Date : February 20, 2020

Certificate of Analysis – GC Profiling

Sample identification

Internal code : 20B06-PSC02
Customer identification : Rosemary - Tunisa - B021419
Type : Essential oil
Source : *Rosmarinus officinalis* ct. 1,8-Cineole
Customer : Pacha Soap Co.

Analysis

Method: PC-MAT-007 - Analysis of the composition of an essential oil or other volatile liquide by FAST GC-FID (in French); identifications validated by GC-MS.
Analyst : Sarah-Eve Tremblay, M. Sc. A., Chimiste
Analysis date : February 13, 2020

Checked and approved by :

Alexis St-Gelais, M. Sc., chimiste 2013-174

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PHYSICOCHEMICAL DATA

Physical aspect: Clear liquid
Refractive index: 1.4669 ± 0.0003 (20 °C)
Optical rotation: 0.23°

ISO 1342:2001 - OIL OF ROSEMARY - MOROCCO & TUNISIA

Compound	Min. %	Max. %	Observed %	Complies?
Verbenone		0.4	0	Yes
Borneol	1	5	2	Yes
α-Terpineol	1.0	2.5	1.4	Yes
Bornyl acetate	0.1	1.6	1.1	Yes
Camphor	5	15	10	Yes
para-Cymene	0.5	2.5	1.0	Yes
1,8-Cineole	38	55	45	Yes
Limonene	1.5	4.0	2.2	Yes
Myrcene	1.0	2.0	1.3	Yes
β-Pinene	4	9	9	Yes
Camphene	2.5	6.0	4.6	Yes
α-Pinene	9	14	11	Yes
Optical rotation	-2.0°	+5.0°	+0.2°	Yes
Refractive index	1.4640	1.4700	1.4669	Yes

CONCLUSION

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

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
Heptane	tr	Alkane
2-Methylbutanol	0.01	Aliphatic alcohol
Toluene	tr	Simple phenolic
(3*Z*)-Hexenol	0.02	Aliphatic alcohol
Hexanol	tr	Aliphatic alcohol
Bornylene	tr	Monoterpene
Hashishene	0.02	Monoterpene
Tricyclene	0.17	Monoterpene
α-Thujene	0.38	Monoterpene
α-Pinene	10.69	Monoterpene
α-Fenchene	0.06	Monoterpene
Camphene	4.61	Monoterpene
Thuja-2,4(10)-diene	0.03	Monoterpene
Sabinene	0.05	Monoterpene
β-Pinene	8.64	Monoterpene
Octen-3-ol	0.09	Aliphatic alcohol
Octan-3-one	0.06	Aliphatic ketone
Myrcene	1.35	Monoterpene
Octan-3-ol	tr	Aliphatic alcohol
α-Phellandrene	0.15	Monoterpene
Pseudolimonene	0.03	Monoterpene
Δ3-Carene	0.24	Monoterpene
α-Terpinene	0.43	Monoterpene
para-Cymene	0.99	Monoterpene
Limonene	2.17	Monoterpene
1,8-Cineole	44.68	Monoterpenic ether
(*Z*)-β-Ocimene	0.06	Monoterpene
(*E*)-β-Ocimene	0.05	Monoterpene
γ-Terpinene	0.79	Monoterpene
cis-Sabinene hydrate	0.11	Monoterpenic alcohol
cis-Linalool oxide (fur.)	tr	Monoterpenic alcohol
Octanol	0.01	Aliphatic alcohol
para-Cymenene	0.02	Monoterpene
Terpinolene	0.39	Monoterpene
trans-Sabinene hydrate	0.05	Monoterpenic alcohol
Linalool	0.69	Monoterpenic alcohol
endo-Fenchol	0.04	Monoterpenic alcohol
cis-para-Menth-2-en-1-ol	0.03	Monoterpenic alcohol
α-Campholenal	0.02	Monoterpenic aldehyde
Camphor	10.27	Monoterpenic ketone
Camphene hydrate	0.06	Monoterpenic alcohol
Isoborneol	0.01	Monoterpenic alcohol
Pinocamphone	tr	Monoterpenic ketone
Pinocarvone	0.01	Monoterpenic ketone
Borneol	2.42	Monoterpenic alcohol

