

GC/MS BATCH NUMBER: CB7102

ESSENTIAL OIL: COPAIBA OLEORESIN ORGANIC

BOTANICAL NAME: COPAIFERA OFFICINALIS

ORIGIN: BRAZIL

KEY CONSTITUENTS PRESENT IN THIS BATCH OF COPAIBA OLEORESIN ORGANIC OIL	%
β -CARYOPHYLLENE	44.6
GERMACRENE D	6.2
α -HUMULENE	6.1
α -COPAENE	4.6
trans- α -BERGAMOTENE + β -HUMULENE	4.4
COPAIFERA DITERPENIC ACID I	3.9
γ -CADINENE	3.0
ZONARENE + δ -CADINENE	2.7
γ -MUUROLENE	1.7
β -BISABOLENE + β -CURCUMENE	1.6
COPAIFERA DITERPENIC acid IV	1.5
β -SELINENE + trans-MUUROLA-4(15),5-DIENE	1.5
GERMACRENE B	1.2
COPAIFERA DITERPENIC ACID VII	1.0

Comments from Robert Tisserand: Balsamic odor reminiscent of warm lemon bread. Constituents are in expected amounts.

Date : July 24, 2018

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 18G23-PTH1-1-CC

Customer identification : Copaiba Oleoresin Organic - Brazil - CB710276R

Type : Resin

Source : *Copaifera officinalis*

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 : Sarah-Eve Tremblay, M. Sc. A., Chimiste

Analysis date : July 24, 2018

Checked and approved by :

Sylvain Mercier, M. Sc., chimiste 2014-005

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PHYSICOCHEMICAL DATA

Physical aspect: Light yellow viscous liquid

Refractive index: 1.5050 ± 0.0003 (20 °C)

CONCLUSION

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

ANALYSIS SUMMARY

Identification	DB-5 (%)	DB-WAX (%)	Classe
Myrcene	tr	tr	Monoterpene
(2E,4E)-3,7-Dimethylocta-2,4-diene?	0.01	0.01	Monoterpene
(Z)- β -Ocimene	0.10	0.10	Monoterpene
(E)- β -Ocimene	0.01	0.01	Monoterpene
γ -Terpinene	tr	tr	Monoterpene
allo-Ocimene	0.02	0.02	Monoterpene
(3E,5E)-2,6-Dimethylocta-3,5,7-trien-2-ol	tr	0.01	Monoterpenic alcohol
δ -Elemene	0.25*	0.23*	Sesquiterpene
δ -Elemene isomer	[0.25]*	0.61*	Sesquiterpene
α -Cubebene	0.62	[0.61]*	Sesquiterpene
Cyclosativene I	0.01	0.01	Sesquiterpene
Cyclosativene II	0.02	[0.23]*	Sesquiterpene
α -Ylangene	0.06	0.08	Sesquiterpene
α -Copaene	4.60	4.56	Sesquiterpene
7-epi-Sesquithujene?	0.02*	0.47*	Sesquiterpene
<i>cis</i> - β -Elemene	[0.02]*	0.04	Sesquiterpene
β -Cubebene	1.74	[0.47]*	Sesquiterpene
β -Elemene	[1.74]*	49.48*	Sesquiterpene
Cyperene	[1.74]*	tr	Sesquiterpene
Sesquithujene	0.04*	0.01	Sesquiterpene
α -Cedrene	[0.04]*	tr	Sesquiterpene
α -Gurjunene	[0.04]*	0.04	Sesquiterpene
β -Caryophyllene	44.68*	[49.48]*	Sesquiterpene
β -Ylangene	[44.68]*	0.07	Sesquiterpene
β -Copaene	0.14	0.14	Sesquiterpene
γ -Elemene	0.22	0.21	Sesquiterpene
<i>trans</i> - α -Bergamotene	4.51*	[49.48]*	Sesquiterpene
Aromadendrene	[4.51]*	0.10	Sesquiterpene
β -Humulene	[4.51]*	[0.47]*	Sesquiterpene
Sesquisabinene A	0.30*	0.27	Sesquiterpene
epi- β -Santalene	[0.30]*	0.02	Sesquiterpene
α -Humulene	6.07	6.07*	Sesquiterpene
allo-Aromadendrene	0.42*	0.47	Sesquiterpene
<i>cis</i> -Muurolo-4(15),5-diene	[0.42]*	[6.07]*	Sesquiterpene
(E)- β -Farnesene	0.27	0.22	Sesquiterpene
<i>trans</i> -Cadina-1(6),4-diene	0.21	0.06	Sesquiterpene
Germacrene D	7.69*	6.15*	Sesquiterpene
γ -Muurolole	[7.69]*	1.70*	Sesquiterpene
β -Selinene	1.71*	1.48*	Sesquiterpene
ar-Curcumene	[1.71]*	0.26*	Sesquiterpene
<i>trans</i> -Muurolo-4(15),5-diene	[1.71]*	[1.48]*	Sesquiterpene
γ -Amorphene	0.09	[6.15]*	Sesquiterpene
Viridiflorene	1.64*	[1.70]*	Sesquiterpene
α -Selinene	[1.64]*	0.95	Sesquiterpene
Bicyclogermacrene	[1.64]*	0.89*	Sesquiterpene
epi-Cubebol	[1.64]*	0.06	Sesquiterpenic alcohol
Caparratriene	0.09	0.10	Sesquiterpene

