

Date : February 22, 2021

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 21B15-PTH03

Customer identification : Cedarwood Atlas - Morocco - C61105812R

Type : Essential oil

Source : *Cedrus atlantica*

Customer : Plant Therapy

ANALYSIS

Method: PC-MAT-014  - 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 : February 18, 2021

Checked and approved by :

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

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PHYSICOCHEMICAL DATA

Physical aspect: Light yellow viscous liquid

Refractive index: 1.5130 ± 0.0003 (20 °C; method PC-MAT-016)

CONCLUSION

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

ANALYSIS SUMMARY – CONSOLIDATED CONTENTS

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

Identification	%	Class
Mesityl oxide	0.08	Aliphatic ketone
α -Pinene	0.03	Monoterpene
3-Methyl-3-cyclohexenone	0.01	Aliphatic ketone
6-Methyl-5-hepten-2-one	tr	Aliphatic ketone
Myrcene	tr	Monoterpene
para-Cymene	tr	Monoterpene
Limonene	0.02	Monoterpene
Terpinolene	0.01	Monoterpene
para-Cymenene	0.02	Monoterpene
Phenylethyl alcohol	0.01	Simple phenolic
Limona ketone	1.32	Normonoterpenic ketone
$\alpha,4$ -Dimethyl-3-cyclohexene-1-methanol	0.09	Normonoterpenic alcohol
$\alpha,4$ -Dimethyl-3-cyclohexene-1-methanol epimer	0.11	Normonoterpenic alcohol
4-Methylacetophenone	0.21	Simple phenolic
Unknown	0.01	Unknown
α -Longipinene	0.11	Sesquiterpene
Longicyclene	0.01	Sesquiterpene
α -Ylangene	0.08	Sesquiterpene
Unknown	0.47	Sesquiterpene
Sativene	0.04	Sesquiterpene
Unknown	0.75	Sesquiterpene
β -Elemene	0.11	Sesquiterpene
Longifolene	0.62	Sesquiterpene
Sibirene	0.83	Sesquiterpene
α -Cedrene	0.23	Sesquiterpene
(Z?)-Vestitenone, or analog	0.08	Terpenic ketone
β -Caryophyllene	0.10	Sesquiterpene
Himachala-2,4-diene	0.55	Sesquiterpene
Unknown	0.01	Sesquiterpene
Unknown	0.16	Sesquiterpene
<i>trans</i> - α -Bergamotene	0.05	Sesquiterpene
Himachala-2,4-diene isomer	0.20	Sesquiterpene
α -Himachalene	15.11	Sesquiterpene
(E)-Vestitenone	0.47	Terpenic ketone
α -Humulene	0.07	Sesquiterpene
Unknown	0.86	Sesquiterpene
Unknown	0.64	Sesquiterpene
Unknown	0.47	Sesquiterpene
γ -Himachalene	9.27	Sesquiterpene
11- α H-Himachala-1,4-diene	1.85	Sesquiterpene
Unknown	0.41	Sesquiterpenic ether
α -Muurolene	0.21	Sesquiterpene
(Z)- α -Bisabolene	0.02	Sesquiterpene
Cycloisolongifol-5-ol	0.22	Sesquiterpenic alcohol

