

Date : May 15, 2019

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 19E14-PTH08-1-SCC

Customer identification : Cedarwood Texas Crude - USA - CB810285R

Type : Essential oil

Source : *Juniperus mexicana*

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 : Sylvain Mercier, M. Sc., Chimiste

Analysis date : May 15, 2019

Checked and approved by :



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

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PHYSICOCHEMICAL DATA

Physical aspect: Dark yellow viscous liquid

Refractive index: 1.5057 ± 0.0003 (20 °C)

ISO 4725:2004 - OIL OF CEDARWOOD, TEXAS

Compound	Min. %	Max. %	Observed %	Complies?
Widdrol	2.5		1.6	No
α-Cedrol	20.0		22.5	Yes
Cuparene	1.5	3.2	1.3	No
cis-Thujopsene	25.0	35.0	30.2	Yes
β-Cedrene	3.0	8.0	3.8	Yes
α-Cedrene	15.0	25.0	14.6	No
Refractive index	1.5020	1.5100	1.5057	Yes

CONCLUSION

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

ANALYSIS SUMMARY

Identification	DB-5 (%)	DB-WAX (%)	Classe
Unknown	0.02	0.02	Monoterpene
α -Pinene	0.13	0.12	Monoterpene
Camphene	0.03*	0.01	Monoterpene
α -Fenchene	[0.03]*	0.02	Monoterpene
Thuja-2,4(10)-diene	0.02	0.02	Monoterpene
β -Pinene	0.01	0.01	Monoterpene
α -Methylstyrene	0.02	0.02	Normonoterpene
Δ^3 -Carene	0.03	0.03	Monoterpene
para-Cymene	0.02	0.02	Monoterpene
Limonene	0.01	0.01	Monoterpene
γ -Terpinene	0.01	0.01	Monoterpene
Terpinolene	0.02*	0.01	Monoterpene
para-Cymenene	[0.02]*	0.01	Monoterpene
Linalool	0.01	1.21*	Monoterpenic alcohol
α -Campholenal	0.01	0.01	Monoterpenic aldehyde
<i>trans</i> -Pinocarveol	0.03	0.03	Monoterpenic alcohol
Camphor	0.02	0.29*	Monoterpenic ketone
meta-Mentha-4,6-dien-8-ol	0.01	0.58*	Monoterpenic alcohol
Pinocamphone	0.01	0.02	Monoterpenic ketone
Borneol	0.02	0.93*	Monoterpenic alcohol
α -Phellandren-8-ol	0.01	0.26	Monoterpenic alcohol
Terpinen-4-ol	0.03	0.24*	Monoterpenic alcohol
meta-Cymen-8-ol	0.01	0.01	Monoterpenic alcohol
para-Cymen-8-ol	0.05	0.05	Monoterpenic alcohol
α -Terpineol	0.04	0.06	Monoterpenic alcohol
Myrtenol	0.04	0.04	Monoterpenic alcohol
Verbenone	0.05	0.39*	Monoterpenic ketone
<i>trans</i> -Carveol	0.01	0.01	Monoterpenic alcohol
Carvacrol methyl ether	0.02	[0.24]*	Monoterpenic ether
Bornyl acetate	0.01	0.68*	Monoterpenic ester
Brasila-1,10-diene	0.01	0.02	Sesquiterpene
Carvacrol	0.04	0.03	Monoterpenic alcohol
α -Terpinyl acetate	0.09	0.28	Monoterpenic ester
African-1-ene	0.03	0.02	Sesquiterpene
2-epi- α -Funebrene	0.44*	[0.29]*	Sesquiterpene
β -Patchoulene	[0.44]*	0.01	Sesquiterpene
α -Duprezianene	0.50	0.46	Sesquiterpene
β -Elemene	0.84	1.44	Sesquiterpene
α -Chamipinene	0.09	0.10	Sesquiterpene
Unknown	0.15	[0.68]*	Sesquiterpene
α -Cedrene	16.22*	14.58	Sesquiterpene
β -Funebrene	[16.22]*	[1.21]*	Sesquiterpene
β -Cedrene	5.11*	3.82	Sesquiterpene
β -Caryophyllene	[5.11]*	[1.44]*	Sesquiterpene
β -Duprezianene	[5.11]*	[0.68]*	Sesquiterpene
<i>cis</i> -Thujopsene	30.18	29.89	Sesquiterpene
Isobazzanene	0.11*	[0.24]*	Sesquiterpene
(<i>Z</i>)- β -Farnesene?	[0.11]*	0.10	Sesquiterpene

