

Date : September 24, 2018

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 18I18-HBN1-1-CC

Customer identification : Organic Cedarwood Atlas - 180956560

Type : Essential oil

Source : *Cedrus atlantica*

Customer : Health & Beauty Natural Oils

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 : Sylvain Mercier, M. Sc., Chimiste

Analysis date : September 20, 2018

Checked and approved by :

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

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PHYSICOCHEMICAL DATA

Physical aspect: Light yellow liquid

Refractive index: 1.5118 ± 0.0003 (20 °C)

CONCLUSION

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

ANALYSIS SUMMARY

Identification	DB-5 (%)	DB-WAX (%)	Classe
Mesityl oxide	0.01	0.01	Aliphatic ketone
α -Pinene	0.01	0.01	Monoterpene
Limonene	0.01	0.01	Monoterpene
Terpinolene	0.01*		Monoterpene
para-Cymenene	[0.01]*	tr	Monoterpene
Linalool	0.01	0.01	Monoterpenic alcohol
Limona ketone	0.50	0.52	Normoterpenic ketone
4-Hydroxy-4-methylcyclohex-2-enone	0.01	0.02	Aliphatic alcohol
α ,4-Dimethyl-3-cyclohexene-1-methanol	0.03		Normoterpenic alcohol
α ,4-Dimethyl-3-cyclohexene-1-methanol epimer	0.04		Normoterpenic alcohol
Borneol	0.01	0.05*	Monoterpenic alcohol
4-Methylacetophenone	0.05	0.04	Simple phenolic
α -Terpineol	0.02	[0.05]*	Monoterpenic alcohol
α -Longipinene	0.07	0.07	Sesquiterpene
α -Ylangene	0.07	0.03	Sesquiterpene
Unknown	0.13	0.14	Sesquiterpene
Sativene	0.20*	0.03	Sesquiterpene
Unknown	[0.20]*	0.18	Sesquiterpene
Longifolene	1.02*	0.56*	Sesquiterpene
Sibirene	[1.02]*	0.51	Sesquiterpene
α -Cedrene	0.06	[0.56]*	Sesquiterpene
(Z)-Vestitenone, or analog	0.08*	0.06	Terpenic ketone
Unknown	[0.08]*	0.01	Unknown
β -Cedrene	0.04	0.03	Sesquiterpene
Himachala-2,4-diene	0.50*	0.42	Sesquiterpene
Unknown	[0.50]*		Sesquiterpene
Unknown	0.12		Sesquiterpene
Himachala-2,4-diene isomer	0.16	0.16	Sesquiterpene
α -Himachalene	15.90*	15.46	Sesquiterpene
(E)-Vestitenone	[15.90]*	0.46	Terpenic ketone
Unknown	0.25	0.32	Sesquiterpene
(E)- β -Farnesene	0.22	9.44*	Sesquiterpene
Unknown	0.52	0.41	Sesquiterpene
Unknown	0.17		Sesquiterpene
γ -Himachalene	9.29	[9.44]*	Sesquiterpene
11- α H-Himachala-1,4-diene	1.87	1.62	Sesquiterpene
Unknown	0.32	0.31	Sesquiterpenic ether
β -Himachalene	45.23*	44.60	Sesquiterpene
α -Muurolene	[45.23]*	0.23	Sesquiterpene
(Z)- α -Bisabolene	[45.23]*	0.07	Sesquiterpene
Cycloisolongifol-5-ol	[45.23]*	0.14	Sesquiterpenic alcohol
γ -Cadinene	0.26	1.40*	Sesquiterpene
α -Dehydro-ar-himachalene	0.82	0.77	Sesquiterpene
δ -Cadinene	2.45*	[1.40]*	Sesquiterpene
<i>trans</i> -Calamenene	[2.45]*	0.12	Sesquiterpene
γ -Dehydro-ar-himachalene	[2.45]*	0.78	Sesquiterpene

