

Date : 2023-09-01

CERTIFICATE OF ANALYSIS - GC PROFILING

SAMPLE IDENTIFICATION

**Internal code :** 23H24-NPA01

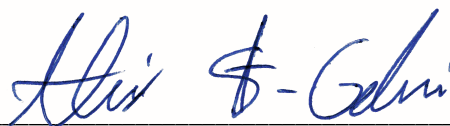
**Customer Identification :** Cypress - Cupressus sempervirens - Spain - NPS00101 - Lot # NP0213

**Type :** Essential Oil

**Source :** Cupressus sempervirens

**Customer :** Nature Packaged

Checked and 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 2023-08-31 to format it for online publication.



## 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 :** Alexis St-Gelais, Ph. D., Chimiste 2013-174

**Date :** 2023-08-28

## PHYSICOCHEMICAL DATA

**Refractive index :**  $1.4718 \pm 0.0003$  (20 °C)

**Method :** PC-MAT-016 - Measure of the refractive index of a liquid.

**Analyst :** Dany Massé B. Sc. Chimiste

**Date :** 2023-08-24

## 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
3-Methylfuran	tr	Furan
Toluene	0.02	Simple phenolic
Unknown	tr	Alkene
Cyclofenchene	0.02	Monoterpene
Bornylene	0.07	Monoterpene
Tricyclene	0.17	Monoterpene
$\alpha$ -Thujene	0.81	Monoterpene
$\alpha$ -Pinene	45.70	Monoterpene
$\alpha$ -Fenchene	0.84	Monoterpene
Camphene	0.18	Monoterpene
Thuja-2,4(10)-diene	0.03	Monoterpene
3,7,7-Trimethylcyclohepta-1,3,5-triene	0.12	Monoterpene
Sabinene	1.68	Monoterpene
$\beta$ -Pinene	0.98	Monoterpene
Pseudolimonene isomer	0.01	Monoterpene
Myrcene	2.68	Monoterpene
Menthatriene isomer I	0.01	Monoterpene
$\alpha$ -Phellandrene	0.07	Monoterpene
Pseudolimonene	0.01	Monoterpene
$\Delta^3$ -Carene	23.62	Monoterpene
$\alpha$ -Terpinene	0.48	Monoterpene
<i>meta</i> -Cymene	0.05	Monoterpene
<i>para</i> -Cymene	0.24	Monoterpene
Sylvestrene	0.20	Monoterpene
Limonene	1.91	Monoterpene
1,8-Cineole	0.01	Monoterpenic ether
$\beta$ -Phellandrene	0.43	Monoterpene
( <i>Z</i> )- $\beta$ -Ocimene	0.01	Monoterpene
( <i>E</i> )- $\beta$ -Ocimene	0.05	Monoterpene
Unknown	0.06	Monoterpene
$\gamma$ -Terpinene	0.84	Monoterpene
<i>cis</i> -Sabinene hydrate	0.02	Monoterpenic alcohol
Unknown	0.01	Oxygenated monoterpene
<i>cis</i> -Linalool oxide (fur.)	0.01	Monoterpenic alcohol
<i>meta</i> -Cymenene	0.02	Monoterpene
Isoterpinolene	0.14	Monoterpene
<i>para</i> -Cymenene	0.08	Monoterpene
Terpinolene	3.05	Monoterpene
$\alpha$ -Pinene oxide	0.01	Monoterpenic ether
Unknown	0.01	Unknown