<i>trans</i> - α -Bergamotene	0.05	[1.44]*	Sesquiterpene
Prezizaene	0.14	0.11	Sesquiterpene
α -Himachalene	0.57*	0.45	Sesquiterpene
7,8-Dehydro- α -acoradiene?	[0.57]*	0.09	Sesquiterpene
α -Humulene	0.19*	0.05	Sesquiterpene
Cadina-4,11-diene	[0.19]*	0.04	Sesquiterpene
α -Acoradiene	0.20	[0.58]*	Sesquiterpene
(<i>E</i>)- β -Farnesene	1.00*	0.36	Sesquiterpene
9-epi- β -Caryophyllene	[1.00]*	[0.58]*	Sesquiterpene
β -Acoradiene	[1.00]*	0.48*	Sesquiterpene
Thujopsene isomer	[1.00]	[0.48]*	Sesquiterpene
β -Chamigrene	0.15	[0.39]*	Sesquiterpene
Unknown	0.54*	0.17	Sesquiterpene
Unknown	[0.54]*		Sesquiterpene
Widdra-2,4(14)-diene?	0.51*	[0.93]*	Sesquiterpene
γ -Himachalene	[0.51]*	0.29	Sesquiterpene
<i>ar</i> -Curcumene	0.57*	0.22	Sesquiterpene
Unknown	[0.57]*	0.28	Sesquiterpene
Pseudowiddrene	1.05*	0.68	Sesquiterpene
α -Chamigrene	[1.05]*	1.77*	Sesquiterpene
β -Himachalene	0.37	0.27	Sesquiterpene
α -Cuprenene	3.25	[1.77]*	Sesquiterpene
Cuparene	[3.25]	1.36*	Sesquiterpene
1,4-Dihydrocuparene	0.89*	0.13	Sesquiterpene
α -Dehydro- <i>ar</i> -himachalene	[0.89]*	0.08	Sesquiterpene
α -Alaskene	[0.89]*	0.08	Sesquiterpene
γ -Cadinene	[0.89]*	0.68	Sesquiterpene
β -Curcumene	[0.89]*	0.21	Sesquiterpene
β -Sesquiphellandrene	0.75*	0.30*	Sesquiterpene
δ -Cadinene	[0.75]*	[0.68]*	Sesquiterpene
γ -Dehydro- <i>ar</i> -himachalene	[0.75]*	0.05	Sesquiterpene
Unknown	0.31*		Oxygenated sesquiterpene
γ -Cuprenene	[0.31]*	[0.30]*	Sesquiterpene
(<i>E</i>)- γ -Bisabolene	0.17*	[0.68]*	Sesquiterpene
<i>ar</i> -Himachalene	[0.17]*	0.03	Sesquiterpene
δ -Cuprenene epimer I	[0.17]*	0.10	Sesquiterpene
δ -Cuprenene epimer II	0.20*	[1.36]*	Sesquiterpene
Unknown	[0.20]*	0.14	Oxygenated sesquiterpene
Unknown	0.17	0.19	Oxygenated sesquiterpene
Unknown	0.06	0.03	Oxygenated sesquiterpene
Unknown	0.11	0.08	Oxygenated sesquiterpene
Unknown	0.11*		Sesquiterpene
Caryophyllenyl alcohol	[0.11]*	0.03	Sesquiterpenic alcohol
Caryophyllene oxide	0.05*	0.05	Sesquiterpenic ether
Caryophyllene oxide isomer	[0.05]*	0.01	Sesquiterpenic ether
allo-Cedrol	0.43	23.09*	Sesquiterpenic alcohol
α -Cedrol	24.14*	[23.09]*	Sesquiterpenic alcohol
Widdrol	[24.14]*	1.88*	Sesquiterpenic alcohol
β -Himachalene oxide	[24.14]	0.01	Sesquiterpenic ether
epi-Cedrol	0.42*	0.59	Sesquiterpenic alcohol
Unknown	[0.42]*	0.01	Oxygenated sesquiterpene
α -Acorenol	0.88	0.83	Sesquiterpenic alcohol

