Date : August 31, 2021

Certificate of Analysis – GC Profiling

Sample identification

Internal code : 21H27-PTH01
Customer identification : Cedarwood Atlas Organic - Morocco - C60106214R
Type : Essential oil
Source : *Cedrus atlantica*
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 : Sarah-Eve Tremblay, M. Sc. A., Chimiste
Analysis date : August 30, 2021

Checked and approved by :

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

Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia. This report is digitally signed, it is only considered valid if the digital signature is intact. The results only describe the samples that were submitted to the assays.

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PHYSICOCHEMICAL DATA

Physical aspect: Light yellow 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.

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Analysis summary – Consolidated contents

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

Identification	%	Class
Mesityl oxide	0.04	Aliphatic ketone
α-Pinene	0.04	Monoterpene
Camphene	0.01	Monoterpene
3-Methyl-3-cyclohexenone	0.01	Aliphatic ketone
Myrcene	tr	Monoterpene
para-Cymene	tr	Monoterpene
Limonene	0.02	Monoterpene
para-Cymenene	0.01	Monoterpene
Terpinolene	tr	Monoterpene
Phenylethyl alcohol	0.01	Simple phenolic
Limona ketone	0.38	Normonoterpenic ketone
4-Hydroxy-4-methylcyclohex-2-enone	0.01	Aliphatic alcohol
α,4-Dimethyl-3-cyclohexene-1-methanol	0.02	Normonoterpenic alcohol
α,4-Dimethyl-3-cyclohexene-1-methanol epimer	0.02	Normonoterpenic alcohol
Borneol	0.02	Monoterpenic alcohol
Terpinen-4-ol	tr	Monoterpenic alcohol
4-Methylacetophenone	0.10	Simple phenolic
α-Terpineol	0.05	Monoterpenic alcohol
Unknown	0.01	Unknown
α-Longipinene	0.10	Sesquiterpene
Longicyclene	0.01	Sesquiterpene
α-Ylangene	0.08	Sesquiterpene
α-Copaene	0.02	Sesquiterpene
Unknown	0.24	Sesquiterpene
(3*Z*)-Hexenyl (3*Z*)-hexenoate	0.16	Aliphatic ester
Unknown	0.55	Sesquiterpene
Sativene	0.04	Sesquiterpene
Longifolene	0.65	Sesquiterpene
Sibirene	0.62	Sesquiterpene
α-Cedrene	0.05	Sesquiterpene
(*Z*?)-Vestitenone, or analog	0.10	Terpenic ketone
Unknown	0.02	Unknown
β-Cedrene	0.01	Sesquiterpene
β-Caryophyllene	0.01	Sesquiterpene
Himachala-2,4-diene	0.49	Sesquiterpene
Unknown	0.02	Sesquiterpene
Unknown	0.05	Sesquiterpene
Himachala-2,4-diene isomer	0.17	Sesquiterpene
(*E*)-Vestitenone	0.45	Terpenic ketone
α-Himachalene	16.00	Sesquiterpene
α-Humulene	0.06	Sesquiterpene
Unknown	0.33	Sesquiterpene
(*E*)-β-Farnesene	0.20	Sesquiterpene
Unknown	0.52	Sesquiterpene

