Results : See analysis summary (next page)
Analyst : Sylvain Mercier, M. Sc., Chimiste 2014-005
Date : 2024-08-21

PHYSICOCHEMICAL DATA

Refractive index : 1.4608 ± 0.0003 (20 ℃)
Method : PC-MAT-016 - Measure of the refractive index of a liquid.
Analyst : Kassandra Baker
Date : 2024-08-13

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
Isovaleral	0.01	Aliphatic aldehyde
2-Methylbutyral	0.01	Aliphatic aldehyde
Isoamyl alcohol	tr	Aliphatic alcohol
2-Methylbutanol	tr	Aliphatic alcohol
trans-2,5-Diethyltetrahydrofuran	0.01	Furan
α-Thujene	0.03	Monoterpene
α-Pinene	0.64	Monoterpene
3-Methylcyclohexanone	0.03	Aliphatic ketone
Camphene	0.01	Monoterpene
Thuja-2,4(10)-diene	0.01	Monoterpene
Sabinene	0.31	Monoterpene
β-Pinene	0.91	Monoterpene
cis-para-Menthane	0.02	Monoterpene
Octen-3-ol	0.02	Aliphatic alcohol
cis-Carane	0.03	Monoterpene
Octan-3-one	0.02	Aliphatic ketone
trans-para-Menthane	0.01	Monoterpene
Myrcene	0.22	Monoterpene
Octan-3-ol	0.12	Aliphatic alcohol
α-Phellandrene	0.03	Monoterpene
Pseudolimonene	0.05	Monoterpene
Octanal	tr	Aliphatic aldehyde
Δ3-Carene	0.02	Monoterpene
α-Terpinene	0.13	Monoterpene
Carvomenthene	0.01	Aliphatic alcohol
para-Cymene	0.17	Monoterpene
1,8-Cineole	4.59	Monoterpenic ether
Limonene	1.98	Monoterpene
(*Z*)-β-Ocimene	0.09	Monoterpene
(*E*)-β-Ocimene	0.05	Monoterpene
γ-Terpinene	0.14	Monoterpene
cis-Sabinene hydrate	0.12	Monoterpenic alcohol
Unknown	0.01	Oxygenated monoterpene
Octanol	0.02	Aliphatic alcohol
Terpinolene	0.06	Monoterpene
para-Cymenene	0.02	Monoterpene
trans-Sabinene hydrate	0.02	Monoterpenic alcohol
Nonan-3-ol	0.08	Aliphatic alcohol
2-Methylbutyl 2-methylbutyrate	0.02	Aliphatic ester
Amyl isovalerate	0.01	Aliphatic ester

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Compound	Value	Class
cis-para-Menth-2-en-1-ol	0.02	Monoterpenic alcohol
Isopulegol	[0.18]	Monoterpenic alcohol
cis-α-Dihydroterpineol	[0.18]	Monoterpenic alcohol
Menthone	19.06	Monoterpenic ketone
Menthofuran	2.97	Monoterpenic ether
Isomenthone	3.08	Monoterpenic ketone
δ-Terpineol	0.22	Monoterpenic alcohol
ne*o*-Menthol	2.01	Monoterpenic alcohol
Terpinen-4-ol	0.92	Monoterpenic alcohol
Menthol	48.04	Monoterpenic alcohol
Isomenthol	0.32	Monoterpenic alcohol
neoiso-Menthol	0.05	Monoterpenic alcohol
α-Terpineol	0.27	Monoterpenic alcohol
Myrtenal	0.04	Monoterpenic aldehyde
cis-Piperitol	0.04	Monoterpenic alcohol
Methylchavicol	0.01	Phenylpropanoid
Unknown	tr	Unknown
trans-Piperitol	0.04	Monoterpenic alcohol
trans-Carveol	0.02	Monoterpenic alcohol
(3*Z*)-Hexenyl 2-methylbutyrate	0.01	Aliphatic ester
Pulegone	0.52	Monoterpenic ketone
Carvone	0.06	Monoterpenic ketone
Piperitone	0.44	Monoterpenic ketone
cis-Carvone oxide	0.02	Monoterpenic ketone
ne*o*-Menthyl acetate	0.10	Monoterpenic ester
Decanol	0.18	Aliphatic alcohol
2-Ethylmenthone?	0.04	Aliphatic ketone
Dihydroedulan I	0.02	Terpenic ether
Menthyl acetate	5.11	Monoterpenic ester
Dihydroedulan II	0.01	Terpenic ether
Thymol	0.03	Monoterpenic alcohol
Isomenthyl acetate	0.09	Monoterpenic alcohol
neoiso-Menthyl acetate?	0.01	Monoterpenic ester
Bicycloelemene	0.06	Sesquiterpene
Eugenol	0.03	Phenylpropanoid
α-Ylangene	0.02	Sesquiterpene
α-Copaene	0.04	Sesquiterpene
β-Bourbonene	0.21	Sesquiterpene
β-Cubebene	0.03	Sesquiterpene
β-Elemene	0.10	Sesquiterpene
Unknown	0.03	Unknown
Longifolene	0.06	Sesquiterpene
Isocaryophyllene	0.05	Sesquiterpene
Unknown	0.02	Unknown
β-Ylangene	0.24	Sesquiterpene

