

GC/MS BATCH NUMBER: CJ0105

ESSENTIAL OIL: COPAIBA OLEORESIN
BOTANICAL NAME: COPAIFERA OFFICINALIS
ORIGIN: BRAZIL

KEY CONSTITUENTS PRESENT IN THIS BATCH OF COPAIBA OLEORESIN OIL	%
β -CARYOPHYLLENE	42.6
GERMACRENE D	7.4
α -HUMULENE	5.7
α -COPAENE	5.3
COPAIFERA DITERPENIC ACID I	3.7
COPAIFERA DITERPENIC ACID IV	2.5
β -BISABOLENE	2.5

Comments from Robert Tisserand: Fine, sophisticated odor note, reminiscent of freshly-cut wood. Contains 42% beta-caryophyllene.

Date : August 07, 2018

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 18H03-PTH3-1-CC

Customer identification : Copaiba Balsam - Brazil - CJ010576R

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 : August 06, 2018

Checked and approved by :

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

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PHYSICOCHEMICAL DATA

Physical aspect: Light orange viscous liquid

Refractive index: 1.5073 ± 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	0.12	0.12	Monoterpene
(E)- β -Ocimene	0.01	0.01	Monoterpene
allo-Ocimene	0.01	0.01	Monoterpene
δ -Elemene isomer	0.01	0.01	Sesquiterpene
δ -Elemene	0.53	0.49	Sesquiterpene
α -Cubebene	0.72	0.67	Sesquiterpene
Cyclosativene I	0.01	0.02	Sesquiterpene
Cyclosativene II	0.02	0.01	Sesquiterpene
α -Ylangene	0.08	0.09	Sesquiterpene
α -Copaene	5.30	4.96	Sesquiterpene
<i>cis</i> - β -Elemene	tr	0.14*	Sesquiterpene
7-epi-Sesquithujene?	0.02	0.56*	Sesquiterpene
β -Cubebene	0.59	[0.56]*	Sesquiterpene
β -Elemene	0.70	44.69*	Sesquiterpene
Cyperene	0.31	0.28	Sesquiterpene
α -Gurjunene	0.01	0.01	Sesquiterpene
α -Cedrene	0.04*	0.06	Sesquiterpene
Sesquithujene	[0.04]*	tr	Sesquiterpene
β -Caryophyllene	42.62*	[44.69]*	Sesquiterpene
β -Ylangene	[42.62]*	0.06	Sesquiterpene
β -Copaene	0.12	[0.14]*	Sesquiterpene
γ -Elemene	0.08	0.08	Sesquiterpene
β -Humulene	4.73*	[0.56]*	Sesquiterpene
Aromadendrene	[4.73]*	0.08	Sesquiterpene
<i>trans</i> - α -Bergamotene	[4.73]*	[44.69]*	Sesquiterpene
epi- β -Santalene	0.28*	0.02	Sesquiterpene
Sesquisabinene A	[0.28]*	0.26	Sesquiterpene
α -Humulene	5.71	5.43	Sesquiterpene
allo-Aromadendrene	0.46*	0.42	Sesquiterpene
<i>cis</i> -Muurolo-4(15),5-diene	[0.46]*	0.06	Sesquiterpene
(E)- β -Farnesene	0.35	1.84	Sesquiterpene
<i>trans</i> -Cadina-1(6),4-diene	0.20*	0.06	Sesquiterpene
γ -Muurolene	[0.20]*	[1.84]*	Sesquiterpene
Germacrene D	8.17*	6.30*	Sesquiterpene
β -Selinene	[8.17]*	0.76	Sesquiterpene
<i>trans</i> -Muurolo-4(15),5-diene	1.06*	[6.30]*	Sesquiterpene
ar-Curcumene	[1.06]*	0.32*	Sesquiterpene
γ -Amorphene	0.09*	0.03	Sesquiterpene
δ -Selinene	[0.09]*	[1.84]*	Sesquiterpene
epi-Cubebol	1.18*	0.06	Sesquiterpenic alcohol
α -Selinene	[1.18]*	0.48*	Sesquiterpene
Viridiflorene	[1.18]*	[1.84]*	Sesquiterpene
Bicyclogermacrene	[1.18]*	0.78	Sesquiterpene
Caparratriene	0.10	0.09	Sesquiterpene
α -Muurolene	0.39	[0.48]*	Sesquiterpene
γ -Cadinene	2.87*	[2.73]*	Sesquiterpene