<i>trans</i> -Sabinene hydrate	0.01	Monoterpenic alcohol
Unknown	0.01	Oxygenated monoterpene
Linalool	0.60	Monoterpenic alcohol
endo-Fenchol	0.01	Monoterpenic alcohol
<i>cis-para</i> -Menth-2-en-1-ol	0.03	Monoterpenic alcohol
4-Hydroxy-4-methylcyclohex-2-enone	0.04	Aliphatic alcohol
<i>trans</i> -Pinocarveol	0.04	Monoterpenic alcohol
Camphor	0.05	Monoterpenic ketone
<i>trans-para</i> -Menth-2-en-1-ol	0.03	Monoterpenic alcohol
Epoxyterpinolene	0.04	Monoterpenic ether
Karahanaenone	0.57	Monoterpenic ketone
Borneol	0.03	Monoterpenic alcohol
$\alpha$ -Phellandren-8-ol	0.04	Monoterpenic alcohol
Umbellulone	0.08	Monoterpenic ketone
Terpinen-4-ol	1.28	Monoterpenic alcohol
<i>meta</i> -Cymen-8-ol	0.01	Monoterpenic alcohol
<i>para</i> -Cymen-8-ol	0.04	Monoterpenic alcohol
Unknown	0.06	Oxygenated monoterpene
$\alpha$ -Terpineol	0.30	Monoterpenic alcohol
Myrtenol	0.01	Monoterpenic alcohol
Verbenone	0.06	Monoterpenic ketone
<i>trans</i> -Carveol	0.02	Monoterpenic alcohol
Unknown	0.02	Oxygenated monoterpene
Carvacrol methyl ether	0.04	Monoterpenic ether
Car-3-en-2-one	0.02	Monoterpenic ketone
( <i>cis</i> ?)-Linalool oxide acetate (fur.)?	0.02	Monoterpenic ester
Linalyl acetate	0.06	Monoterpenic ester
( <i>trans</i> ?)-Linalool oxide acetate (fur.)?	0.05	Monoterpenic ester
Unknown	0.01	Oxygenated monoterpene
Bornyl acetate	0.10	Monoterpenic ester
Terpinen-4-yl acetate	0.02	Monoterpenic ester
Unknown	0.46	Monoterpenic ester
Thymol	0.01	Monoterpenic alcohol
Unknown	0.02	Oxygenated monoterpene
Unknown	0.02	Unknown
Unknown	0.43	Monoterpenic ester
$\alpha$ -Terpinyl acetate	3.06	Monoterpenic ester
$\alpha$ -Cubebene	0.19	Sesquiterpene
$\alpha$ -Ylangene	0.02	Sesquiterpene
$\alpha$ -Copaene	0.07	Sesquiterpene
2-epi- $\alpha$ -Funebrene	0.01	Sesquiterpene
$\beta$ -Bourbonene	0.02	Sesquiterpene
$\beta$ -Cubebene	0.04	Sesquiterpene
$\beta$ -Elemene	0.03	Sesquiterpene
$\alpha$ -Cedrene	0.56	Sesquiterpene

β-Caryophyllene	0.24	Sesquiterpene
β-Cedrene	0.18	Sesquiterpene
β-Copaene	0.04	Sesquiterpene
cis-Thujopsene	0.02	Sesquiterpene
cis-Muuroala-3,5-diene	0.09	Sesquiterpene
α-Humulene	0.24	Sesquiterpene
cis-Muuroala-4(15),5-diene	0.24	Sesquiterpene
Unknown	0.02	Sesquiterpene
trans-Cadina-1(6),4-diene	0.04	Sesquiterpene
α-Amorphene	0.25	Sesquiterpene
Germacrene D	0.95	Sesquiterpene
trans-Muuroala-4(15),5-diene	0.04	Sesquiterpene
β-Alaskene	0.10	Sesquiterpene
Epizonarene	0.08	Sesquiterpene
α-Muurolene	0.13	Sesquiterpene
δ-Amorphene	0.04	Sesquiterpene
γ-Cadinene	0.14	Sesquiterpene
α-Alaskene	0.12	Sesquiterpene
δ-Cadinene	0.45	Sesquiterpene
trans-Calamenene	0.03	Sesquiterpene
trans-Cadina-1,4-diene	0.04	Sesquiterpene
α-Cadinene	0.03	Sesquiterpene
α-Calacorene	0.01	Sesquiterpene
Salviadienol?	0.03	Sesquiterpenic alcohol
Caryophyllene oxide	0.02	Sesquiterpenic ether
allo-Cedrol	0.04	Sesquiterpenic alcohol
α-Cedrol	1.50	Sesquiterpenic alcohol
epi-Cedrol	0.02	Sesquiterpenic alcohol
Torilenol	0.02	Oxygenated sesquiterpene
1-epi-Cubenol	0.04	Sesquiterpenic alcohol
τ-Cadinol	0.02	Sesquiterpenic alcohol
τ-Muurolol	0.02	Sesquiterpenic alcohol
α-Muurolol	0.02	Sesquiterpenic alcohol
α-Cadinol	0.04	Sesquiterpenic alcohol
Unknown	0.06	Unknown
Eudesma-4(15),7-dien-1β-ol	0.02	Sesquiterpenic alcohol
Manoyl oxide	0.10	Diterpenic ether
7,13-Abietadiene	0.02	Diterpene
Unknown	0.03	Unknown
Isopimaradiene	0.08	Diterpene
<b>Consolidated total</b>	<b>98.98</b>	

