

Date : February 18, 2019

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 19B15-PTH05-1-SCC

Customer identification : Juniper Berry - Hungary - J20106811R

Type : Essential oil

Source : *Juniperus communis*

Customer : Plant Therapy


ANALYSIS

Method: PC-PA-014-17J19 - Analysis of the composition of an essential oil, or other volatile liquid, by FAST GC-FID (in French); identifications validated by GC-MS.

Analyst : Benoit Roger, Ph. D.

Analysis date : February 18, 2019

Checked and approved by :



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

Note: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.

This report is digitally signed, it is only considered valid if the digital signature is intact.

PHYSICOCHEMICAL DATA

Physical aspect: Faintly yellow liquid

Refractive index: 1.4748 ± 0.0003 (20 °C)

ISO 8897:2010 - OIL OF JUNIPER BERRY

Compound	Min. %	Max. %	Observed %	Complies?
δ-Cadinene	1.0	3.5	0.9	No
Germacrene D	1.0	5.0	2.8	Yes
α-Humulene	1.0	4.0	2.8	Yes
β-Caryophyllene	1.5	5.0	3.1	Yes
Bornyl acetate		0.6	0.1	Yes
Terpinen-4-ol	1.0	6.0	3.6	Yes
Limonene	2.0	8.0	4.8	Yes
Myrcene	3.0	22.0	9.7	Yes
β-Pinene	1.0	12.0	7.7	Yes
Sabinene	4.0	20.0	9.4	Yes
α-Pinene	25.0	45.0	37.3	Yes
Refractive index	1.4700	1.4830	1.4748	Yes

CONCLUSION

No adulterant, contaminant or diluent has been detected using this method.

ANALYSIS SUMMARY

Identification	DB-5 (%)	DB-WAX (%)	Classe
Hexanal	0.01		Aliphatic aldehyde
(2E)-Hexenal	tr	0.01*	Aliphatic aldehyde
Tricyclene	0.08	0.08	Monoterpene
α -Thujene	0.94	0.99	Monoterpene
α -Pinene	37.33	37.07	Monoterpene
α -Fenchene	0.24*	0.03	Monoterpene
Camphene	[0.24]*	0.21	Monoterpene
Thuja-2,4(10)-diene	0.03	9.44*	Monoterpene
meta-Cymene	0.02	9.64*	Monoterpene
Sabinene	17.27	[9.44]*	Monoterpene
β -Pinene	[17.27]	7.70	Monoterpene
Unknown	0.10	0.08	Monoterpene
Octen-3-ol	0.02	0.01	Aliphatic alcohol
6-Methyl-5-hepten-2-one	0.04		Aliphatic ketone
Myrcene	9.72	[9.64]*	Monoterpene
2-Carene	0.05	0.04	Monoterpene
α -Phellandrene	0.18*	0.13	Monoterpene
Pseudolimonene	[0.18]*	0.16	Monoterpene
Menthatriene isomer I	0.16	[0.01]*	Monoterpene
Δ^3 -Carene	0.11	0.10	Monoterpene
α -Terpinene	0.81	0.80	Monoterpene
ortho-Cymene	0.03	3.40*	Simple phenolic
para-Cymene	3.37	[3.40]*	Monoterpene
Limonene	5.15*	4.75	Monoterpene
β -Phellandrene	[5.15]*	0.35*	Monoterpene
1,8-Cineole	[5.15]*	[0.35]*	Monoterpenic ether
(E)- β -Ocimene	0.02	0.02	Monoterpene
γ -Terpinene	2.60	2.60	Monoterpene
cis-Sabinene hydrate	0.02	0.03	Monoterpenic alcohol
Unknown	0.02	0.01	Oxygenated monoterpene
cis-Linalool oxide (fur.)	0.01	0.01	Monoterpenic alcohol
Fenchone	0.01	0.01	Aliphatic alcohol
Terpinolene	0.84*	0.76	Monoterpene
para-Cymenene	[0.84]*	0.01	Monoterpene
6,7-Epoxyterpinene	0.01*	0.01	Monoterpenic ether
trans-Sabinene hydrate	[0.01]*	0.05	Monoterpenic alcohol
Linalool	0.05*	0.05	Monoterpenic alcohol
Perillene	[0.05]*	0.02	Monoterpenic ether
Nonanal	0.01	0.01	Aliphatic aldehyde
endo-Fenchol	0.02	0.03	Monoterpenic alcohol
cis-para-Menth-2-en-1-ol	0.04	0.02	Monoterpenic alcohol
α -Campholenal	0.03	0.02	Monoterpenic aldehyde
trans-Pinocarveol	0.04	0.14	Monoterpenic alcohol
Camphor	0.04*	0.03*	Monoterpenic ketone
cis-Verbenol	[0.04]*	0.01	Monoterpenic alcohol
trans-Verbenol	0.02*	0.02	Monoterpenic alcohol
Camphene hydrate	[0.02]*	3.73*	Monoterpenic alcohol
meta-Mentha-4,6-dien-8-ol	0.01	0.01	Monoterpenic alcohol