Unknown	0.53	0.66	Sesquiterpene
10-epi-Cubebol?	0.19	0.63*	Sesquiterpenic alcohol
ar-Himachalene	0.36	0.35	Sesquiterpene
α-Calacorene	0.64	0.59	Sesquiterpene
(E)-α-Bisabolene	0.47	0.43	Sesquiterpene
Unknown	0.22	0.26	Oxygenated sesquiterpene
(E)-Nerolidol	0.25	[0.63]*	Sesquiterpenic alcohol
Himachalene epoxide	0.57*	0.36	Sesquiterpenic ether
Unknown	[0.57]*	0.24*	Unknown
Unknown	0.08	0.07	Oxygenated sesquiterpene
Longiborneol	0.36	0.36	Sesquiterpenic alcohol
β-Himachalene oxide	0.78	0.79	Sesquiterpenic ether
Unknown	0.46	0.42	Oxygenated sesquiterpene
Unknown	0.18	0.24	Oxygenated sesquiterpene
1-epi-Cubenol	0.79*	[0.63]*	Sesquiterpenic alcohol
6-Methyl-6-meta-tolyl-heptan-2-one	[0.79]*	0.04	Miscellaneous
Unknown	0.17		Oxygenated sesquiterpene
Unknown	0.05		Oxygenated sesquiterpene
Himachalol	0.84	0.70	Sesquiterpenic alcohol
Allohimachalol	0.93	0.93	Sesquiterpenic alcohol
β-Atlantone	0.17	[0.24]*	Sesquiterpenic ketone
(E)-10,11-Dihydroatlantone	0.31	0.21	Sesquiterpenic ketone
(Z)-γ-Atlantone	2.62*	0.66	Sesquiterpenic ketone
Deodarone epimer I	[2.62]*	1.43	Sesquiterpenic ketone
Deodarone epimer II	[2.62]	0.98	Sesquiterpenic ketone
(E)-γ-Atlantone	0.78	0.72	Sesquiterpenic ketone
(Z)-α-Atlantone	0.81	0.72	Sesquiterpenic ketone
Unknown	0.15		Oxygenated sesquiterpene
Unknown	0.12		Oxygenated sesquiterpene
Unknown	0.05		Oxygenated sesquiterpene
Unknown	0.14		Oxygenated sesquiterpene
(E)-α-Atlantone	3.04	2.90	Sesquiterpenic ketone
Unknown	0.20		Oxygenated sesquiterpene
Unknown	0.05	0.04	Oxygenated sesquiterpene
Unknown	0.05		Oxygenated sesquiterpene
Unknown	0.01	0.02	Oxygenated sesquiterpene
Himachalene isomer		0.80	Sesquiterpene
Total identified	92.84%	91.57%	