α-Muurolene	0.44	[0.89]*	Sesquiterpene
γ-Cadinene	2.31*	2.97	Sesquiterpene
β-Bisabolene	[2.31]*	1.64*	Sesquiterpene
Cubebol	[2.31]*	0.02	Sesquiterpenic alcohol
β-Curcumene	[2.31]*	[1.64]*	Sesquiterpene
(3E,6E)-α-Farnesene	[2.31]	0.06	Sesquiterpene
Zonarene	2.79*	[2.97]*	Sesquiterpene
δ-Cadinene	[2.79]*	[2.97]	Sesquiterpene
β-Sesquiphellandrene	[2.79]*	0.10*	Sesquiterpene
trans-Cadina-1,4-diene	0.19*	[0.26]*	Sesquiterpene
(E)-γ-Bisabolene	[0.19]*	[2.97]*	Sesquiterpene
α-Cadinene	0.12	0.10	Sesquiterpene
Selina-3,7(11)-diene	0.03	[0.10]*	Sesquiterpene
α-Calacorene	0.06	0.19	Sesquiterpene
(E)-α-Bisabolene	0.18*	0.16	Sesquiterpene
Isocaryophyllene epoxide B	[0.18]*	0.01	Sesquiterpenic ether
Germacrene B	1.19	1.19	Sesquiterpene
Maaliol	0.08	0.08	Sesquiterpenic alcohol
Caryophyllenyl alcohol	0.30	0.71*	Sesquiterpenic alcohol
Spathulenol	0.04	0.15	Sesquiterpenic alcohol
Caryophyllene oxide	0.25*	0.20	Sesquiterpenic ether
Caryophyllene oxide isomer	[0.25]*	0.07	Sesquiterpenic ether
Globulol	0.07	0.06	Sesquiterpenic alcohol
Viridiflorol	0.07	0.07	Sesquiterpenic alcohol
Humulene epoxide I	0.04	0.02	Sesquiterpenic ether
Ledol	0.14	0.09	Sesquiterpenic alcohol
Junenol	0.63*	[0.71]*	Sesquiterpenic alcohol
10-epi-Cubenol	[0.63]*		Sesquiterpenic alcohol
Unknown	[0.63]*	0.11	Oxygenated sesquiterpene
Rosifoliol	0.03	0.03	Sesquiterpenic alcohol
1-epi-Cubenol	0.14	0.09	Sesquiterpenic alcohol
Caryophylladienol II	0.04	0.22*	Sesquiterpenic alcohol
τ-Cadinol	0.62*	0.18	Sesquiterpenic alcohol
τ-Muurolol	[0.62]*	0.31	Sesquiterpenic alcohol
Isospathulenol	[0.62]*	0.44*	Sesquiterpenic alcohol
α-Muurolol	0.40	0.35*	Sesquiterpenic alcohol
Unknown	0.09	[0.35]*	Sesquiterpenic alcohol
Selin-11-en-4α-ol	0.51*	0.08	Sesquiterpenic alcohol
α-Cadinol	[0.51]*	[0.44]*	Sesquiterpenic alcohol
cis-Calamenen-10-ol	0.02	0.02	Sesquiterpenic alcohol
trans-Calamenen-10-ol	0.02	0.01	Sesquiterpenic alcohol
Cadalene	0.09*	0.03	Sesquiterpene
(3Z)-Caryophylla-3,8(13)-dien-5β-ol	[0.09]*	0.03	Sesquiterpenic alcohol
epi-α-Bisabolol	0.04*	[0.44]*	Sesquiterpenic alcohol
Germacra-4(15),5,10(14)-trien-1α-ol	[0.04]*	[0.22]*	Sesquiterpenic alcohol
α-Bisabolol	0.03	0.03	Sesquiterpenic alcohol
Juniper camphor	0.18	[0.22]*	Sesquiterpenic alcohol
Methyl (E,E)-farnesate?	tr		Sesquiterpenic ester
Unknown	0.01	0.01	Oxygenated diterpene
Unknown	0.04	0.02	Diterpene
Unknown	0.02	0.02	Oxygenated diterpene
Unknown	0.02		Oxygenated diterpene