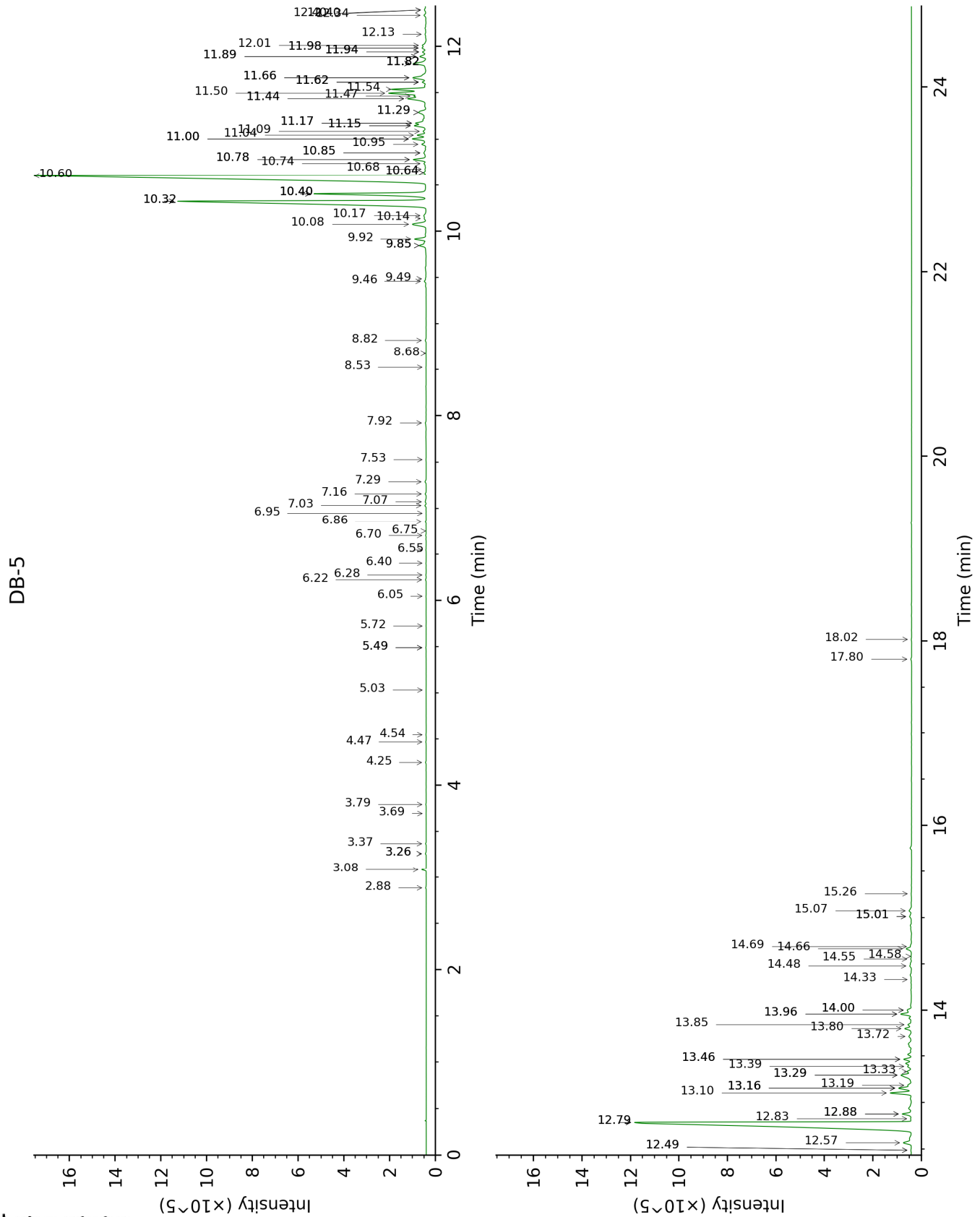
β-Acorenol	0.62*	0.13	Sesquiterpenic alcohol
Unknown	[0.62]*	0.04	Oxygenated sesquiterpene
Unknown	[0.62]*	0.11	Oxygenated sesquiterpene
Unknown	0.17		Oxygenated sesquiterpene
Himachalol	0.76*	0.27	Sesquiterpenic alcohol
Unknown	[0.76]*		Oxygenated sesquiterpene
Unknown	0.21	0.43*	Oxygenated sesquiterpene
Unknown	0.20	0.16	Oxygenated sesquiterpene
Cedrenol analog	0.35*	0.13	Sesquiterpenic alcohol
14-Hydroxy-9-epi-(E)-caryophyllene	[0.35]*	0.18	Sesquiterpenic alcohol
Cedr-8-en-13-ol	0.20	0.15	Sesquiterpenic alcohol
α-Bisabolol	0.32	0.39	Sesquiterpenic alcohol
α-Cedrenol	0.18	0.14	Sesquiterpenic alcohol
Unknown	0.48*		Oxygenated sesquiterpene
Mayurone?	[0.48]*	0.03	Norsesquiterpenic ketone
Thujopsenal	0.25*	0.23	Sesquiterpenic aldehyde
Unknown	[0.25]*	0.01	Oxygenated sesquiterpene
Thujopsenal analog	0.03	0.04	Sesquiterpenic aldehyde
Unknown	0.10		Oxygenated sesquiterpene
Cuparenal	0.04		Sesquiterpenic aldehyde
Unknown	0.03		Oxygenated sesquiterpene
Cedryl acetate?	0.27	[1.88]*	Sesquiterpenic ester
Unknown	0.06	0.07	Oxygenated sesquiterpene
Unknown	0.14*	0.08	Oxygenated sesquiterpene
Unknown	[0.14]*	0.01	Oxygenated sesquiterpene
Unknown	0.15	0.15	Oxygenated sesquiterpene
Nootkatone analog	0.03	0.04	Sesquiterpenic ketone
Manool	0.04	0.04	Diterpenic alcohol
7,13-Abietadiene	0.02	[0.43]*	Diterpene
Total identified	94.99%	92.37%	

