Date : 2023-10-16

CERTIFICATE OF ANALYSIS - GC PROFILING

SAMPLE IDENTIFICATION

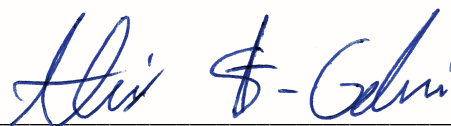**Internal code :** 23J06-NPA01
Customer Identification : Peppermint - Mentha Piperita - India - NPS00110 - Lot # NP0209
Type : Essential Oil
Source : *Mentha x piperita*
Customer : Nature Packaged

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 2023-10-11 to format it for online publication.

MÉTHODE CERTIFIÉE
*☀ISO 17025:2017
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 : 2023-10-11

PHYSICOCHEMICAL DATA

Refractive index : 1.4596 ± 0.0003 (20 ℃)
Method : PC-MAT-016 - Measure of the refractive index of a liquid.
Analyst : Cindy Caron B. Sc.
Date : 2023-10-10

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	tr	Aliphatic aldehyde
2-Methylbutyral	tr	Aliphatic aldehyde
Isoamyl alcohol	tr	Aliphatic alcohol
2-Methylbutanol	tr	Aliphatic alcohol
Hexanol	0.02	Aliphatic alcohol
trans-2,5-Diethyltetrahydrofuran	0.02	Furan
Hashishene	0.01	Monoterpene
α-Thujene	0.04	Monoterpene
α-Pinene	1.06	Monoterpene
3-Methylcyclohexanone	0.06	Aliphatic ketone
Camphene	0.03	Monoterpene
α-Fenchene	tr	Monoterpene
Benzaldehyde	0.01	Simple phenolic
Sabinene	0.48	Monoterpene
β-Pinene	1.49	Monoterpene
cis-para-Menthane	0.03	Monoterpene
trans-para-Menthane	0.01	Monoterpene
Octen-3-ol	0.02	Aliphatic alcohol
cis-Carane	0.01	Monoterpene
Octan-3-one	0.03	Aliphatic ketone
Myrcene	0.07	Monoterpene
Octan-3-ol	0.04	Aliphatic alcohol
α-Phellandrene	0.01	Monoterpene
Δ3-Carene	0.01	Monoterpene
α-Terpinene	0.05	Monoterpene
Carvomenthene	0.01	Aliphatic alcohol
para-Cymene	0.10	Monoterpene
1,8-Cineole	6.23	Monoterpenic ether
Limonene	2.97	Monoterpene
2-Ethylhexanol	0.01	Aliphatic alcohol
(*Z*)-β-Ocimene	0.04	Monoterpene
(*E*)-β-Ocimene	0.04	Monoterpene
γ-Terpinene	0.10	Monoterpene
cis-Sabinene hydrate	0.08	Monoterpenic alcohol
cis-Linalool oxide (fur.)	0.01	Monoterpenic alcohol
Octanol	0.02	Aliphatic alcohol
Terpinolene	0.04	Monoterpene
para-Cymenene	0.02	Monoterpene
trans-Sabinene hydrate	0.02	Monoterpenic alcohol
Nonan-3-ol	0.02	Aliphatic alcohol

