Date : November 23, 2020

Certificate of Analysis – GC Profiling

Sample identification

Internal code : 20K16-PTH02
Customer identification : Chamomile (German) - C80104203R
Type : Essential oil
Source : *Matricaria chamomilla*
Customer : Plant Therapy

Analysis

Method: PC-MAT-014 ISO - Analysis of the composition of an essential oil or other volatile liquid by FAST GC-FID (in French); identifications validated by GC-MS.
Analyst : Fanny Charlier, B. Sc., chimiste à l'entraînement
Analysis date : November 18, 2020

Checked and approved by :

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

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Méthode certifiée ISO 17025:2017 Certified method

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PHYSICOCHEMICAL DATA

Physical aspect: Dark blue liquid
Refractive index: 1.5061 ± 0.0003 (20 °C; method PC-MAT-016)

ISO 19332:2008 - OIL OF BLUE CHAMOMILE - EGYPT

Compound	Min. %	Max. %	Observed %	Complies?
α-Bisabolol oxide A	35	50	39	Yes
Chamazulene	2	5	3	Yes
α-Bisabolol	1	10	1	Yes
Bisabolone oxide A	2.0	6.5	4.2	Yes
(E)-β-Farnesene	15	35	15	Yes
α-Bisabolol oxide B	2	8	6	Yes

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	%	Class
Acetone	tr	Aliphatic ketone
Isovaleral	0.02	Aliphatic aldehyde
2-Methylbutyral	0.03	Aliphatic aldehyde
2-Ethylfuran	tr	Furan
Heptane	tr	Alkane
Toluene	0.01	Simple phenolic
Methyl 2-methylbutyrate	tr	Aliphatic ester
Hexanal	0.01	Aliphatic aldehyde
Octane	tr	Alkane
Ethyl 2-methylbutyrate	0.17	Aliphatic ester
(3*Z*)-Hexenol	tr	Aliphatic alcohol
(2*E*)-Hexenol	tr	Aliphatic alcohol
Heptanal	0.01	Aliphatic aldehyde
Santolinatriene	0.01	Monoterpene
α-Pinene	0.02	Monoterpene
Camphene	0.02	Monoterpene
Propyl 2-methylbutyrate	0.07	Aliphatic ester
Benzaldehyde	0.01	Simple phenolic
β-Pinene	0.01	Monoterpene
Sabinene	0.02	Monoterpene
6-Methyl-5-hepten-2-one	0.05	Aliphatic ketone
2-Pentylfuran	0.05	Furan
Myrcene	0.02	Monoterpene
Unknown	0.01	Monoterpene
α-Phellandrene	0.01	Monoterpene
Octanal	0.05	Aliphatic aldehyde
Yomogi alcohol	0.05	Monoterpenic alcohol
α-Terpinene	0.01	Monoterpene
para-Cymene	0.10	Monoterpene
Limonene	0.05	Monoterpene
1,8-Cineole	0.02	Monoterpenic ether
(*Z*)-β-Ocimene	0.07	Monoterpene
(*E*)-β-Ocimene	0.32	Monoterpene
γ-Terpinene	0.14	Monoterpene
Artemisia ketone	0.38	Monoterpenic ketone
Octanol	0.02	Aliphatic alcohol
Artemisia alcohol	0.12	Monoterpenic alcohol
Terpinolene	0.01	Monoterpene
Linalool	0.01	Monoterpenic alcohol
Nonanal	0.01	Aliphatic aldehyde
Unknown	0.02	Oxygenated monoterpene
Camphor	0.01	Monoterpenic ketone
Borneol	0.06	Monoterpenic alcohol
Artemisyl acetate	0.02	Monoterpenic ester
Terpinen-4-ol	0.03	Monoterpenic alcohol