Citronellal	0.02	0.01	Monoterpenic aldehyde
Borneol	0.04	0.26*	Monoterpenic alcohol
α -Phellandren-8-ol	0.02	0.02	Monoterpenic alcohol
Terpinen-4-ol	3.59	3.62*	Monoterpenic alcohol
para-Cymen-8-ol	0.02	0.02	Monoterpenic alcohol
α -Terpineol	0.19*	[0.26]*	Monoterpenic alcohol
Myrtenal	[0.19]*	0.02	Monoterpenic aldehyde
Myrtenol	0.04	0.02	Monoterpenic alcohol
Verbenone	0.03	0.23*	Monoterpenic ketone
endo-Fenchyl acetate	0.02*	0.20*	Monoterpenic ester
trans-Carveol	[0.02]*	0.01	Monoterpenic alcohol
Citronellol	0.03	0.06*	Monoterpenic alcohol
Thymol methyl ether	0.02*	[3.73]*	Monoterpenic ether
Unknown	[0.02]*	0.01	Oxygenated monoterpene
Carvone	0.01	0.19*	Monoterpenic ketone
Carvacrol methyl ether	0.01	[3.62]*	Monoterpenic ether
Piperitone	0.02	2.79*	Monoterpenic ketone
Geraniol	0.02	0.03	Monoterpenic alcohol
Methyl citronellate	0.03	0.17*	Monoterpenic ester
Geranial	0.02	0.41*	Monoterpenic aldehyde
Decanol	0.01	[0.06]*	Aliphatic alcohol
Bornyl acetate	0.13	[0.17]*	Monoterpenic ester
2-Undecanone	0.03	0.09*	Aliphatic ketone
Thymol	0.01	0.10*	Monoterpenic alcohol
Myrtenyl acetate	0.04*	0.05	Monoterpenic ester
Bicycloelemene analog	[0.04]*	[0.20]*	Sesquiterpene
Terpinyl acetate analog	0.04	[0.23]*	Monoterpenic ester
α -Terpinyl acetate	0.21*	0.05	Monoterpenic ester
α -Cubebene	[0.21]*	[0.20]*	Sesquiterpene
Citronellyl acetate	0.03	0.03	Monoterpenic ester
α -Ylangene	0.02	[0.03]*	Sesquiterpene
α -Copaene	0.12	0.13	Sesquiterpene
cis- β -Elemene	0.02	0.02	Sesquiterpene
β -Cubebene	0.03	0.04	Sesquiterpene
β -Elemene	0.56	[3.73]*	Sesquiterpene
Longifolene	0.07*	0.04	Sesquiterpene
Sibirene	[0.07]*	0.02	Sesquiterpene
α -Gurjunene	0.03	0.03	Sesquiterpene
β -Caryophyllene	3.10	[3.73]*	Sesquiterpene
cis-Thujopsene	0.07*	0.02	Sesquiterpene
β -Copaene	[0.07]*	[3.73]*	Sesquiterpene
γ -Elemene	0.23	0.27	Sesquiterpene
Aromadendrene	0.04	[0.09]*	Sesquiterpene
α -Himachalene	0.02	0.01	Sesquiterpene
cis- β -Bergamotene?	2.94		Sesquiterpene
α -Humulene	[2.94]	2.85*	Sesquiterpene
allo-Aromadendrene	0.02	0.03	Sesquiterpene
(E)- β -Farnesene	0.24*	[0.23]*	Sesquiterpene
β -Acoradiene	[0.24]*	0.04	Sesquiterpene
10-epi- β -Acoradiene	0.01	[0.23]*	Sesquiterpene
trans-Cadina-1(6),4-diene	0.07	[2.85]*	Sesquiterpene
γ -Muurolene	0.23	0.27	Sesquiterpene