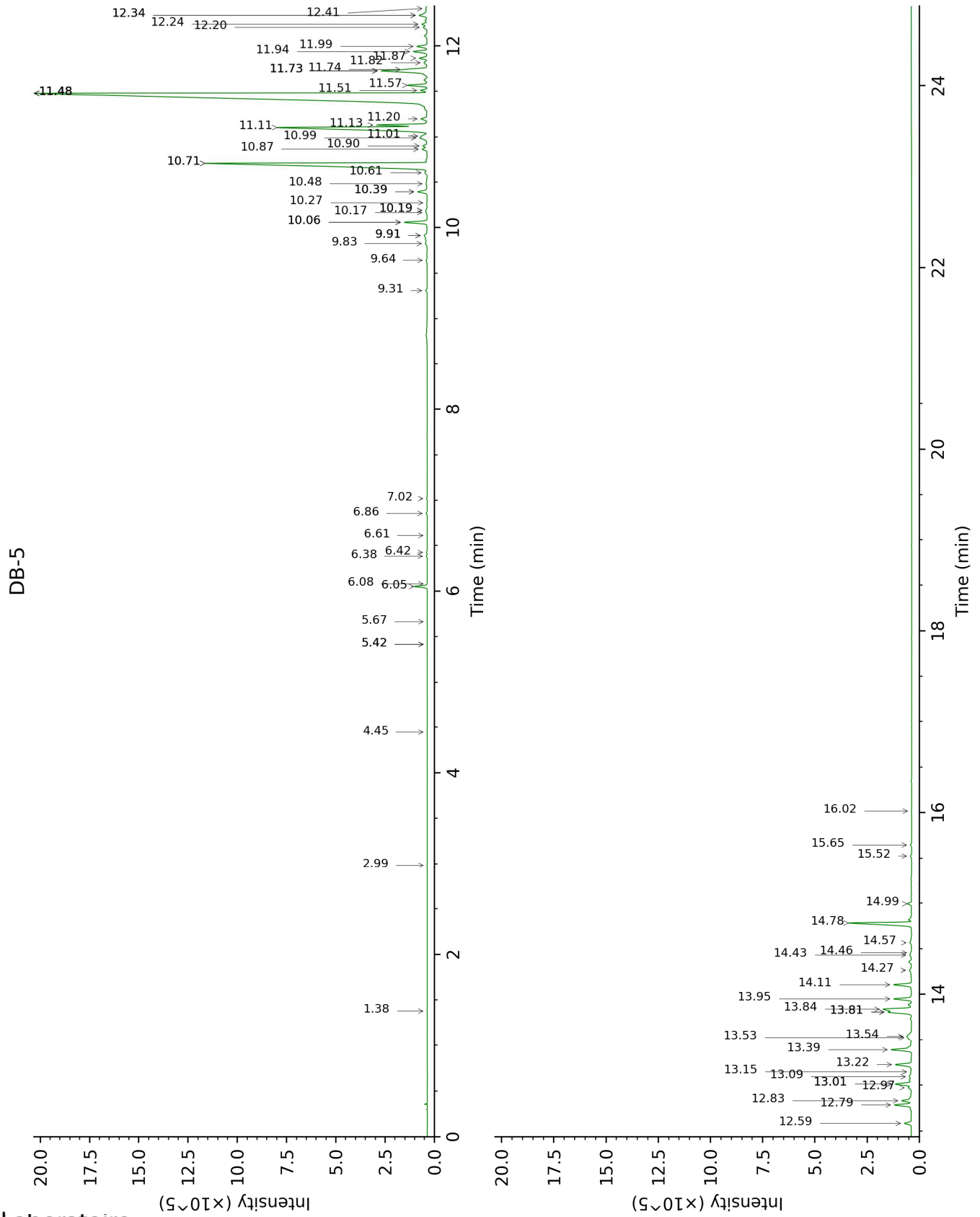
*: Two or more compounds are coeluting on this column