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

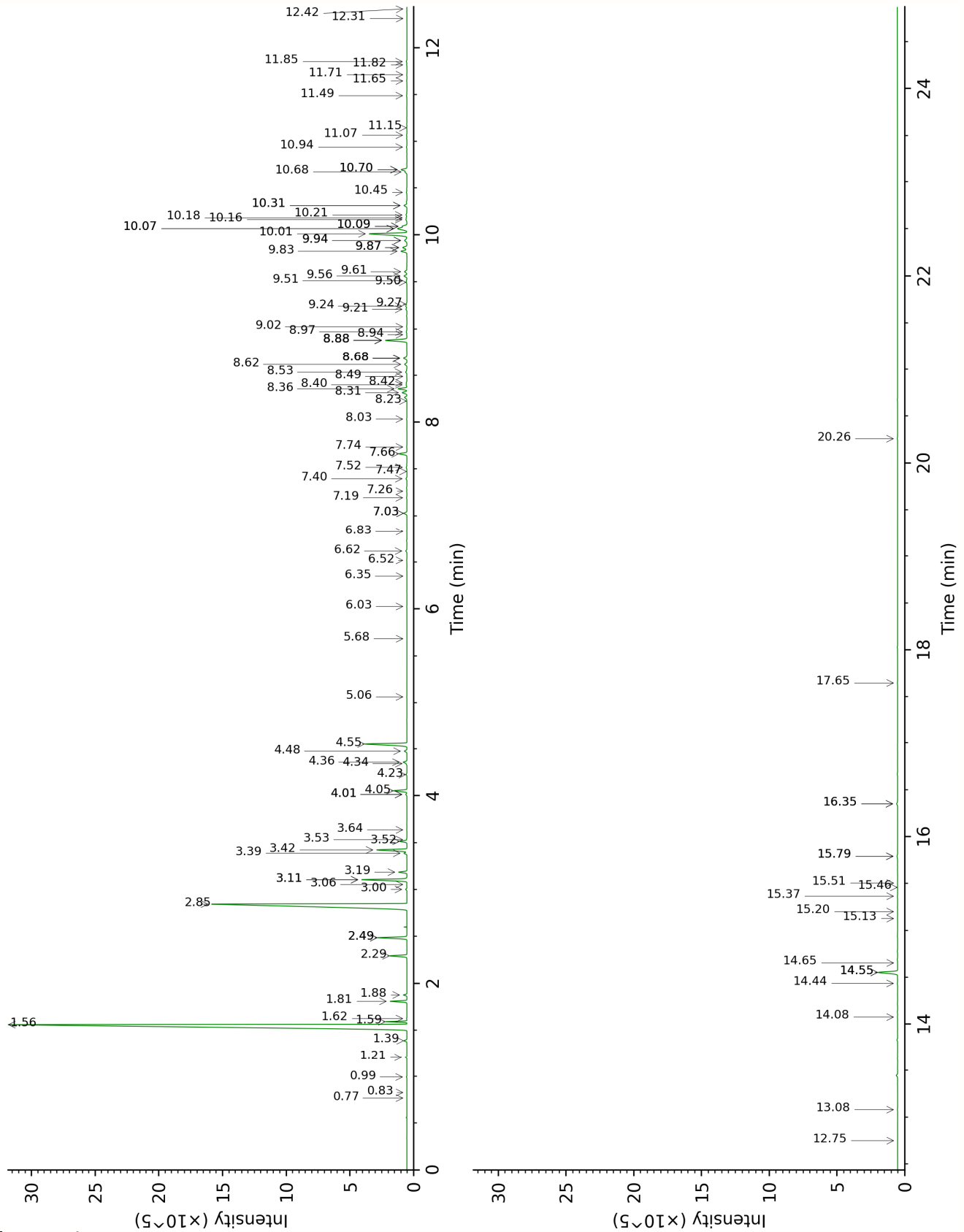
overestimating individual content. This process is semi-automatic. Advanced users are invited to consult the "Full analysis data" table after the chromatograms in this report to access the full untreated data and perform their own calculations if needed.