Unknown	0.22	Sesquiterpene
γ-Himachalene	9.72	Sesquiterpene
11-αH-Himachala-1,4-diene	1.97	Sesquiterpene
Unknown	0.31	Sesquiterpenic ether
α-Muurolene	0.20	Sesquiterpene
(*Z*)-α-Bisabolene	0.02	Sesquiterpene
β-Himachalene	40.95	Sesquiterpene
Cycloisolongifol-5-ol	0.41	Sesquiterpenic alcohol
α-Dehydro-ar-himachalene	1.60	Sesquiterpene
Unknown	0.10	Sesquiterpene
γ-Cadinene	tr	Sesquiterpene
trans-Calamenene	0.07	Sesquiterpene
δ-Cadinene	1.81	Sesquiterpene
Unknown	1.43	Sesquiterpene
γ-Dehydro-ar-himachalene	1.53	Sesquiterpene
10-epi-Cubebol?	0.15	Sesquiterpenic alcohol
ar-Himachalene	0.41	Sesquiterpene
α-Calacorene	0.59	Sesquiterpene
(*E*)-α-Bisabolene	0.44	Sesquiterpene
Unknown	0.12	Oxygenated sesquiterpene
Unknown	0.08	Unknown
Himachalene epoxide	0.47	Sesquiterpenic ether
Unknown	0.11	Oxygenated sesquiterpene
Longiborneol	0.41	Sesquiterpenic alcohol
β-Himachalene oxide	0.33	Sesquiterpenic ether
Unknown	1.04	Oxygenated sesquiterpene
Unknown	0.17	Oxygenated sesquiterpene
1-epi-Cubenol	0.78	Sesquiterpenic alcohol
6-Methyl-6-meta-tolyl-heptan-2-one	0.07	Miscellanous
Unknown	0.21	Oxygenated sesquiterpene
Unknown	0.04	Oxygenated sesquiterpene
Himachalol	0.60	Sesquiterpenic alcohol
Allohimachalol	0.92	Sesquiterpenic alcohol
(*E*)-10,11-Dihydroatlantone	0.45	Sesquiterpenic ketone
Deodarone epimer I	2.48	Sesquiterpenic ketone
Deodarone epimer II	0.10	Sesquiterpenic ketone
(*E*)-γ-Atlantone	0.93	Sesquiterpenic ketone
(*Z*)-α-Atlantone	0.65	Sesquiterpenic ketone
Unknown	0.15	Oxygenated sesquiterpene
Unknown	0.01	Oxygenated sesquiterpene
Unknown	0.04	Oxygenated sesquiterpene
Unknown	0.04	Oxygenated sesquiterpene
Unknown	0.08	Oxygenated sesquiterpene
Unknown	0.01	Oxygenated sesquiterpene
(*E*)-α-Atlantone	2.74	Sesquiterpenic ketone
Unknown	0.18	Oxygenated sesquiterpene
Unknown	0.01	Oxygenated sesquiterpene
Unknown	0.01	Oxygenated sesquiterpene
Unknown	0.01	Oxygenated sesquiterpene
Consolidated total	**96.90%**	