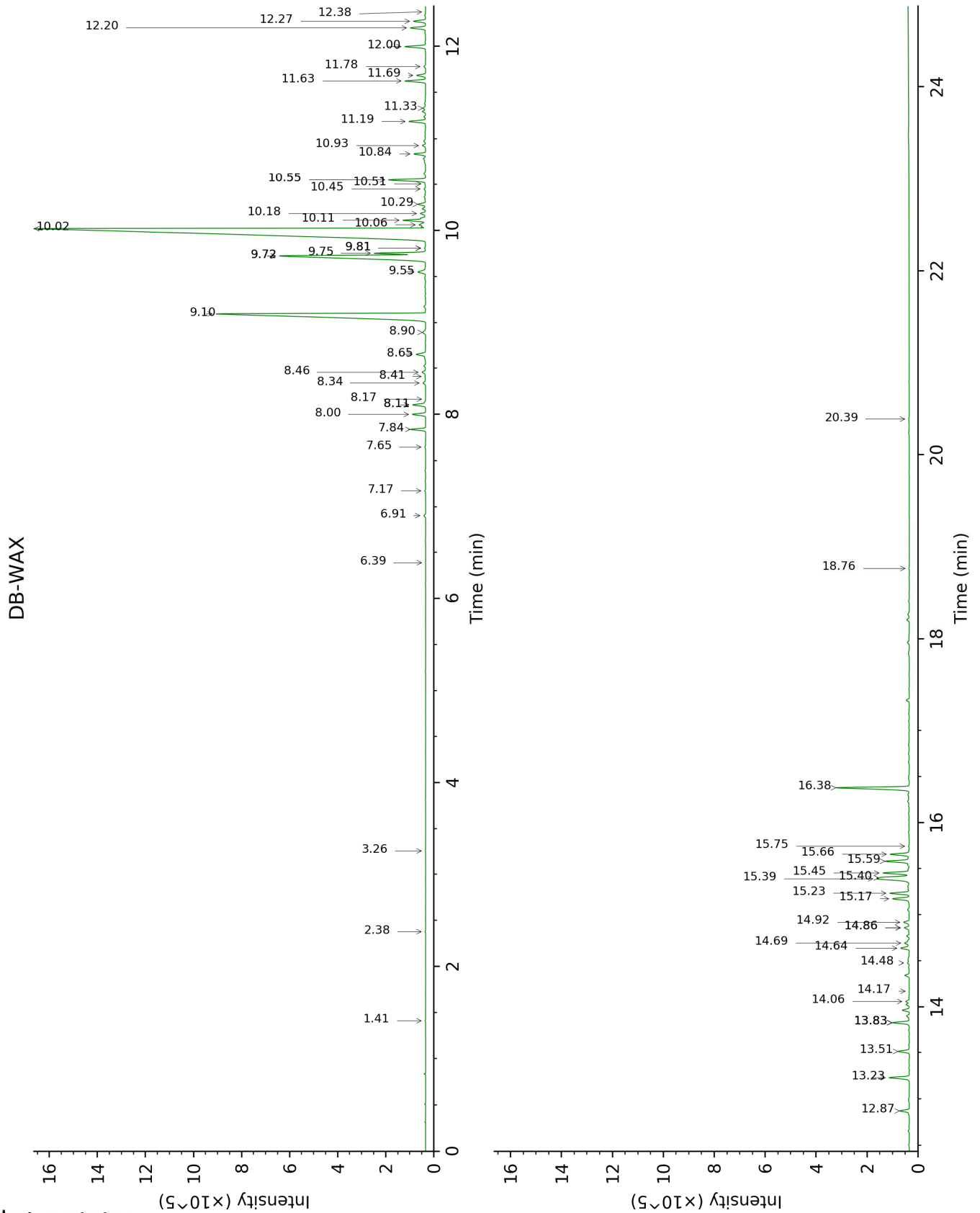
[xx]: Duplicate percentage due to coelutions, not taken account in the identified total

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	%
Mesityl oxide	1.38	796	0.01	2.38	1092	0.01
α -Pinene	2.99	928	0.01	1.41	995	0.01
Limonene	4.45	1025	0.01	3.26	1162	0.01
Terpinolene	5.42*	1086	0.01			
para-Cymenene	5.42*	1086	[0.01]	6.39	1388	tr
Linalool	5.66	1102	0.01	8.17	1520	0.01
Limona ketone	6.05	1126	0.50	7.84	1494	0.52
4-Hydroxy-4-methylcyclohex-2-enone	6.08	1128	0.01	14.17	2033	0.02
α ,4-Dimethyl-3-cyclohexene-1-methanol	6.38	1148	0.03			
α ,4-Dimethyl-3-cyclohexene-1-methanol epimer	6.42	1150	0.04			
Borneol	6.61	1162	0.01	9.81*	1649	0.05
4-Methylacetophenone	6.86	1178	0.05	10.51	1706	0.04
α -Terpineol	7.02	1189	0.02	9.81*	1649	[0.05]
α -Longipinene	9.31	1344	0.07	6.91	1426	0.07
α -Ylangene	9.64	1367	0.07	7.17	1445	0.03
Unknown epimer I [m/z 131, 146 (36), 91 (22), 145 (19), 202 (18)]	9.83	1380	0.13	8.34	1533	0.14
Sativene	9.91*	1386	0.20	7.65	1480	0.03
Unknown epimer II [m/z 131, 146 (33), 91 (20), 202 (18)]	9.91*	1386	[0.20]	8.46	1542	0.18
Longifolene	10.06*	1396	1.02	8.10*	1515	0.56
Sibirene	10.06*	1396	[1.02]	8.00	1507	0.51
α -Cedrene	10.17	1404	0.06	8.10*	1515	[0.56]
(Z?)-Vestitenone, or analog	10.19*	1406	0.08	11.78	1814	0.06
Unknown [m/z 105, 93 (61), 120 (55), 145 (54), 91 (52)...]	10.19*	1406	[0.08]	12.38	1867	0.01
β -Cedrene	10.27	1412	0.04	8.41	1538	0.03
Himachala-2,4-diene	10.39*	1421	0.50	8.65	1557	0.42
Unknown [m/z 91, 93 (90), 105 (72), 202 (71), 131 (68), 77 (63), 107 (55), 187 (54)]	10.39*	1421	[0.50]			
Unknown [m/z 105, 91 (70), 93 (65), 43 (61), 120 (57), 145 (50)... 204 (6)]	10.48	1428	0.12			