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Linalool	0.06	Monoterpenic alcohol
2-Methylbutyl 2-methylbutyrate	0.02	Aliphatic ester
cis-para-Menth-2-en-1-ol	0.02	Monoterpenic alcohol
all*o*-Ocimene	0.01	Monoterpene
trans-Sabinol	0.02	Monoterpenic alcohol
Isopulegol	0.06	Monoterpenic alcohol
cis-α-Dihydroterpineol	0.02	Monoterpenic alcohol
Menthone	25.06	Monoterpenic ketone
Isomenthone	4.64	Monoterpenic ketone
Menthofuran	1.23	Monoterpenic ether
δ-Terpineol	0.07	Monoterpenic alcohol
ne*o*-Menthol	3.74	Monoterpenic alcohol
Lavandulol	0.02	Monoterpenic alcohol
Menthol	40.01	Monoterpenic alcohol
Terpinen-4-ol	0.47	Monoterpenic alcohol
Isomenthol	0.14	Monoterpenic alcohol
para-Cymen-8-ol	0.02	Monoterpenic alcohol
α-Terpineol	0.14	Monoterpenic alcohol
Myrtenal	0.02	Monoterpenic aldehyde
neois*o*-Menthol	0.05	Monoterpenic alcohol
Methylchavicol	0.03	Phenylpropanoid
Myrtenol	0.01	Monoterpenic alcohol
Unknown	tr	Unknown
trans-Piperitol	0.01	Monoterpenic alcohol
Citronellol	0.02	Monoterpenic alcohol
Pulegone	0.59	Monoterpenic ketone
Carvone	0.03	Monoterpenic ketone
Piperitone	0.39	Monoterpenic ketone
ne*o*-Menthyl acetate	0.09	Monoterpenic ester
2-Ethylmenthone?	0.02	Aliphatic ketone
Menthyl acetate	5.01	Monoterpenic ester
Dihydroedulan II	0.01	Terpenic ether
Isomenthyl acetate	0.08	Monoterpenic alcohol
neois*o*-Menthyl acetate?	0.02	Monoterpenic ester
Bicycloelemene	0.04	Sesquiterpene
Piperitenone	0.01	Monoterpenic ketone
α-Cubebene	0.01	Sesquiterpene
cis-Carvyl acetate	0.02	Monoterpenic ester
α-Copaene	0.05	Sesquiterpene
β-Bourbonene	0.06	Sesquiterpene
1,5-diepi-β-Bourbonene	0.01	Sesquiterpene
β-Elemene	0.02	Sesquiterpene
Unknown	0.02	Unknown
Isocaryophyllene	0.02	Sesquiterpene
β-Caryophyllene	3.47	Sesquiterpene

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β-Copaene	0.01	Sesquiterpene
Isogermacrene D	0.01	Sesquiterpene
α-Humulene	0.03	Sesquiterpene
Muurola-4,11-diene	0.01	Sesquiterpene
(*E*)-β-Farnesene	0.06	Sesquiterpene
γ-Muurolene	0.01	Sesquiterpene
Germacrene D	0.26	Sesquiterpene
Menthalactone	0.01	Monoterpenic lactone
Bicyclogermacrene	0.02	Sesquiterpene
Viridiflorene	0.03	Sesquiterpene
α-Muurolene	0.01	Sesquiterpene
γ-Cadinene	0.01	Sesquiterpene
δ-Cadinene	0.02	Sesquiterpene
Isocaryophyllene epoxide B	0.01	Sesquiterpenic ether
Caryophyllene oxide isomer	0.02	Sesquiterpenic ether
Caryophyllene oxide	0.07	Sesquiterpenic ether
Viridiflorol	0.03	Sesquiterpenic alcohol
Consolidated total	**99.71**	