Palmitic acid	0.03	0.03	Aliphatic acid
Unknown	tr	tr	Oxygenated diterpene
<i>cis</i> -3,14-Clerodadien-13-ol	0.02	0.03	Diterpenic alcohol
Unknown	0.01	0.01	Oxygenated diterpene
Manool	0.19	0.20	Diterpenic alcohol
Kolavelool	0.04	0.05	Diterpenic alcohol
Linoleic acid	0.04		Aliphatic acid
Oleic acid	0.04		Aliphatic acid
3 α -Hydroxymanool	tr		Diterpenic alcohol
Copalol	0.26		Diterpenic alcohol
Kolavenol	0.13		Diterpenic alcohol
Methyl copalate?	0.15		Diterpenic ester
Copaifera diterpenic acid I	3.90	4.57	Diterpenic acid
Methyl kolavenate	0.13		Diterpenic ester
Copaifera diterpenic acid II	0.26	0.16	Diterpenic acid
Kolavenyl acetate?	0.09		Diterpenic ester
Methyl hardwickiiate?	0.10		Diterpenic ester
Copaifera diterpenic acid III	0.19		Diterpenic acid
Copaifera diterpenic acid IV	1.48	1.28	Diterpenic acid
Copaifera diterpenic acid V	0.32		Diterpenic acid
Copaifera diterpenic acid VI	0.49		Diterpenic acid
Copaifera diterpenic acid VII	1.01		Diterpenic acid
Copaifera diterpenic acid VIII	0.29		Diterpenic acid
Total identified	95.76%	90.94%	