**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.

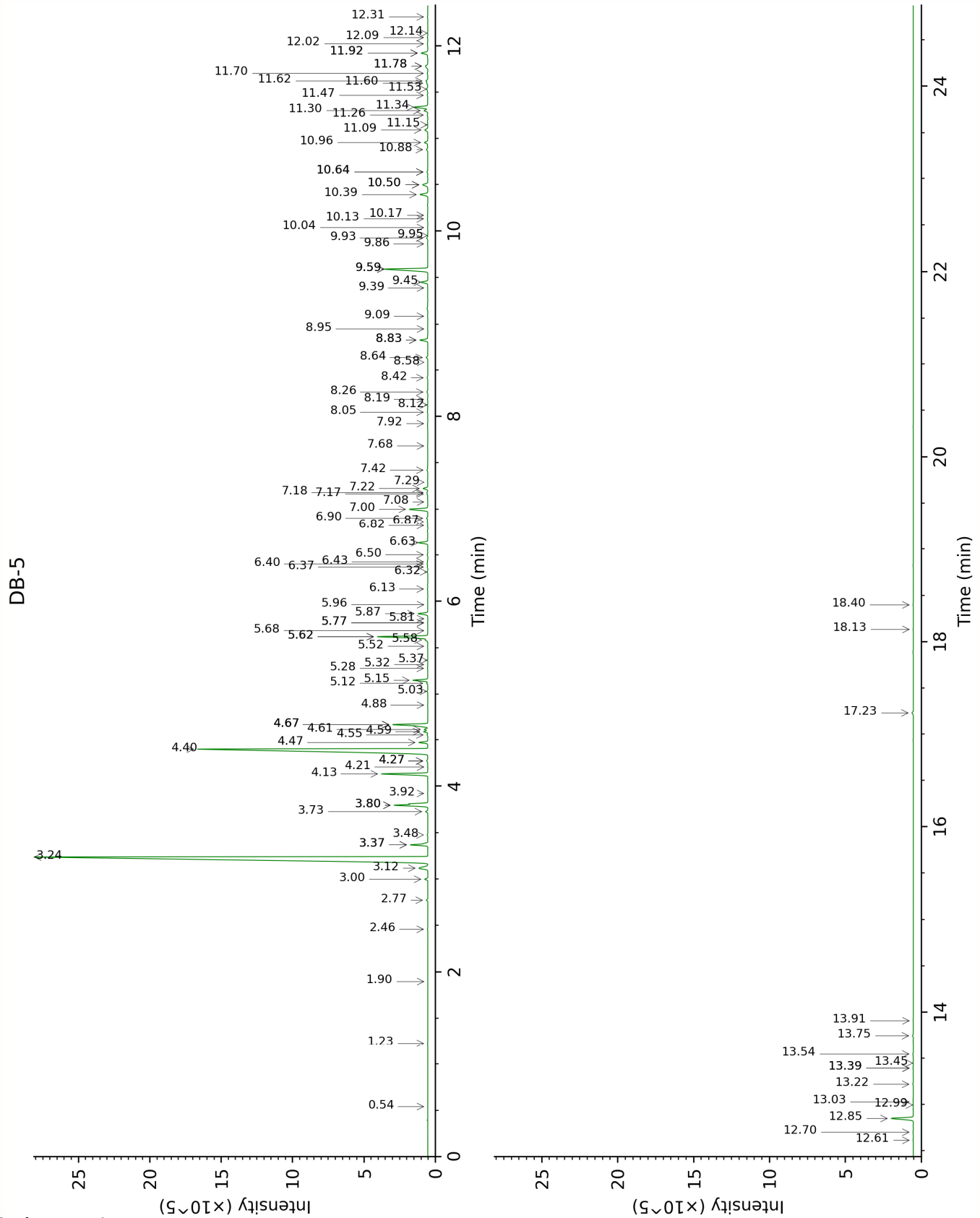
**Bracketed value (xx):** A bracketed percent value indicate that two or more compound percentage could not be solved due to coelution.