α-Terpineol	0.07	Monoterpenic alcohol
Safranal	0.02	Monoterpenic aldehyde
trans-Carveol	0.01	Monoterpenic alcohol
Citronellol	0.01	Monoterpenic alcohol
Carvone	0.03	Monoterpenic ketone
(2*E*)-Hexenyl isovalerate	0.05	Aliphatic ester
Hexyl isovalerate	0.02	Aliphatic ester
Geraniol	0.01	Monoterpenic alcohol
α-Ionene	0.01	Terpene derivative
(*E*)-4,8-Dimethylnona-3,8-dien-2-one	0.04	Terpenic ketone
trans-Chrysanthemyl acetate	0.07	Monoterpenic ester
Lavandulyl acetate	0.03	Monoterpenic ester
(2*E*,4*E*)-Decadienal	0.01	Aliphatic aldehyde
Bicycloelemene	0.03	Sesquiterpene
α-Longipinene	0.02	Sesquiterpene
Dehydro-ar-ionene	0.02	Miscellanous
Eugenol	0.02	Phenylpropanoid
α-Copaene	0.05	Sesquiterpene
α-Isocomene	0.09	Sesquiterpene
Capric acid	1.27	Aliphatic acid
β-Elemene	0.07	Sesquiterpene
β-Isocomene	0.02	Sesquiterpene
β-Caryophyllene	0.10	Sesquiterpene
β-Copaene	0.03	Sesquiterpene
Aromadendrene	0.07	Sesquiterpene
Striatene?	0.03	Sesquiterpene
α-Humulene	0.03	Sesquiterpene
allo-Aromadendrene	0.12	Sesquiterpene
(*E*)-β-Farnesene	15.16	Sesquiterpene
Dehydrosesquicineole	0.10	Sesquiterpenic ether
Precocene I	0.10	Chromane
Germacrene D	1.25	Sesquiterpene
β-Selinene	0.15	Sesquiterpene
ar-Curcumene	0.06	Sesquiterpene
α-Selinene	0.06	Sesquiterpene
Bicyclogermacrene	0.72	Sesquiterpene
Viridiflorene	0.10	Sesquiterpene
α-Zingiberene	0.06	Sesquiterpene
α-Muurolene	0.12	Sesquiterpene
(3*Z*,6*E*)-α-Farnesene	0.08	Sesquiterpene
γ-Cadinene	0.15	Sesquiterpene
3,6-Dihydrochamazulene	0.56	Azulene
(3*E*,6*E*)-α-Farnesene	0.68	Sesquiterpene
Dihydrochamazulene isomer I	0.19	Azulene
β-Sesquiphellandrene	0.04	Sesquiterpene
δ-Cadinene	0.21	Sesquiterpene
Unknown	0.04	Oxygenated sesquiterpene
(*E*)-α-Bisabolene	0.03	Sesquiterpene
Salviadienol?	0.04	Sesquiterpenic alcohol
Sesquirosefuran?	0.09	Sesquiterpenic ether
(*E*)-Nerolidol	0.22	Sesquiterpenic alcohol
Spathulenol	0.71	Sesquiterpenic alcohol

Dendrolasin	0.18	Sesquiterpenic ether
Caryophyllene oxide	0.08	Sesquiterpenic ether
Globulol	0.12	Sesquiterpenic alcohol
Unknown	0.11	Oxygenated sesquiterpene
Viridiflorol	0.15	Sesquiterpenic alcohol
Ledol	0.11	Sesquiterpenic alcohol
5,6-Dihydrochamazulene	0.19	Azulene
(2,7*Z*)-Bisaboladien-4-ol	0.23	Sesquiterpenic alcohol
τ-Cadinol	0.69	Sesquiterpenic alcohol
τ-Muurolol	0.08	Sesquiterpenic alcohol
α-Bisabolol oxide B, epimer 1	0.30	Sesquiterpenic alcohol
α-Bisabolol oxide B, epimer 2	5.22	Sesquiterpenic alcohol
Ageratochromene	0.33	Chromane
epi-β-Bisabolol	0.17	Sesquiterpenic alcohol
Bisabolone oxide A	4.22	Sesquiterpenic ketone
α-Bisabolol	1.38	Sesquiterpenic alcohol
(2*E*,6*Z*)-Farnesol	0.03	Sesquiterpenic alcohol
Chamazulene	2.53	Azulene
α-Bisabolol oxide A	39.19	Sesquiterpenic alcohol
Benzyl benzoate	0.11	Phenolic ester
α-Costol?	0.28	Sesquiterpenic alcohol
Phytone	0.31	Terpenic ketone
(*Z*)-Spiroether	5.16	Polyyne
(*E*)-Spiroether	0.64	Polyyne
(*Z*)-Tibetin spiroether	0.04	Polyyne
(*E*)-Tibetin spiroether	0.16	Polyyne
Palmitic acid	1.59	Aliphatic acid
Eicosane	0.04	Alkane
Phytol	0.14	Diterpenic alcohol
Linoleic acid	0.51	Aliphatic acid
Oleic acid	0.35	Aliphatic acid
cis-Vaccenic acid?	0.02	Aliphatic acid
(9*Z*)-18-Octadecenolide?	0.30	Aliphatic lactone
Docosane	0.04	Alkane
Tricosane	0.42	Alkane
Tetracosane	0.14	Alkane
Pentacosane	1.14	Alkane
Hexacosane	0.06	Alkane
Heptacosane	0.26	Alkane
Unknown	0.02	Unknown
Unknown	0.01	Unknown
Unknown	0.02	Unknown
Consolidated total	**92.40%**	

