

**Date :** November 26, 2020

**CERTIFICATE OF ANALYSIS – GC PROFILING**

*SAMPLE IDENTIFICATION*

**Internal code :** 20K20-PTH03

**Customer identification :** Cypress - CL0109209R

**Type :** Essential oil

**Source :** *Cupressus sempervirens*

**Customer :** Plant Therapy

*ANALYSIS*

**Method:** PC-MAT-014  - 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 23, 2020

Checked and approved by :

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

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### PHYSICOCHEMICAL DATA

**Physical aspect:** Faintly yellow liquid

**Refractive index:** 1.4716 ± 0.0003 (20 °C; method PC-MAT-016)

### NFT 75-254:1992 - OIL OF CUPRESSUS

Compound	Min. %	Max. %	Observed %	Complies?
Manoyl oxide	tr		0.01	Yes
Isopimaradiene	tr		0.04	Yes
Karahanaenone	tr		0.18	Yes
Germacrene D	0.5	3.0	0.5	Yes
α-Cedrol	0.8	7.0	1.7	Yes
α-Terpinyl acetate	1	4	2	Yes
Terpinen-4-ol	0.2	2.0	1.2	Yes
Limonene	1.8	5.0	2.9	Yes
Δ <sup>3</sup> -Carene	12	25	22	Yes
Myrcene	1.0	3.5	2.4	Yes
β-Pinene	0.5	3.0	1.2	Yes
α-Pinene	40	65	49	Yes
<b>Refractive index</b>	1.4680	1.4780	1.4716	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
Toluene	tr	Simple phenolic
Cyclofenchene	0.01	Monoterpene
Bornylene	0.04	Monoterpene
Tricyclene	0.19	Monoterpene
$\alpha$ -Thujene	0.56	Monoterpene
$\alpha$ -Pinene	49.25	Monoterpene
$\alpha$ -Fenchene	0.55	Monoterpene
Camphene	0.34	Monoterpene
$\beta$ -Pinene	1.17	Monoterpene
Sabinene	1.18	Monoterpene
Pseudolimonene isomer	0.01	Monoterpene
Myrcene	2.41	Monoterpene
2-Carene	0.01	Monoterpene
$\alpha$ -Phellandrene	0.11	Monoterpene
Pseudolimonene	0.04	Monoterpene
Menthatriene isomer I	0.01	Monoterpene
$\Delta^3$ -Carene	22.47	Monoterpene
1,4-Cineole	0.05	Monoterpenic ether
$\alpha$ -Terpinene	0.55	Monoterpene
ortho-Cymene	0.04	Monoterpene
para-Cymene	0.31	Monoterpene
Sylvestrene	0.14	Monoterpene
$\beta$ -Phellandrene	0.33	Monoterpene
Limonene	2.93	Monoterpene
1,8-Cineole	0.04	Monoterpenic ether
(Z)- $\beta$ -Ocimene	0.01	Monoterpene
(E)- $\beta$ -Ocimene	0.04	Monoterpene
Unknown	0.04	Monoterpene
$\gamma$ -Terpinene	0.90	Monoterpene
<i>cis</i> -Sabinene hydrate	0.01	Monoterpenic alcohol
Unknown	0.01	Oxygenated monoterpene
<i>cis</i> -Linalool oxide (fur.)	0.01	Monoterpenic alcohol
meta-Cymenene	0.01	Monoterpene
Terpinolene isomer	0.03	Monoterpene
Isoterpinolene	0.09	Monoterpene
Terpinolene	3.34	Monoterpene
para-Cymenene	0.02	Monoterpene
$\alpha$ -Pinene oxide	0.01	Monoterpenic ether
Unknown	0.01	Unknown
Linalool	0.29	Monoterpenic alcohol
endo-Fenchol	0.01	Monoterpenic alcohol
<i>cis</i> -para-Menth-2-en-1-ol	0.02	Monoterpenic alcohol
4-Hydroxy-4-methylcyclohex-2-enone	0.02	Aliphatic alcohol
<i>trans</i> -Pinocarveol	0.03	Monoterpenic alcohol
Camphor	0.15	Monoterpenic ketone