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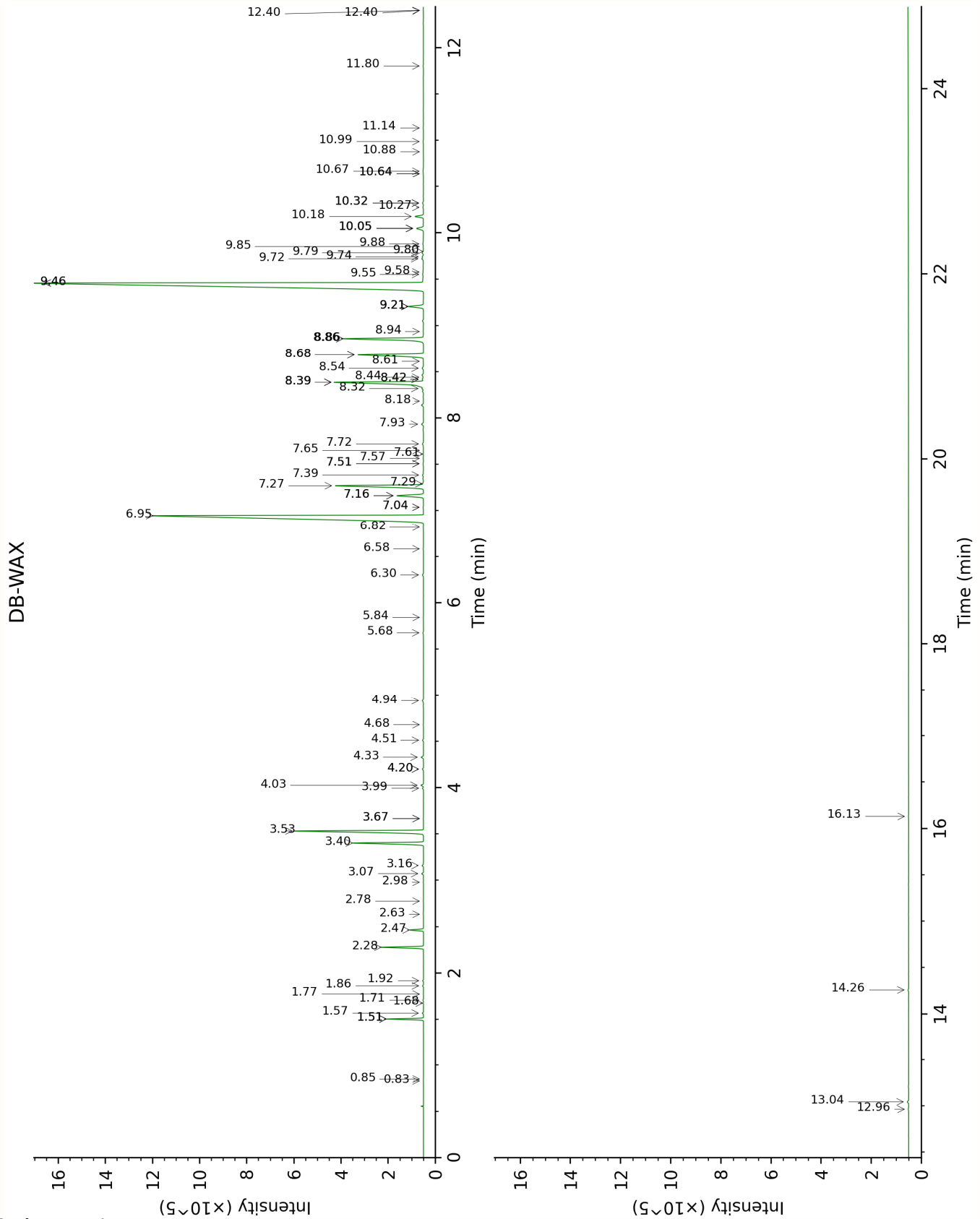