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β-Caryophyllene	2.47	Sesquiterpene
β-Copaene	0.11	Sesquiterpene
Aromadendrene	0.03	Sesquiterpene
trans-α-Bergamotene	0.02	Sesquiterpene
Isogermacrene D	0.05	Sesquiterpene
α-Humulene	0.19	Sesquiterpene
Muurola-4,11-diene	0.03	Sesquiterpene
(*E*)-β-Farnesene	0.12	Sesquiterpene
γ-Muurolene	0.09	Sesquiterpene
Germacrene D	0.49	Sesquiterpene
Menthalactone	0.02	Monoterpenic lactone
Bicyclogermacrene	0.15	Sesquiterpene
Viridiflorene	0.06	Sesquiterpene
α-Muurolene	0.05	Sesquiterpene
δ-Amorphene	0.03	Sesquiterpene
γ-Cadinene	0.03	Sesquiterpene
δ-Cadinene	0.07	Sesquiterpene
Caryophyllene oxide isomer	0.02	Sesquiterpenic ether
Caryophyllene oxide	0.05	Sesquiterpenic ether
Viridiflorol	0.09	Sesquiterpenic alcohol
τ-Muurolol	0.01	Sesquiterpenic alcohol
α-Cadinol	0.01	Sesquiterpenic alcohol
Consolidated total	**99.00**	

