Date : January 06, 2020

Certificate of Analysis – GC Profiling

Sample identification

Internal code : 20A03-PTH10
Customer identification : Copaiba Balsam (Resin) - Brazil - CJ0106910R
Type : Resin
Source : *Copaifera officinalis*
Customer : Plant Therapy

Analysis

Method: PC-MAT-007 - Analysis of the composition of an essential oil or other volatile liquide by FAST GC-FID (in French); identifications validated by GC-MS.
Analyst : Sarah-Eve Tremblay, M. Sc. A., Chimiste
Analysis date : January 06, 2020

Checked and approved by :

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

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PHYSICOCHEMICAL DATA

Physical aspect: Faintly yellow viscous liquid
Refractive index: 1.5063 ± 0.0003 (20 °C)

CONCLUSION

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

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Analysis summary – Consolidated contents

New readers of similar reports are encouraged to read table footnotes at least once.

Identification	%	Classe
Myrcene	tr	Monoterpene
(2*E*,4*E*)-3,7-Dimethylocta-2,4-diene?	0.01	Monoterpene
(*Z*)-β-Ocimene	0.09	Monoterpene
(*E*)-β-Ocimene	0.01	Monoterpene
γ-Terpinene	tr	Monoterpene
allo-Ocimene	0.01	Monoterpene
δ-Elemene isomer	0.01	Sesquiterpene
δ-Elemene	0.41	Sesquiterpene
α-Cubebene	0.61	Sesquiterpene
Cyclosativene I	0.01	Sesquiterpene
Cyclosativene II	0.01	Sesquiterpene
α-Ylangene	0.06	Sesquiterpene
α-Copaene	3.63	Sesquiterpene
cis-β-Elemene	tr	Sesquiterpene
7-epi-Sesquithujene?	0.02	Sesquiterpene
β-Cubebene	0.40	Sesquiterpene
7-epi-Sesquithujene	0.06	Sesquiterpene
β-Elemene	0.75	Sesquiterpene
Cyperene	0.23	Sesquiterpene
α-Gurjunene	0.04	Sesquiterpene
Sesquithujene	0.01	Sesquiterpene
β-Caryophyllene	41.44	Sesquiterpene
β-Ylangene	0.06	Sesquiterpene
β-Copaene	0.13	Sesquiterpene
γ-Elemene	0.15	Sesquiterpene
Aromadendrene	0.02	Sesquiterpene
trans-α-Bergamotene	3.46	Sesquiterpene
β-Humulene	0.13	Sesquiterpene
Sesquisabinene A	0.27	Sesquiterpene
epi-β-Santalene	0.07	Sesquiterpene
α-Humulene	5.11	Sesquiterpene
allo-Aromadendrene	0.29	Sesquiterpene
cis-Muurola-4(15),5-diene	0.03	Sesquiterpene
(*E*)-β-Farnesene	0.26	Sesquiterpene
trans-Cadina-1(6),4-diene	0.32	Sesquiterpene
Germacrene D	5.52	Sesquiterpene
β-Selinene	0.21	Sesquiterpene
trans-Muurola-4(15),5-diene	0.48	Sesquiterpene
δ-Selinene	0.07	Sesquiterpene
α-Selinene	0.34	Sesquiterpene
Bicyclogermacrene	0.48	Sesquiterpene
epi-Cubebol	0.07	Sesquiterpenic alcohol
Viridiflorene	0.11	Sesquiterpene
γ-Amorphene	0.16	Sesquiterpene
Caparratriene	0.10	Sesquiterpene
α-Muurolene	0.42	Sesquiterpene
δ-Guaiene	0.25	Sesquiterpene