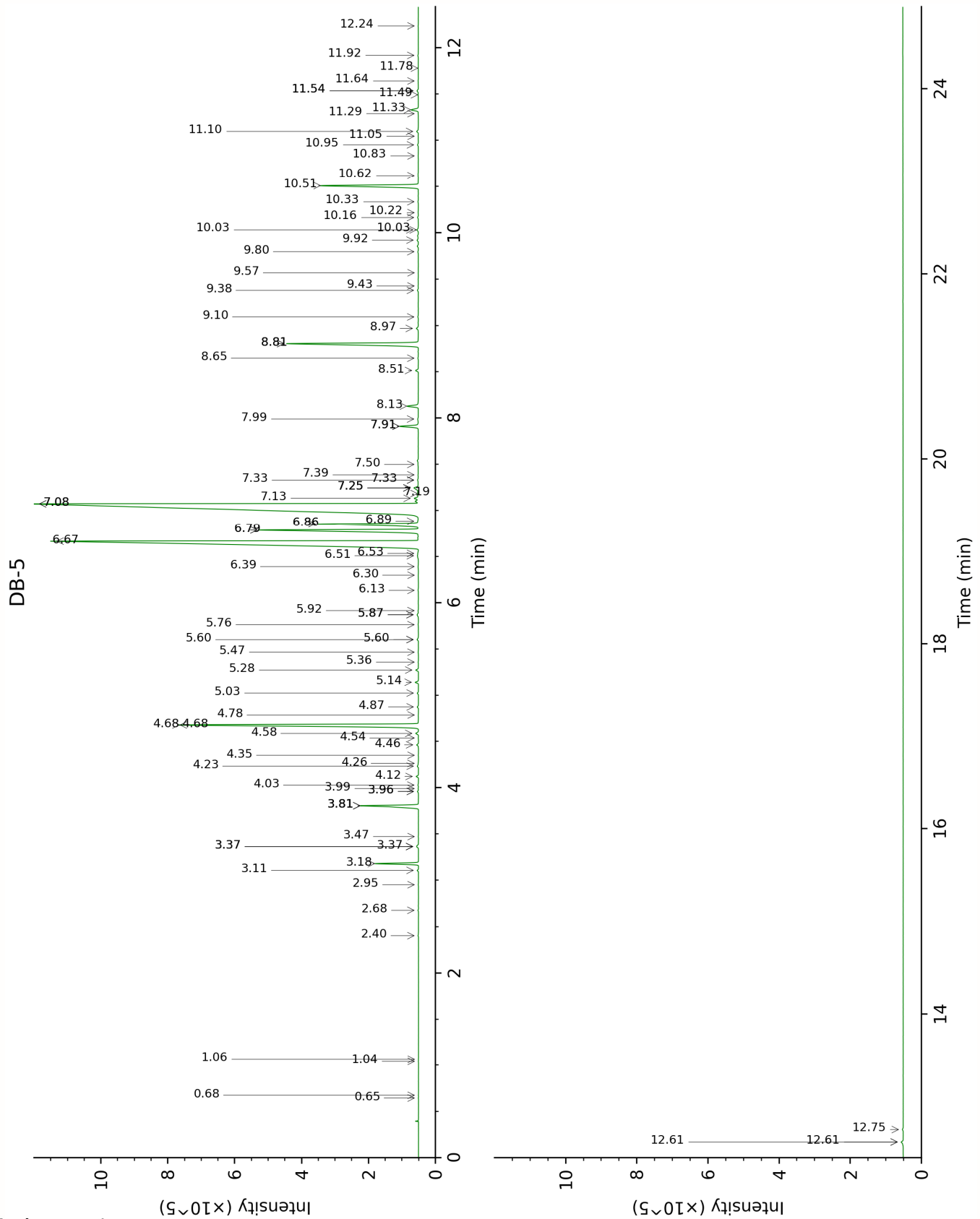
Note: no correction factor was applied