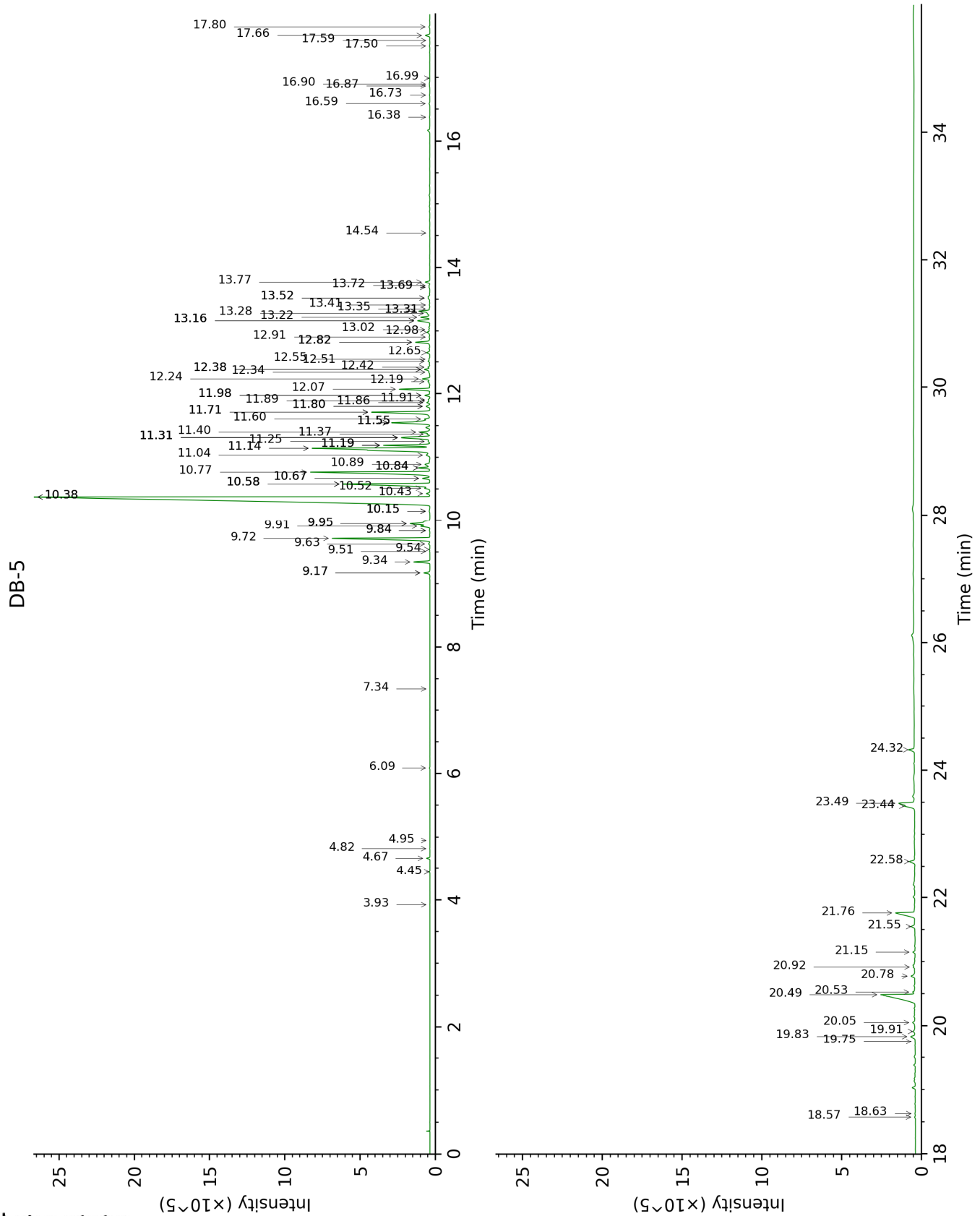
*: Two or more compounds are coeluting on this column

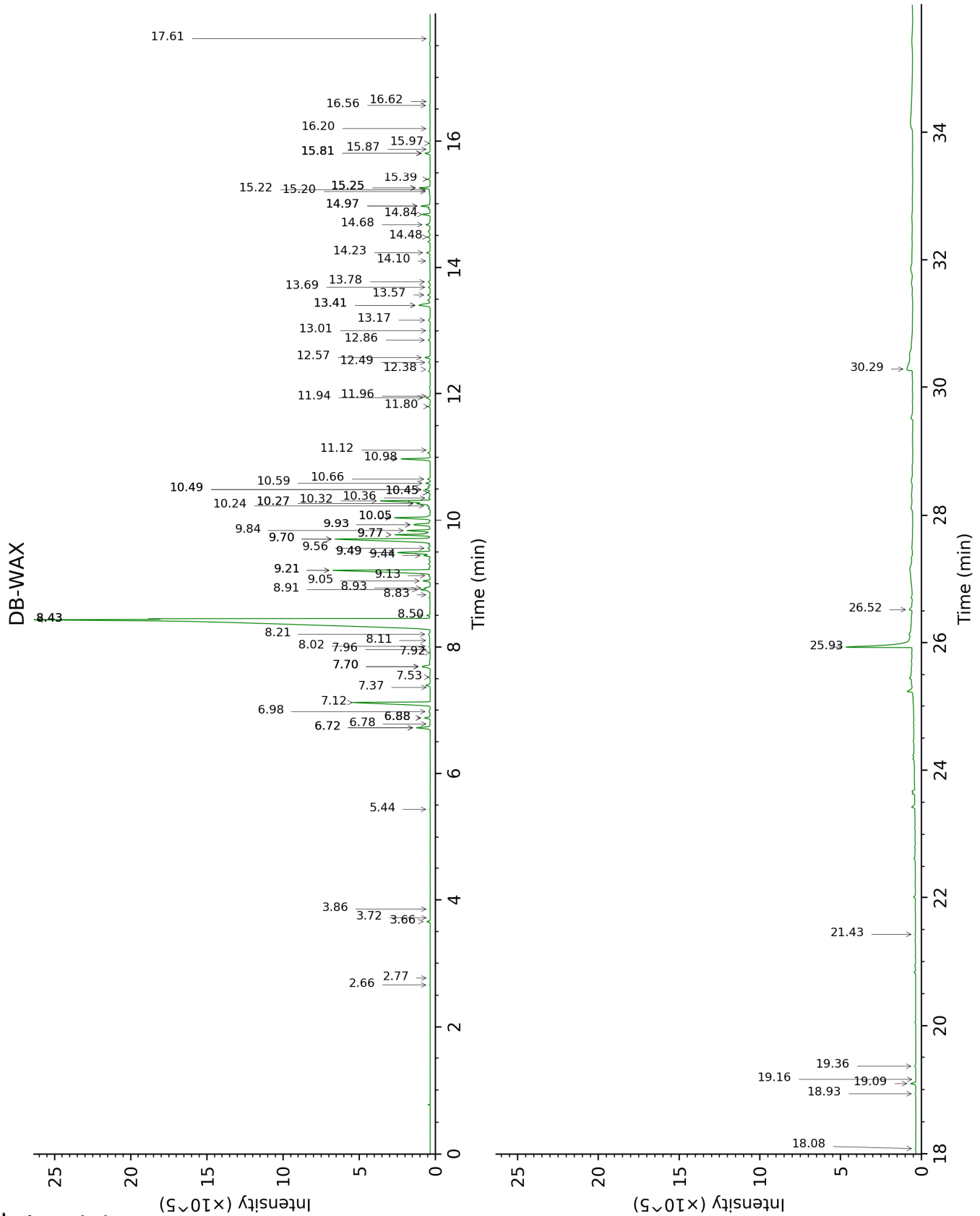
[xx]: Duplicate percentage due to coelutions, not taken account in the identified total