β-Bisabolene	1.29	Sesquiterpene
Cubebol	0.08	Sesquiterpenic alcohol
β-Curcumene	0.08	Sesquiterpene
(3*E*,6*E*)-α-Farnesene	0.10	Sesquiterpene
γ-Cadinene	0.45	Sesquiterpene
trans-Calamenene	0.01	Sesquiterpene
δ-Cadinene	1.97	Sesquiterpene
β-Sesquiphellandrene	0.16	Sesquiterpene
Zonarene	0.15	Sesquiterpene
(*E*)-γ-Bisabolene	0.07	Sesquiterpene
trans-Cadina-1,4-diene	0.14	Sesquiterpene
α-Cadinene	0.11	Sesquiterpene
α-Calacorene	0.09	Sesquiterpene
Selina-3,7(11)-diene	0.02	Sesquiterpene
(*E*)-α-Bisabolene	0.06	Sesquiterpene
Isocaryophyllene epoxide B	0.09	Sesquiterpenic ether
Germacrene B	0.97	Sesquiterpene
Maaliol	0.08	Sesquiterpenic alcohol
Caryophyllenyl alcohol	0.24	Sesquiterpenic alcohol
β-Calacorene	0.05	Sesquiterpene
Germacrene D-4-ol	0.03	Sesquiterpenic alcohol
Caryophyllene oxide	0.13	Sesquiterpenic ether
Globulol	0.07	Sesquiterpenic alcohol
Viridiflorol	0.06	Sesquiterpenic alcohol
Humulene epoxide I	0.02	Sesquiterpenic ether
Ledol	0.06	Sesquiterpenic alcohol
Humulene epoxide II	0.01	Sesquiterpenic ether
10-epi-Cubenol	0.08	Sesquiterpenic alcohol
Junenol	0.42	Sesquiterpenic alcohol
Unknown	0.14	Oxygenated sesquiterpene
Rosifoliol	0.03	Sesquiterpenic alcohol
1-epi-Cubenol	0.10	Sesquiterpenic alcohol
Isospathulenol	0.38	Sesquiterpenic alcohol
τ-Cadinol	0.02	Sesquiterpenic alcohol
τ-Muurolol	0.26	Sesquiterpenic alcohol
α-Muurolol	0.33	Sesquiterpenic alcohol
Unknown	0.15	Oxygenated sesquiterpene
Unknown	0.09	Sesquiterpenic alcohol
α-Cadinol	0.28	Sesquiterpenic alcohol
Selin-11-en-4α-ol	0.05	Sesquiterpenic alcohol
cis-Calamenen-10-ol	0.02	Sesquiterpenic alcohol
trans-Calamenen-10-ol	0.04	Sesquiterpenic alcohol
(3*Z*)-Caryophylla-3,8(13)-dien-5β-ol	0.06	Sesquiterpenic alcohol
Cadalene	0.04	Sesquiterpene
Germacra-4(15),5,10(14)-trien-1α-ol	0.03	Sesquiterpenic alcohol
α-Bisabolol	0.05	Sesquiterpenic alcohol
Juniper camphor	0.11	Sesquiterpenic alcohol
Methyl (*E*,*E*)-farnesate?	0.01	Sesquiterpenic ester
Unknown	0.03	Oxygenated diterpene
Unknown	0.11	Diterpene
Unknown	0.04	Oxygenated diterpene
Unknown	0.11	Oxygenated diterpene

Palmitic acid	0.37	Aliphatic acid
Unknown	0.04	Oxygenated diterpene
cis-3,14-Clerodadien-13-ol	0.05	Diterpenic alcohol
Unknown	0.03	Oxygenated diterpene
Manool	0.13	Diterpenic alcohol
Kolavelool	0.39	Diterpenic alcohol
Linoleic acid	0.08	Aliphatic acid
Oleic acid	0.09	Aliphatic acid
Stearic acid	0.04	Aliphatic acid
3α-Hydroxymanool	0.01	Diterpenic alcohol
Copalol	1.04	Diterpenic alcohol
Kolavenol	0.59	Diterpenic alcohol
Methyl copalate?	0.10	Diterpenic ester
Copaifera diterpenic acid I	4.42	Diterpenic acid
Methyl kolavenate	0.43	Diterpenic ester
Copaifera diterpenic acid II	1.04	Diterpenic acid
Kolavenyl acetate?	0.07	Diterpenic ester
Methyl hardwickiiate?	0.02	Diterpenic ester
Copaifera diterpenic acid III	0.26	Diterpenic acid
Copaifera diterpenic acid IV	2.81	Diterpenic acid
Copaifera diterpenic acid V	0.53	Diterpenic acid
Copaifera diterpenic acid VI	1.45	Diterpenic acid
Copaifera diterpenic acid VII	1.48	Diterpenic acid
Copaifera diterpenic acid VIII	0.38	Diterpenic acid
Consolidated total	**91.79%**	