δ-Terpineol	0.33	Monoterpenic alcohol
Terpinen-4-ol	0.75	Monoterpenic alcohol
para-Cymen-8-ol	0.02	Monoterpenic alcohol
α-Terpineol	1.44	Monoterpenic alcohol
Myrtenal	0.02	Monoterpenic aldehyde
Myrtenol	0.02	Monoterpenic alcohol
γ-Terpineol	0.02	Monoterpenic alcohol
Verbenone	0.01	Monoterpenic ketone
trans-Carveol	tr	Monoterpenic alcohol
Bornyl formate	0.01	Monoterpenic ester
Citronellol	0.01	Monoterpenic alcohol
Carvone	tr	Monoterpenic ketone
Piperitone	0.01	Monoterpenic ketone
Linalyl acetate	0.01	Monoterpenic ester
trans-Ascaridole glycol	0.01	Monoterpenic alcohol
Bornyl acetate	1.11	Monoterpenic ester
Unknown	0.02	Oxygenated monoterpene
α-Cubebene	0.04	Sesquiterpene
α-Terpinyl acetate	tr	Monoterpenic ester
α-Ylangene	0.06	Sesquiterpene
α-Copaene	0.19	Sesquiterpene
α-Gurjunene	0.01	Sesquiterpene
Methyleugenol	0.03	Phenylpropanoid
β-Caryophyllene	3.53	Sesquiterpene
β-Copaene	0.06	Sesquiterpene
Aromadendrene	0.03	Sesquiterpene
trans-α-Bergamotene	0.04	Sesquiterpene
α-Humulene	0.39	Sesquiterpene
allo-Aromadendrene	0.01	Sesquiterpene
(*E*)-β-Farnesene	0.01	Sesquiterpene
trans-Cadina-1(6),4-diene	0.02	Sesquiterpene
γ-Muurolene	0.16	Sesquiterpene
Germacrene D	0.02	Sesquiterpene
β-Selinene	0.03	Sesquiterpene
α-Selinene	0.07	Sesquiterpene
α-Muurolene	0.06	Sesquiterpene
β-Bisabolene	0.05	Sesquiterpene
γ-Cadinene	0.09	Sesquiterpene
trans-Calamenene	0.02	Sesquiterpene
δ-Cadinene	0.20	Sesquiterpene
trans-Cadina-1,4-diene	0.02	Sesquiterpene
α-Calacorene	0.02	Sesquiterpene
Caryophyllene oxide	0.10	Sesquiterpenic ether
Caryophyllene oxide isomer	0.01	Sesquiterpenic ether
Humulene epoxide II	0.01	Sesquiterpenic ether
Caryophylladienol II	0.01	Sesquiterpenic alcohol
14-Hydroxy-(*Z*)-caryophyllene	0.01	Sesquiterpenic alcohol
(3*Z*)-Caryophylla-3,8(13)-dien-5β-ol	0.01	Sesquiterpenic alcohol
Consolidated total	**98.97%**	