Germacrene D	2.78	[2.79]*	Sesquiterpene
β-Selinene	0.16	0.21	Sesquiterpene
γ-Amorphene	0.05	[2.79]*	Sesquiterpene
Bicyclogermacrene	0.40*	[0.41]*	Sesquiterpene
α-Selinene	[0.40]*	[0.19]*	Sesquiterpene
α-Muurolene	0.36	[0.41]*	Sesquiterpene
Germacrene A	[0.36]	0.13	Sesquiterpene
γ-Cadinene	0.31	0.26*	Sesquiterpene
<i>trans</i> -Calamenene	0.89*	0.01	Sesquiterpene
δ-Cadinene	[0.89]*	0.87	Sesquiterpene
<i>trans</i> -Cadina-1,4-diene	0.12	0.16*	Sesquiterpene
(<i>E</i>)-γ-Bisabolene	0.10*	[0.26]*	Sesquiterpene
Selina-4(15),7(11)-diene	[0.10]*	0.05	Sesquiterpene
α-Cadinene	0.10*	0.07	Sesquiterpene
α-Calacorene	[0.10]*	0.02	Sesquiterpene
Selina-3,7(11)-diene	[0.10]*	[0.16]*	Sesquiterpene
Germacrene B	1.16	1.16	Sesquiterpene
(<i>E</i>)-Nerolidol	0.02	0.07*	Sesquiterpenic alcohol
Caryophyllenyl alcohol	0.02	0.01	Sesquiterpenic alcohol
Spathulenol	0.07	0.07	Sesquiterpenic alcohol
Caryophyllene oxide	0.03*	0.02	Sesquiterpenic ether
Caryophyllene oxide isomer	[0.03]*		Sesquiterpenic ether
Unknown	0.03		Oxygenated sesquiterpene
α-Cedrol	0.01	0.02	Sesquiterpenic alcohol
Humulene epoxide II	0.03	0.02	Sesquiterpenic ether
10-epi-Cubenol	0.03	[0.07]*	Sesquiterpenic alcohol
τ-Cadinol	0.20*	0.11	Sesquiterpenic alcohol
τ-Muurolol	[0.20]*	[0.10]*	Sesquiterpenic alcohol
α-Muurolol	0.06	0.04	Sesquiterpenic alcohol
Unknown	0.04		Oxygenated sesquiterpene
α-Cadinol	0.18	0.28*	Sesquiterpenic alcohol
(3 <i>Z</i>)-Caryophylla-3,8(13)-dien-5β-ol	0.02	0.04	Sesquiterpenic alcohol
epi-α-Bisabolol	0.01	0.01	Sesquiterpenic alcohol
meta-Camphorene	0.11	[0.28]*	Diterpene
para-Camphorene	0.04	0.03	Diterpene
ar-Abietatriene	0.02	0.03	Diterpene
Sandaracopimarinal?	0.02		Diterpenic aldehyde
Total identified	99.03%	98.33%	