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

Note: no correction factor was applied

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FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Myrcene	3.93	992	tr	2.77	1135	tr
(2E,4E)-3,7-Dimethylocta-2,4-diene?	4.44	1025	0.01	2.66	1127	0.01
(Z)- β -Ocimene	4.67	1040	0.10	3.66	1205	0.10
(E)- β -Ocimene	4.82	1049	0.01	3.86	1219	0.01
γ -Terpinene	4.95	1057	tr	3.72	1209	tr
allo-Ocimene	6.09	1130	0.02	5.44	1334	0.02
(3E,5E)-2,6-Dimethylocta-3,5,7-trien-2-ol	7.34	1211	tr	11.12	1778	0.01
δ -Elemene	9.17*	1335	0.25	6.88*	1439	0.23
δ -Elemene isomer	9.17*	1335	[0.25]	6.72*	1427	0.61
α -Cubebene	9.34	1348	0.62	6.72*	1427	[0.61]
Cyclosativene I	9.51	1359	0.01	6.78	1432	0.01
Cyclosativene II	9.54	1362	0.02	6.88*	1439	[0.23]
α -Ylangene	9.63	1368	0.06	6.98	1446	0.08
α -Copaene	9.72	1374	4.60	7.12	1457	4.56
7-epi-Sesquithujene?	9.84*	1383	0.02	7.70*	1500	0.47
<i>cis</i> - β -Elemene	9.84*	1383	[0.02]	8.11	1532	0.04
β -Cubebene	9.91†	1388	1.74	7.70*	1500	[0.47]
β -Elemene	9.95*†	1390	[1.74]	8.43*	1558	49.48
Cyperene	9.95*†	1390	[1.74]	7.37	1476	tr
Sesquithujene	10.15*	1405	0.04	7.96	1521	0.01
α -Cedrene	10.15*	1405	[0.04]	7.92	1517	tr
α -Gurjunene	10.15*	1405	[0.04]	7.53	1488	0.04
β -Caryophyllene	10.38*	1422	44.68	8.43*	1558	[49.48]
β -Ylangene	10.38*	1422	[44.68]	8.02	1525	0.07
β -Copaene	10.43	1426	0.14	8.20	1540	0.14
γ -Elemene	10.52	1432	0.22	8.93	1597	0.21
<i>trans</i> - α -Bergamotene	10.58*	1437	4.51	8.43*	1558	[49.48]
Aromadendrene	10.58*	1437	[4.51]	8.50	1563	0.10
β -Humulene	10.58*	1437	[4.51]	7.70*	1500	[0.47]
Sesquisabinene A	10.67*	1444	0.30	9.05	1606	0.27
epi- β -Santalene	10.67*	1444	[0.30]	8.83	1588	0.02
α -Humulene	10.77	1451	6.07	9.21*	1619	6.07
allo-Aromadendrene	10.84*	1456	0.42	8.91	1595	0.47
<i>cis</i> -Muurolo-4(15),5-diene	10.84*	1456	[0.42]	9.21*	1619	[6.07]
(E)- β -Farnesene	10.89	1460	0.27	9.44	1638	0.22
<i>trans</i> -Cadina-1(6),4-diene	11.04	1471	0.21	9.13	1612	0.06
Germacrene D	11.14*	1479	7.69	9.70*	1659	6.15
γ -Muurolole	11.14*	1479	[7.69]	9.49*	1642	1.70
β -Selinene	11.19*	1482	1.71	9.77*	1665	1.48