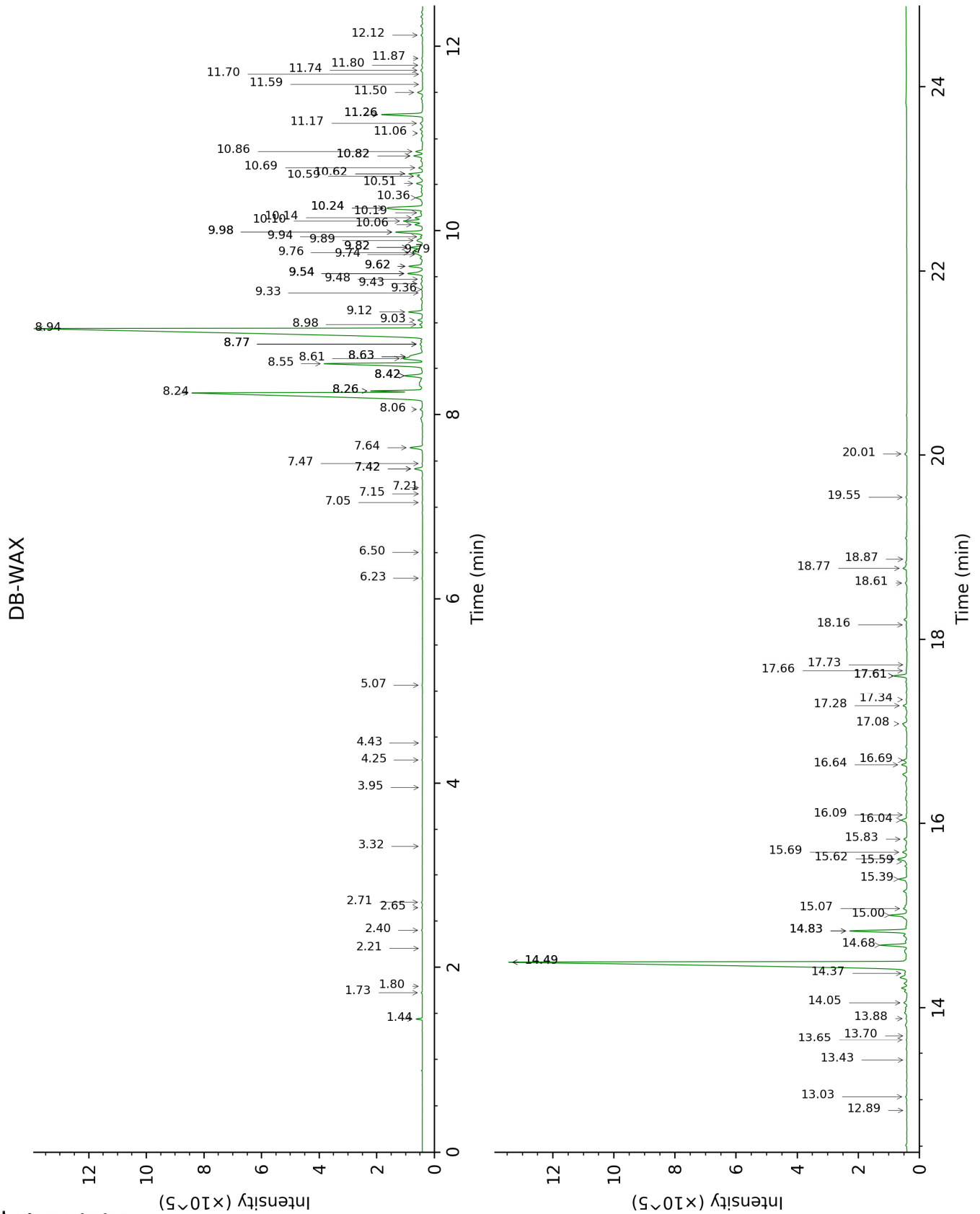
*: Two or more compounds are coeluting on this column