Cubebol	[2.87]*	0.06	Sesquiterpenic alcohol
β -Bisabolene	[2.87]*	2.46	Sesquiterpene
(3E,6E)- α -Farnesene	0.22*	0.07	Sesquiterpene
β -Curcumene	[0.22]*	[2.46]	Sesquiterpene
<i>trans</i> -Calamenene	2.74*	0.46*	Sesquiterpene
δ -Cadinene	[2.74]*	[2.73]	Sesquiterpene
Zonarene	[2.74]*	[2.73]*	Sesquiterpene
β -Sesquiphellandrene	[2.74]*	0.04*	Sesquiterpene
(E)- γ -Bisabolene	0.17*	2.73	Sesquiterpene
<i>trans</i> -Cadina-1,4-diene	[0.17]*	[0.32]*	Sesquiterpene
α -Cadinene	0.10	0.25	Sesquiterpene
α -Calacorene	0.06*	0.05	Sesquiterpene
Selina-3,7(11)-diene	[0.06]*	[0.04]*	Sesquiterpene
(E)- α -Bisabolene	0.29*	0.09	Sesquiterpene
Isocaryophyllene epoxide B	[0.29]*	0.04	Sesquiterpenic ether
Germacrene B	0.49	[0.46]*	Sesquiterpene
Maaliol	0.09	0.07	Sesquiterpenic alcohol
β -Calacorene	0.24*	0.01	Sesquiterpene
Caryophyllenyl alcohol	[0.24]*	0.58*	Sesquiterpenic alcohol
Spathulenol	0.04	0.03	Sesquiterpenic alcohol
Caryophyllene oxide isomer	0.12*	0.03	Sesquiterpenic ether
10-epi-Junenol	[0.12]*	tr	Sesquiterpenic alcohol
Caryophyllene oxide	[0.12]*	0.09	Sesquiterpenic ether
Globulol	0.06	0.08	Sesquiterpenic alcohol
Viridiflorol	0.06	0.06	Sesquiterpenic alcohol
Ledol	0.12	0.08	Sesquiterpenic alcohol
Humulene epoxide II	0.02	0.02	Sesquiterpenic ether
Junenol	0.55*	[0.58]*	Sesquiterpenic alcohol
10-epi-Cubebol	[0.55]*	0.05	Sesquiterpenic alcohol
Unknown	[0.55]*	0.02	Oxygenated sesquiterpene
Rosifoliol	0.02	0.02	Sesquiterpenic alcohol
1-epi-Cubebol	0.11	0.12	Sesquiterpenic alcohol
Caryophylladienol II	0.01	tr	Sesquiterpenic alcohol
τ -Cadinol	0.46*	0.16	Sesquiterpenic alcohol
τ -Muurolol	[0.46]*	0.22	Sesquiterpenic alcohol
α -Muurolol	0.34	0.30	Sesquiterpenic alcohol
Unknown	0.09	0.09	Oxygenated sesquiterpene
Unknown	0.07	0.06	Sesquiterpenic alcohol
α -Cadinol	0.35*	0.04	Sesquiterpenic alcohol
Selin-11-en-4 α -ol	[0.35]*	0.32	Sesquiterpenic alcohol
<i>cis</i> -Calamenen-10-ol	0.04	0.02	Sesquiterpenic alcohol
<i>trans</i> -Calamenen-10-ol	0.02	tr	Sesquiterpenic alcohol
(3Z)-Caryophylla-3,8(13)-dien-5 β -ol	0.01	0.02	Sesquiterpenic alcohol
Cadalene	0.07	0.09	Sesquiterpene
epi- α -Bisabolol	0.05*	0.03	Sesquiterpenic alcohol
Germacra-4(15),5,10(14)-trien-1 α -ol	[0.05]*	0.01	Sesquiterpenic alcohol
α -Bisabolol	0.03	0.02	Sesquiterpenic alcohol
Juniper camphor	0.05		Sesquiterpenic alcohol
Methyl (E,E)-farnesate?	0.01		Sesquiterpenic ester
Unknown	0.04	0.07	Oxygenated diterpene
Unknown	0.13	0.07*	Diterpene
Unknown	0.08		Oxygenated diterpene