ar-Curcumene	11.19*	1482	[1.71]	10.49*	1725	0.26
trans-Muuro-la-4(15),5-diene	11.19*	1482	[1.71]	9.77*	1665	[1.48]
γ-Amorphene	11.25	1487	0.09	9.70*	1659	[6.15]
Viridiflorene	11.31*	1492	1.64	9.49*	1642	[1.70]
α-Selinene	11.31*	1492	[1.64]	9.84	1670	0.95
Bicyclogermacrene	11.31*	1492	[1.64]	9.93*	1678	0.89
epi-Cubebol	11.31*	1492	[1.64]	11.80	1838	0.06
Caparratriene	11.37	1496	0.09	9.56	1648	0.10
α-Muurolene	11.40	1498	0.44	9.93*	1678	[0.89]
γ-Cadinene	11.55*†	1509	2.31	10.24†	1703	2.97
β-Bisabolene	11.55*†	1509	[2.31]	10.05*	1688	1.64
Cubebol	11.55*†	1509	[2.31]	12.38	1890	0.02
β-Curcumene	11.55*†	1509	[2.31]	10.05*	1688	[1.64]
(3E,6E)-α-Farnesene	11.60†	1514	[2.31]	10.36	1713	0.06
Zonarene	11.71*	1522	2.79	10.27*†	1706	[2.97]
δ-Cadinene	11.71*	1522	[2.79]	10.32†	1710	[2.97]
β-Sesquiphellandrene	11.71*	1522	[2.79]	10.45*	1721	0.10
trans-Cadina-1,4-diene	11.80*	1530	0.19	10.49*	1725	[0.26]
(E)-γ-Bisabolene	11.80*	1530	[0.19]	10.27*†	1706	[2.97]
α-Cadinene	11.86	1534	0.12	10.66	1739	0.10
Selina-3,7(11)-diene	11.89	1536	0.03	10.45*	1721	[0.10]
α-Calacorene	11.91	1538	0.06	11.94	1850	0.19
(E)-α-Bisabolene	11.98*	1543	0.18	10.59	1733	0.16
Isocaryophyllene epoxide B	11.98*	1543	[0.18]	11.96	1853	0.01
Germacrene B	12.07	1551	1.19	10.98	1766	1.19
Maaliol	12.19	1560	0.08	12.86	1934	0.08
Caryophyllenyl alcohol	12.24	1564	0.30	13.41*	1985	0.71
Spathulenol	12.34	1572	0.04	14.23	2064	0.15
Caryophyllene oxide	12.38*	1576	0.25	12.57	1907	0.20
Caryophyllene oxide isomer	12.38*	1576	[0.25]	12.50	1900	0.07
Globulol	12.42	1578	0.07	13.69	2011	0.06
Viridiflorol	12.51	1586	0.07	13.78	2020	0.07
Humulene epoxide I	12.55	1588	0.04	13.01	1947	0.02
Ledol	12.65	1596	0.14	13.17	1963	0.09
Junenol	12.82*	1610	0.63	13.41*	1985	[0.71]
10-epi-Cubenol	12.82*	1610	[0.63]			
Unknown [m/z 179, 161 (66), 119 (44), 95 (38), 105 (35)... 204 (24), 222 (1)]	12.82*	1610	[0.63]	14.48	2088	0.11
Rosifoliol	12.91	1617	0.03	14.10	2052	0.03
1-epi-Cubenol	12.98	1623	0.14	13.57	2000	0.09
Caryophylladienol II	13.02	1627	0.04	15.81*	2222	0.22
τ-Cadinol	13.16*	1638	0.62	14.68	2107	0.18