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

Note: no correction factor was applied

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FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Unknown [m/z 105, 79 (80), 91 (78), 77 (69), 78 (56), 93 (46), 120 (44)... 136 (4)]	2.88	917	0.02	2.65	1105	0.02
α -Pinene	3.08	930	0.13	1.44	991	0.12
Camphene	3.26*	941	0.03	1.80	1026	0.01
α -Fenchene	3.26*	941	[0.03]	1.73	1020	0.02
Thuja-2,4(10)-diene	3.37	949	0.02	2.40	1085	0.02
β -Pinene	3.69	970	0.01	2.20	1066	0.01
α -Methylstyrene	3.79	977	0.02	5.07	1284	0.02
Δ 3-Carene	4.24	1006	0.03	2.70	1110	0.03
para-Cymene	4.47	1020	0.02	4.25	1226	0.02
Limonene	4.54	1025	0.01	3.32	1156	0.01
γ -Terpinene	5.03	1056	0.01	3.95	1204	0.01
Terpinolene	5.49*	1085	0.02	4.43	1238	0.01
para-Cymenene	5.49*	1085	[0.02]	6.50	1386	0.01
Linalool	5.72	1100	0.01	8.26*	1516	1.21
α -Campholenal	6.05	1121	0.01	7.21	1438	0.01
trans-Pinocarveol	6.22	1133	0.03	9.33	1599	0.03
Camphor	6.28	1136	0.02	7.42*	1453	0.29
meta-Mentha-4,6-dien-8-ol	6.40	1144	0.01	9.54*	1615	0.58
Pinocamphone	6.55	1154	0.01	7.47	1457	0.02
Borneol	6.70	1164	0.02	9.98*	1652	0.93
α -Phellandren-8-ol	6.75	1167	0.01	10.36	1681	0.26
Terpinen-4-ol	6.86	1174	0.03	8.77*†	1556	0.24
meta-Cymen-8-ol	6.95	1180	0.01	11.70	1794	0.01
para-Cymen-8-ol	7.03	1186	0.05	11.80	1803	0.05
α -Terpineol	7.07	1188	0.04	9.94	1648	0.06
Myrtenol	7.16	1194	0.04	11.06	1740	0.04
Verbenone	7.29	1203	0.05	9.82*	1638	0.39
trans-Carveol	7.53	1219	0.01	11.59	1785	0.01
Carvacrol methyl ether	7.92	1246	0.02	8.77*†	1556	[0.24]
Bornyl acetate	8.53	1289	0.01	8.42*	1529	0.68
Brasila-1,10-diene	8.68	1299	0.01	6.23	1366	0.02
Carvacrol	8.82	1309	0.04	15.59	2156	0.03
α -Terpinyl acetate	9.46	1348	0.09	9.89	1644	0.28
African-1-ene	9.49	1350	0.03	7.05	1426	0.02
2-epi- α -Funebrene	9.85*	1376	0.44	7.42*	1453	[0.29]
β -Patchoulene	9.85*	1376	[0.44]	7.15	1433	0.01
α -Duprezianene	9.92	1380	0.50	7.64	1470	0.46
β -Elemene	10.08	1392	0.84	8.61†	1543	1.44
α -Chamipinene	10.14	1396	0.09	8.06	1501	0.10
Unknown [m/z 107, 91 (86), 93 (83), 79 (81), 162 (74), 41 (73), 133 (72)... 204	10.17	1398	0.15	8.42*	1529	[0.68]