β-Himachalene	36.50	Sesquiterpene
α-Dehydro-ar-himachalene	2.17	Sesquiterpene
γ-Cadinene	0.07	Sesquiterpene
δ-Cadinene	1.98	Sesquiterpene
γ-Dehydro-ar-himachalene	1.96	Sesquiterpene
Unknown	1.54	Sesquiterpene
<i>trans</i> -Calamenene	0.10	Sesquiterpene
Unknown	0.21	Sesquiterpene
ar-Himachalene	0.68	Sesquiterpene
α-Calacorene	0.72	Sesquiterpene
(<i>E</i>)-α-Bisabolene	0.76	Sesquiterpene
Unknown	0.20	Oxygenated sesquiterpene
(<i>E</i>)-Nerolidol	0.12	Sesquiterpenic alcohol
Himachalene epoxide	0.77	Sesquiterpenic ether
Unknown	0.19	Oxygenated sesquiterpene
Longiborneol	0.39	Sesquiterpenic alcohol
β-Himachalene oxide	0.52	Sesquiterpenic ether
Unknown	0.75	Oxygenated sesquiterpene
Unknown	0.19	Oxygenated sesquiterpene
1-epi-Cubenol	0.72	Sesquiterpenic alcohol
6-Methyl-6-meta-tolyl-heptan-2-one	0.01	Miscellaneous
Unknown	0.20	Oxygenated sesquiterpene
Unknown	0.09	Oxygenated sesquiterpene
Himachalol	0.87	Sesquiterpenic alcohol
Allohimachalol	0.73	Sesquiterpenic alcohol
β-Atlantone	0.04	Sesquiterpenic ketone
(<i>E</i>)-10,11-Dihydroatlantone	0.21	Sesquiterpenic ketone
(<i>Z</i>)-γ-Atlantone	0.65	Sesquiterpenic ketone
Deodarone epimer I	0.61	Sesquiterpenic ketone
Deodarone epimer II	0.71	Sesquiterpenic ketone
(<i>E</i>)-γ-Atlantone	0.82	Sesquiterpenic ketone
(<i>Z</i>)-α-Atlantone	0.61	Sesquiterpenic ketone
Unknown	0.08	Oxygenated sesquiterpene
Unknown	0.04	Oxygenated sesquiterpene
Unknown	0.04	Oxygenated sesquiterpene
Unknown	0.05	Oxygenated sesquiterpene
Unknown	0.09	Oxygenated sesquiterpene
Unknown	0.01	Oxygenated sesquiterpene
(<i>E</i>)-α-Atlantone	2.87	Sesquiterpenic ketone
Unknown	0.18	Oxygenated sesquiterpene
Unknown	0.02	Oxygenated sesquiterpene
Unknown	0.02	Oxygenated sesquiterpene
Unknown	0.01	Oxygenated sesquiterpene
Consolidated total	95.40%	