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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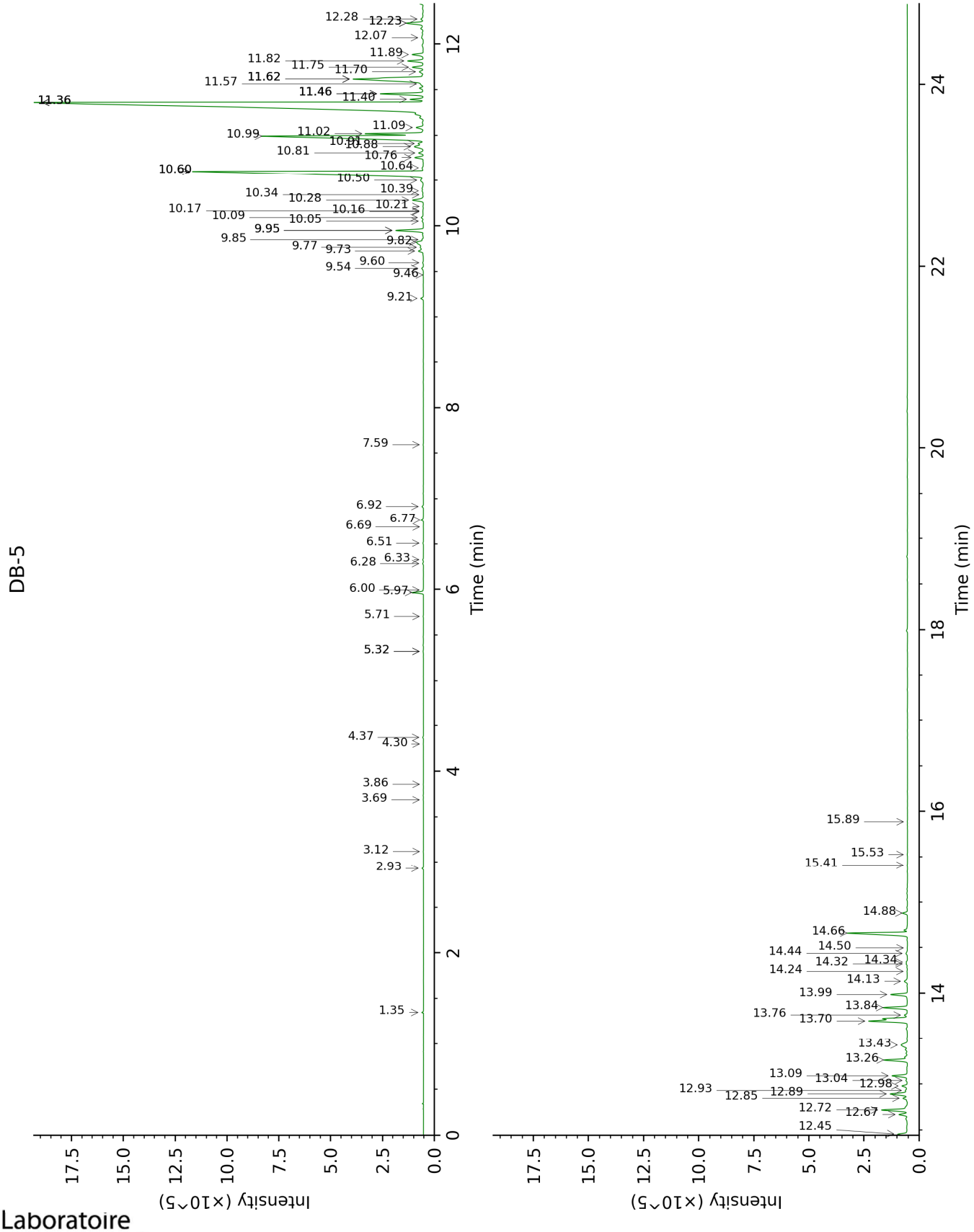
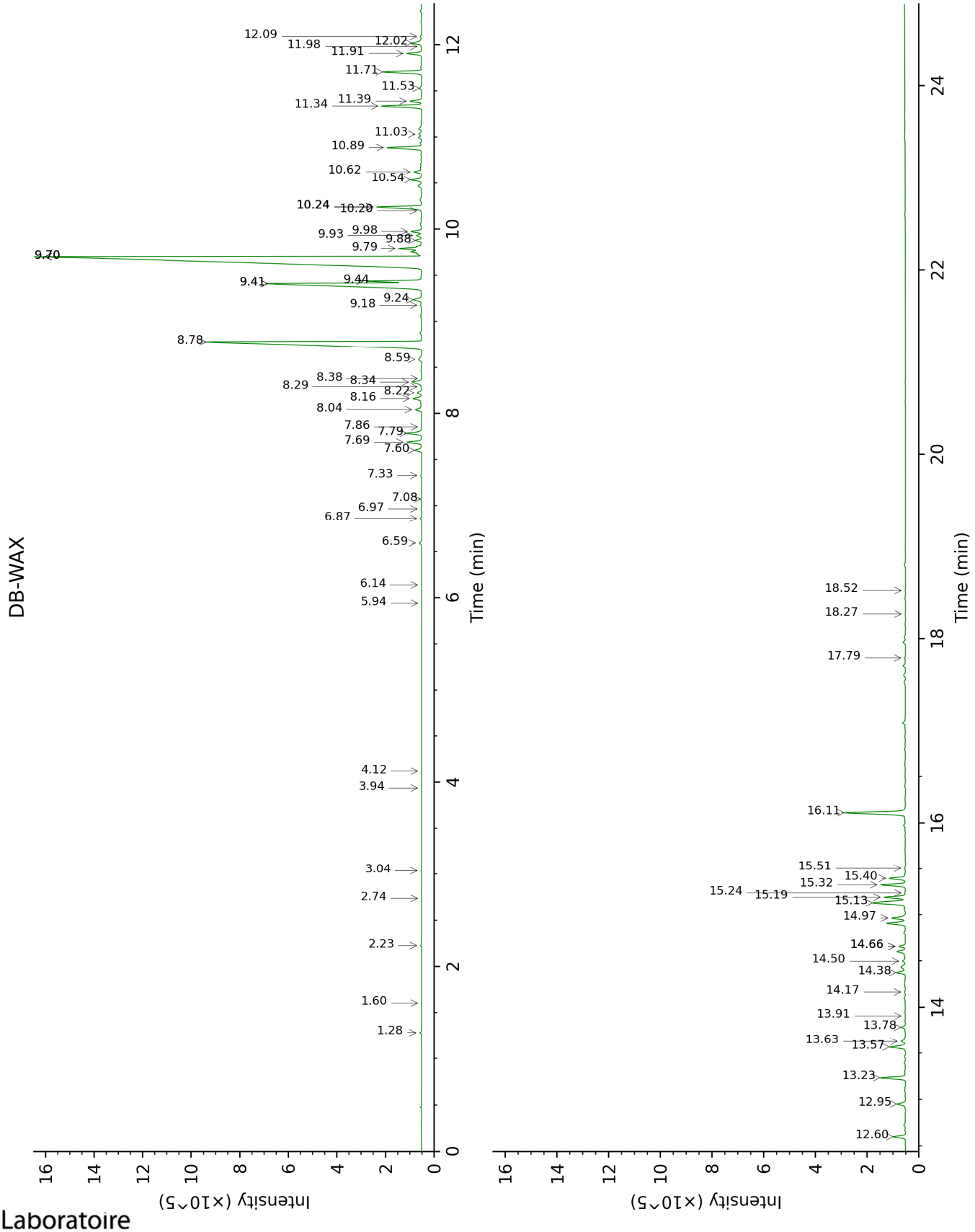