(13)]						
α -Cedrene	10.32*	1410	16.22	8.24	1514	14.58
β -Funebrene	10.32*	1410	[16.22]	8.26*	1516	[1.21]
β -Cedrene	10.40*	1416	5.11	8.55	1539	3.82
β -Caryophyllene	10.40*	1416	[5.11]	8.63*†	1545	[1.44]
β -Duprezianene	10.40*	1416	[5.11]	8.42*	1529	[0.68]
<i>cis</i> -Thujopsene	10.60	1430	30.18	8.94	1569	29.89
Isobazzanene	10.64*	1433	0.11	8.77*†	1556	[0.24]
(<i>Z</i>)- β -Farnesene?	10.64*	1433	[0.11]	9.43	1607	0.10
<i>trans</i> - α - Bergamotene	10.68	1436	0.05	8.63*†	1545	[1.44]
Prezizaene	10.74	1441	0.14	8.98	1572	0.11
α -Himachalene	10.78*	1444	0.57	9.12	1582	0.45
7,8-Dehydro- α - acoradiene?	10.78*	1444	[0.57]	9.74	1632	0.09
α -Humulene	10.85*	1449	0.19	9.48	1610	0.05
Cadina-4,11-diene	10.85*	1449	[0.19]	9.36	1602	0.04
α -Acoradiene	10.95	1456	0.20	9.54*	1615	[0.58]
(<i>E</i>)- β -Farnesene	11.00*†	1461	1.00	9.76	1634	0.36
9-epi- β - Caryophyllene	11.00*†	1461	[1.00]	9.54*	1615	[0.58]
β -Acoradiene	11.00*†	1461	[1.00]	9.62*	1622	0.48
Thujopsene isomer	11.04†	1464	[1.00]	9.62*	1622	[0.48]
β -Chamigrene	11.09	1467	0.15	9.82*	1638	[0.39]
Unknown [m/z 118, 69 (82), 91 (51), 117 (40)... 202 (25)]	11.15*	1471	0.54	9.03	1576	0.17
Unknown [m/z 91, 105 (93), 161 (77), 93 (73), 119 (71), 133 (69)... 204 (31)]	11.15*	1471	[0.54]			
Widdra-2,4(14)- diene?	11.17*	1473	0.51	9.98*	1652	[0.93]
γ -Himachalene	11.17*	1473	[0.51]	9.79	1636	0.29
α -Curcumene	11.29*	1482	0.57	10.86	1724	0.22
Unknown [m/z 189, 91 (95), 105 (93), 133 (84), 119 (75), 41 (59), 93 (46)... 204 (33)]	11.29*	1482	[0.57]	10.14	1664	0.28
Pseudowiddrene	11.44*	1493	1.05	10.10	1661	0.68
α -Chamigrene	11.44*	1493	[1.05]	10.24*	1672	1.77
β -Himachalene	11.47	1495	0.37	10.06	1658	0.27
α -Cuprenene	11.50†	1498	3.25	10.24*	1672	[1.77]
Cuparene	11.54†	1501	[3.25]	11.26*	1757	1.36
1,4- Dihydrocuparene	11.62*†	1506	0.89	10.69	1709	0.13
α -Dehydro- α - himachalene	11.62*†	1506	[0.89]	11.74	1798	0.08
α -Alaskene	11.62*†	1506	[0.89]	10.19	1668	0.08
γ -Cadinene	11.66*†	1510	[0.89]	10.59†	1700	0.68
β -Curcumene	11.66*†	1510	[0.89]	10.51	1694	0.21