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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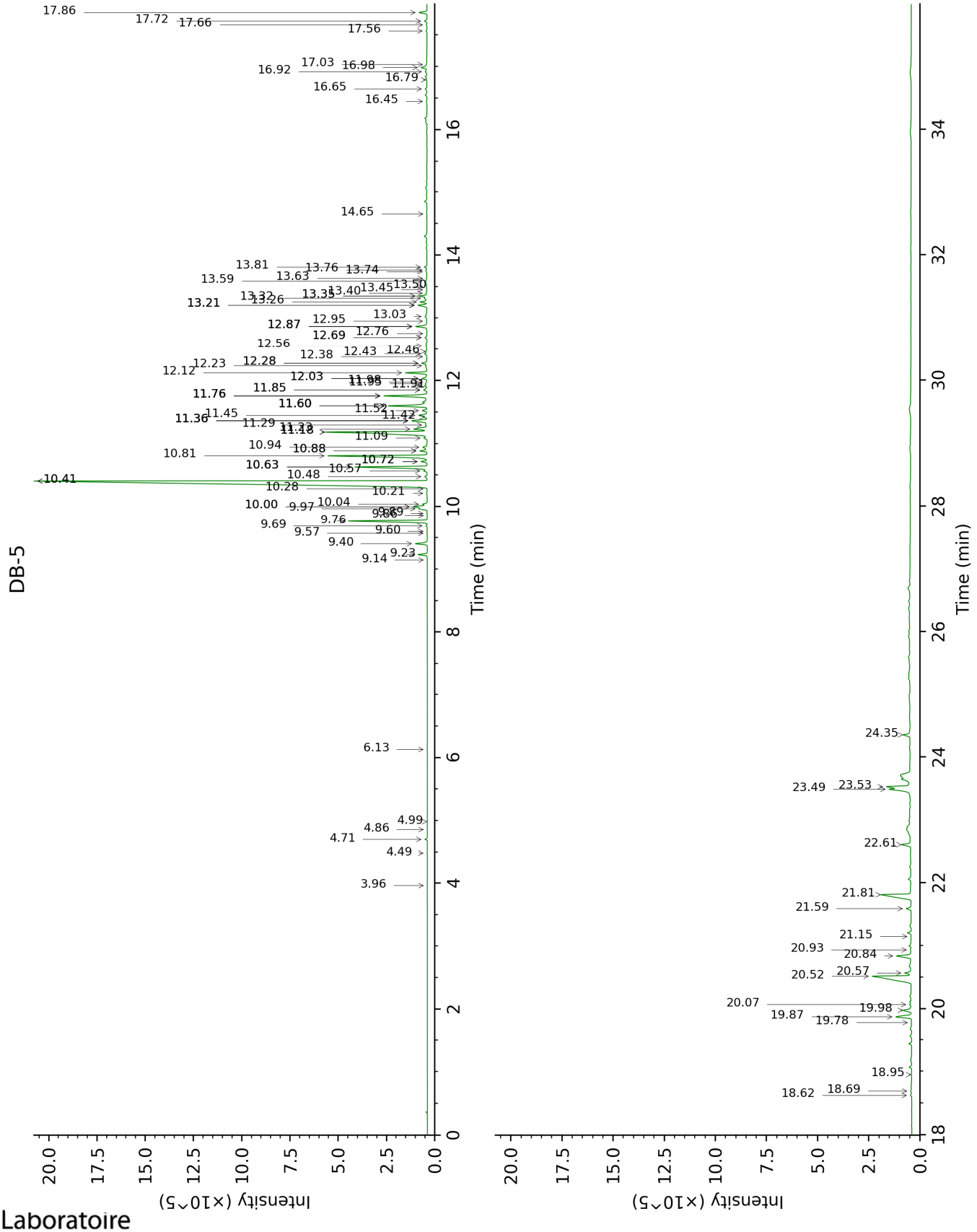
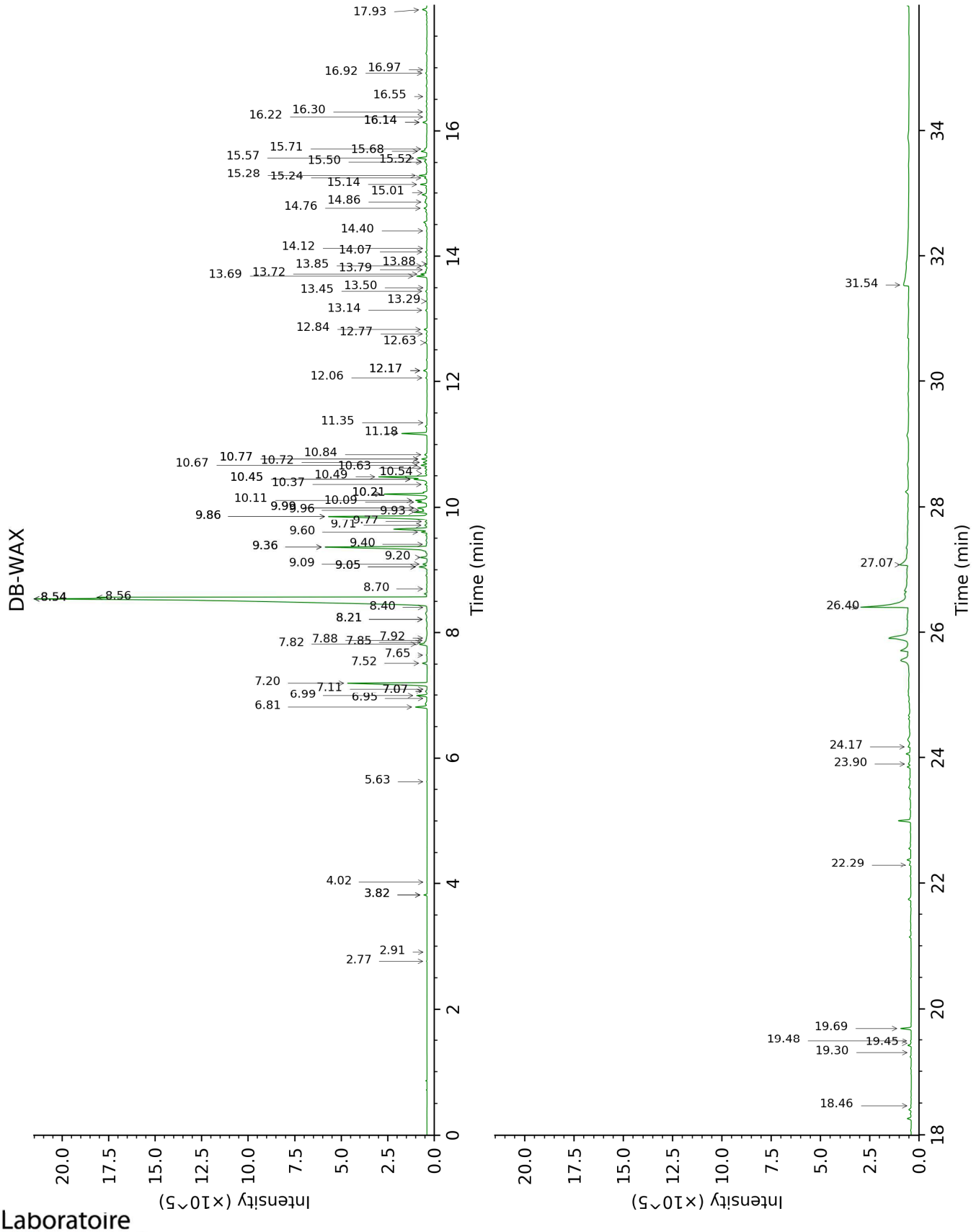