Camphene hydrate	0.02	Monoterpenic alcohol
Epoxyterpinolene	0.02	Monoterpenic ether
meta-Mentha-4,6-dien-8-ol	0.01	Monoterpenic alcohol
Karahanaenone	0.18	Monoterpenic ketone
Borneol	0.06	Monoterpenic alcohol
$\alpha$ -Phellandren-8-ol	0.03	Monoterpenic alcohol
Umbellulone	0.05	Monoterpenic ketone
Terpinen-4-ol	1.24	Monoterpenic alcohol
para-Cymen-8-ol	0.03	Monoterpenic alcohol
Unknown	0.02	Oxygenated monoterpene
Myrtenal	0.01	Monoterpenic aldehyde
$\alpha$ -Terpineol	0.32	Monoterpenic alcohol
Myrtenol	0.02	Monoterpenic alcohol
Verbenone	0.05	Monoterpenic ketone
<i>trans</i> -Carveol	0.02	Monoterpenic alcohol
Unknown	0.01	Oxygenated monoterpene
Car-3-en-2-one	0.03	Monoterpenic ketone
Linalyl acetate	0.04	Monoterpenic ester
<i>trans</i> -Ascaridole glycol	0.02	Monoterpenic alcohol
( <i>trans</i> ?) -Linalool oxide acetate (fur.)?	0.01	Monoterpenic ester
Bornyl acetate	0.30	Monoterpenic ester
Terpinen-4-yl acetate	0.05	Monoterpenic ester
Unknown	0.18	Monoterpenic ester
Thymol	0.17	Monoterpenic alcohol
Unknown	0.01	Oxygenated monoterpene
Unknown	0.01	Unknown
Unknown	0.27	Monoterpenic ester
$\alpha$ -Terpinyl acetate	2.12	Monoterpenic ester
$\alpha$ -Cubebene	0.02	Sesquiterpene
$\alpha$ -Ylangene	0.03	Sesquiterpene
$\alpha$ -Copaene	0.07	Sesquiterpene
$\beta$ -Bourbonene	0.02	Sesquiterpene
$\beta$ -Cubebene	0.03	Sesquiterpene
$\beta$ -Elemene	0.02	Sesquiterpene
$\alpha$ -Cedrene	0.25	Sesquiterpene
Sesquithujene	0.19	Sesquiterpene
$\beta$ -Caryophyllene	0.38	Sesquiterpene
$\beta$ -Cedrene	0.08	Sesquiterpene
$\beta$ -Copaene	0.06	Sesquiterpene
<i>cis</i> -Thujopsene	0.01	Sesquiterpene
<i>cis</i> -Muuro-la-3,5-diene	0.06	Sesquiterpene
<i>trans</i> -Muuro-la-3,5-diene	0.02	Sesquiterpene
$\alpha$ -Humulene	0.20	Sesquiterpene
<i>cis</i> -Cadina-1(6),4-diene	0.04	Sesquiterpene
<i>cis</i> -Muuro-la-4(15),5-diene	0.12	Sesquiterpene
Unknown	0.01	Sesquiterpene
<i>trans</i> -Cadina-1(6),4-diene	0.04	Sesquiterpene
$\gamma$ -Muuro-lene	0.22	Sesquiterpene
Germacrene D	0.48	Sesquiterpene
$\alpha$ -Amorphene	0.05	Sesquiterpene
<i>trans</i> -Muuro-la-4(15),5-diene	0.03	Sesquiterpene
$\beta$ -Alaskene	0.10	Sesquiterpene