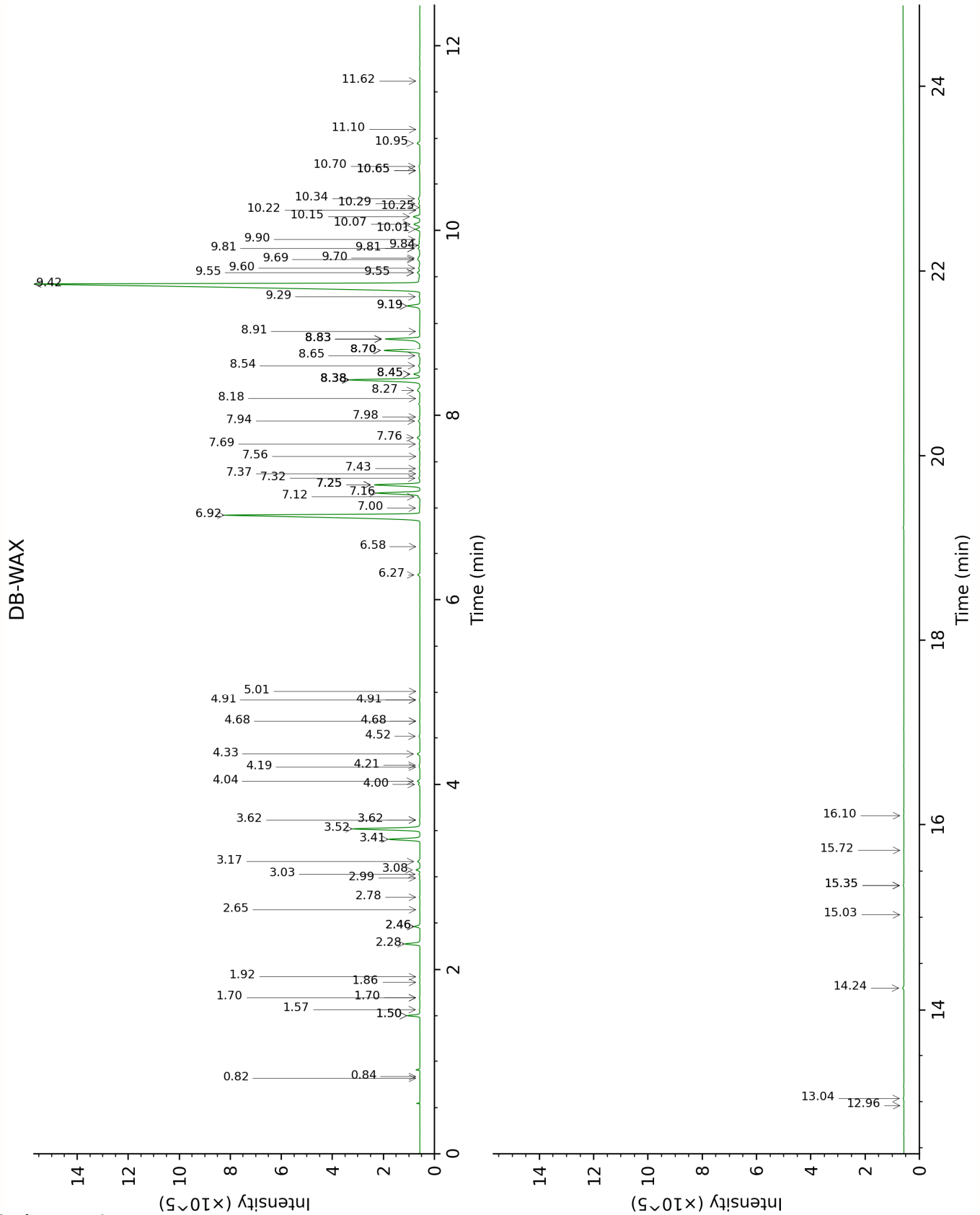tr: The compound has been detected below 0.005% of the total signal
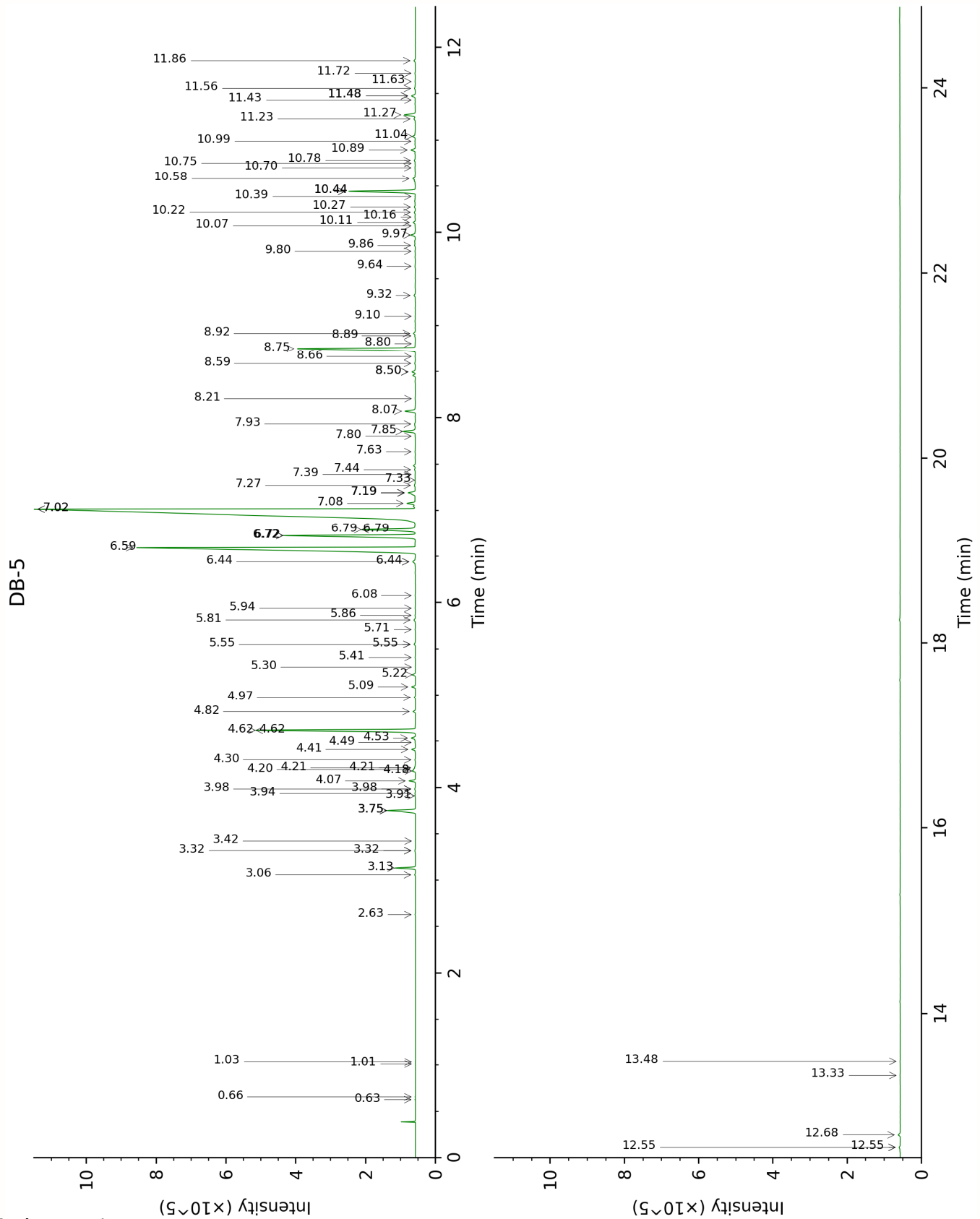
Note: no correction factor was applied