β-Sesquiphellandrene	11.82*	1522	0.75	10.82*	1720	0.30
δ-Cadinene	11.82*	1522	[0.75]	10.62*†	1703	[0.68]
γ-Dehydro-arhimachalene	11.82*	1522	[0.75]	12.12	1831	0.05
Unknown [m/z 91, 107 (97), 105 (93), 41 (92), 109 (78), 43 (78), 121 (76), 135 (75)... 220 (21)]	11.89*	1528	0.31			
γ-Cuprenene	11.89*	1528	[0.31]	10.82*	1720	[0.30]
(E)-γ-Bisabolene	11.94*	1532	0.17	10.62*†	1703	[0.68]
ar-Himachalene	11.94*	1532	[0.17]	11.87	1809	0.03
δ-Cuprenene epimer I	11.94*	1532	[0.17]	11.17	1749	0.10
δ-Cuprenene epimer II	11.98*	1536	0.20	11.26*	1757	[1.36]
Unknown [m/z 43, 95 (81), 207 (61), 41 (55), 55 (50)... 222 (3)]	11.98*	1536	[0.20]	14.05	2007	0.14
Unknown [m/z 106, 41 (86), 43 (84), 149 (75), 69 (75), 91 (63), 93 (61)... 220 (1)]	12.01	1538	0.17	11.50	1777	0.19
Unknown [m/z 91, 119 (98), 121 (91), 105 (85), 43 (82), 41 (76)... 205 (37), 220 (16)]	12.13	1547	0.06	13.65	1969	0.03
Unknown [m/z 95, 191 (52), 107 (50), 121 (32), 81 (31)...]	12.34	1563	0.11	14.37	2037	0.08
Unknown [m/z 95, 131 (96), 202 (64), 187 (61), 159 (55), 105 (50)...202 (64)]	12.40*	1568	0.11			
Caryophyllenyl alcohol	12.40*	1568	[0.11]	13.88	1990	0.03
Caryophyllene oxide	12.49*	1575	0.05	13.03	1912	0.05
Caryophyllene oxide isomer	12.49*	1575	[0.05]	12.89	1899	0.01
allo-Cedrol	12.57	1582	0.43	14.49*	2049	23.09
α-Cedrol	12.79*†	1599	24.14	14.49*	2049	[23.09]
Widdrol	12.79*†	1599	[24.14]	14.83*	2081	1.88
β-Himachalene oxide	12.83†	1602	[24.14]	13.43	1949	0.01
epi-Cedrol	12.88*	1606	0.42	15.00	2098	0.59
Unknown [m/z 138, 110 (77), 137 (75), 107 (62), 91 (61), 93	12.88*	1606	[0.42]	13.70	1973	0.01