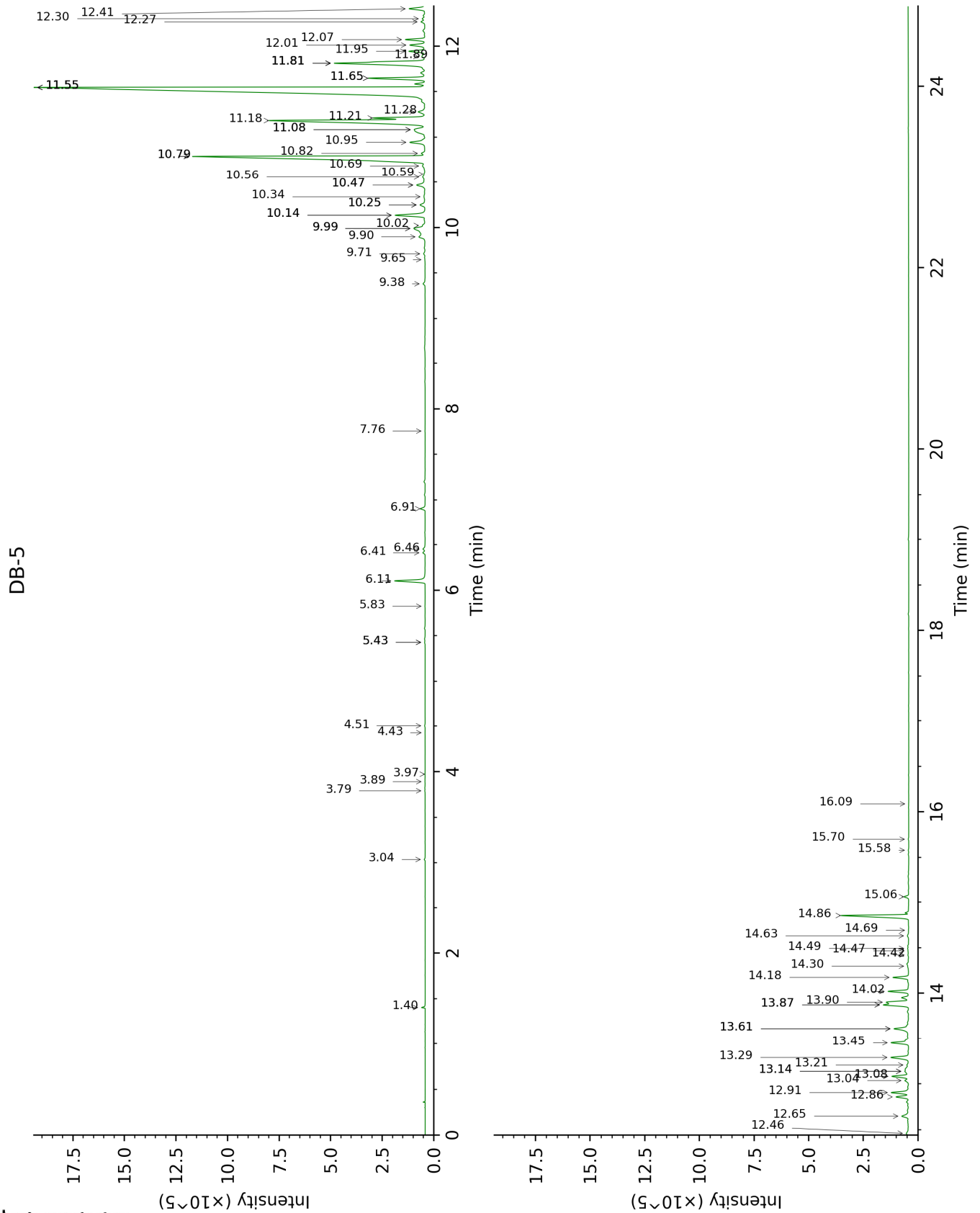
tr: The compound has been detected below 0.005% of total signal.