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DB-WAX







FULL ANALYSIS DATA

3-Methylfuran	Column DB-WAX			Column DB-5		
	0.77	861.3	tr	0.54	608.3	tr
Toluene	1.62	1003.0	0.01	1.23	760.1	0.02
Unknown BOCA I [m/z 109, 67 (32), 81 (14), 41 (12), 124 (10)]	0.83	880.5	tr	1.90	833.0	tr
Cyclofenchene	0.99	914.0	0.02	2.46	879.0	0.02
Bornylene	1.21	945.6	0.07	2.77	904.6	0.07
Tricyclene	1.39	972.6	0.17	3.00	919.6	0.17
$\alpha$ -Thujene	1.59	999.8	0.81	3.12	927.4	0.81
$\alpha$ -Pinene	1.56	996.9	45.62	3.24	935.2	45.70
$\alpha$ -Fenchene	1.81	1020.3	0.84	3.37*	943.9	[1.03]
Camphene	1.88	1026.6	0.18	3.37*	943.9	[1.03]
Thuja-2,4(10)-diene 3,7,7-	2.49*	1084.4	[1.73]	3.48	950.9	0.03
Trimethylcyclohepta- 1,3,5-triene	3.11*	1133.6	[2.80]	3.73	967.3	0.12
Sabinene	2.49*	1084.4	[1.73]	3.80*	971.9	[2.67]
$\beta$ -Pinene	2.29	1066.0	0.98	3.80*	971.9	[2.67]
Pseudolimonene isomer				3.92	980.2	0.01
Myrcene	3.11*	1133.6	[2.80]	4.13	994.0	2.68
Menthatriene isomer I	3.64	1174.5	0.01	4.21	998.9	0.01
$\alpha$ -Phellandrene	3.00	1125.6	0.07	4.27*	1003.1	[0.10]
Pseudolimonene	3.06	1129.7	0.01	4.27*	1003.1	[0.10]
$\Delta$ 3-Carene	2.85	1113.6	23.53	4.40	1011.2	23.62
$\alpha$ -Terpinene	3.19	1139.8	0.46	4.47	1015.6	0.48
<i>meta</i> -Cymene	4.34	1227.1	0.04	4.55	1020.7	0.05
<i>para</i> -Cymene	4.36	1228.2	0.24	4.59	1022.9	0.24
Sylvestrene	3.39	1155.3	0.19	4.61	1024.4	0.20
Limonene	3.42	1158.0	1.91	4.66*	1027.6	[2.34]
1,8-Cineole	3.53	1166.5	0.01	4.66*	1027.6	[2.34]
$\beta$ -Phellandrene	3.52	1165.1	0.43	4.66*	1027.6	[2.34]
(Z)- $\beta$ -Ocimene	4.02*	1203.2	[0.08]	4.88	1040.7	0.01
(E)- $\beta$ -Ocimene	4.23	1218.6	0.05	5.03	1050.4	0.05
Unknown CUSE I [m/z 93, 91 (54), 92 (31), 77 (29), 79 (17), 43 (13), 41 (10), 136 (9)]	4.02*	1203.2	[0.08]	5.12	1055.9	0.06
$\gamma$ -Terpinene	4.05	1206.0	0.84	5.15	1057.9	0.84
<i>cis</i> -Sabinene hydrate	7.19	1430.5	0.03	5.28	1065.9	0.02