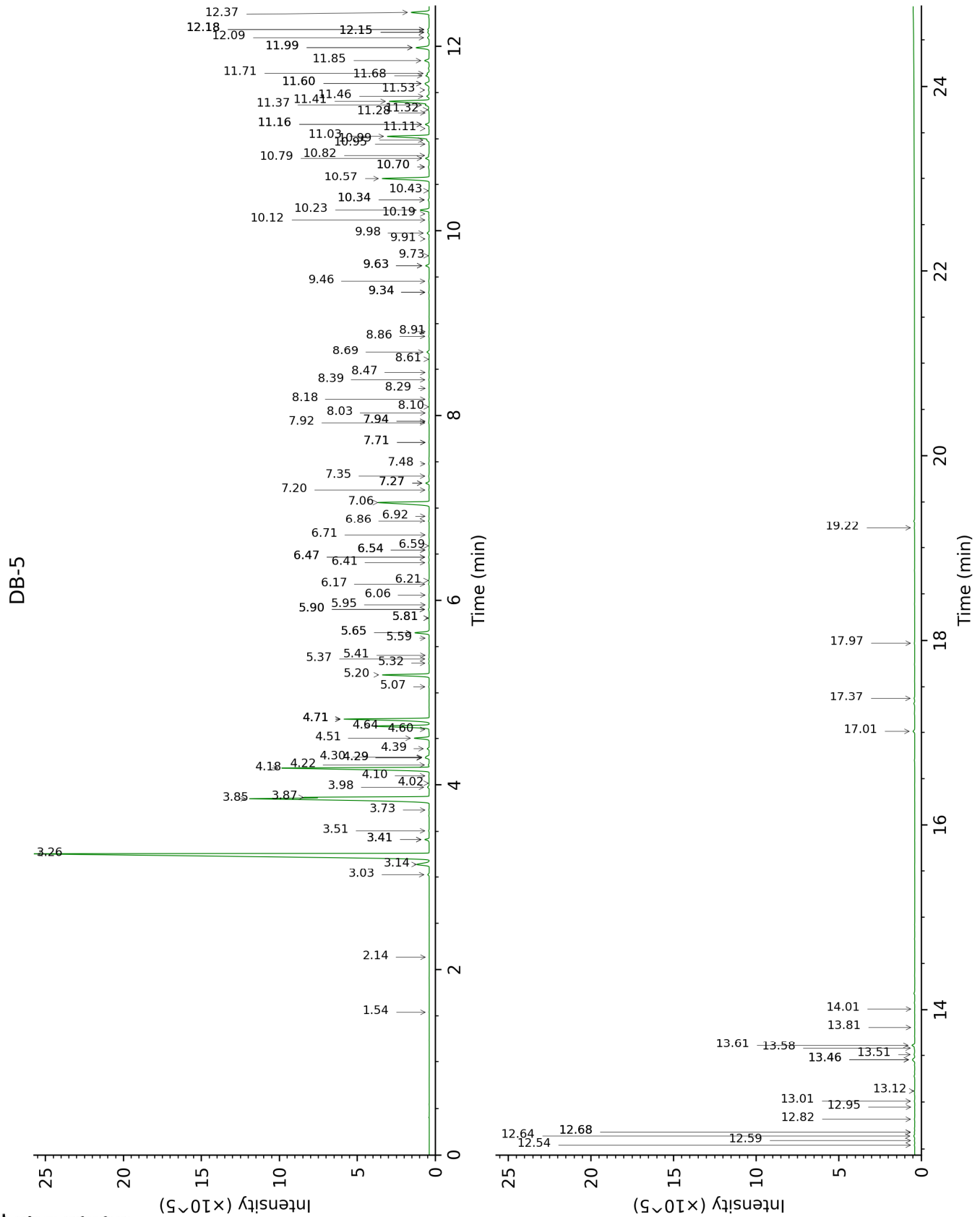
*: Two or more compounds are coeluting on this column