Himachala-2,4-diene isomer	10.61	1437	0.16	8.90	1576	0.16
α-Himachalene	10.71*	1445	15.90	9.10	1591	15.46
(E)-Vestitenone	10.71*	1445	[15.90]	12.27	1858	0.46
Unknown [m/z 187, 131 (78), 202 (76), 105 (74), 91 (74), 117 (53), 145 (52)]	10.87	1456	0.25	10.06	1669	0.32
(E)-β-Farnesene	10.90	1459	0.22	9.72*	1642	9.44
Unknown [m/z 119, 91 (85), 93 (77), 105 (76), 79 (61), 134 (60), 94 (49), 204 (46)]	10.99	1466	0.52	9.55	1628	0.41
Unknown [m/z 131, 202 (78), 91 (74), 105 (68), 187 (68), 119 (53), 145 (52)]	11.01	1467	0.17			
γ-Himachalene	11.11	1474	9.29	9.72*	1642	[9.44]
11-αH-Himachala-1,4-diene	11.13	1476	1.87	9.75	1644	1.62
Unknown [m/z 137, 43 (84), 138 (63), 109 (53), 95 (51), 93 (50), 207 (46)... 222 (21)]	11.20	1481	0.32	10.28	1687	0.31
β-Himachalene	11.48*	1502	45.23	10.02	1666	44.60
α-Muurolene	11.48*	1502	[45.23]	10.18	1679	0.23
(Z)-α-Bisabolene	11.48*	1502	[45.23]	10.45	1701	0.07
Cycloisolongifol-5-ol	11.48*	1502	[45.23]	10.93	1741	0.14
γ-Cadinene	11.51	1505	0.26	10.55*	1709	1.40
α-Dehydro-arhimachalene	11.57	1509	0.82	11.63	1801	0.77
δ-Cadinene	11.73*	1522	2.45	10.55*	1709	[1.40]
trans-Calamenene	11.73*	1522	[2.45]	11.33	1775	0.12
γ-Dehydro-arhimachalene	11.73*	1522	[2.45]	12.00	1834	0.78
Unknown [m/z 131, 202 (28), 91 (22), 159 (16), 145 (16), 132 (15), 115 (14)]	11.74	1523	0.53	11.19	1763	0.66
10-epi-Cubebol?	11.82	1529	0.19	13.83*	2000	0.63
ar-Himachalene	11.87	1532	0.36	11.69	1806	0.35
α-Calacorene	11.94	1538	0.64	12.20	1851	0.59
(E)-α-Bisabolene	12.00	1543	0.47	10.84	1734	0.43
Unknown [m/z 189, 91 (85), 43 (74), 105 (67), 133 (66), 107 (63), 135 (52)... 220 (20)]	12.20	1559	0.22	14.06	2022	0.26
(E)-Nerolidol	12.24	1562	0.25	13.83*	2000	[0.63]
Himachalene epoxide	12.34*	1569	0.57	12.87	1912	0.36
Unknown [m/z 96, 95]	12.34*	1569	[0.57]	14.86*	2099	0.24