DB-5
Time (min)
Intensity (×10^5)
17.86
17.72
17.66
17.56
16.92
17.03
16.98
16.79
16.65
16.45
14.65
13.81
13.76
13.74
13.59
13.63
13.50
13.45
13.40
13.21
13.26
12.87
12.95
13.03
12.69
12.76
12.56
12.38
12.43
12.46
12.12
12.23
12.28
12.03
11.85
11.76
11.60
11.52
11.45
11.42
11.36
11.29
11.09
10.94
10.88
10.81
10.72
10.63
10.57
10.48
10.41
10.28
10.21
10.00
9.97
10.04
9.69
9.76
9.57
9.60
9.40
9.23
9.14
6.13
4.99
4.86
4.71
4.49
3.96
24.35
23.49
23.53
22.61
21.81
21.59
21.15
20.93
20.84
20.52
20.57
20.07
19.98
19.87
19.78
18.95
18.62
18.69


DB-WAX
Time (min)
Intensity (×10^5)
17.93
16.92
16.97
16.55
16.22
16.30
16.14
15.57
15.71
15.68
15.50
15.52
15.28
15.24
15.14
15.01
14.76
14.86
14.40
14.12
14.07
13.69
13.72
13.85
13.79
13.88
13.45
13.50
13.29
13.14
12.84
12.77
12.63
12.06
12.17
11.35
11.18
10.67
10.77
10.72
10.84
10.63
10.45
10.37
10.49
10.54
10.11
10.09
10.21
9.99
9.96
9.93
9.86
9.77
9.71
9.60
9.36
9.40
9.20
9.09
9.05
8.70
8.54
8.56
8.40
8.21
7.82
7.88
7.85
7.92
7.65
7.52
7.20
7.11
7.07
6.99
6.95
6.81
5.63
4.02
3.82
2.91
2.77
31.54
27.07
26.40
24.17
23.90
22.29
19.69
19.48
19.45
19.30
18.46

FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Myrcene	3.96	990	tr	2.91	1132	tr
(2*E*,4*E*)-3,7-Dimethylocta-2,4-diene?	4.49	1024	0.01	2.76	1120	0.01
(*Z*)-β-Ocimene	4.70	1038	0.09	3.82*	1202	0.09
(*E*)-β-Ocimene	4.86	1048	0.01	4.02	1217	tr
γ-Terpinene	4.99	1056	tr	3.82*	1202	[0.09]
allo-Ocimene	6.13	1130	0.01	5.63	1332	0.01
δ-Elemene isomer	9.14	1330	0.01	6.95	1428	0.01
δ-Elemene	9.23	1336	0.41	6.99	1431	0.41
α-Cubebene	9.40	1348	0.61	6.81	1417	0.51
Cyclosativene I	9.57	1360	0.01	7.11	1439	0.01
Cyclosativene II	9.60	1362	0.01	7.07*	1437	0.09
α-Ylangene	9.69	1368	0.06	7.07*	1437	[0.09]
α-Copaene	9.76	1373	3.63	7.20	1446	3.82
cis-β-Elemene	9.86	1380	tr	8.40	1537	0.02
7-epi-Sesquithujene?	9.89	1382	0.02	7.92	1500	0.04
β-Cubebene	9.97	1388	0.40	7.82	1492	0.41
7-epi-Sesquithujene	10.00*	1390	0.82	7.88	1496	0.06
β-Elemene	10.00*	1390	[0.82]	8.54*†	1547	45.77
Cyperene	10.04	1393	0.23	7.52	1470	0.20
α-Gurjunene	10.21	1405	0.04	7.65	1479	0.03
Sesquithujene	10.28	1410	0.01	8.21*	1522	0.07
β-Caryophyllene	10.41*	1419	39.46	8.54*†	1547	[45.77]
β-Ylangene	10.41*	1419	[39.46]	8.21*	1522	[0.07]
β-Copaene	10.48	1424	0.13	8.54*†	1547	[45.77]
γ-Elemene	10.57	1431	0.15	9.09	1590	0.18
Aromadendrene	10.63*	1436	3.61	8.70	1560	0.02
trans-α-Bergamotene	10.63*	1436	[3.61]	8.56†	1549	[45.77]
β-Humulene	10.63*	1436	[3.61]	7.85	1494	0.13
Sesquisabinene A	10.72*	1442	0.27	9.20	1598	0.27
epi-β-Santalene	10.72*	1442	[0.27]	9.05*	1587	0.37
α-Humulene	10.81	1449	5.11	9.36*	1612	5.42
allo-Aromadendrene	10.88*	1455	0.32	9.05*	1587	[0.37]
cis-Muurola-4(15),5-diene	10.88*	1455	[0.32]	9.40	1615	0.03
(*E*)-β-Farnesene	10.94	1459	0.26	9.60	1631	0.19
trans-Cadina-1(6),4-diene	11.09†	1470	7.61	9.36*	1612	[5.42]
Germacrene D	11.18*†	1477	[7.61]	9.86*	1652	5.63
β-Selinene	11.18*†	1477	[7.61]	9.99*	1662	0.46
trans-Muurola-4(15),5-diene	11.23†	1480	[7.61]	9.93	1657	0.48
δ-Selinene	11.30	1485	0.07	9.77	1644	0.07