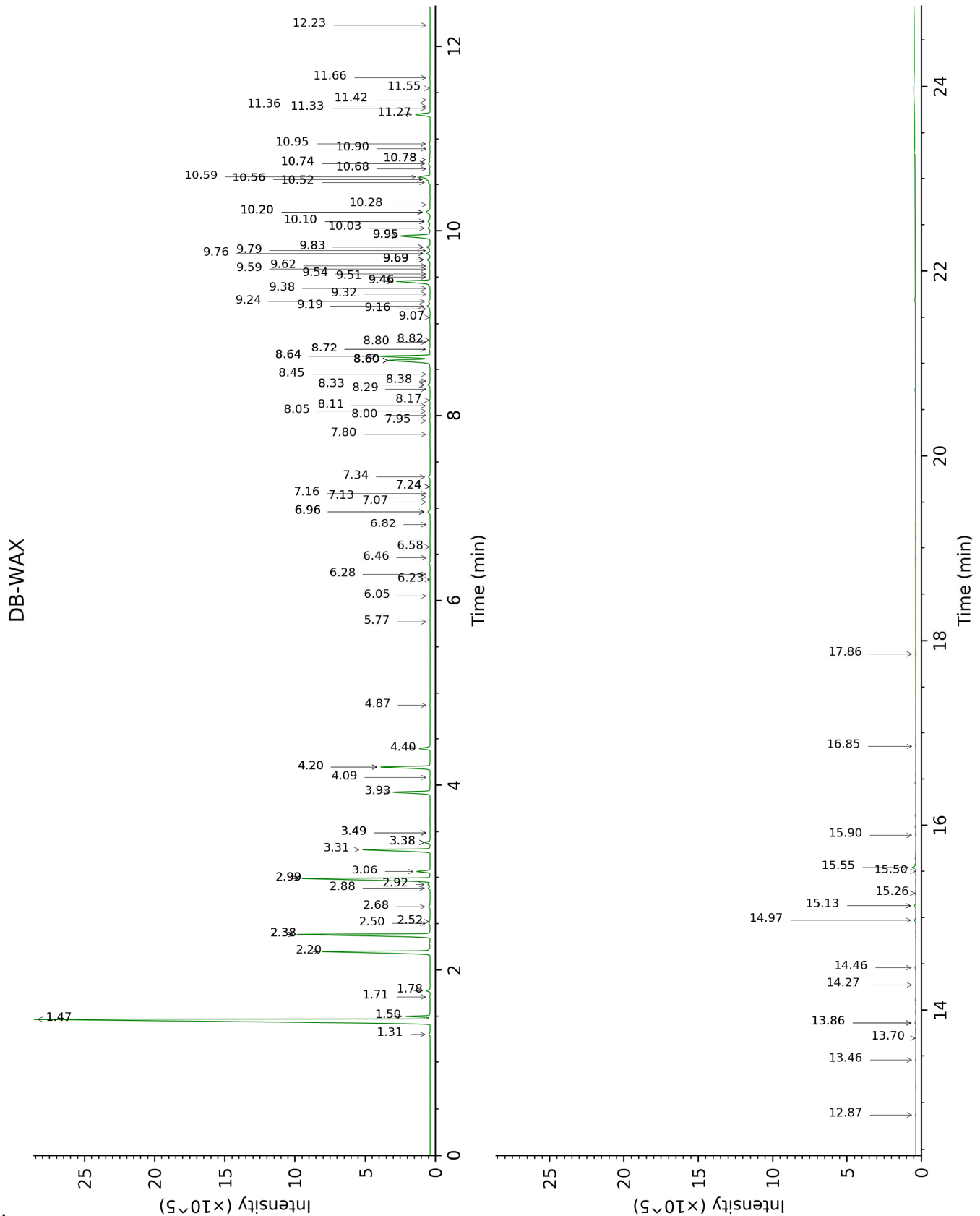
[xx]: Duplicate percentage due to coelutions, not taken account in the identified total