Unknown	0.17	0.21*	Oxygenated diterpene
Palmitic acid	0.16	0.20	Aliphatic acid
Unknown	0.02	[0.07]*	Oxygenated diterpene
<i>cis</i> -3,14-Clerodadien-13-ol	0.10	0.08	Diterpenic alcohol
Unknown	0.03	0.03	Oxygenated diterpene
Manool	0.20	[0.21]*	Diterpenic alcohol
Kolavelool	0.52	0.50	Diterpenic alcohol
Linoleic acid	0.01		Aliphatic acid
Oleic acid	0.02		Aliphatic acid
3 α -Hydroxymanool	0.02		Diterpenic alcohol
Copalol	1.07		Diterpenic alcohol
Kolavenol	0.44		Diterpenic alcohol
Methyl copalate?	0.02		Diterpenic ester
Copaifera diterpenic acid I	3.69	4.71	Diterpenic acid
Methyl kolavenate	0.59		Diterpenic ester
Copaifera diterpenic acid II	0.91	0.92	Diterpenic acid
Kolavenyl acetate?	0.09		Diterpenic ester
Methyl hardwickiiate?	0.24		Diterpenic ester
Copaifera diterpenic acid III	0.21		Diterpenic acid
Copaifera diterpenic acid IV	2.49	1.60	Diterpenic acid
Copaifera diterpenic acid V	0.14		Diterpenic acid
Copaifera diterpenic acid VI	0.55		Diterpenic acid
Copaifera diterpenic acid VII	0.05		Diterpenic acid
Copaifera diterpenic acid VIII	0.03		Diterpenic acid
Total identified	95.40%	86.31%	

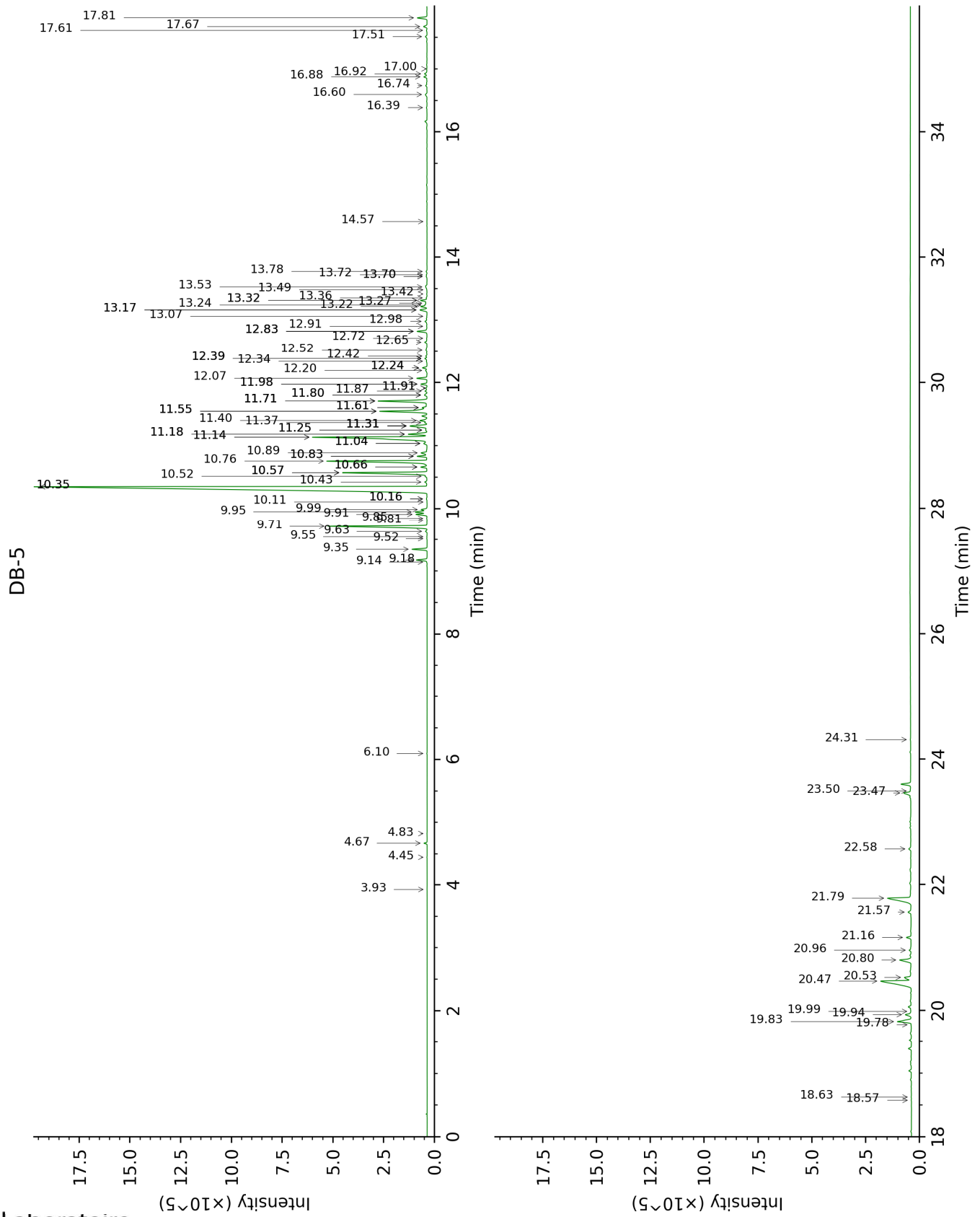
*: Two or more compounds are coeluting on this column