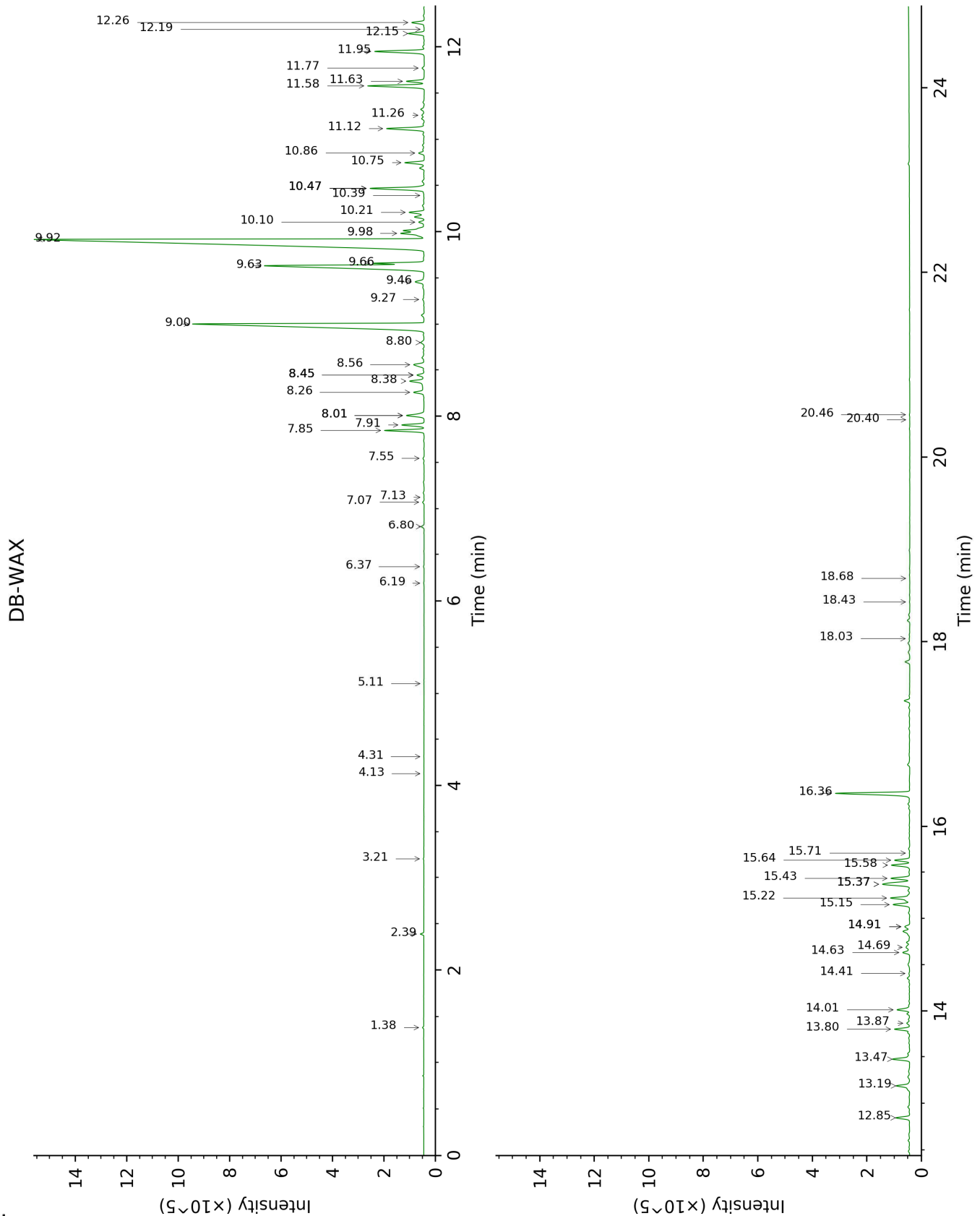
Note: no correction factor was applied

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.

This page was intentionally left blank. The following pages present the complete data of the analysis.





FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Mesityl oxide	1.40	801	0.08	2.39	1094	0.09
α-Pinene	3.04	930	0.03	1.38	992	0.03
3-Methyl-3-cyclohexenone	3.79	980	0.01	6.19	1376	0.02
6-Methyl-5-hepten-2-one	3.89	986	tr	5.11	1298	0.01
Myrcene	3.97	992	tr			
para-Cymene	4.43	1021	tr	4.13	1227	0.01
Limonene	4.51	1026	0.02	3.21	1158	0.02
Terpinolene	5.43*	1084	0.02	4.31	1241	0.01
para-Cymenene	5.43*	1084	[0.02]	6.37	1389	0.02
Phenylethyl alcohol	5.83	1109	0.01	12.19	1854	0.01
Limona ketone	6.10	1127	1.32	7.85	1498	1.36
α,4-Dimethyl-3-cyclohexene-1-methanol	6.41	1147	0.09			
α,4-Dimethyl-3-cyclohexene-1-methanol epimer	6.46	1150	0.11			
4-Methylacetophenone	6.90	1179	0.21	10.47*	1706	2.26
Unknown [m/z 105, 145 (97), 160 (86), 119 (76), 91 (61)]	7.76	1237	0.01			
α-Longipinene	9.38	1345	0.11	6.80	1421	0.10
Longicyclene	9.65	1363	0.01	7.13	1444	0.01
α-Ylangene	9.71	1368	0.08	7.07	1441	0.06
Unknown epimer I [m/z 131, 146 (36), 91 (22), 145 (19), 202 (18)]	9.90	1381	0.47	8.26	1530	0.51
Sativene	9.99*	1387	1.06	7.55	1476	0.04
Unknown epimer II [m/z 131, 146 (33), 91 (20), 202 (18)]	9.99*	1387	[1.06]	8.38	1539	0.75
β-Elemene	10.02	1390	0.11	8.44*	1544	0.30
Longifolene	10.14*	1398	1.45	8.01*	1511	0.85
Sibirene	10.14*	1398	[1.45]	7.91	1503	0.83
α-Cedrene	10.25*	1406	0.31	8.01*	1511	[0.85]
(Z?)-Vestitenone, or analog	10.25*	1406	[0.31]	11.77	1817	0.08
β-Caryophyllene	10.34	1412	0.10	8.44*	1544	[0.30]
Himachala-2,4-diene	10.47*	1422	0.56	8.56	1553	0.55
Unknown [m/z 91, 93 (90), 105 (72), 202 (71), 131 (68), 77 (63), 107 (55), 187 (54)]	10.47*	1422	[0.56]			