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

Note: no correction factor was applied

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





FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Hexanal	1.54	797	0.01			
(2E)-Hexenal	2.14	848	tr	3.49*	1176	0.01
Tricyclene	3.03	917	0.08	1.31	977	0.08
α -Thujene	3.14	925	0.94	1.50	1004	0.99
α -Pinene	3.26	932	37.33	1.47	1001	37.07
α -Fenchene	3.41*	942	0.24	1.71	1024	0.03
Camphene	3.41*	942	[0.24]	1.78	1030	0.21
Thuja-2,4(10)-diene	3.51	948	0.03	2.38*	1088	9.44
meta-Cymene	3.73	963	0.02	2.99*	1137	9.64
Sabinene	3.85†	971	17.27	2.38*	1088	[9.44]
β -Pinene	3.87†	972	[17.27]	2.20	1070	7.70
Unknown [m/z 93, 79 (73), 67 (49), 95 (42), 91 (41), 121 (38)...]	3.98	979	0.10	2.50	1099	0.08
Octen-3-ol	4.02	982	0.02	6.82	1414	0.01
6-Methyl-5-hepten-2-one	4.10	987	0.04			
Myrcene	4.18	993	9.72	2.99*	1137	[9.64]
2-Carene	4.22	995	0.05	2.52	1100	0.04
α -Phellandrene	4.29*	1000	0.18	2.88	1128	0.13
Pseudolimonene	4.29*	1000	[0.18]	2.92	1132	0.16
Menthatriene isomer I	4.30	1000	0.16	3.49*	1176	[0.01]
Δ 3-Carene	4.39	1006	0.11	2.68	1113	0.10
α -Terpinene	4.51	1013	0.81	3.06	1143	0.80
ortho-Cymene	4.60	1019	0.03	4.20*	1232	3.40
para-Cymene	4.64	1021	3.37	4.20*	1232	[3.40]
Limonene	4.71*	1026	5.15	3.31	1162	4.75
β -Phellandrene	4.71*	1026	[5.15]	3.38*	1168	0.35
1,8-Cineole	4.71*	1026	[5.15]	3.38*	1168	[0.35]
(E)- β -Ocimene	5.07	1048	0.02	4.09	1223	0.02
γ -Terpinene	5.20	1056	2.60	3.93	1211	2.60
cis-Sabinene hydrate	5.32	1064	0.02	7.07	1433	0.03
Unknown [m/z 79, 93 (60), 43 (40), 94 (35), 137 (33), 77 (26), 91 (20), 152 (18)]	5.37	1067	0.02	4.86	1284	0.01
cis-Linalool oxide (fur.)	5.41	1069	0.01	6.58	1396	0.01
Fenchone	5.59	1081	0.01	5.77	1336	0.01
Terpinolene	5.65*	1084	0.84	4.40	1248	0.76
para-Cymenene	5.65*	1084	[0.84]	6.46	1387	0.01
6,7-Epoxymyrcene	5.81*	1094	0.01	6.23	1370	0.01
trans-Sabinene hydrate	5.81*	1094	[0.01]	8.05	1508	0.05
Linalool	5.90*	1100	0.05	8.17	1517	0.05