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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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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DB-5

FULL ANALYSIS DATA

	Column DB-WAX			Column DB-5		
Isovaleral	0.85	890.0	tr	0.64	643.0	tr
2-Methylbutyral	0.83	883.0	tr	0.68	653.1	tr
Isoamyl alcohol	3.67*	1178.9	[0.01]	1.04	734.7	tr
2-Methylbutanol	3.67*	1178.9	[0.01]	1.06	737.6	tr
Hexanol	5.68	1325.3	0.03	2.40	874.8	0.02
trans-2,5-Diethyltetrahydrofuran	1.71	1014.6	0.02	2.68	897.1	0.02
Hashishene	1.51*	993.8	[1.09]	2.95	916.9	0.01
α-Thujene	1.57	1001.4	0.03	3.11	927.1	0.04
α-Pinene	1.51*	993.8	[1.09]	3.18	931.9	1.06
3-Methylcyclohexanone	4.94	1270.0	0.06	3.36*	943.9	[0.09]
Camphene	1.86	1029.2	0.03	3.36*	943.9	[0.09]
α-Fenchene	1.77	1020.8	tr	3.36*	943.9	[0.09]
Benzaldehyde	7.51*	1457.1	[0.03]	3.47	951.0	0.01
Sabinene	2.47	1085.9	0.48	3.80*	972.8	[2.00]
β-Pinene	2.28	1068.4	1.49	3.80*	972.8	[2.00]
cis-para-Menthane	1.51*	993.8	[1.09]	3.80*	972.8	[2.00]
trans-para-Menthane	1.68	1011.7	0.01	3.96*	982.9	[0.04]
Octen-3-ol	7.04*	1422.6	[0.02]	3.96*	982.9	[0.04]
cis-Carane	1.92	1034.4	0.03	3.99	984.9	0.01
Octan-3-one	4.20*	1217.7	[0.05]	4.03	987.4	0.03
Myrcene	3.07	1134.1	0.07	4.12	993.5	0.07
Octan-3-ol	6.30	1369.6	0.05	4.23	1000.8	0.04
α-Phellandrene	2.98	1127.0	0.01	4.26	1002.8	0.01
Δ3-Carene	2.78	1111.7	0.01	4.35	1008.3	0.01
α-Terpinene	3.16	1140.7	0.06	4.46	1015.4	0.05
Carvomenthene	2.64	1101.0	0.01	4.54	1020.0	0.01
para-Cymene	4.33	1226.8	0.10	4.58	1023.1	0.10
1,8-Cineole	3.53	1168.9	6.23	4.68*	1028.7	[9.20]
Limonene	3.40	1159.0	2.97	4.68*	1028.7	[9.20]
2-Ethylhexanol	7.51*	1457.1	[0.03]	4.78	1035.4	0.01
(*Z*)-β-Ocimene	3.99	1203.2	0.04	4.87	1040.9	0.04
(*E*)-β-Ocimene	4.20*	1217.7	[0.05]	5.03	1050.7	0.04
γ-Terpinene	4.03	1205.4	0.10	5.14	1057.9	0.10
cis-Sabinene hydrate	7.16*	1431.8	[1.36]	5.28	1066.1	0.08
cis-Linalool oxide (fur.)	6.82	1406.5	0.01	5.36	1071.5	0.01
Octanol	8.44	1526.7	0.02	5.47	1078.1	0.02
Terpinolene	4.51	1239.8	0.04	5.60*	1086.6	[0.05]
para-Cymenene	6.58	1389.5	0.02	5.60*	1086.6	[0.05]
trans-Sabinene hydrate	8.18	1507.0	0.01	5.76	1096.7	0.02
Nonan-3-ol	7.56	1461.2	0.02	5.87*	1103.4	[0.07]

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Linalool	8.32	1517.4	0.06	5.87*	1103.4	[0.07]
2-Methylbutyl 2-methylbutyrate	4.68	1251.6	0.02	5.92	1106.1	0.02
cis-para-Menth-2-en-1-ol	8.39*	1522.6	[5.05]	6.14	1120.0	0.02
all*o*-Ocimene	5.84	1337.1	0.01	6.30	1130.4	0.01
trans-Sabinol	10.05*	1652.4	[0.38]	6.39	1136.4	0.02
Isopulegol	8.39*	1522.6	[5.05]	6.51	1143.8	0.06
cis-α-Dihydroterpineol	8.42*	1525.0	[0.06]	6.53	1145.4	0.02
Menthone	6.95	1415.9	25.05	6.67	1153.8	25.06
Isomenthone	7.27	1439.6	4.64	6.79*	1161.6	[5.87]
Menthofuran	7.16*	1431.8	[1.36]	6.79*	1161.6	[5.87]
δ-Terpineol	9.72	1626.2	0.07	6.86*	1166.0	[3.80]
ne*o*-Menthol	8.86*	1559.1	[3.93]	6.86*	1166.0	[3.80]
Lavandulol	9.85	1636.8	0.01	6.89	1167.9	0.02
Menthol	9.46*	1605.3	[40.02]	7.08*†	1179.9	[40.38]
Terpinen-4-ol	8.86*	1559.1	[3.93]	7.08*†	1179.9	[40.38]
Isomenthol	9.21*	1585.5	[0.75]	7.14	1183.7	0.14
para-Cymen-8-ol	11.80	1798.3	0.02	7.19	1187.0	0.02
α-Terpineol	10.05*	1652.4	[0.38]	7.25*	1190.8	[0.20]
Myrtenal	8.94	1564.9	0.02	7.25*	1190.8	[0.20]
neois*o*-Menthol	9.74	1627.9	0.05	7.25*	1190.8	[0.20]
Methylchavicol	9.58	1614.8	0.03	7.33*	1196.2	[0.03]
Myrtenol	11.14	1741.9	0.01	7.33*	1196.2	[0.03]
Unknown MEPI V [m/z 43, 99 (84), 81 (46), 986 (43), 126 (36), 71 (28)... 170 (12)]				7.39	1199.8	tr
trans-Piperitol	10.64*	1700.4	[0.01]	7.50	1207.1	0.01
Citronellol	10.99	1729.6	0.02	7.91*	1234.5	[0.61]
Pulegone	9.21*	1585.5	[0.75]	7.91*	1234.5	[0.61]
Carvone	10.27	1670.5	0.03	7.99	1239.7	0.03
Piperitone	10.18	1662.7	0.38	8.13	1249.0	0.39
ne*o*-Menthyl acetate	7.93	1488.3	0.09	8.51	1274.6	0.09
2-Ethylmenthone?				8.65	1283.4	0.02
Menthyl acetate	8.39*	1522.6	[5.05]	8.81*	1294.5	[5.02]
Dihydroedulan II	7.65	1467.6	0.01	8.81*	1294.5	[5.02]
Isomenthyl acetate	8.54	1534.2	0.07	8.97	1305.3	0.08
neois*o*-Menthyl acetate?				9.10	1314.0	0.02
Bicycloelemene	7.29	1441.2	0.03	9.38	1334.1	0.04
Piperitenone	12.40*	1851.0	[0.01]	9.43	1337.4	0.01
α-Cubebene	7.04*	1422.6	[0.02]	9.57	1347.4	0.01
cis-Carvyl acetate	10.88	1720.3	0.01	9.80	1363.3	0.02
α-Copaene	7.39	1448.1	0.05	9.92	1372.1	0.05