Unknown PIMA I [m/z 79, 93 (60), 43 (40), 94 (35), 137 (33), 77 (26), 91 (20), 152 (18)]	5.06	1279.7	0.01	5.32	1068.5	0.01
<i>cis</i> -Linalool oxide (fur.)	6.83	1403.6	0.01	5.37	1071.4	0.01
<i>meta</i> -Cymenene	6.52	1381.1	0.02	5.52	1080.7	0.02
Isoterpinolene	4.48	1236.8	0.18	5.58	1084.9	0.14
<i>para</i> -Cymenene	6.62	1388.2	0.08	5.62*	1087.2	[3.16]
Terpinolene	4.55	1242.4	3.05	5.62*	1087.2	[3.16]
$\alpha$ -Pinene oxide	5.68	1321.5	0.01	5.68	1091.2	0.01
Unknown PINI III [m/z 109, 43 (65), 95 (54), 119 (50), 91 (47)... 149 (8)...]	6.35	1369.1	0.01	5.77*	1096.5	[0.02]
<i>trans</i> -Sabinene hydrate	8.23	1507.2	0.01	5.77*	1096.5	[0.02]
Unknown CEDE I [m/z 95, 150 (45), 110 (35), 107 (23), 109 (21)]	6.03	1346.0	0.01	5.81	1099.2	0.01
Linalool	8.36	1517.2	0.60	5.87	1102.6	0.60
endo-Fenchol	8.68*	1542.3	[0.26]	5.96	1108.7	0.01
<i>cis-para</i> -Menth-2-en- 1-ol	8.42	1522.1	0.05	6.13	1119.5	0.03
4-Hydroxy-4- methylcyclohex-2- enone	14.44	2033.5	0.03	6.32	1131.2	0.04
<i>trans</i> -Pinocarveol	9.50	1605.4	0.04	6.37	1134.6	0.04
Camphor	7.52	1454.5	0.06	6.40	1136.6	0.05
<i>trans-para</i> -Menth-2- en-1-ol	9.26	1587.0	0.04	6.43	1138.1	0.03
Epoxyterpinolene	7.03*	1418.3	[0.23]	6.50	1143.0	0.04
Karahanaenone	7.66	1465.1	0.57	6.63	1151.3	0.57
Borneol	10.09*	1653.2	[0.31]	6.82	1163.2	0.03
$\alpha$ -Phellandren-8-ol	10.45	1682.2	0.04	6.86	1166.0	0.04
Umbellulone	9.21	1582.8	0.08	6.90	1168.4	0.08
Terpinen-4-ol	8.88*	1557.4	[1.59]	7.00	1174.6	1.28
<i>meta</i> -Cymen-8-ol	11.82	1796.8	0.02	7.08	1179.6	0.01
<i>para</i> -Cymen-8-ol	11.85	1799.8	0.05	7.16	1185.1	0.04
Unknown JUVI II [m/z 93, 59 (85), 81 (36), 92 (35), 43 (34), 121 (20), 136 (16)...]	10.07*	1651.2	[0.97]	7.18	1186.1	0.06