α-Muurolene	0.19	Sesquiterpene
δ-Amorphene	0.04	Sesquiterpene
α-Alaskene	0.10	Sesquiterpene
γ-Cadinene	0.11	Sesquiterpene
<i>trans</i> -Calamenene	0.01	Sesquiterpene
δ-Cadinene	0.39	Sesquiterpene
<i>trans</i> -Cadina-1,4-diene	0.04	Sesquiterpene
α-Cadinene	0.03	Sesquiterpene
α-Calacorene	0.02	Sesquiterpene
Salviadienol?	0.02	Sesquiterpenic alcohol
Caryophyllene oxide	0.02	Sesquiterpenic ether
allo-Cedrol	0.04	Sesquiterpenic alcohol
Widdrol	0.01	Sesquiterpenic alcohol
α-Cedrol	1.75	Sesquiterpenic alcohol
Torilenol	0.02	Oxygenated sesquiterpene
α-Acorenol	0.04	Sesquiterpenic alcohol
Unknown	0.01	Unknown
τ-Cadinol	0.04	Sesquiterpenic alcohol
α-Cadinol	0.04	Sesquiterpenic alcohol
Unknown	0.05	Unknown
Eudesma-4(15),7-dien-1β-ol	0.01	Sesquiterpenic alcohol
Phenylethyl octanoate	0.01	Phenolic ester
Manoyl oxide	0.01	Diterpenic ether
Isopimaradiene	0.04	Diterpene
7,13-Abietadiene	0.01	Diterpene
Unknown	0.02	Unknown
<b>Consolidated total</b>	<b>98.72%</b>	

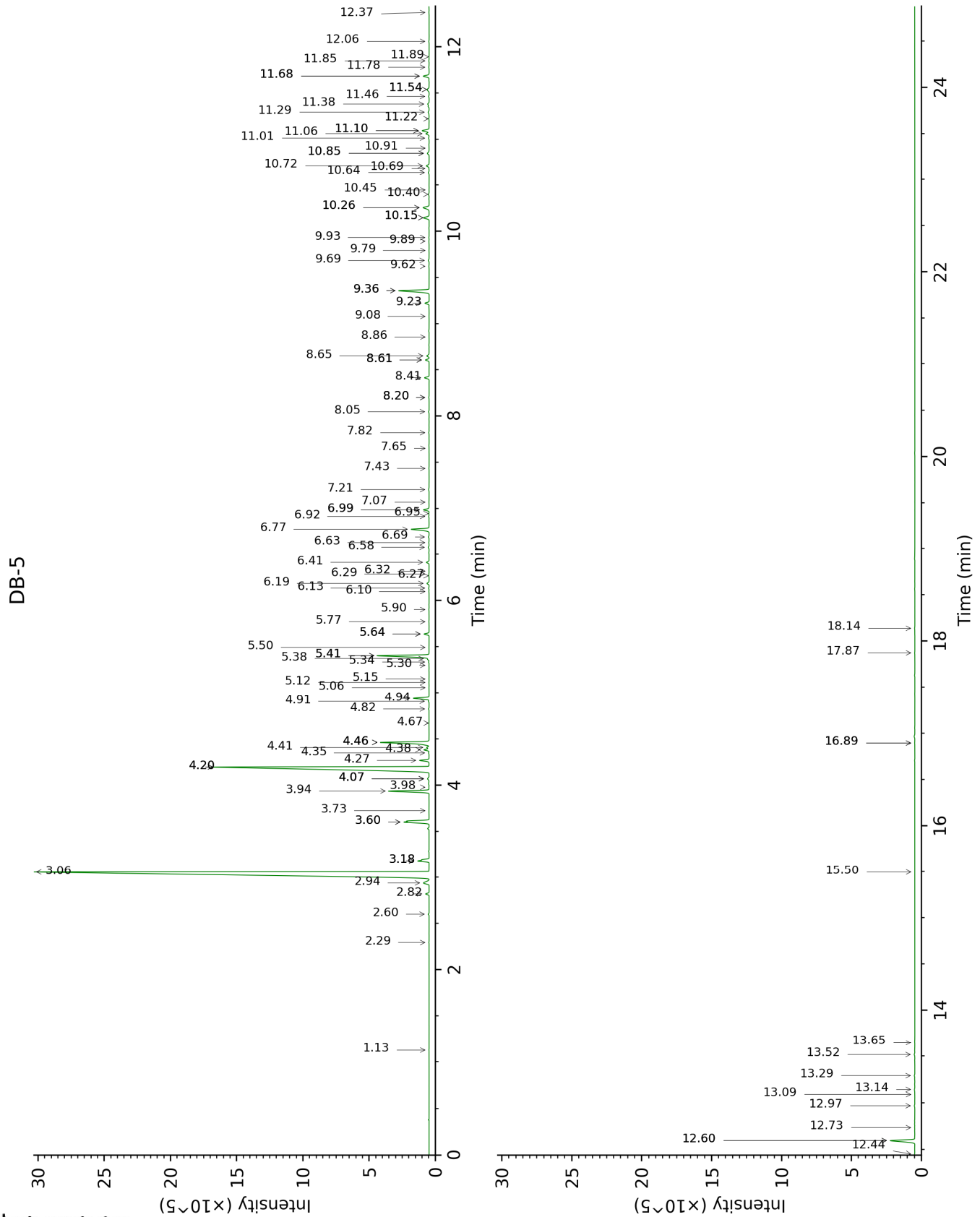
tr: The compound has been detected below 0.005% of total signal.