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.

Bracketed value ([xx]): A bracketed percent value indicate that two or more compound percentage could not be solved due to coelution.

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Essential Oil, *Mentha x piperita*
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Nature Packaged

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

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DB-WAX

Time (min)

Intensity (×10^5)

Time (min)

Intensity (×10^5)

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Page 7/12

Essential Oil, *Mentha x piperita*
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Report prepared for:
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DB-5

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FULL ANALYSIS DATA

	Column DB-WAX			Column DB-5		
Isovaleral						
	0.84	884.5	0.01	0.63	640.2	0.01
2-Methylbutyral	0.82	878.0	0.01	0.66	650.6	0.01
Isoamyl alcohol	3.62*	1174.6	[0.03]	1.01	732.1	tr
2-Methylbutanol	3.62*	1174.6	[0.03]	1.03	735.2	tr
trans-2,5-Diethyltetrahydrofuran	1.70*	1011.5	[0.03]	2.63	895.3	0.01
α-Thujene	1.57	999.3	0.03	3.06	925.3	0.03
α-Pinene	1.50*	992.1	[0.66]	3.13	930.1	0.64
3-Methylcyclohexanone	4.91*	1268.6	[0.04]	3.32*	942.5	[0.04]
Camphene	1.86	1027.4	0.01	3.32*	942.5	[0.04]
Thuja-2,4(10)-diene	2.46*	1084.8	[0.32]	3.42	949.3	0.01
Sabinene	2.46*	1084.8	[0.32]	3.75*	971.0	[1.23]
β-Pinene	2.28	1066.9	0.91	3.75*	971.0	[1.23]
cis-para-Menthane	1.50*	992.1	[0.66]	3.75*	971.0	[1.23]
Octen-3-ol	7.00	1418.2	0.03	3.91	981.4	0.02
cis-Carane	1.92	1033.1	0.02	3.94	983.1	0.03
Octan-3-one	4.19	1216.7	0.02	3.98*	986.3	[0.04]
trans-para-Menthane	1.70*	1011.5	[0.03]	3.98*	986.3	[0.04]
Myrcene	3.08	1133.5	0.22	4.07	992.1	0.22
Octan-3-ol	6.27	1365.5	0.14	4.18	999.2	0.12
α-Phellandrene	2.99	1126.7	0.03	4.20*†	1000.2	[0.07]
Pseudolimonene	3.03	1129.8	0.05	4.21*†	1001.4	[0.04]
Octanal	4.68*	1252.2	[0.02]	4.21*†	1001.4	[0.04]
Δ3-Carene	2.78	1110.9	0.03	4.30	1006.9	0.02
α-Terpinene	3.17	1140.4	0.15	4.41	1013.9	0.13
Carvomenthene	2.65	1100.6	0.02	4.49	1018.6	0.01
para-Cymene	4.33	1226.8	0.17	4.53	1021.6	0.17
1,8-Cineole	3.52	1167.3	4.59	4.62*	1026.8	[6.55]
Limonene	3.41	1158.7	1.98	4.62*	1026.8	[6.55]
(*Z*)-β-Ocimene	4.00	1203.4	0.09	4.82	1039.5	0.09
(*E*)-β-Ocimene	4.21	1218.2	0.05	4.98	1049.2	0.05
γ-Terpinene	4.04	1205.9	0.16	5.09	1056.5	0.14
cis-Sabinene hydrate	7.12	1427.3	0.11	5.22	1064.7	0.12
Unknown PIMA I [m/z 79, 93 (60), 43 (40), 94 (35), 137 (33), 77 (26), 91 (20), 152 (18)]	5.01	1275.7	0.02	5.30	1069.8	0.01
Octanol	8.45*	1526.2	[0.41]	5.41	1076.3	0.02
Terpinolene	4.52	1240.5	0.06	5.55*	1085.2	[0.06]
para-Cymenene	6.58	1387.2	0.02	5.55*	1085.2	[0.06]
trans-Sabinene hydrate	8.18	1505.9	0.03	5.71	1095.2	0.02