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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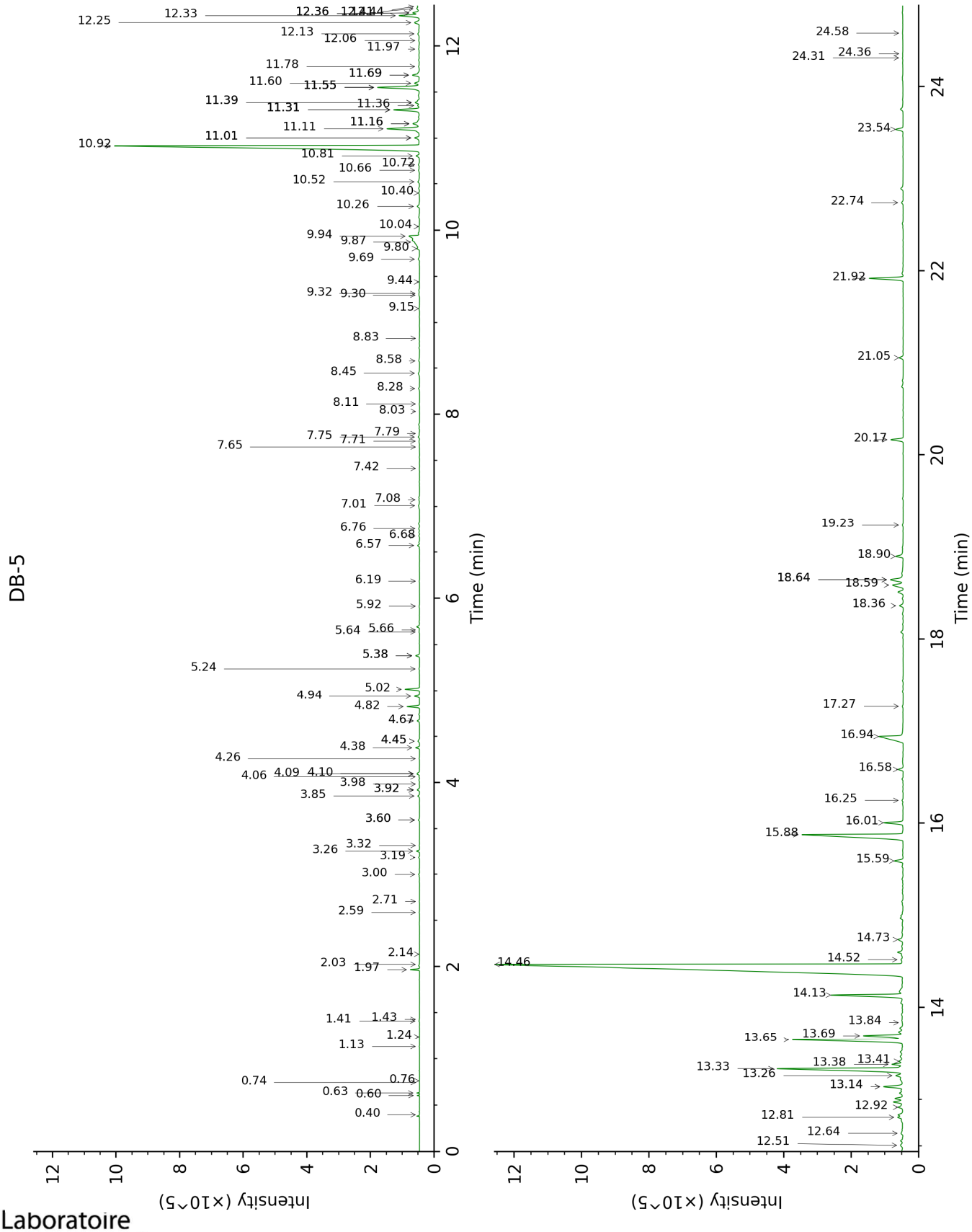