$\alpha$ -Terpineol	10.09*	1653.2	[0.31]	7.22	1188.9	0.30
Myrtenol	11.15	1740.2	0.02	7.29	1193.2	0.01
Verbenone	9.94*	1641.1	[0.23]	7.42	1201.4	0.06
<i>trans</i> -Carveol	11.71	1787.6	0.02	7.68	1218.7	0.02
Unknown CIAU II [m/z 137, 152 (28), 43 (25), 91 (24), 109 (23), 119 (19)]	11.65	1782.0	0.03	7.92	1234.7	0.02
Carvacrol methyl ether	8.88*	1557.4	[1.59]	8.05	1243.0	0.04
Car-3-en-2-one	10.70*	1702.7	[0.46]	8.12	1248.2	0.02
( <i>cis</i> ?)-Linalool oxide acetate (fur.)?	8.49	1527.4	0.02	8.18	1252.2	0.02
Linalyl acetate	8.40	1520.5	0.06	8.26	1257.4	0.06
( <i>trans</i> ?)-Linalool oxide acetate (fur.)?	8.97	1564.4	0.06	8.42	1267.7	0.05
Unknown CIAU V [m/z 95, 67 (45), 41 (42), 110 (42), 43 (41), 59 (36)]	12.75	1878.3	0.01	8.58	1278.8	0.01
Bornyl acetate	8.53	1530.9	0.10	8.64	1282.3	0.10
Terpinen-4-yl acetate	9.02	1568.5	0.02	8.83*	1295.2	[0.49]
Unknown CUSE III [m/z 121, 93 (97), 43 (81), 136 (48), 107 (47), 108 (44)...]	8.88*	1557.4	[1.59]	8.83*	1295.2	[0.49]
Thymol	15.46	2132.6	0.01	8.95	1303.2	0.01
Unknown CUSE IV [m/z 150, 107 (98), 91 (79), 108 (61)]	12.31	1840.0	0.01	9.09	1312.8	0.02
Unknown CUSE V [m/z 93, 92 (34), 43 (31), 91 (27)...]				9.39	1334.1	0.02
Unknown CUSE VI [m/z 93, 43 (50), 121 (50), 136 (35)...]	9.83	1632.0	0.45	9.45	1338.5	0.43
$\alpha$ -Terpinyl acetate	10.01	1646.8	3.06	9.59*	1348.3	[3.25]
$\alpha$ -Cubebene	7.03*	1418.3	[0.23]	9.59*	1348.3	[3.25]
$\alpha$ -Ylangene	7.26	1435.7	0.02	9.86	1367.4	0.02
$\alpha$ -Copaene	7.40	1445.5	0.07	9.93	1371.8	0.07
2-epi- $\alpha$ -Funebrene	7.48	1451.2	0.01	9.95	1373.7	0.01
$\beta$ -Bourbonene	7.74	1470.4	0.03	10.04	1379.7	0.02
$\beta$ -Cubebene	8.03	1492.4	0.02	10.13	1386.3	0.04
$\beta$ -Elemene	8.68*	1542.3	[0.26]	10.17	1388.9	0.03
$\alpha$ -Cedrene	8.32†	1514.0	0.35	10.39	1404.7	0.56