Note: no correction factor was applied

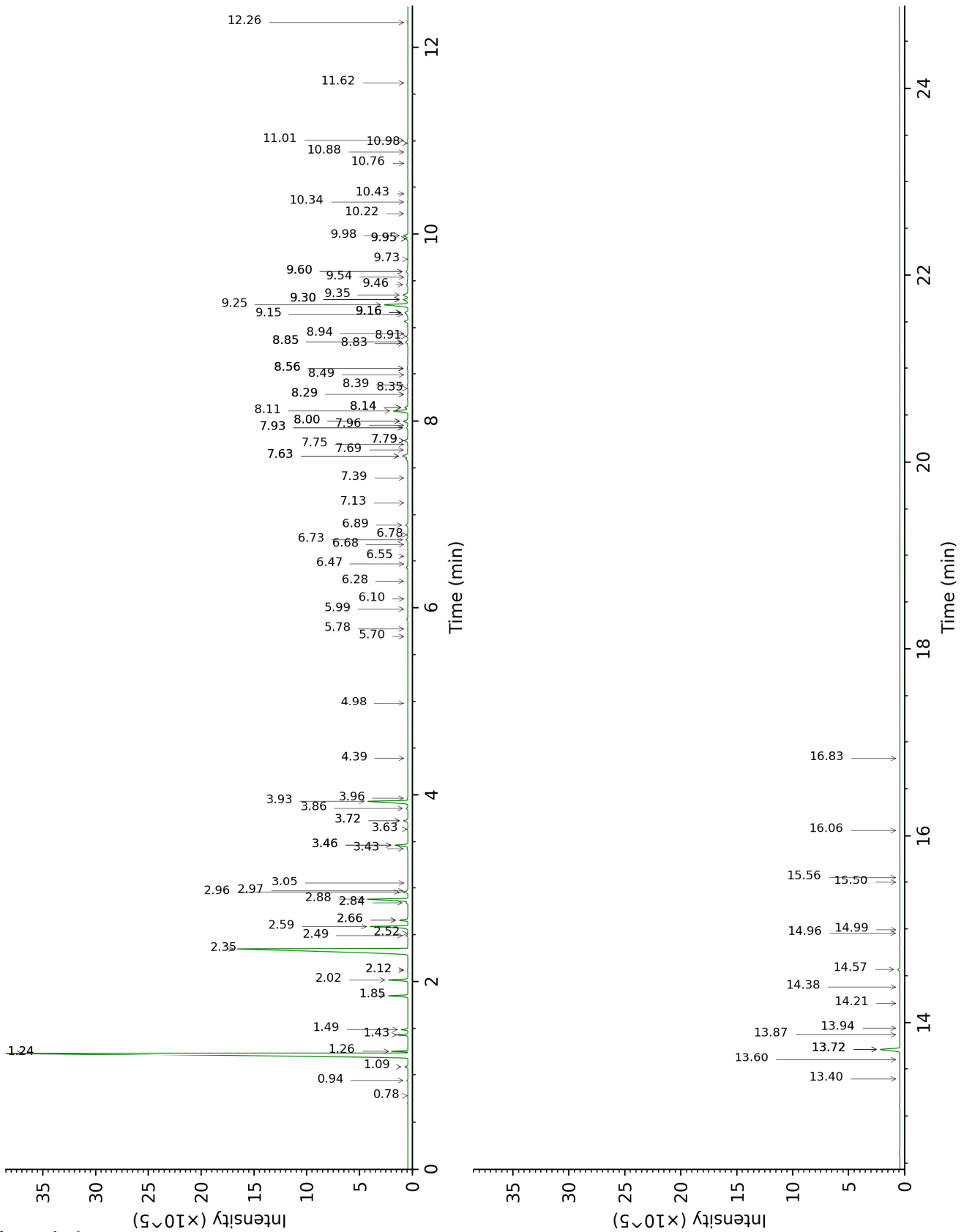
**About "consolidated" data:** The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm 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-WAX





FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Toluene	1.13	759	tr	1.26	1003	0.56
Cyclofenchene	2.30	877	0.01	0.78	918	0.01
Bornylene	2.60	903	0.04	0.94	947	0.04
Tricyclene	2.82	918	0.19	1.09	972	0.19
α-Thujene	2.94	926	0.56	1.24*	1000	49.22
α-Pinene	3.06	934	49.25	1.24*	1000	[49.22]
α-Fenchene	3.18*†	942	0.89	1.43	1021	0.55
Camphene	3.18*†	942	[0.89]	1.49	1027	0.34
β-Pinene	3.60*†	970	2.31	1.85	1065	1.17
Sabinene	3.60*†	970	[2.31]	2.02	1083	1.18
Pseudolimonene isomer	3.72	979	0.01	2.12*	1094	0.03
Myrcene	3.94	993	2.41	2.59	1134	2.49
2-Carene	3.98	996	0.01	2.12*	1094	[0.03]
α-Phellandrene	4.07*	1002	0.14	2.49	1126	0.11
Pseudolimonene	4.07*	1002	[0.14]	2.52	1128	0.04
Menthatriene isomer I	4.07*	1002	[0.14]	3.05	1172	0.01
Δ <sup>3</sup> -Carene	4.20*	1010	22.52	2.35	1114	22.47
1,4-Cineole	4.20*	1010	[22.52]	2.66*	1139	0.54
α-Terpinene	4.27	1014	0.55	2.66*	1139	[0.54]
ortho-Cymene	4.35	1020	0.04	3.72*	1225	0.34
para-Cymene	4.38	1022	0.31	3.72*	1225	[0.34]
Sylvestrene	4.41	1023	0.14	2.84	1154	0.12
β-Phellandrene	4.46*	1027	3.27	2.96	1164	0.33
Limonene	4.46*	1027	[3.27]	2.88	1158	2.93
1,8-Cineole	4.46*	1027	[3.27]	2.97	1165	0.04
(Z)-β-Ocimene	4.67	1040	0.01	3.43	1202	0.05
(E)-β-Ocimene	4.82	1050	0.04	3.63	1218	0.04
Unknown [m/z 93, 91 (54), 92 (31), 77 (29), 79 (17), 43 (13), 41 (10), 136 (9)]	4.91	1055	0.04	3.46*	1206	0.91
γ-Terpinene	4.94	1057	0.90	3.46*	1206	[0.91]
cis-Sabinene hydrate	5.06	1065	0.01	6.55	1432	0.01
Unknown [m/z 79, 93 (60), 43 (40), 94 (35), 137 (33), 77 (26), 91 (20), 152 (18)]	5.12	1068	0.01	4.39	1276	0.01
cis-Linalool oxide (fur.)	5.15	1071	0.01	6.10	1398	0.01
meta-Cymenene	5.30	1080	0.01	5.78	1375	0.02
Terpinolene isomer	5.34	1082	0.03	3.96	1244	0.03
Isoterpinolene	5.38	1085	0.09	3.86	1235	0.12