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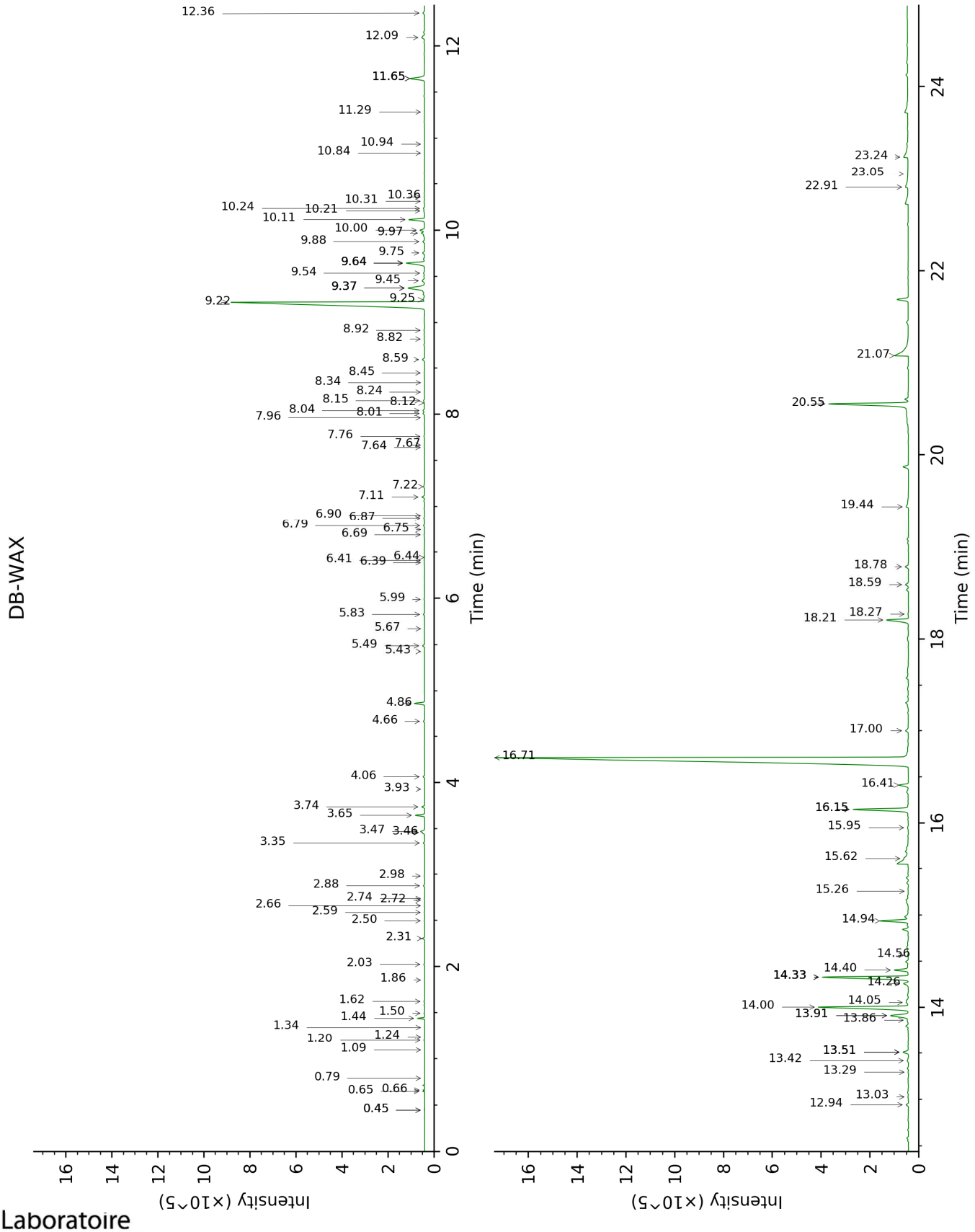
DB-WAX
Time (min)
Intensity (×10^5)
12.36
12.09
11.65
11.29
10.94
10.84
10.31
10.36
10.24
10.21
10.11
10.00
9.97
9.88
9.75
9.64
9.54
9.45
9.37
9.25
9.22
8.92
8.82
8.59
8.45
8.34
8.24
8.15
8.12
8.04
8.01
7.96
7.76
7.64
7.67
7.22
7.11
6.90
6.87
6.79
6.75
6.69
6.44
6.41
6.39
5.99
5.83
5.67
5.49
5.43
4.86
4.66
4.06
3.93
3.74
3.65
3.47
3.46
3.35
2.98
2.88
2.74
2.72
2.66
2.59
2.50
2.31
2.03
1.86
1.62
1.50
1.44
1.34
1.24
1.20
1.09
0.79
0.65
0.66
0.45
23.24
23.05
22.91
21.07
20.55
19.44
18.78
18.59
18.27
18.21
17.00
16.71
16.41
16.15
15.95
15.62
15.26
14.94
14.56
14.40
14.33
14.26
14.05
14.00
13.91
13.86
13.51
13.42
13.29
13.03
12.94

FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Acetone	0.40	507	tr	0.45*	784	tr
Isovaleral	0.60	643	0.02	0.66	886	0.02
2-Methylbutyral	0.63	654	0.03	0.65	880	0.03
2-Ethylfuran	0.74	697	tr	0.79	919	tr
Heptane	0.76	704	tr			
Toluene	1.13	759	0.01	1.24	1000	tr
Methyl 2-methylbutyrate	1.24	775	tr	1.09	974	tr
Hexanal	1.41	801	0.01	1.62	1041	0.02
Octane	1.43	803	tr	0.45*	784	[tr]
Ethyl 2-methylbutyrate	1.97	850	0.17	1.44	1022	0.18
(3*Z*)-Hexenol	2.03	854	tr	5.43	1349	0.01
(2*E*)-Hexenol	2.14	864	tr	5.67	1367	0.01
Heptanal	2.59	902	0.01	2.72	1144	0.01
Santolinatriene	2.71	910	0.01	1.34	1012	0.01
α-Pinene	3.00	930	0.02	1.20	992	0.02
Camphene	3.19	943	0.02	1.50	1028	0.02
Propyl 2-methylbutyrate	3.26	947	0.07	2.31	1110	0.08
Benzaldehyde	3.32	952	0.01	6.90	1458	0.01
β-Pinene	3.60*	970	0.04	1.86	1065	0.01
Sabinene	3.60*	970	[0.04]	2.03	1083	0.02
6-Methyl-5-hepten-2-one	3.86	987	0.05	4.66	1297	0.05
2-Pentylfuran	3.92*	992	0.07	3.35	1196	0.05
Myrcene	3.92*	992	[0.07]	2.59	1134	0.02
Unknown [m/z 93, 91 (46), 80 (44), 79 (42), 77 (33), 92 (20)... 136 (4)]	3.98	996	0.01	2.74	1146	0.01
α-Phellandrene	4.06	1001	0.01	2.50	1126	0.02
Octanal	4.09	1004	0.05	4.06	1251	0.06
Yomogi alcohol	4.10	1004	0.05	5.83	1378	0.05
α-Terpinene	4.26	1014	0.01	2.66	1139	0.01
para-Cymene	4.38	1021	0.10	3.74	1226	0.11
Limonene	4.45*	1026	0.06	2.88	1157	0.05
1,8-Cineole	4.45*	1026	[0.06]	2.98	1166	0.02
(*Z*)-β-Ocimene	4.67	1040	0.07	3.46†	1205	0.23
(*E*)-β-Ocimene	4.82	1050	0.32	3.65	1219	0.33
γ-Terpinene	4.94	1057	0.14	3.47†	1206	[0.23]
Artemisia ketone	5.02	1062	0.38	4.86	1308	0.40
Octanol	5.24	1076	0.02	7.76	1523	0.04
Artemisia alcohol	5.38*	1085	0.11	7.10	1473	0.12
Terpinolene	5.38*	1085	[0.11]	3.93	1241	0.01
Linalool	5.64	1101	0.01	7.64	1514	0.02
Nonanal	5.66	1103	0.01	5.49	1354	0.08