Perillene	5.90*	1100	[0.05]	6.28	1374	0.02
Nonanal	5.95	1103	0.01	6.05	1357	0.01
endo-Fenchol	6.06	1110	0.02	8.45	1539	0.03
cis-para-Menth-2-en-1-ol	6.18	1118	0.04	8.29	1526	0.02
α-Campholenal	6.21	1120	0.03	7.13	1437	0.02
trans-Pinocarveol	6.41	1133	0.04	9.24	1602	0.14
Camphor	6.47*	1136	0.04	7.24*	1446	0.03
cis-Verbenol	6.47*	1136	[0.04]	9.32	1608	0.01
trans-Verbenol	6.54*	1141	0.02	9.62	1633	0.02
Camphene hydrate	6.54*	1141	[0.02]	8.60*	1551	3.73
meta-Mentha-4,6-dien-8-ol	6.59	1144	0.01	9.38	1613	0.01
Citronellal	6.71	1152	0.02	7.16	1440	0.01
Borneol	6.86	1162	0.04	9.83*	1650	0.26
α-Phellandren-8-ol	6.92	1165	0.02	10.28	1688	0.02
Terpinen-4-ol	7.06	1175	3.59	8.64*	1554	3.62
para-Cymen-8-ol	7.20	1183	0.02	11.55	1796	0.02
α-Terpineol	7.27*	1188	0.19	9.83*	1650	[0.26]
Myrtenal	7.27*	1188	[0.19]	8.80	1567	0.02
Myrtenol	7.35	1193	0.04	10.90	1740	0.02
Verbenone	7.48	1202	0.03	9.69*	1639	0.23
endo-Fenchyl acetate	7.71*	1217	0.02	6.96*	1425	0.20
trans-Carveol	7.71*	1217	[0.02]	11.42	1785	0.01
Citronellol	7.92	1232	0.03	10.78*	1729	0.06
Thymol methyl ether	7.94*	1233	0.02	8.60*	1551	[3.73]
Unknown [m/z 137, 152 (28), 43 (25), 91 (24), 109 (23), 119 (19)]	7.94*	1233	[0.02]	11.36	1779	0.01
Carvone	8.03	1239	0.01	10.10*	1673	0.19
Carvacrol methyl ether	8.10	1243	0.01	8.64*	1554	[3.62]
Piperitone	8.18	1249	0.02	9.95*	1660	2.79
Geraniol	8.30	1257	0.02	11.66	1806	0.03
Methyl citronellate	8.39	1263	0.03	8.33*	1530	0.17
Geranial	8.47	1268	0.02	10.20*	1681	0.41
Decanol	8.61	1278	0.01	10.78*	1729	[0.06]
Bornyl acetate	8.69	1283	0.13	8.33*	1530	[0.17]
2-Undecanone	8.86	1295	0.03	8.72*	1560	0.09
Thymol	8.92	1299	0.01	15.13*	2130	0.10
Myrtenyl acetate	9.34*	1325	0.04	9.59	1630	0.05
Bicycloelemene analog	9.34*	1325	[0.04]	6.96*	1425	[0.20]
Terpinyl acetate analog	9.46	1333	0.04	9.69*	1639	[0.23]
α-Terpinyl acetate	9.63*	1345	0.21	9.79	1647	0.05
α-Cubebene	9.63*	1345	[0.21]	6.96*	1425	[0.20]
Citronellyl acetate	9.73	1352	0.03	9.54	1626	0.03
α-Ylangene	9.92	1365	0.02	7.24*	1446	[0.03]
α-Copaene	9.98	1370	0.12	7.34	1453	0.13