Terpinolene	5.41*	1087	3.45	3.93	1241	3.34
para-Cymenene	5.41*	1087	[3.45]	5.99	1390	0.02
α-Pinene oxide	5.50	1092	0.01	4.98	1317	0.01
Unknown [m/z 109, 43 (65), 95 (54), 119 (50), 91 (47)... 149 (8)...]	5.64*	1102	0.30	5.70	1369	0.01
Linalool	5.64*	1102	[0.30]	7.63*	1513	0.54
endo-Fenchol	5.77	1110	0.01	7.96	1538	0.03
cis-para-Menth-2- en-1-ol	5.90	1119	0.02	7.75	1522	0.04
4-Hydroxy-4- methylcyclohex- 2-enone	6.10	1131	0.02	13.60	2028	0.02
trans-Pinocarveol	6.14	1134	0.03	8.83	1607	0.04
Camphor	6.19	1137	0.15	6.73	1445	0.13
Camphene hydrate	6.27	1142	0.02	8.14*	1553	0.27
Epoxyterpinolene	6.29	1144	0.02	6.28	1412	0.02
meta-Mentha- 4,6-dien-8-ol	6.32	1146	0.01	8.94	1616	0.01
Karahanaenone	6.41	1152	0.18	6.89	1457	0.18
Borneol	6.58	1162	0.06	9.30*	1646	0.43
α-Phellandren-8- ol	6.63	1165	0.03	9.73	1681	0.02
Umbellulone	6.69	1169	0.05	8.56*	1586	0.09
Terpinen-4-ol	6.77	1175	1.24	8.11	1550	1.18
para-Cymen-8-ol	6.92	1184	0.03	11.01	1789	0.03
Unknown [m/z 93, 59 (85), 81 (36), 92 (35), 43 (34), 121 (20), 136 (16)...]	6.95	1186	0.02			
Myrtenal	6.99*	1189	0.37	8.28*	1564	0.02
α-Terpineol	6.99*	1189	[0.37]	9.30*	1646	[0.43]
Myrtenol	7.07	1194	0.02	10.43	1740	0.01
Verbenone	7.21	1203	0.05	9.15	1633	0.08
trans-Carveol	7.43	1219	0.02	10.98	1787	0.01
Unknown [m/z 137, 152 (28), 43 (25), 91 (24), 109 (23), 119 (19)]	7.65	1233	0.01	10.88	1778	0.01
Car-3-en-2-one	7.82	1245	0.03	9.95*	1699	0.13
Linalyl acetate	8.05	1260	0.04	7.69	1518	0.04
trans-Ascaridole glycol	8.20*	1271	0.03	13.72*	2040	1.73
(trans?)-Linalool oxide acetate (fur.)?	8.20*	1271	[0.03]	8.35	1569	0.01
Bornyl acetate	8.41	1286	0.30	7.79*	1526	0.30
Terpinen-4-yl acetate	8.60*	1299	0.23	8.39	1572	0.05

Unknown [m/z 121, 93 (97), 43 (81), 136 (48), 107 (47), 108 (44)...]	8.60*	1299	[0.23]	8.14*	1553	[0.27]
Thymol	8.65	1302	0.17	14.57	2125	0.18
Unknown [m/z 150, 107 (98), 91 (79), 108 (61)]	8.86	1313	0.01	11.62	1844	0.02
Unknown [m/z 93, 92 (34), 43 (31), 91 (27)...]	9.08	1328	0.01			
Unknown [m/z 93, 43 (50), 121 (50), 136 (35)...]	9.23	1339	0.27	9.16*	1634	0.29
$\alpha$ -Terpinyl acetate	9.36*	1348	2.23	9.25	1641	2.12
$\alpha$ -Cubebene	9.36*	1348	[2.23]	6.47	1426	0.02
$\alpha$ -Ylangene	9.62	1367	0.03	6.68	1441	0.02
$\alpha$ -Copaene	9.69	1371	0.07	6.78	1449	0.06
$\beta$ -Bourbonene	9.79	1379	0.02	7.13	1475	0.01
$\beta$ -Cubebene	9.89	1386	0.03	7.39	1495	0.03
$\beta$ -Elemene	9.93	1389	0.02	8.00*	1542	0.41
$\alpha$ -Cedrene	10.15*	1404	0.45	7.63*	1513	[0.54]
Sesquithujene	10.15*	1404	[0.45]	7.79*	1526	[0.30]
$\beta$ -Caryophyllene	10.26*	1412	0.53	8.00*	1542	[0.41]
$\beta$ -Cedrene	10.26*	1412	[0.53]	7.93*	1536	0.14
$\beta$ -Copaene	10.40	1423	0.06	7.93*	1536	[0.14]
<i>cis</i> -Thujopsene	10.45	1426	0.01	8.28*	1564	[0.02]
<i>cis</i> -Muurolo-3,5-diene	10.64	1441	0.06	8.56*	1586	[0.09]
<i>trans</i> -Muurolo-3,5-diene	10.69	1444	0.02	8.49	1580	0.02
$\alpha$ -Humulene	10.72	1446	0.20	8.85*	1608	0.20
<i>cis</i> -Cadina-1(6),4-diene	10.85*	1457	0.16	8.56*	1586	[0.09]
<i>cis</i> -Muurolo-4(15),5-diene	10.85*	1457	[0.16]	8.91	1613	0.12
Unknown [m/z 161, 91 (57), 120 (46), 105 (42), 133 (25), 119 (22), 41 (21), 204 (21)]	10.91	1461	0.01	9.16*	1634	[0.29]
<i>trans</i> -Cadina-1(6),4-diene	11.01	1469	0.04	8.85*	1608	[0.20]
$\gamma$ -Muurolole	11.06	1472	0.22	9.16*	1634	[0.29]
Germacrene D	11.10*	1475	0.53	9.35	1650	0.48
$\alpha$ -Amorphene	11.10*	1475	[0.53]	9.30*	1646	[0.43]
<i>trans</i> -Muurolo-4(15),5-diene	11.22	1484	0.03	9.46	1659	0.12
$\beta$ -Alaskene	11.29	1490	0.10	9.16*	1634	[0.29]
$\alpha$ -Muurolole	11.38	1496	0.19	9.60*	1670	0.18
$\delta$ -Amorphene	11.46	1502	0.04	9.54	1665	0.03