Unknown [m/z 43, 81 (62), 59 (60), 85 (49), 82 (38)... 154 (2)]	5.92	1119	0.02			
Camphor	6.19	1137	0.01	6.75	1446	0.01
Borneol	6.57	1162	0.06	9.37*	1651	1.23
Artemisyl acetate	6.68	1169	0.02	5.99	1390	0.02
Terpinen-4-ol	6.76	1174	0.03	8.24	1560	0.03
α-Terpineol	7.01	1191	0.07	9.37*	1651	[1.23]
Safranal	7.08	1195	0.02	8.45	1577	0.03
trans-Carveol	7.42	1217	0.01	10.94	1783	0.01
Citronellol	7.65	1233	0.01	10.36	1734	0.02
Carvone	7.71	1238	0.03	9.64*	1674	0.97
(2*E*)-Hexenyl isovalerate	7.75	1240	0.05	6.87	1456	0.04
Hexyl isovalerate	7.79	1243	0.02	6.39	1420	0.01
Geraniol	8.03	1259	0.01	11.29	1814	0.01
α-Ionene	8.11	1265	0.01	6.44	1424	0.01
(*E*)-4,8-Dimethylnona-3,8-dien-2-one	8.28	1276	0.04	8.82	1606	0.03
trans-Chrysanthemyl acetate	8.44	1288	0.07	8.15	1553	0.06
Lavandulyl acetate	8.58	1297	0.03	8.34	1568	0.01
(2*E*,4*E*)-Decadienal	8.83	1311	0.01	10.84	1775	0.01
Bicycloelemene	9.15	1334	0.03	6.69	1442	0.03
α-Longipinene	9.30	1344	0.02	6.41	1421	0.02
Dehydro-ar-ionene	9.32	1345	0.02			
Eugenol	9.44	1354	0.02	14.33*	2100	4.56
α-Copaene	9.69	1371	0.05	6.79	1450	0.05
α-Isocomene	9.80	1379	0.09	7.22	1482	0.07
Capric acid	9.87†	1384	1.19	15.62	2233	1.27
β-Elemene	9.94†	1389	[1.19]	8.01	1542	0.07
β-Isocomene	10.04	1396	0.02	7.67	1516	0.03
β-Caryophyllene	10.26	1412	0.10	8.04	1545	0.08
β-Copaene	10.40	1423	0.03	7.96	1539	0.02
Aromadendrene	10.52	1432	0.07	8.12	1551	0.02
Striatene?	10.66	1442	0.03			
α-Humulene	10.72	1447	0.03	8.92	1614	0.03
allo-Aromadendrene	10.81	1454	0.12	8.59	1588	0.11
(*E*)-β-Farnesene	10.92	1462	15.16	9.22	1639	15.33
Dehydrosesquicineole	11.01*	1468	0.19	9.64*	1674	[0.97]
Precocene I	11.01*	1468	[0.19]	13.42	2011	0.10
Germacrene D	11.10	1476	1.25	9.37*	1651	[1.23]
β-Selinene	11.16*	1480	0.35	9.45	1658	0.15
ar-Curcumene	11.16*	1480	[0.35]	10.24	1723	0.06
α-Selinene	11.31*	1491	0.89	9.54	1664	0.06
Bicyclogermacrene	11.31*	1491	[0.89]	9.64*	1674	[0.97]
Viridiflorene	11.31*	1491	[0.89]	9.25	1641	0.10
α-Zingiberene	11.36	1494	0.06	9.75	1682	0.09
α-Muurolene	11.39*	1497	0.20	9.64*	1674	[0.97]
(3*Z*,6*E*)-α-Farnesene	11.39*	1497	[0.20]	9.88	1693	0.08
γ-Cadinene	11.55*	1509	1.57	9.97	1700	0.15