(60), 109 (57)... 220 (34)]						
α-Acorenol	13.10	1625	0.88	14.68	2066	0.83
β-Acorenol	13.16*	1629	0.62	15.07	2105	0.13
Unknown [m/z 105, 93 (78), 95 (75), 131 (72), 119 (71), 132 (70), 91 (67), 120 (49)... 202 (39), 220 (9)]	13.16*	1629	[0.62]	16.09	2207	0.04
Unknown [m/z 132, 175 (22), 119 (18), 91 (18), 157 (18)... 219 (10)]	13.16*	1629	[0.62]	15.83	2180	0.11
Unknown [m/z 132, 91 (24), 119 (22), 105 (21), 133 (17), 117 (16)... 219 (3)]	13.19	1631	0.17			
Himachalol	13.30*	1640	0.76	15.39	2136	0.27
Unknown [m/z 123, 81 (77), 95 (77), 107 (72), 41 (72), 93 (66), 55 (64)... 220? (13)]	13.30*	1640	[0.76]			
Unknown [m/z 41, 91 (96), 79 (88), 69 (82), 123 (80), 93 (80)... 220 (8)]	13.33	1644	0.21	17.61*	2366	0.43
Unknown [m/z 43, 81 (84), 41 (64), 67 (62), 95 (58), 79 (58)... 204 (48), 220 (2)]	13.39	1648	0.20	15.69	2166	0.16
Cedrenol analog	13.46*	1654	0.35	16.69	2268	0.13
14-Hydroxy-9-epi-(E)-caryophyllene	13.46*	1654	[0.35]	16.64	2263	0.18
Cedr-8-en-13-ol	13.72	1676	0.20	17.08	2310	0.15
α-Bisabolol	13.80	1682	0.32	15.62	2159	0.39
α-Cedrenol	13.84	1686	0.18	17.28	2331	0.14
Unknown [m/z 91, 105 (87), 123 (74), 135 (70), 107 (60), 79 (59)... 220 (13)]	13.96*	1695	0.48			
Mayurone?	13.96*	1695	[0.48]	17.34	2338	0.03
Thujopsenal	14.00*	1699	0.25	16.04	2201	0.23
Unknown [m/z 105, 69 (77), 91 (66), 119 (65), 111 (56), 107 (45), 55 (45)... 220? (2)]	14.00*	1699	[0.25]	17.73	2379	0.01
Thujopsenal analog	14.33	1727	0.03	17.66	2372	0.04
Unknown [m/z 105, 91 (83), 79 (78), 135	14.48	1740	0.10			

(67), 107 (56), 67 (53)... 220 (9)]						
Cuparenal	14.55	1746	0.04			
Unknown [m/z 105, 69 (79), 111 (66), 119 (60), 91 (50), 55 (41)... 203 (11), 220 (1)]	14.58	1749	0.03			
Cedryl acetate?	14.66	1756	0.27	14.83*	2081	[1.88]
Unknown [m/z 91, 105 (74), 93 (67), 79 (59), 133 (54), 41 (47), 107 (46)...]	14.69	1758	0.06	18.61	2477	0.07
Unknown [m/z 148, 141 (99), 91 (74), 105 (52), 41 (42), 121 (42), 133 (37)... 218 (32)]	15.01*	1786	0.14	20.01	2641	0.08
Unknown [m/z 189, 91 (48), 133 (40), 105 (40), 41 (34), 187 (34)... 220 (5)]	15.01*	1786	[0.14]	18.87	2507	0.01
Unknown [m/z 121, 136 (53), 91 (22), 93 (19), 79 (15), 105 (13)... 220 (3)]	15.07	1792	0.15	18.77	2496	0.15
Nootkatone analog	15.26	1808	0.03	18.16	2427	0.04
Manool	17.80	2047	0.04	19.55	2585	0.04
7,13-Abietadiene	18.02	2068	0.02	17.61*	2366	[0.43]
Total identified		94.99%			92.37%	
Total reported		96.43%			93.93%	

*: 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

Note: no correction factor was applied

R.T.: Retention time (minutes)

R.I.: Retention index