DB-5
Time (min)
Intensity (×10^5)
12.28
12.23
12.07
11.89
11.82
11.75
11.70
11.57
11.62
11.46
11.40
11.36
11.09
10.99
11.02
10.81
10.88
10.76
10.64
10.60
10.50
10.39
10.34
10.28
10.21
10.17
10.16
10.09
10.05
9.95
9.85
9.82
9.77
9.73
9.60
9.54
9.46
9.21
7.59
6.92
6.77
6.69
6.51
6.33
6.28
6.00
5.97
5.71
5.32
4.37
4.30
3.86
3.69
3.12
2.93
1.35
15.89
15.53
15.41
14.88
14.66
14.50
14.44
14.32
14.34
14.24
14.13
13.99
13.84
13.76
13.70
13.43
13.26
13.09
13.04
12.98
12.93
12.89
12.85
12.72
12.67
12.45


DB-WAX
12.09
11.98
12.02
11.91
11.71
11.53
11.34
11.39
11.03
10.89
10.62
10.54
10.24
10.20
9.93
9.98
9.88
9.79
9.70
9.41
9.44
9.18
9.24
8.78
8.59
8.29
8.38
8.34
8.22
8.16
8.04
7.86
7.79
7.69
7.60
7.33
7.08
6.97
6.87
6.59
6.14
5.94
4.12
3.94
3.04
2.74
2.23
1.60
1.28
Time (min)
Intensity (×10^5)
18.52
18.27
17.79
16.11
15.51
15.40
15.32
15.24
15.19
15.13
14.97
14.66
14.50
14.38
14.17
13.91
13.78
13.63
13.57
13.23
12.95
12.60
Time (min)
Intensity (×10^5)

FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Mesityl oxide	1.35	798	0.04	2.23	1089	0.03
α-Pinene	2.93	930	0.04	1.28	990	0.04
Camphene	3.12	943	0.01	1.60	1026	tr
3-Methyl-3-cyclohexenone	3.69	981	0.01	5.94	1369	tr
Myrcene	3.86	993	tr	2.74	1132	tr
para-Cymene	4.30	1022	tr	3.94	1227	tr
Limonene	4.37	1026	0.02	3.04	1156	0.02
para-Cymenene	5.32*	1086	0.01	6.14	1384	0.01
Terpinolene	5.32*	1086	[0.01]	4.12	1241	tr
Phenylethyl alcohol	5.70	1111	0.01	11.98	1853	0.01
Limona ketone	5.97	1128	0.38	7.60	1492	0.31
4-Hydroxy-4-methylcyclohex-2-enone	6.00	1129	0.01	13.91	2030	0.01
α,4-Dimethyl-3-cyclohexene-1-methanol	6.28	1148	0.02			
α,4-Dimethyl-3-cyclohexene-1-methanol epimer	6.33	1151	0.02			
Borneol	6.51	1162	0.02	9.70*	1658	41.02
Terpinen-4-ol	6.69	1174	tr	8.38	1552	tr
4-Methylacetophenone	6.77	1179	0.10	10.24*	1702	1.83
α-Terpineol	6.92	1188	0.05	9.70*	1658	[41.02]
Unknown [m/z 105, 145 (97), 160 (86), 119 (76), 91 (61)]	7.60	1233	0.01			
α-Longipinene	9.21	1344	0.10	6.59	1417	0.10
Longicyclene	9.46	1362	0.01	6.97	1445	0.02
α-Ylangene	9.54	1367	0.08	6.86	1437	0.04
α-Copaene	9.60	1371	0.02	7.08	1453	0.03
Unknown epimer I [m/z 131, 146 (36), 91 (22), 145 (19), 202 (18)]	9.73	1380	0.24	8.04	1526	0.29
(3*Z*)-Hexenyl (3*Z*)-hexenoate	9.77	1383	0.16	9.93	1677	0.19
Unknown epimer II [m/z 131, 146 (33), 91 (20), 202 (18)]	9.82	1387	0.55	8.16	1536	0.39
Sativene	9.85	1389	0.04	7.33	1472	0.04
Longifolene	9.95*	1396	1.14	7.79	1507	0.65
Sibirene	9.95*	1396	[1.14]	7.69	1499	0.62
α-Cedrene	10.05	1403	0.05	7.86	1512	0.01
(*Z*?)-Vestitenone, or analog	10.09	1406	0.10	11.53	1812	0.10