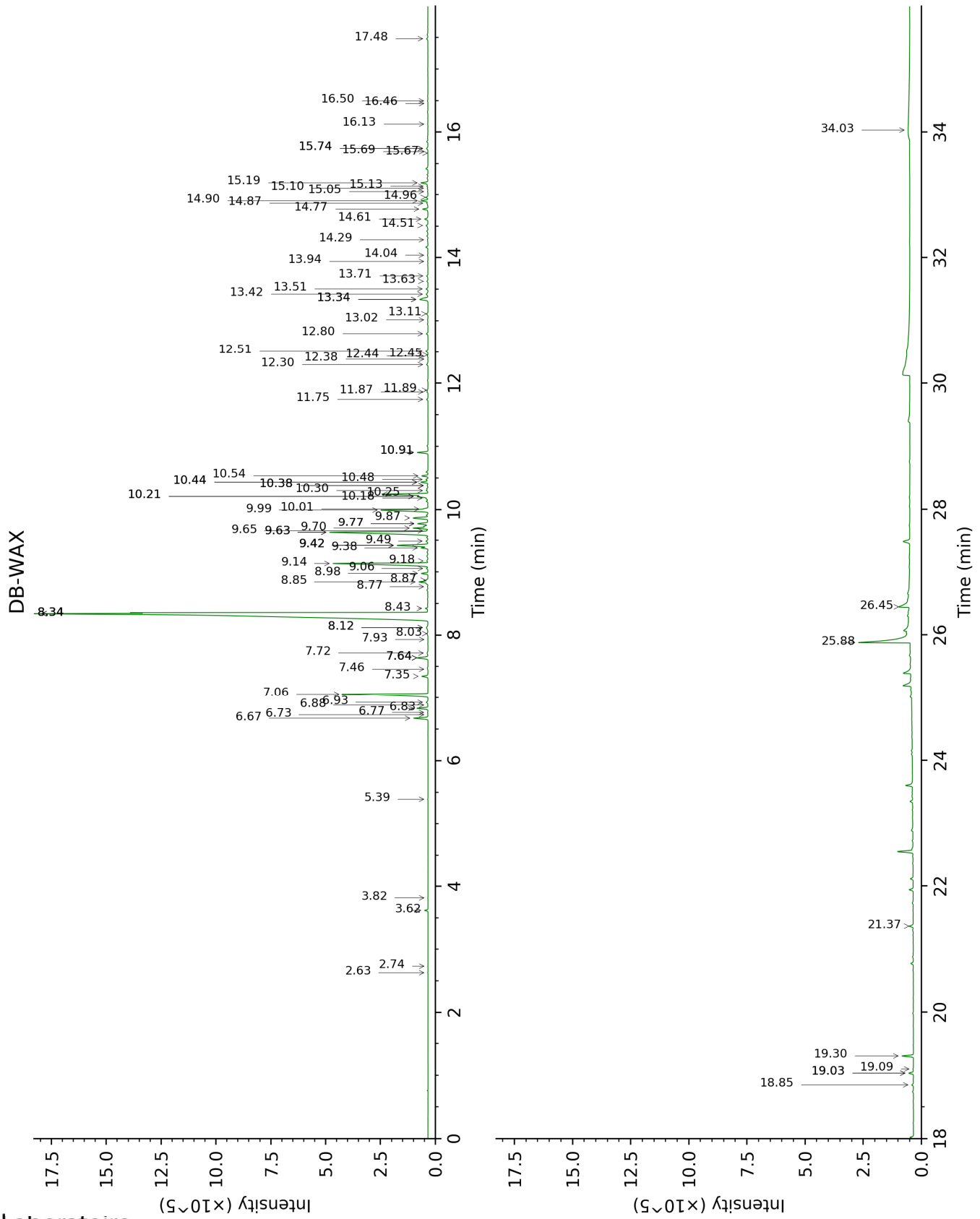
[xx]: Duplicate percentage due to coelutions, not taken account in the identified total