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Compound						
Nonan-3-ol	7.56	1459.3	0.02	5.81	1101.6	0.08
2-Methylbutyl 2-methylbutyrate	4.68*	1252.2	[0.02]	5.86	1104.8	0.02
Amyl isovalerate	4.91*	1268.6	[0.04]	5.94	1109.7	0.01
cis-para-Menth-2-en-1-ol	8.38*	1521.5	[5.26]	6.08	1118.4	0.02
Isopulegol	8.38*	1521.5	[5.26]	6.44*	1141.7	[0.18]
cis-α-Dihydroterpineol	8.38*	1521.5	[5.26]	6.44*	1141.7	[0.18]
Menthone	6.92	1412.6	19.01	6.59	1151.3	19.06
Menthofuran	7.16	1430.2	2.97	6.72*	1159.7	[6.04]
Isomenthone	7.25*	1436.7	[3.12]	6.72*	1159.7	[6.04]
δ-Terpineol	9.70*†	1624.3	[0.11]	6.79*	1163.8	[2.23]
neo-Menthol	8.83*	1555.9	[2.41]	6.79*	1163.8	[2.23]
Terpinen-4-ol	8.83*	1555.9	[2.41]	7.02*	1178.3	[48.96]
Menthol	9.42	1601.8	48.04	7.02*	1178.3	[48.96]
Isomenthol	9.19*	1583.3	[0.92]	7.08	1182.2	0.32
neoiso-Menthol	9.69*†	1623.1	[0.17]	7.19*	1189.5	[0.36]
α-Terpineol	10.01	1649.2	0.27	7.19*	1189.5	[0.36]
Myrtenal	8.92	1562.2	0.04	7.19*	1189.5	[0.36]
cis-Piperitol	9.81*†	1632.7	[0.12]	7.27	1194.6	0.04
Methylchavicol	9.60	1615.6	0.13	7.33	1198.2	0.01
Unknown MEPI V [m/z 43, 99 (84), 81 (46), 986 (43), 126 (36), 71 (28)... 170 (12)]				7.39	1202.1	tr
trans-Piperitol	10.65*	1701.2	[0.04]	7.44	1205.5	0.04
trans-Carveol	11.62	1782.5	0.02	7.64	1218.5	0.02
(3Z)-Hexenyl 2-methylbutyrate	7.32	1442.0	0.08	7.80	1229.6	0.01
Pulegone	9.19*	1583.3	[0.92]	7.85	1233.0	0.52
Carvone	10.25	1668.1	0.03	7.93	1238.4	0.06
Piperitone	10.15	1660.1	0.46	8.07	1247.6	0.44
cis-Carvone oxide	11.10	1738.5	0.01	8.21	1256.6	0.02
neo-Menthyl acetate	7.94	1487.5	0.10	8.50*	1275.9	[0.15]
Decanol	10.95	1726.0	0.18	8.50*	1275.9	[0.15]
2-Ethylmenthone?				8.59	1282.1	0.04
Dihydroedulan I	7.37	1445.5	0.04	8.66	1287.1	0.02
Menthyl acetate	8.38*	1521.5	[5.26]	8.75	1293.0	5.11
Dihydroedulan II	7.69	1469.1	0.06	8.80	1296.6	0.01
Thymol	15.34*	2126.7	[0.04]	8.89	1302.3	0.03
Isomenthyl acetate	8.54	1533.2	0.10	8.92	1304.1	0.09
neoiso-Menthyl acetate?				9.10	1317.1	0.01
Bicycloelemene	7.25*	1436.7	[3.12]	9.32	1332.8	0.06
Eugenol	15.03	2095.3	0.03	9.64	1354.9	0.03