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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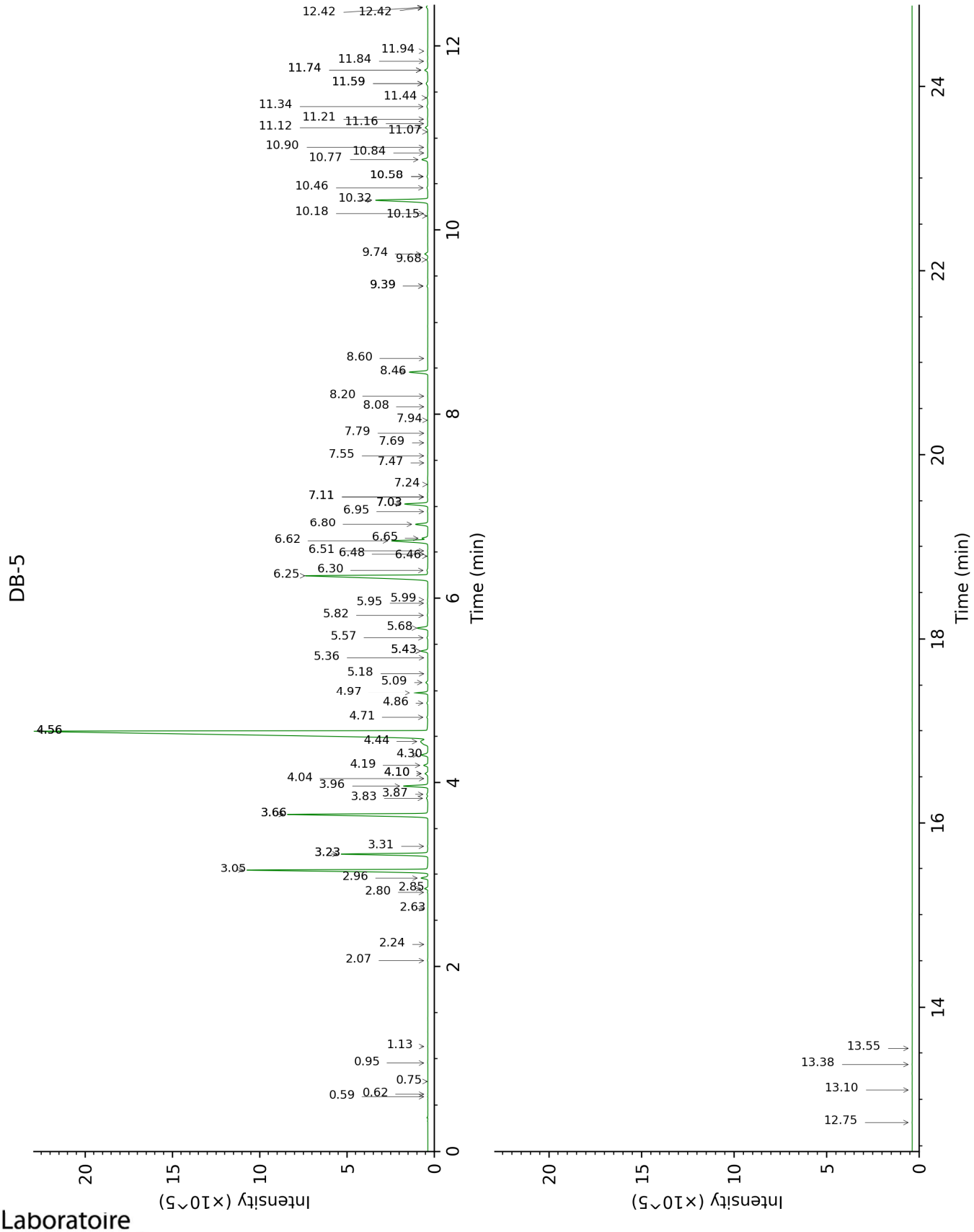
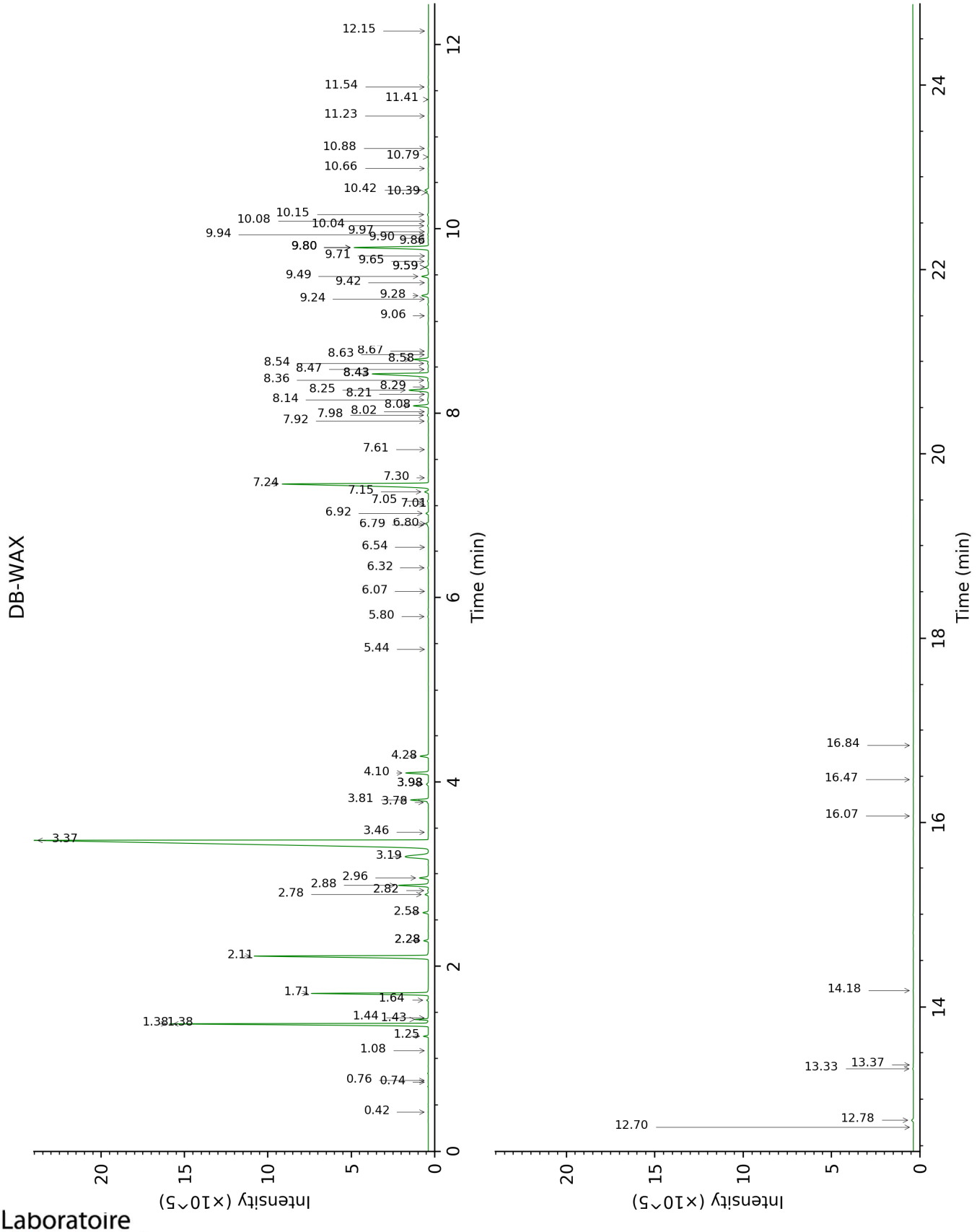