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Peppermint - Mentha Piperita - India - NPS00110 - Lot # NP0209

Compound	R.T.	R.I.	%	R.T.	R.I.	%
β-Bourbonene	7.72	1472.7	0.06	10.03*	1379.8	[0.06]
1,5-diepi-β-Bourbonene	7.61	1464.7	0.01	10.03*	1379.8	[0.06]
β-Elemene	8.68*	1545.4	[3.48]	10.16	1389.1	0.02
Unknown MEPI VII [m/z 107, 121 (79), 119 (66), 91 (58), 136 (55), 105 (49)... 194 (1)]				10.22	1392.8	0.02
Isocaryophyllene	8.42*	1525.0	[0.06]	10.33	1401.1	0.02
β-Caryophyllene	8.68*	1545.4	[3.48]	10.51	1413.8	3.47
β-Copaene	8.61	1539.9	0.01	10.62	1422.2	0.01
Isogermacrene D	9.21*	1585.5	[0.75]	10.83	1438.1	0.01
α-Humulene	9.55	1612.7	0.05	10.95	1446.9	0.03
Muurola-4,11-diene	9.46*	1605.3	[40.02]	11.05	1453.8	0.01
(*E*)-β-Farnesene	9.79	1631.4	0.06	11.10	1457.7	0.06
γ-Muurolene	9.80	1632.6	0.01	11.29	1471.9	0.01
Germacrene D	10.05*	1652.4	[0.38]	11.33	1475.0	0.26
Menthalactone	16.13	2205.0	0.01	11.49	1487.0	0.01
Bicyclogermacrene	10.32*	1674.2	[0.04]	11.54*	1490.2	[0.05]
Viridiflorene	9.88	1639.0	0.03	11.54*	1490.2	[0.05]
α-Muurolene	10.32*	1674.2	[0.04]	11.64	1498.1	0.01
γ-Cadinene	10.64*	1700.4	[0.01]	11.78	1508.6	0.01
δ-Cadinene	10.67	1702.7	0.04	11.92	1519.4	0.02
Isocaryophyllene epoxide B	12.40*	1851.0	[0.01]	12.24	1544.2	0.01
Caryophyllene oxide isomer	12.96	1900.6	0.02	12.61*	1573.7	[0.09]
Caryophyllene oxide	13.04	1908.0	0.07	12.61*	1573.7	[0.09]
Viridiflorol	14.26	2020.7	0.03	12.75	1584.2	0.03
Total reported		99.31%			99.67%	

*: 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.

Note: no correction factor was applied

R.T.: Retention time (minutes)

R.I.: Retention index

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