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	991	tr	2.74	1136	tr
(2E,4E)-3,7-Dimethylocta-2,4-diene?	4.45	1024	0.01	2.63	1128	0.01
(Z)- β -Ocimene	4.67	1038	0.12	3.62	1204	0.12
(E)- β -Ocimene	4.83	1048	0.01	3.82	1219	0.01
allo-Ocimene	6.10	1129	0.01	5.39	1333	0.01
δ -Elemene isomer	9.14	1331	0.01	6.73	1432	0.01
δ -Elemene	9.18	1334	0.53	6.83	1440	0.49
α -Cubebene	9.35	1346	0.72	6.68	1428	0.67
Cyclosativene I	9.52	1358	0.01	6.77	1435	0.02
Cyclosativene II	9.55	1360	0.02	6.88	1444	0.01
α -Ylangene	9.63	1366	0.08	6.93	1447	0.09
α -Copaene	9.71	1372	5.30	7.06	1458	4.96
<i>cis</i> - β -Elemene	9.81	1378	tr	8.12*	1537	0.14
7-epi-Sesquithujene?	9.84	1381	0.02	7.64*	1502	0.56
β -Cubebene	9.91	1386	0.59	7.64*	1502	[0.56]
β -Elemene	9.95	1388	0.70	8.34*	1555	44.69
Cyperene	9.99	1391	0.31	7.35	1480	0.28
α -Gurjunene	10.11	1399	0.01	7.46	1488	0.01
α -Cedrene	10.16*	1403	0.04	7.72	1508	0.06
Sesquithujene	10.16*	1403	[0.04]	7.93	1521	tr
β -Caryophyllene	10.35*	1418	42.62	8.34*	1555	[44.69]
β -Ylangene	10.35*	1418	[42.62]	8.03	1529	0.06
β -Copaene	10.42	1423	0.12	8.12*	1537	[0.14]
γ -Elemene	10.52	1430	0.08	8.87	1598	0.08
β -Humulene	10.57*	1434	4.73	7.64*	1502	[0.56]
Aromadendrene	10.57*	1434	[4.73]	8.42	1562	0.08
<i>trans</i> - α -Bergamotene	10.57*	1434	[4.73]	8.34*	1555	[44.69]
epi- β -Santalene	10.66*	1441	0.28	8.77	1590	0.02
Sesquisabinene A	10.66*	1441	[0.28]	8.98	1606	0.26
α -Humulene	10.76	1448	5.71	9.14	1619	5.43
allo-Aromadendrene	10.83*	1454	0.46	8.84	1596	0.42
<i>cis</i> -Muurolo-4(15),5-diene	10.83*	1454	[0.46]	9.18	1623	0.06
(E)- β -Farnesene	10.89	1458	0.35	9.38†	1640	1.84
<i>trans</i> -Cadina-1(6),4-diene	11.04*	1469	0.20	9.06	1613	0.06
γ -Muurolole	11.04*	1469	[0.20]	9.42*†	1644	[1.84]
Germacrene D	11.14*	1476	8.17	9.63*	1661	6.30
β -Selinene	11.14*	1476	[8.17]	9.70	1667	0.76
<i>trans</i> -Muurolo-4(15),5-diene	11.18*	1480	1.06	9.63*	1661	[6.30]
ar-Curcumene	11.18*	1480	[1.06]	10.44*	1730	0.32
γ -Amorphene	11.25*	1484	0.09	9.65	1663	0.03