Unknown [m/z 105, 91 (70), 93 (65), 43 (61), 120 (57), 145 (50)... 204 (6)]	10.56	1429	0.16			
<i>trans</i> - α -Bergamotene	10.59	1431	0.05	8.44*	1544	[0.30]
Himachala-2,4-diene isomer	10.68	1438	0.20	8.80	1572	0.16
α -Himachalene	10.79*†	1446	15.60	9.00	1588	15.11
(<i>E</i>)-Vestitenone	10.79*†	1446	[15.60]	12.26	1860	0.47
α -Humulene	10.82†	1448	[15.60]	9.27	1609	0.07
Unknown [m/z 187, 131 (78), 202 (76), 105 (74), 91 (74), 117 (53), 145 (52)]	10.94	1457	0.86	9.98	1666	1.90
Unknown [m/z 131, 202 (78), 91 (74), 105 (68), 187 (68), 119 (53), 145 (52)]	11.08*	1468	1.11			
Unknown [m/z 119, 91 (85), 93 (77), 105 (76), 79 (61), 134 (60), 94 (49), 204 (46)]	11.08*	1468	[1.11]	9.46	1624	0.47
γ -Himachalene	11.18	1475	9.27	9.63	1638	9.18
11- α H-Himachala-1,4-diene	11.21	1477	1.85	9.66	1640	1.41
Unknown [m/z 137, 43 (84), 138 (63), 109 (53), 95 (51), 93 (50), 207 (46)... 222 (21)]	11.28	1482	0.41	10.21	1684	0.59
α -Muurolene	11.55*	1502	36.77	10.10	1676	0.21
(<i>Z</i>)- α -Bisabolene	11.55*	1502	[36.77]	10.39	1700	0.02
Cycloisolongifol-5-ol	11.55*	1502	[36.77]	10.86	1739	0.22
β -Himachalene	11.55*	1502	[36.77]	9.92	1661	36.50
α -Dehydro-ar-himachalene	11.65*	1510	2.25	11.58	1800	2.17
γ -Cadinene	11.65*	1510	[2.25]	10.47*	1706	[2.26]
δ -Cadinene	11.81*†	1523	5.69	10.47*	1706	[2.26]
γ -Dehydro-ar-himachalene	11.81*†	1523	[5.69]	11.95	1833	1.96
Unknown [m/z 131, 202 (28), 91 (22), 159 (16), 145 (16), 132 (15), 115 (14)]	11.81*†	1523	[5.69]	11.12	1761	1.54
<i>trans</i> -Calamenene	11.81*†	1523	[5.69]	11.26	1773	0.10
Unknown [m/z 93, 187 (70), 145 (59), 119 (42), 131 (39), 202 (33)]	11.89	1529	0.21			
ar-Himachalene	11.94	1533	0.68	11.63	1805	0.65
α -Calacorene	12.01	1539	0.72	12.15	1850	0.61
(<i>E</i>)- α -Bisabolene	12.07	1543	0.76	10.75	1730	0.70