$\beta$ -Caryophyllene	8.68*	1542.3	[0.26]	10.50*	1412.4	[0.42]
$\beta$ -Cedrene	8.62	1537.3	0.18	10.50*	1412.4	[0.42]
$\beta$ -Copaene				10.64*	1423.2	[0.06]
<i>cis</i> -Thujopsene	8.94	1562.1	0.02	10.64*	1423.2	[0.06]
<i>cis</i> -Muurolo-3,5-diene	9.24	1585.3	0.10	10.88	1441.2	0.09
$\alpha$ -Humulene	9.56	1610.8	0.23	10.96	1446.8	0.24
<i>cis</i> -Muurolo-4(15),5-diene	9.61	1614.5	0.19	11.09	1456.8	0.24
Unknown DACA II [m/z 161, 91 (57), 120 (46), 105 (42), 133 (25), 119 (22), 41 (21), 204 (21)]	9.86*	1635.0	[0.36]	11.15	1461.0	0.02
<i>trans</i> -Cadina-1(6),4-diene	9.51	1606.7	0.03	11.26	1468.8	0.04
$\alpha$ -Amorphene	9.86*	1635.0	[0.36]	11.30	1472.3	0.25
Germacrene D	10.07*	1651.2	[0.97]	11.34	1475.1	0.95
<i>trans</i> -Muurolo-4(15),5-diene	10.16	1658.9	0.10	11.47	1484.5	0.04
$\beta$ -Alaskene	9.94*	1641.1	[0.23]	11.53	1489.5	0.10
Epizonarene	10.21	1662.9	0.08	11.60	1494.3	0.08
$\alpha$ -Muurolole	10.31*	1670.9	[0.23]	11.62	1496.0	0.13
$\delta$ -Amorphene	10.18	1660.5	0.05	11.70	1502.1	0.04
$\gamma$ -Cadinene	10.68	1700.7	0.14	11.78*	1508.2	[0.26]
$\alpha$ -Alaskene	10.31*	1670.9	[0.23]	11.78*	1508.2	[0.26]
$\delta$ -Cadinene	10.70*	1702.7	[0.46]	11.92*	1519.1	[0.48]
<i>trans</i> -Calamenene	11.49	1768.9	0.03	11.92*	1519.1	[0.48]
<i>trans</i> -Cadina-1,4-diene	10.94	1722.9	0.04	12.02	1527.0	0.04
$\alpha$ -Cadinene	11.07	1733.5	0.03	12.09	1532.2	0.03
$\alpha$ -Calacorene	12.42	1849.2	0.02	12.14	1536.0	0.01
Salviadienol?	14.65	2054.2	0.01	12.31	1549.7	0.03
Caryophyllene oxide	13.08	1908.1	0.02	12.61	1573.2	0.02
allo-Cedrol	14.55*	2044.7	[1.51]	12.70	1580.1	0.04
$\alpha$ -Cedrol	14.55*	2044.7	[1.51]	12.85	1591.7	1.50
epi-Cedrol	15.13	2099.7	0.02	12.99	1603.1	0.02
Torilenol	15.79*	2165.3	[0.08]	13.03	1605.8	0.02
1-epi-Cubenol	14.08	1999.5	0.02	13.22	1621.5	0.04
$\tau$ -Cadinol	15.20	2107.1	0.02	13.39*	1635.8	[0.04]
$\tau$ -Muurolol	15.37	2123.3	0.02	13.39*	1635.8	[0.04]
$\alpha$ -Muurolol	15.51	2137.1	0.02	13.45	1640.3	0.02
$\alpha$ -Cadinol	15.79*	2165.3	[0.08]	13.54	1648.4	0.04
Unknown CUSE VIII [m/z 85, 57 (59), 79				13.75	1665.2	0.06

(26), 67 (18), 41 (16), 80 (15), 81 (10), 77 (8), 238 (7)]						
Eudesma-4(15),7- dien-1β-ol	16.35*	2222.0	[0.11]	13.91	1678.5	0.02
Manoyl oxide				17.23	1975.7	0.10
7,13-Abietadiene	17.65	2357.5	0.02	18.13	2064.5	0.02
Unknown PISY I [m/z 191, 81 (47), 95 (41), 69 (39), 109 (32), 93 (32)...]	20.26	2652.1	0.03	18.40	2090.7	0.03
Isopimaradiene	16.35*	2222.0	[0.11]			
Total reported		98.48%			98.92%	

\*: 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