(18), 83 (15), 125 (13), 119 (12), 55 (12), 41 (11)... 218? (tr) Unknown [m/z 177, 202 (79), 91 (76), 159 (75), 43 (65), 107 (59), 105 (57)...]	12.41	1575	0.08	14.48	2062	0.07
Longiborneol	12.58	1589	0.36	14.64	2078	0.36
β -Himachalene oxide	12.78	1605	0.78	13.23	1944	0.79
Unknown [m/z 138, 110 (77), 137 (75), 107 (62), 91 (61), 93 (60), 109 (57)... 220 (34)]	12.83	1609	0.46	13.51	1971	0.42
Unknown [m/z 137, 119 (69), 43 (51), 95 (50), 109 (40)... 222 (1)]	12.97	1620	0.18	14.92	2105	0.24
1-epi-Cubenol	13.01*	1624	0.79	13.83*	2000	[0.63]
6-Methyl-6-metha- tolyl-heptan-2-one	13.01*	1624	[0.79]	15.75	2188	0.04
Unknown [m/z 119, 163 (80), 107 (64), 95 (61), 93 (57), 91 (53)... 220 (11)]	13.09	1630	0.17			
Unknown [m/z 119, 91 (44), 94 (36), 107 (35), 93 (29)... 202 (19)...]	13.15	1635	0.05			
Himachalol	13.22	1641	0.84	15.23	2137	0.70
Allohimachalol	13.39	1655	0.93	15.59	2172	0.93
β -Atlantone	13.52	1666	0.17	14.86*	2099	[0.24]
(E)-10,11- Dihydroatlantone	13.54	1667	0.31	14.69	2083	0.21
(Z)- γ -Atlantone	13.81*†	1689	2.62	15.17	2131	0.66
Deodarone epimer I	13.81*†	1689	[2.62]	15.39	2152	1.43
Deodarone epimer II	13.84†	1692	[2.62]	15.45	2159	0.98
(E)- γ -Atlantone	13.95	1701	0.78	15.40	2154	0.72
(Z)- α -Atlantone	14.11	1715	0.81	15.66	2180	0.72
Unknown [m/z 105, 119 (89), 59 (68), 120 (65), 43 (65), 93 (62), 121 (61)...]	14.26	1728	0.15			
Unknown [m/z 83, 91 (28), 105 (25), 55 (21), 43 (17), 119 (17)...]	14.43	1743	0.12			
Unknown [m/z 43, 105 (99), 119 (90), 91 (87), 147 (76), 41 (69), 93 (63)...]	14.46	1745	0.05			
Unknown [m/z 83, 55 (17), 91 (14), 105 (9),	14.57	1754	0.14			

216 (6)...						
(E)- α -Atlantone	14.78	1773	3.04	16.38	2254	2.90
Unknown [m/z 95, 43 (59), 69, (57), 67 (43), 163 (42), 94 (37), 107 (37)... 178 (26), 218 (2)]	14.99	1792	0.20			
Unknown [m/z 83, 134 (28), 119 (19), 55 (18), 91 (14), 43 (11), 109 (10)... 216 (4), 249? (0)]	15.52	1839	0.05	20.39	2708	0.04
Unknown [m/z 83, 134 (30), 119 (19), 55 (18), 91 (12)... 216 (4)...	15.65	1850	0.05			
Unknown [m/z 173, 83 (83), 91 (80), 201 (79), 115 (65)... 216 (31)]	16.02	1884	0.01	18.76	2515	0.02
Himachalene isomer				10.11	1673	0.80
Total identified		92.84%			91.57%	
Total reported		96.82%			94.53%	

*: 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