Unknown [m/z 105, 93 (61), 120 (55), 145 (54), 91 (52)...]	10.16	1411	0.02	12.09	1862	0.06
β-Cedrene	10.17	1412	0.01	8.22	1541	0.17
β-Caryophyllene	10.21	1415	0.01	8.29	1546	0.01
Himachala-2,4-diene	10.28	1421	0.49	8.34	1550	0.47
Unknown [m/z 91, 93 (90), 105 (72), 202 (71), 131 (68), 77 (63), 107 (55), 187 (54)]	10.34	1425	0.02			
Unknown [m/z 105, 91 (70), 93 (65), 43 (61), 120 (57), 145 (50)... 204 (6)]	10.39	1428	0.05			
Himachala-2,4-diene isomer	10.50	1437	0.17	8.59	1569	0.19
(*E*)-Vestitenone	10.60*	1444	16.54	12.02	1856	0.45
α-Himachalene	10.60*	1444	[16.54]	8.78	1584	16.00
α-Humulene	10.64	1447	0.06	9.18	1616	0.06
Unknown [m/z 187, 131 (78), 202 (76), 105 (74), 91 (74), 117 (53), 145 (52)]	10.76	1456	0.33	9.79	1665	0.76
(*E*)-β-Farnesene	10.81	1460	0.20	9.41*	1635	9.77
Unknown [m/z 119, 91 (85), 93 (77), 105 (76), 79 (61), 134 (60), 94 (49), 204 (46)]	10.88	1465	0.52	9.24	1620	0.40
Unknown [m/z 131, 202 (78), 91 (74), 105 (68), 187 (68), 119 (53), 145 (52)]	10.91	1467	0.22			
γ-Himachalene	10.99	1473	9.72	9.41*	1635	[9.77]
11-αH-Himachala-1,4-diene	11.02	1476	1.97	9.44	1637	1.68
Unknown [m/z 137, 43 (84), 138 (63), 109 (53), 95 (51), 93 (50), 207 (46)... 222 (21)]	11.09	1480	0.31	9.98	1680	0.38
α-Muurolene	11.36*	1501	41.51	9.88	1673	0.20
(*Z*)-α-Bisabolene	11.36*	1501	[41.51]	10.20	1699	0.02
β-Himachalene	11.36*	1501	[41.51]	9.70*	1658	[41.02]
Cycloisolongifol-5-ol	11.40	1504	0.41	10.62	1735	0.29
α-Dehydro-ar-himachalene	11.46*	1508	1.62	11.34	1796	1.60
Unknown [m/z 105, 119 (89), 91 (69), 159 (62), 131 (42), 93 (41), 202 (38)]	11.46*	1508	[1.62]			
γ-Cadinene	11.46*	1508	[1.62]	10.24*	1702	[1.83]
trans-Calamenene	11.57	1517	0.07	11.03	1770	0.11
δ-Cadinene	11.62*	1521	4.77	10.24*	1702	[1.83]