τ-Muurolol	13.16*	1638	[0.62]	14.84	2123	0.31
Isospathulenol	13.16*	1638	[0.62]	15.25*	2166	0.44
α-Muurolol	13.22	1643	0.40	14.97*	2137	0.35
Unknown cadinol analog II [m/z 95, 121 (73), 43 (57), 79 (43), 161 (43), 109 (40)... 204 (35), 222 (2)]	13.28	1648	0.09	14.97*	2137	[0.35]
Selin-11-en-4α-ol	13.31*	1651	0.51	15.39	2179	0.08
α-Cadinol	13.31*	1651	[0.51]	15.25*	2166	[0.44]
cis-Calamenen-10-ol	13.35	1654	0.02	16.20	2263	0.02
trans-Calamenen-10-ol	13.41	1659	0.02	16.62	2308	0.01
Cadalene	13.52*	1668	0.09	15.20	2160	0.03
(3Z)-Caryophylla-3,8(13)-dien-5β-ol	13.52*	1668	[0.09]	16.56	2302	0.03
epi-α-Bisabolol	13.69*	1682	0.04	15.25*	2166	[0.44]
Germacra-4(15),5,10(14)-trien-1α-ol	13.69*	1682	[0.04]	15.81*	2222	[0.22]
α-Bisabolol	13.72	1684	0.03	15.22	2162	0.03
Juniper camphor	13.77	1689	0.18	15.81*	2222	[0.22]
Methyl (E,E)-farnesate?	14.54	1755	tr			
Unknown [m/z 43, 95 (66), 81 (63), 137 (61), 41 (53), 107 (47)... 262 (6)...]	16.38	1921	0.01	17.61	2416	0.01
Unknown [m/z 95, 105 (79), 107 (75), 189 (68), 41 (64), 81 (61)... 257 (12), 272 (2)]	16.59	1941	0.04	15.97	2239	0.02
Unknown [m/z 43, 95 (98), 107 (84), 93 (55), 121 (53)... 262 (7)...]	16.72	1954	0.02	18.08	2469	0.02
Unknown [m/z 95, 107 (61), 191 (46), 121 (45)...]	16.87	1968	0.02			
Palmitic acid	16.90	1971	0.03	21.43	2876	0.03
Unknown [m/z 95, 107 (27), 81 (19), 191 (17), 55 (16)... 275 (1)...]	16.99	1980	tr	15.87	2229	tr
cis-3,14-Clerodadien-13-ol	17.50	2029	0.02	18.94	2568	0.03
Unknown [m/z 95, 191 (43), 71 (27), 55 (27)...]	17.58	2038	0.01	19.16	2594	0.01

Manool	17.66	2046	0.19	19.09	2586	0.20
Kolavelool	17.80	2059	0.04	19.36	2618	0.05
Linoleic acid	18.57	2138	0.04			
Oleic acid	18.63	2143	0.04			
3 α -Hydroxymanool	19.75	2262	tr			
Copalol	19.83	2271	0.26			
Kolavenol	19.91	2280	0.13			
Methyl copalate?	20.05	2295	0.15			
Copaifera diterpenic acid I	20.49	2343	3.90	25.93	3517	4.57
Methyl kolavenate	20.53	2348	0.13			
Copaifera diterpenic acid II	20.78	2376	0.26	26.52	3602	0.16
Kolavenyl acetate?	20.92	2392	0.09			
Methyl hardwickiiate?	21.15	2419	0.10			
Copaifera diterpenic acid III	21.55	2465	0.19			
Copaifera diterpenic acid IV	21.76	2490	1.48	30.28	3958	1.28
Copaifera diterpenic acid V	22.58	2588	0.32			
Copaifera diterpenic acid VI	23.44	2696	0.49			
Copaifera diterpenic acid VII	23.49	2702	1.01			
Copaifera diterpenic acid VIII	24.32	2811	0.29			
Total identified		95.76%			90.94%	
Total reported		95.94%			91.10%	

*: 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