DB-5
Time (min)
Intensity (×10^5)
12.42
11.94
11.84
11.74
11.59
11.44
11.34
11.21
11.16
11.12
11.07
10.90
10.84
10.77
10.58
10.46
10.32
10.18
10.15
9.74
9.68
9.39
8.60
8.46
8.20
8.08
7.94
7.79
7.69
7.55
7.47
7.24
7.11
7.03
6.95
6.80
6.65
6.62
6.51
6.48
6.46
6.30
6.25
5.99
5.95
5.82
5.68
5.57
5.43
5.36
5.18
5.09
4.97
4.86
4.71
4.56
4.44
4.30
4.19
4.10
4.04
3.96
3.87
3.83
3.66
3.31
3.23
3.05
2.96
2.85
2.80
2.63
2.24
2.07
1.13
0.95
0.75
0.62
0.59
13.55
13.38
13.10
12.75


DB-WAX
Time (min)
Intensity (×10^5)
12.15
11.54
11.41
11.23
10.88
10.79
10.66
10.42
10.39
10.15
10.08
10.04
9.97
9.94
9.90
9.86
9.80
9.71
9.65
9.59
9.49
9.42
9.28
9.24
9.06
8.67
8.63
8.58
8.54
8.47
8.43
8.36
8.29
8.25
8.21
8.14
8.08
8.02
7.98
7.92
7.61
7.30
7.24
7.15
7.05
7.01
6.92
6.80
6.79
6.54
6.32
6.07
5.80
5.44
4.28
4.10
3.98
3.81
3.78
3.46
3.37
3.19
2.96
2.88
2.82
2.78
2.58
2.28
2.11
1.71
1.64
1.44
1.43
1.38
1.25
1.08
0.76
0.74
0.42
16.84
16.47
16.07
14.18
13.37
13.33
12.78
12.70

FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Isovaleral	0.59	639	tr	0.76	884	tr
2-Methylbutyral	0.62	650	tr	0.74	878	tr
Heptane	0.75	705	tr	0.42	707	tr
2-Methylbutanol	0.95	736	0.01	3.46	1178	0.01
Toluene	1.13	761	tr	1.44	1001	0.01
(3*Z*)-Hexenol	2.07	856	0.02	5.80	1348	0.03
Hexanol	2.24	871	tr	5.44	1322	tr
Bornylene	2.63	903	tr	1.08	944	tr
Hashishene	2.80	915	0.02	1.38*	993	10.80
Tricyclene	2.84	918	0.17	1.24	971	0.16
α-Thujene	2.96	925	0.38	1.43	999	0.40
α-Pinene	3.05	931	10.69	1.38*	993	[10.80]
α-Fenchene	3.23*	943	4.66	1.64	1020	0.06
Camphene	3.23*	943	[4.66]	1.71	1027	4.61
Thuja-2,4(10)-diene	3.31	948	0.03	2.28*	1084	0.19
Sabinene	3.66*	971	8.68	2.28*	1084	[0.19]
β-Pinene	3.66*	971	[8.68]	2.11	1067	8.64
Octen-3-ol	3.83	983	0.09	6.80	1421	0.14
Octan-3-one	3.87	986	0.06	3.98*	1217	0.10
Myrcene	3.96	992	1.35	2.88	1133	1.39
Octan-3-ol	4.04	997	tr	6.07	1367	tr
α-Phellandrene	4.10*	1000	0.18	2.78	1125	0.15
Pseudolimonene	4.10*	1000	[0.18]	2.82	1129	0.03
Δ3-Carene	4.19	1006	0.24	2.58	1110	0.24
α-Terpinene	4.30	1013	0.43	2.96	1139	0.44
para-Cymene	4.44	1022	0.99	4.10	1226	1.05
Limonene	4.56*	1030	47.50	3.19	1158	2.17
1,8-Cineole	4.56*	1030	[47.50]	3.37	1171	44.68
(*Z*)-β-Ocimene	4.71	1039	0.06	3.78	1203	0.05
(*E*)-β-Ocimene	4.86	1049	0.05	3.98*	1217	[0.10]
γ-Terpinene	4.98	1056	0.79	3.81	1205	0.81
cis-Sabinene hydrate	5.09	1063	0.11	6.92	1430	0.12
cis-Linalool oxide (fur.)	5.18	1069	tr	6.54	1402	0.01
Octanol	5.36	1080	0.01	8.20	1526	0.01
para-Cymenene	5.43*	1085	0.40	6.32	1386	0.02
Terpinolene	5.43*	1085	[0.40]	4.28	1239	0.39
trans-Sabinene hydrate	5.57	1094	0.05	7.98	1509	0.06
Linalool	5.68	1101	0.69	8.08	1516	0.72
endo-Fenchol	5.82	1110	0.04	8.43*	1543	3.54
cis-para-Menth-2-en-1-ol	5.95	1118	0.03	8.14	1521	0.08
α-Campholenal	5.99	1121	0.02	7.01	1437	0.02
Camphor	6.24	1138	10.27	7.24	1453	10.08
Camphene	6.30	1141	0.06	8.54	1552	0.06