Unknown [m/z 131, 202 (28), 91 (22), 159 (16), 145 (16), 132 (15), 115 (14)]	11.62*	1521	[4.77]	10.89	1757	1.43
γ-Dehydro-ar-himachalene	11.62*	1521	[4.77]	11.71	1828	1.53
10-epi-Cubebol?	11.70	1527	0.15	13.63	2003	0.17
ar-Himachalene	11.75	1531	0.41	11.39	1800	0.43
α-Calacorene	11.82	1537	0.59	11.91	1846	0.58
(*E*)-α-Bisabolene	11.89	1542	0.44	10.54	1727	0.42
Unknown [m/z 189, 91 (85), 43 (74), 105 (67), 133 (66), 107 (63), 135 (52)... 220 (20)]	12.07	1557	0.12	13.78	2018	0.15
Unknown [m/z 96, 95 (18), 83 (15), 125 (13), 119 (12), 55 (12), 41 (11)... 218? (tr)]	12.23*	1569	0.78	14.66*	2103	0.25
Himachalene epoxide	12.23*	1569	[0.78]	12.60	1908	0.47
Unknown [m/z 177, 202 (79), 91 (76), 159 (75), 43 (65), 107 (59), 105 (57)...]	12.28	1573	0.11	14.17	2055	0.03
Longiborneol	12.45	1587	0.41	14.38	2075	0.37
β-Himachalene oxide	12.67	1604	0.33	12.95	1940	0.36
Unknown [m/z 138, 110 (77), 137 (75), 107 (62), 91 (61), 93 (60), 109 (57)... 220 (34)]	12.72	1608	1.04	13.23	1966	0.99
Unknown [m/z 137, 119 (69), 43 (51), 95 (50), 109)40)... 222 (1)]	12.85	1618	0.17	14.66*	2103	[0.25]
1-epi-Cubenol	12.89	1622	0.78	13.57	1997	0.69
6-Methyl-6-meta-tolyl-heptan-2-one	12.93	1625	0.07	15.51	2188	0.04
Unknown [m/z 119, 163 (80), 107 (64), 95 (61), 93 (57), 91 (53)... 220 (11)]	12.98	1629	0.21			
Unknown [m/z 119, 91 (44), 94 (36), 107 (35), 93 (29)... 202 (19)...]	13.04	1634	0.04			
Himachalol	13.09	1639	0.60	14.97	2134	0.58
Allohimachalol	13.26	1653	0.92	15.32	2170	0.93
(*E*)-10,11-Dihydroatlantone	13.43	1666	0.45	14.50	2087	0.14
Deodarone epimer I	13.70	1689	2.48	15.13	2150	1.79

Deodarone epimer II	13.76	1694	0.10	15.24	2161	0.01
(*E*)-γ-Atlantone	13.84	1701	0.93	15.19	2156	0.84
(*Z*)-α-Atlantone	13.99	1713	0.65	15.40	2176	0.64
Unknown [m/z 105, 119 (89), 59 (68), 120 (65), 43 (65), 93 (62), 121 (61)...]	14.13	1726	0.15			
Unknown [m/z 91, 79 (83), 105 (68), 109 (63), 41 (590), 93 (58), 107 (57)...]	14.24	1735	0.01	17.79	2431	0.03
Unknown [m/z 83, 91 (28), 105 (25), 55 (21), 43 (17), 119 (17)...]	14.32	1742	0.04			
Unknown [m/z 43, 105 (99), 119 (90), 91 (87), 147 (76), 41 (69), 93 (63)...]	14.34	1744	0.04			
Unknown [m/z 83, 55 (17), 91 (14), 105 (9), 216 (6)...]	14.44	1752	0.08			
Unknown [m/z 91, 105 (74), 93 (67), 79 (59), 133 (54), 41 (47), 107 (46)...]	14.50	1758	0.01	18.27	2484	0.01
(*E*)-α-Atlantone	14.66	1772	2.74	16.11	2250	2.74
Unknown [m/z 95, 43 (59), 69, (57), 67 (43), 163 (42), 94 (37), 107 (37)... 178 (26), 218 (2)]	14.88	1791	0.18			
Unknown [m/z 83, 134 (28), 119 (19), 55 (18), 91 (14), 43 (11), 109 (10)... 216 (4), 249? (0)]	15.41	1838	0.01			
Unknown [m/z 83, 134 (30), 119 (19), 55 (18), 91 (12)... 216 (4)...]	15.53	1849	0.01			
Unknown [m/z 173, 83 (83), 91 (80), 201 (79), 115 (65)... 216 (31)]	15.89	1882	0.01	18.52	2513	0.01
Total identified		**92.84%**			**89.11%**	
Total reported		**97.35%**			**94.05%**	

*: 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

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