α-Selinene	11.36*	1490	0.96	10.09	1670	0.34
Bicyclogermacrene	11.36*	1490	[0.96]	10.11	1672	0.48
epi-Cubebol	11.36*	1490	[0.96]	12.06	1837	0.07
Viridiflorene	11.36*	1490	[0.96]	9.71	1640	0.11
γ-Amorphene	11.36*	1490	[0.96]	9.96	1660	0.16
Caparratriene	11.42	1494	0.10	9.86*	1652	[5.63]
α-Muurolene	11.45	1496	0.42	10.21*	1680	1.71
δ-Guaiene	11.52	1502	0.25	9.99*	1662	[0.46]
β-Bisabolene	11.60*†	1508	2.31	10.21*	1680	[1.71]
Cubebol	11.60*†	1508	[2.31]	12.63	1887	0.08
β-Curcumene	11.60*†	1508	[2.31]	10.37	1693	0.08
(3*E*,6*E*)-α-Farnesene	11.60*†	1508	[2.31]	10.63	1715	0.10
γ-Cadinene	11.60*†	1508	[2.31]	10.45*	1700	0.60
trans-Calamenene	11.76*	1520	2.29	11.35	1775	0.01
δ-Cadinene	11.76*	1520	[2.29]	10.49	1703	1.97
β-Sesquiphellandrene	11.76*	1520	[2.29]	10.72	1722	0.16
Zonarene	11.76*	1520	[2.29]	10.45*	1700	[0.60]
(*E*)-γ-Bisabolene	11.85*	1527	0.21	10.54	1707	0.07
trans-Cadina-1,4-diene	11.85*	1527	[0.21]	10.77*	1727	0.20
α-Cadinene	11.92	1532	0.11	10.84	1732	0.11
α-Calacorene	11.95	1535	0.09	12.17*	1847	0.19
Selina-3,7(11)-diene	11.98	1537	0.02	10.67	1718	0.23
(*E*)-α-Bisabolene	12.03*	1542	0.28	10.77*	1727	[0.20]
Isocaryophyllene epoxide B	12.03*	1542	[0.28]	12.17*	1847	[0.19]
Germacrene B	12.12	1549	0.97	11.18	1761	1.02
Maaliol	12.24	1558	0.08	13.14	1934	0.06
Caryophyllenyl alcohol	12.28*	1561	0.26	13.72	1986	0.24
β-Calacorene	12.28*	1561	[0.26]	12.77	1900	0.05
Germacrene D-4-ol	12.38	1569	0.03	13.79	1993	0.04
Caryophyllene oxide	12.43	1573	0.13	12.84	1906	0.12
Globulol	12.46	1575	0.07	14.07	2020	0.06
Viridiflorol	12.56	1583	0.06	14.12	2025	0.03
Humulene epoxide I	12.69*	1593	0.10	13.29	1947	0.02
Ledol	12.69*	1593	[0.10]	13.44	1961	0.06
Humulene epoxide II	12.76	1598	0.01	13.50	1966	0.01
10-epi-Cubenol	12.87*	1607	0.61	13.85	1999	0.08
Junenol	12.87*	1607	[0.61]	13.68	1983	0.42
Unknown [m/z 179, 161 (66), 119 (44), 95 (38), 105 (35)... 204 (24), 222 (1)]	12.87*	1607	[0.61]	14.76	2086	0.14
Rosifoliol	12.95	1614	0.03	14.40	2052	0.03
1-epi-Cubenol	13.03	1620	0.10	13.88	2002	0.01
Isospathulenol	13.20*	1635	0.49	15.57	2166	0.38
τ-Cadinol	13.20*	1635	[0.49]	15.01	2110	0.02