δ-Selinene	11.25*	1484	[0.09]	9.42*†	1644	[1.84]
epi-Cubebol	11.32*	1489	1.18	11.75	1846	0.06
α-Selinene	11.32*	1489	[1.18]	9.77*	1673	0.48
Viridiflorene	11.32*	1489	[1.18]	9.42*†	1644	[1.84]
Bicyclogermacrene	11.32*	1489	[1.18]	9.87	1681	0.78
Caparratriene	11.37	1493	0.10	9.49	1649	0.09
α-Muurolene	11.40	1496	0.39	9.77*	1673	[0.48]
γ-Cadinene	11.55*	1507	2.87	10.21*†	1710	[2.73]
Cubebol	11.55*	1507	[2.87]	12.30	1897	0.06
β-Bisabolene	11.55*	1507	[2.87]	9.99†	1692	2.46
(3E,6E)-α-Farnesene	11.61*	1512	0.22	10.30	1718	0.07
β-Curcumene	11.61*	1512	[0.22]	10.01†	1693	[2.46]
trans-Calamenene	11.71*	1520	2.74	10.91*	1771	0.46
δ-Cadinene	11.71*	1520	[2.74]	10.25†	1713	[2.73]
Zonarene	11.71*	1520	[2.74]	10.21*†	1710	[2.73]
β-Sesquiphellandrene	11.71*	1520	[2.74]	10.38*	1725	0.04
(E)-γ-Bisabolene	11.80*	1527	0.17	10.18†	1708	2.73
trans-Cadina-1,4-diene	11.80*	1527	[0.17]	10.44*	1730	[0.32]
α-Cadinene	11.87	1532	0.10	10.54	1738	0.25
α-Calacorene	11.92*	1536	0.06	11.86	1857	0.05
Selina-3,7(11)-diene	11.92*	1536	[0.06]	10.38*	1725	[0.04]
(E)-α-Bisabolene	11.98*	1541	0.29	10.48	1733	0.09
Isocaryophyllene epoxide B	11.98*	1541	[0.29]	11.89	1860	0.04
Germacrene B	12.07	1548	0.49	10.91*	1771	[0.46]
Maaliol	12.20	1558	0.09	12.80	1943	0.07
β-Calacorene	12.24*	1561	0.24	12.38	1905	0.01
Caryophyllenyl alcohol	12.24*	1561	[0.24]	13.34*	1995	0.58
Spathulenol	12.34	1570	0.04	14.04	2063	0.03
Caryophyllene oxide isomer	12.39*	1573	0.12	12.44	1909	0.03
10-epi-Junenol	12.39*	1573	[0.12]	12.45	1911	tr
Caryophyllene oxide	12.39*	1573	[0.12]	12.51	1916	0.09
Globulol	12.42	1576	0.06	13.51	2011	0.08
Viridiflorol	12.52	1583	0.06	13.71	2030	0.06
Ledol	12.65	1594	0.12	13.11	1973	0.08
Humulene epoxide II	12.72	1599	0.02	13.02	1964	0.02
Junenol	12.83*	1608	0.55	13.34*	1995	[0.58]
10-epi-Cubenol	12.83*	1608	[0.55]	13.63	2022	0.05
Unknown [m/z 179, 161 (66), 119 (44), 95 (38), 105 (35)... 204 (24), 222 (1)]	12.83*	1608	[0.55]	14.29	2087	0.02
Rosifoliol	12.91	1615	0.02	13.94	2053	0.02
1-epi-Cubenol	12.98	1621	0.11	13.42	2003	0.12
Caryophylladienol II	13.07	1628	0.01	15.69	2230	tr
τ-Cadinol	13.17*	1636	0.46	14.61	2119	0.16