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Compound						
α-Ylangene	7.25*	1436.7	[3.12]	9.80	1366.2	0.02
α-Copaene	7.43	1449.7	0.04	9.86	1370.6	0.04
β-Bourbonene	7.76	1474.2	0.20	9.97	1378.5	0.21
β-Cubebene	7.98	1490.7	0.03	10.07	1385.4	0.03
β-Elemene	8.65	1541.6	0.08	10.11	1388.0	0.10
Unknown MEPI VII [m/z 107, 121 (79), 119 (66), 91 (58), 136 (55), 105 (49)... 194 (1)]				10.16	1392.0	0.03
Longifolene	8.27	1512.6	0.23	10.22	1395.6	0.06
Isocaryophyllene	8.45*	1526.2	[0.41]	10.27	1399.6	0.05
Unknown MEPI X [m/z 109, 95 (88), 69 (66), 135 (56), 82 (54), 41 (45)...]				10.39	1407.9	0.02
β-Ylangene	8.38*	1521.5	[5.26]	10.44*	1412.1	[2.71]
β-Caryophyllene	8.70*	1545.9	[2.60]	10.44*	1412.1	[2.71]
β-Copaene	8.70*	1545.9	[2.60]	10.58	1422.3	0.11
Aromadendrene	8.83*	1555.9	[2.41]	10.70	1431.3	0.03
trans-α-Bergamotene	8.70*	1545.9	[2.60]	10.75	1434.9	0.02
Isogermacrene D	9.29	1590.9	0.06	10.78	1437.2	0.05
α-Humulene	9.55*	1611.7	[0.20]	10.89	1445.6	0.19
Muurola-4,11-diene	9.55*	1611.7	[0.20]	10.99	1452.6	0.03
(*E*)-β-Farnesene	9.84*†	1635.3	[0.10]	11.04	1456.5	0.12
γ-Muurolene	9.81*†	1632.7	[0.12]	11.23	1470.5	0.09
Germacrene D	10.07	1653.6	0.50	11.27	1473.8	0.49
Menthalactone	16.10	2202.3	0.02	11.43	1485.6	0.02
Bicyclogermacrene	10.34	1675.7	0.15	11.48*	1489.0	[0.19]
Viridiflorene	9.90	1640.4	0.06	11.48*	1489.0	[0.19]
α-Muurolene	10.29	1671.4	0.08	11.56	1494.9	0.05
δ-Amorphene	10.22	1665.6	0.01	11.63	1500.4	0.03
γ-Cadinene	10.65*	1701.2	[0.04]	11.72	1507.4	0.03
δ-Cadinene	10.70	1704.9	0.07	11.86	1518.0	0.07
Caryophyllene oxide isomer	12.96	1900.5	0.02	12.55*	1572.2	[0.07]
Caryophyllene oxide	13.04	1907.6	0.05	12.55*	1572.2	[0.07]
Viridiflorol	14.24	2019.1	0.09	12.68	1582.8	0.09
τ-Muurolol	15.34*	2126.7	[0.04]	13.33	1634.7	0.01
α-Cadinol	15.72	2164.4	tr	13.48	1647.2	0.01
Total reported		98.78%			98.84%	

*: Two or more compounds are coeluting on this column

[xx]: Duplicate percentage due to coelutions, only the first one is 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.

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Internal code: 24H13-NPA01

Item: Mentha piperita - India - Lot: NPS00168

Report prepared for:
Nature Packaged
Note: no correction factor was applied
R.T.: Retention time (minutes)
R.I.: Retention index

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