τ-Muurolol	13.20*	1635	[0.49]	15.14	2123	0.26
α-Muurolol	13.26	1640	0.33	15.28	2137	0.31
Unknown [m/z 121, 95 (50), 59 (46), 93 (41), 81 (36), 67 (36)... 206 (18), 220? (1)]	13.32	1644	0.15	14.86	2096	0.11
Unknown cadinol analog II [m/z 95, 121 (73), 43 (57), 79 (43), 161 (43), 109)40)... 204 (35), 222 (2)]	13.35*	1647	0.39	15.24	2134	0.09
α-Cadinol	13.35*	1647	[0.39]	15.68	2176	0.28
Selin-11-en-4α-ol	13.40	1651	0.05	15.71	2180	0.12
cis-Calamenen-10-ol	13.45	1656	0.02	16.55	2265	0.02
trans-Calamenen-10-ol	13.50	1660	0.04	16.97	2310	0.02
(3*Z*)-Caryophylla-3,8(13)-dien-5β-ol	13.59	1667	0.06	16.92	2304	0.07
Cadalene	13.63	1670	0.04	15.50	2159	0.05
Germacra-4(15),5,10(14)-trien-1α-ol	13.74	1679	0.03	16.14*	2223	0.19
α-Bisabolol	13.76	1681	0.05	15.52	2161	0.12
Juniper camphor	13.81	1685	0.11	16.14*	2223	[0.19]
Methyl (*E*,*E*)-farnesate?	14.65	1757	0.01			
Unknown [m/z 43, 95 (66), 81 (63), 137 (61), 41 (53), 107 (47)... 262 (6)...]	16.45	1920	0.03	17.93	2413	0.25
Unknown [m/z 95, 105 (79), 107 (75), 189 (68), 41 (64), 81 (61)... 257 (12), 272 (2)]	16.65	1939	0.11	16.30	2240	0.02
Unknown [m/z 43, 95 (98), 107 (84), 93 (55), 121 (53)... 262 (7)...]	16.79	1953	0.04	18.46	2471	0.03
Unknown [m/z 95, 107 (61), 191 (46), 121 (45)...]	16.92	1965	0.11			
Palmitic acid	16.98	1971	0.37	22.29	2933	0.10
Unknown [m/z 95, 107 (27), 81 (19), 191 (17), 55 (16)... 275 (1)...]	17.03	1976	0.04	16.22	2232	0.03
cis-3,14-Clerodadien-13-ol	17.56	2028	0.05	19.30	2567	0.02

Unknown [m/z 95, 191 (43), 71 (27), 55 (27)...]	17.66	2038	0.03	19.48	2588	0.03
Manool	17.72	2044	0.13	19.45	2584	0.01
Kolavelool	17.86	2057	0.39	19.69	2612	0.41
Linoleic acid	18.62	2135	0.08	24.17	3185	0.11
Oleic acid	18.69	2142	0.09	23.90	3148	0.12
Stearic acid	18.95	2169	0.04			
3α-Hydroxymanool	19.78	2259	0.01			
Copalol	19.87	2269	1.04			
Kolavenol	19.98	2280	0.59			
Methyl copalate?	20.07	2290	0.10			
Copaifera diterpenic acid I	20.52	2340	4.42	26.40	3504	3.93
Methyl kolavenate	20.57	2346	0.43			
Copaifera diterpenic acid II	20.84	2377	1.04	27.07	3587	0.82
Kolavenyl acetate?	20.93	2388	0.07			
Methyl hardwickiiate?	21.15	2412	0.02			
Copaifera diterpenic acid III	21.59	2465	0.26			
Copaifera diterpenic acid IV	21.81	2491	2.81	31.54	3932	2.86
Copaifera diterpenic acid V	22.61	2590	0.53			
Copaifera diterpenic acid VI	23.49	2701	1.45			
Copaifera diterpenic acid VII	23.53	2706	1.48			
Copaifera diterpenic acid VIII	24.35	2815	0.38			
Total identified		**90.30%**			**83.99%**	
Total reported		**90.81%**			**84.69%**	

*: 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