τ-Muurolol	13.17*	1636	[0.46]	14.77	2135	0.22
α-Muurolol	13.22	1641	0.34	14.90	2149	0.30
Unknown [m/z 121, 95 (50), 59 (46), 93 (41), 81 (36), 67 (36)... 206 (18), 220? (1)]	13.24	1642	0.09	14.51	2109	0.09
Unknown cadinol analog II [m/z 95, 121 (73), 43 (57), 79 (43), 161 (43), 109 (40)... 204 (35), 222 (2)]	13.27	1645	0.07	14.87	2145	0.06
α-Cadinol	13.32*	1649	0.35	15.13	2172	0.04
Selin-11-en-4α-ol	13.32*	1649	[0.35]	15.19	2178	0.32
cis-Calamenen-10-ol	13.36	1652	0.04	16.13	2275	0.02
trans-Calamenen-10-ol	13.42	1657	0.02	16.46	2310	tr
(3Z)-Caryophylla-3,8(13)-dien-5β-ol	13.49	1662	0.01	16.50	2314	0.02
Cadalene	13.53	1666	0.07	14.96	2154	0.09
epi-α-Bisabolol	13.70*	1680	0.05	15.10	2169	0.03
Germacra-4(15),5,10(14)-trien-1α-ol	13.70*	1680	[0.05]	15.67	2227	0.01
α-Bisabolol	13.72	1682	0.03	15.05	2164	0.02
Juniper camphor	13.78	1686	0.05			
Methyl (E,E)-farnesate?	14.57	1755	0.01			
Unknown [m/z 43, 95 (66), 81 (63), 137 (61), 41 (53), 107 (47)... 262 (6)...]	16.39	1919	0.04	17.48	2422	0.07
Unknown [m/z 95, 105 (79), 107 (75), 189 (68), 41 (64), 81 (61)... 257 (12), 272 (2)]	16.60	1938	0.13	15.74*	2234	0.07
Unknown [m/z 43, 95 (98), 107 (84), 93 (55), 121 (53)... 262 (7)...]	16.74	1952	0.08			
Unknown [m/z 95, 107 (61), 191 (46), 121 (45)...]	16.88	1965	0.17	19.03*	2598	0.21
Palmitic acid	16.92	1970	0.16	21.37	2883	0.20
Unknown [m/z 95, 107 (27), 81 (19), 191 (17), 55 (16)... 275 (1)...]	17.00	1977	0.02	15.74*	2234	[0.07]
cis-3,14-	17.51	2027	0.10	18.85	2576	0.08

Clerodadien-13-ol						
Unknown [m/z 95, 191 (43), 71 (27), 55 (27)...]	17.61	2037	0.03	19.10	2606	0.03
Manool	17.67	2043	0.20	19.03*	2598	[0.21]
Kolavelool	17.81	2057	0.52	19.30	2630	0.50
Linoleic acid	18.58	2134	0.01			
Oleic acid	18.63	2139	0.02			
3 α -Hydroxymanool	19.78	2261	0.02			
Copalol	19.83	2266	1.07			
Kolavenol	19.94	2278	0.44			
Methyl copalate?	19.99	2284	0.02			
Copaifera diterpenic acid I	20.47	2337	3.69	25.88	3501	4.71
Methyl kolavenate	20.53	2344	0.59			
Copaifera diterpenic acid II	20.80	2375	0.91	26.45	3579	0.92
Kolavenyl acetate?	20.96	2392	0.09			
Methyl hardwickiiate?	21.16	2416	0.24			
Copaifera diterpenic acid III	21.56	2462	0.21			
Copaifera diterpenic acid IV	21.79	2488	2.49	34.03	3985	1.60
Copaifera diterpenic acid V	22.58	2584	0.14			
Copaifera diterpenic acid VI	23.47	2695	0.55			
Copaifera diterpenic acid VII	23.50	2698	0.05			
Copaifera diterpenic acid VIII	24.31	2804	0.03			
Total identified		95.40%			86.31%	
Total reported		96.04%			86.57%	

*: 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