α-Alaskene	11.54*	1508	0.21	9.60*	1670	[0.18]
γ-Cadinene	11.54*	1508	[0.21]	9.95*	1699	[0.13]
<i>trans</i> -Calamenene	11.68*	1520	0.43	10.76	1768	0.01
δ-Cadinene	11.68*	1520	[0.43]	9.98	1701	0.39
<i>trans</i> -Cadina-1,4-diene	11.78	1527	0.04	10.22	1721	0.03
α-Cadinene	11.85	1533	0.03	10.34	1732	0.03
α-Calacorene	11.89	1536	0.02			
Salviadienol?	12.06	1549	0.02	13.87	2055	0.02
Caryophyllene oxide	12.37	1574	0.02	12.26	1902	0.02
allo-Cedrol	12.44	1580	0.04	13.72*	2040	[1.73]
Widdrol	12.60*	1592	1.76	14.21	2088	0.01
α-Cedrol	12.60*	1592	[1.76]	13.72*	2040	[1.73]
Torilenol	12.73	1602	0.02	14.99	2168	0.01
α-Acorenol	12.97	1622	0.04	13.94	2062	0.03
Unknown [m/z 43, 93 (89), 91 (88), 79 (87), 123 (76), 81 (75)...]	13.09	1632	0.01	13.40	2008	0.02
τ-Cadinol	13.14	1636	0.04	14.38	2105	0.01
α-Cadinol	13.29	1649	0.04	14.96	2164	0.07
Unknown [m/z 85, 57 (59), 79 (26), 67 (18), 41 (16), 80 (15), 81 (10), 77 (8), 238 (7)]	13.52	1667	0.05			
Eudesma-4(15),7-dien-1β-ol	13.65	1678	0.01	15.50	2220	0.02
Phenylethyl octanoate	15.50	1839	0.01			
Manoyl oxide	16.89*	1970	0.02	16.06	2280	0.01
Isopimaradiene	16.89*	1970	[0.02]	15.56	2227	0.04
7,13-Abietadiene	17.87	2066	0.01	16.83	2365	0.02
Unknown [m/z 191, 81 (47), 95 (41), 69 (39), 109 (32), 93 (32)...]	18.14	2092	0.02			
<b>Total identified</b>		<b>98.47%</b>			<b>97.83%</b>	
<b>Total reported</b>		<b>98.93%</b>			<b>97.91%</b>	

\*: 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

R.T.: Retention time (minutes)

R.I.: Retention index