hydrate						
Isoborneol	6.46	1152	0.01	9.42	1621	0.01
Pinocamphone	6.48	1153	tr	7.30	1458	0.02
Pinocarvone	6.52	1155	0.01	7.92	1504	0.03
Borneol	6.62	1162	2.42	9.80*	1652	3.87
δ-Terpineol	6.65	1164	0.33	9.49	1626	0.33
Terpinen-4-ol	6.80	1174	0.75	8.58	1555	0.75
para-Cymen-8-ol	6.95	1184	0.02	11.54	1797	0.02
α-Terpineol	7.03*	1189	1.47	9.80*	1652	[3.87]
Myrtenal	7.03*	1189	[1.47]	8.67	1562	0.02
Myrtenol	7.11*	1194	0.02	10.88	1741	0.02
γ-Terpineol	7.11*	1194	[0.02]	9.86	1657	0.02
Verbenone	7.24	1203	0.01	9.65	1640	0.03
trans-Carveol	7.47	1219	tr	11.41	1785	tr
Bornyl formate	7.55	1224	0.01	8.02	1512	0.02
Citronellol	7.69	1234	0.01	10.79	1733	0.01
Carvone	7.80	1241	tr	10.04	1671	0.05
Piperitone	7.94	1251	0.01	9.97	1666	0.01
Linalyl acetate	8.08	1261	0.01	8.28	1532	0.01
trans-Ascaridole glycol	8.20	1269	0.01	14.18	2037	0.02
Bornyl acetate	8.46	1287	1.11	8.25	1530	1.09
Unknown [m/z 43, 93 (66), 91 (44), 41 (38), 69 (35)... 152? (1)]	8.60	1297	0.02			
α-Cubebene	9.40*	1348	0.05	6.79	1420	0.04
α-Terpinyl acetate	9.40*	1348	[0.05]	9.71	1644	tr
α-Ylangene	9.68	1368	0.06	7.05	1439	0.05
α-Copaene	9.74	1372	0.19	7.15	1447	0.19
α-Gurjunene	10.15	1401	0.01	7.61	1481	0.01
Methyleugenol	10.18	1403	0.03	13.33	1957	0.03
β-Caryophyllene	10.32	1414	3.53	8.43*	1543	[3.54]
β-Copaene	10.46	1424	0.06	8.36	1538	0.06
Aromadendrene	10.58*	1433	0.06	8.63	1559	0.03
trans-α-Bergamotene	10.58*	1433	[0.06]	8.47	1547	0.04
α-Humulene	10.77	1447	0.39	9.28	1610	0.40
allo-Aromadendrene	10.84	1452	0.01	9.06	1592	0.01
(*E*)-β-Farnesene	10.90	1457	0.01	9.59*	1634	0.18
trans-Cadina-1(6),4-diene	11.07	1469	0.02	9.24	1606	0.01
γ-Muurolene	11.12	1473	0.16	9.59*	1634	[0.18]
Germacrene D	11.16	1476	0.02	9.80*	1652	[3.87]
β-Selinene	11.21	1480	0.03	9.90	1660	0.03
α-Selinene	11.34	1490	0.07	9.94	1663	0.04
α-Muurolene	11.44	1497	0.06	10.08	1675	0.01
β-Bisabolene	11.59*	1508	0.14	10.16	1680	0.05
γ-Cadinene	11.59*	1508	[0.14]	10.39	1700	0.09
trans-Calamenene	11.74*	1520	0.21	11.23	1770	0.02
δ-Cadinene	11.74*	1520	[0.21]	10.42	1702	0.20

trans-Cadina-1,4-diene	11.84	1528	0.02	10.66	1722	0.02
α-Calacorene	11.94	1536	0.02	12.15	1850	0.01
Caryophyllene oxide	12.42*	1574	0.11	12.78	1906	0.10
Caryophyllene oxide isomer	12.42*	1574	[0.11]	12.70	1899	0.01
Humulene epoxide II	12.75	1600	0.01	13.37	1961	0.01
Caryophylladienol II	13.10	1628	0.01	16.07	2224	0.01
14-Hydroxy-(*Z*)-caryophyllene	13.38	1651	0.01	16.47	2265	0.01
(3*Z*)-Caryophylla-3,8(13)-dien-5β-ol	13.55	1665	0.01	16.84	2304	0.01
Total identified		**99.56%**			**99.25%**	
Total reported		**99.57%**			**99.25%**	

*: Two or more compounds are coeluting on this column
[xx]: Duplicate percentage due to coelutions, not taken into account in the consolidated total
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