<i>cis</i> -β-Elemene	10.12	1380	0.02	8.38	1533	0.02
β-Cubebene	10.18	1384	0.03	7.95	1499	0.04
β-Elemene	10.23	1387	0.56	8.60*	1551	[3.73]
Longifolene	10.34*	1395	0.07	8.11	1512	0.04
Sibirene	10.34*	1395	[0.07]	8.00	1504	0.02
α-Gurjunene	10.43	1402	0.03	7.80	1488	0.03
β-Caryophyllene	10.57	1412	3.10	8.60*	1551	[3.73]
<i>cis</i> -Thujopsene	10.70*	1422	0.07	8.82	1569	0.02
β-Copaene	10.70*	1422	[0.07]	8.60*	1551	[3.73]
γ-Elemene	10.79	1429	0.23	9.19	1598	0.27
Aromadendrene	10.82	1431	0.04	8.72*	1560	[0.09]
α-Himachalene	10.94	1440	0.02	9.07	1588	0.01
<i>cis</i> -β-Bergamotene?	10.99†	1443	2.94			
α-Humulene	11.03†	1446	[2.94]	9.46*	1620	2.85
allo-Aromadendrene	11.11	1452	0.02	9.16	1595	0.03
(<i>E</i>)-β-Farnesene	11.16*	1456	0.24	9.69*	1639	[0.23]
β-Acoradiene	11.16*	1456	[0.24]	9.50	1623	0.04
10- <i>epi</i> -β-Acoradiene	11.28	1465	0.01	9.69*	1639	[0.23]
<i>trans</i> -Cadina-1(6),4-diene	11.32	1468	0.07	9.46*	1620	[2.85]
γ-Murolene	11.37	1471	0.23	9.76	1644	0.27
Germacrene D	11.41	1474	2.78	9.95*	1660	[2.79]
β-Selinene	11.46	1478	0.16	10.03	1667	0.21
γ-Amorphene	11.53	1483	0.05	9.95*	1660	[2.79]
Bicyclogermacrene	11.60*	1489	0.40	10.20*	1681	[0.41]
α-Selinene	11.60*	1489	[0.40]	10.10*	1673	[0.19]
α-Murolene	11.68†	1495	0.36	10.20*	1681	[0.41]
Germacrene A	11.71†	1497	[0.36]	10.52	1708	0.13
γ-Cadinene	11.85	1507	0.31	10.56*	1710	0.26
<i>trans</i> -Calamenene	11.99*	1518	0.89	11.33	1777	0.01
δ-Cadinene	11.99*	1518	[0.89]	10.58	1713	0.87
<i>trans</i> -Cadina-1,4-diene	12.09	1527	0.12	10.74*	1726	0.16
(<i>E</i>)-γ-Bisabolene	12.15*	1531	0.10	10.56*	1710	[0.26]
Selina-4(15),7(11)-diene	12.15*	1531	[0.10]	10.68	1721	0.05
α-Cadinene	12.18*	1534	0.10	10.95	1744	0.07
α-Calacorene	12.18*	1534	[0.10]	12.23	1856	0.02
Selina-3,7(11)-diene	12.18*	1534	[0.10]	10.74*	1726	[0.16]
Germacrene B	12.37	1548	1.16	11.27	1771	1.16
(<i>E</i>)-Nerolidol	12.54	1562	0.02	13.86*	2007	0.07
Caryophyllenyl alcohol	12.59	1566	0.02	13.70	1991	0.01
Spathulenol	12.64	1570	0.07	14.46	2064	0.07
Caryophyllene oxide	12.68*	1573	0.03	12.87	1914	0.02
Caryophyllene oxide isomer	12.68*	1573	[0.03]			
Unknown [m/z 159, 83 (88), 55 (53), 93 (50), 121 (48)... 220 (9)]	12.82	1584	0.03			
α-Cedrol	12.95	1594	0.01	14.27	2047	0.02

Humulene epoxide II	13.01	1599	0.03	13.46	1969	0.02
10-epi-Cubenol	13.12	1608	0.03	13.86*	2007	[0.07]
τ-Cadinol	13.46*	1635	0.20	14.97	2114	0.11
τ-Muurolol	13.46*	1635	[0.20]	15.13*	2130	[0.10]
α-Muurolol	13.51	1640	0.06	15.26	2144	0.04
Unknown [m/z 41, 91 (96), 79 (88), 69 (82), 123 (80), 93 (80)... 220 (8)]	13.58	1646	0.04			
α-Cadinol	13.61	1648	0.18	15.55*	2172	0.28
(3Z)-Caryophylla-3,8(13)-dien-5β-ol	13.81	1665	0.02	16.85	2307	0.04
epi-α-Bisabolol	14.01	1681	0.01	15.50	2167	0.01
meta-Camphorene	17.01	1949	0.11	15.55*	2172	[0.28]
para-Camphorene	17.37	1982	0.04	15.90	2207	0.03
ar-Abietatriene	17.97	2042	0.02	17.86	2416	0.03
Sandaracopimarinal?	19.22	2168	0.02			
Total identified		99.03%			98.33%	
Total reported		99.22%			98.43%	

*: Two or more compounds are coeluting on this column

[xx]: Duplicate percentage due to coelutions, not taken account in the identified 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