Unknown [m/z 189, 91 (85), 43 (74), 105 (67), 133 (66), 107 (63), 135 (52)... 220 (20)]	12.27	1559	0.20	14.01	2021	0.50
(E)-Nerolidol	12.30	1561	0.12	13.87	2007	0.12
Himachalene epoxide	12.41	1570	0.77	12.85	1913	0.51
Unknown [m/z 177, 202 (79), 91 (76), 159 (75), 43 (65), 107 (59), 105 (57)...]	12.46	1574	0.19	14.41	2058	0.03
Longiborneol	12.65	1588	0.39	14.63	2080	0.29
β-Himachalene oxide	12.86	1605	0.52	13.19	1944	0.58
Unknown [m/z 138, 110 (77), 137 (75), 107 (62), 91 (61), 93 (60), 109 (57)... 220 (34)]	12.91	1609	0.75	13.48	1970	0.70
Unknown [m/z 137, 119 (69), 43 (51), 95 (50), 109 (40)... 222 (1)]	13.04	1620	0.19	14.91*	2107	0.23
1-epi-Cubenol	13.08	1623	0.72	13.80	2001	0.56
6-Methyl-6-metatolyl-heptan-2-one	13.14*	1628	0.22	15.71	2187	0.01
Unknown [m/z 119, 163 (80), 107 (64), 95 (61), 93 (57), 91 (53)... 220 (11)]	13.14*	1628	[0.22]			
Unknown [m/z 119, 91 (44), 94 (36), 107 (35), 93 (29)... 202 (19)...]	13.21	1634	0.09			
Himachalol	13.29	1640	0.87	15.22	2138	0.88
Allohimachalol	13.45	1654	0.73	15.58	2174	0.69
β-Atlantone	13.61*	1667	0.80	14.91*	2107	[0.23]
(E)-10,11-Dihydroatlantone	13.61*	1667	[0.80]	14.69	2085	0.21
(Z)-γ-Atlantone	13.87*†	1689	2.06	15.15	2131	0.65
Deodarone epimer I	13.87*†	1689	[2.06]	15.37*	2153	1.43
Deodarone epimer II	13.90†	1691	[2.06]	15.43	2159	0.71
(E)-γ-Atlantone	14.02	1701	0.82	15.37*	2153	[1.43]
(Z)-α-Atlantone	14.18	1714	0.61	15.64	2179	0.56
Unknown [m/z 105, 119 (89), 59 (68), 120 (65), 43 (65), 93 (62), 121 (61)...]	14.30	1725	0.08			
Unknown [m/z 91, 79 (83), 105 (68), 109 (63), 41 (59), 93 (58), 107 (57)...]	14.42	1735	0.04	18.03	2433	0.03

Unknown [m/z 83, 91 (28), 105 (25), 55 (21), 43 (17), 119 (17)...]	14.47	1739	0.04			
Unknown [m/z 43, 105 (99), 119 (90), 91 (87), 147 (76), 41 (69), 93 (63)...]	14.49	1742	0.05			
Unknown [m/z 83, 55 (17), 91 (14), 105 (9), 216 (6)...]	14.63	1754	0.09			
Unknown [m/z 91, 105 (74), 93 (67), 79 (59), 133 (54), 41 (47), 107 (46)...]	14.69	1759	0.01	18.43	2476	0.01
(E)- α -Atlantone	14.86	1773	2.87	16.36	2253	2.86
Unknown [m/z 95, 43 (59), 69, (57), 67 (43), 163 (42), 94 (37), 107 (37)... 178 (26), 218 (2)]	15.06	1791	0.18			
Unknown [m/z 83, 134 (28), 119 (19), 55 (18), 91 (14), 43 (11), 109 (10)... 216 (4), 249? (0)]	15.58	1837	0.02	20.40	2707	0.01
Unknown [m/z 83, 134 (30), 119 (19), 55 (18), 91 (12)... 216 (4)...]	15.70	1848	0.02	20.46	2714	0.02
Unknown [m/z 173, 83 (83), 91 (80), 201 (79), 115 (65)... 216 (31)]	16.09	1883	0.01	18.68	2506	0.01
Total identified		92.13%			86.46%	
Total reported		96.20%			93.52%	

*: 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