3,6-Dihydrochamazulene	11.55*	1509	[1.57]	11.65*	1846	0.83
(3*E*,6*E*)-α-Farnesene	11.55*	1509	[1.57]	10.11	1712	0.68
Dihydrochamazulene isomer I	11.60	1513	0.19	11.65*	1846	[0.83]
β-Sesquiphellandrene	11.69*	1520	0.29	10.21	1721	0.04
δ-Cadinene	11.69*	1520	[0.29]	10.00	1703	0.21
Unknown [m/z 93, 91 (59), 43 (55), 79 (49), 105 (40)... 220? (t)]	11.78	1527	0.04	13.03	1974	0.04
(*E*)-α-Bisabolene	11.97	1542	0.03	10.31	1730	0.02
Salviadienol?	12.06	1549	0.04	13.86	2054	0.10
Sesquirosefuran?	12.13	1555	0.09	11.65*	1846	[0.83]
(*E*)-Nerolidol	12.25	1565	0.22	13.51*	2020	0.30
Spathulenol	12.33	1571	0.71	13.91*	2059	1.14
Dendrolasin	12.36*	1573	0.22	12.09	1886	0.18
Caryophyllene oxide	12.36*	1573	[0.22]	12.36	1910	0.08
Globulol	12.41	1577	0.12	13.51*	2020	[0.30]
Unknown [m/z 109, 43 (95), 81 (81), 93 (76), 69 (75), 95 (74), 107 (71)... 204 (22), 220 (6)]	12.44	1579	0.11			
Viridiflorol	12.51	1585	0.15	13.51*	2020	[0.30]
Ledol	12.64	1595	0.11	12.94	1966	0.12
5,6-Dihydrochamazulene	12.81	1609	0.19	14.05	2073	0.11
(2,7*Z*)-Bisaboladien-4-ol	12.92	1618	0.23	14.33*	2100	[4.56]
τ-Cadinol	13.14*	1636	0.72	14.40	2108	0.69
τ-Muurolol	13.14*	1636	[0.72]	14.56	2124	0.08
α-Bisabolol oxide B, epimer 1	13.26	1646	0.30	13.91*	2059	[1.14]
α-Bisabolol oxide B, epimer 2	13.33	1652	5.22	14.00	2068	4.80
Ageratochromene	13.38	1656	0.33	16.41	2319	0.47
epi-β-Bisabolol	13.41	1659	0.17	14.33*	2100	[4.56]
Bisabolone oxide A	13.65	1678	4.22	14.33*	2100	[4.56]
α-Bisabolol	13.69	1682	1.38	14.94	2162	1.28
(2*E*,6*Z*)-Farnesol	13.84	1694	0.03	15.95	2269	0.09
Chamazulene	14.13	1719	2.53	16.15*	2290	2.77
α-Bisabolol oxide A	14.46	1748	39.19	16.71	2352	39.48
Benzyl benzoate	14.52	1752	0.11	18.27	2530	0.03
α-Costol?	14.73	1772	0.28			
Phytone	15.59	1848	0.31	14.26	2093	0.27
(*Z*)-Spiroether	15.88	1874	5.16	20.55	2815	4.60
(*E*)-Spiroether	16.01	1886	0.64			
(*Z*)-Tibetin spiroether	16.25	1908	0.04			
(*E*)-Tibetin spiroether	16.58	1940	0.16			
Palmitic acid	16.94	1974	1.59	21.08	2884	1.64
Eicosane	17.27	2005	0.04	13.29	1999	0.03
Phytol	18.36	2115	0.14	18.59	2569	0.16

Linoleic acid	18.58	2138	0.51	23.24	3188	0.53
Oleic acid	18.64*	2144	0.62	22.91	3139	0.35
cis-Vaccenic acid?	18.64*	2144	[0.62]	23.05	3160	0.02
(9*Z*)-18-Octadecenolide?	18.90	2170	0.30			
Docosane	19.24	2205	0.04	15.26	2195	0.03
Tricosane	20.17	2306	0.42	16.15*	2290	[2.77]
Tetracosane	21.05	2406	0.14	17.00	2384	0.18
Pentacosane	21.92	2507	1.14	18.21	2523	1.17
Hexacosane	22.74	2606	0.06	18.78	2592	0.17
Heptacosane	23.54	2707	0.26	19.44	2672	0.20
Unknown [m/z 69, 41 (41), 81 (41), 91 (22), 165 (22), 136 (20)...]	24.31	2807	0.02			
Unknown [m/z 69, 41 (46), 81 (31), 165 (29), 91 (20), 181 (18), 167 (15)...]	24.36	2813	0.01			
Unknown [m/z 69, 41 (42), 81 (31), 165 (25), 91 (18), 93 (15), 181 (15)...]	24.58	2843	0.02			
Total identified		**92.51%**			**89.92%**	
Total reported		**92.74%**			**89.97%**	

*: 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