

GC/MS BATCH NUMBER: C50105

ESSENTIAL OIL: CEDARWOOD HIMALAYAN
BOTANICAL NAME: CEDRUS DEODORA
ORIGIN: INDIA

KEY CONSTITUENTS PRESENT IN THIS BATCH OF CEDARWOOD HIMALAYAN OIL	%
β -HIMACHALENE	34.6
α -HIMACHALENE	13.3
(E)- α -ATLANTONE	10.5
γ -HIMACHALENE	8.3
(E)- γ -ATLANTONE	3.3
(Z)- γ -ATLANTONE	3.0
(Z)- α -ATLANTONE	2.5
HIMACHALOL	1.8
11- α H-HIMACHALA-1,4-DIENE	1.6
DEODARONE EPIMER I	1.3
(E)- α -BISABOLENE	1.2

Comments from Robert Tisserand: Characteristic dry, "orange wood" odor quality, with constituents in expected amounts.

Date : May 11, 2018

CERTIFICATE OF ANALYSIS - GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 18E01-PTH1-1-CC

Customer identification : Cedarwood Himalayan - India - C5010581R

Type : Essential oil

Source : *Cedrus deodara*

Customer : Plant Therapy

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 : Benoit Roger, Ph. D.

Analysis date : May 07, 2018

Checked and approved by :



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

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This report is digitally signed, it is only considered valid if the digital signature is intact.

PHYSICOCHEMICAL DATA

Physical aspect: Light yellow greenish liquid

Refractive index: 1.5130 ± 0.0003 (20 °C)

CONCLUSION

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

ANALYSIS SUMMARY

Identification	DB-5 (%)	DB-WAX (%)	Classe
Ethanol	0.09	0.07	Aliphatic alcohol
Mesityl oxide	0.03	0.03	Aliphatic ketone
α -Pinene	0.04	0.04	Monoterpene
Camphene	tr	tr	Monoterpene
β -Pinene	0.01	0.01	Monoterpene
3-Methyl-3-cyclohexenone?	tr	tr	Aliphatic ketone
6-Methyl-5-hepten-2-one	tr		Aliphatic ketone
Limonene	0.02	0.02	Monoterpene
para-Cresol	0.01	0.01*	Simple phenolic
Terpinolene	0.02*	0.01	Monoterpene
para-Cymenene	[0.02]*	0.01	Monoterpene
Unknown	0.01	0.01	Oxygenated monoterpene
4-Hydroxy-4-methylcyclohex-2-enone	0.71*	[0.01]*	Aliphatic alcohol
Limona ketone	[0.71]*	0.73	Normonoterpenic ketone
α ,4-Dimethyl-3-cyclohexene-1-methanol	0.04		Normonoterpenic alcohol
α ,4-Dimethyl-3-cyclohexene-1-methanol epimer	0.04		Normonoterpenic alcohol
Borneol	0.01	34.89*	Monoterpenic alcohol
Terpinen-4-ol	tr	tr	Monoterpenic alcohol
4-Methylacetophenone	0.14	0.15	Simple phenolic
α -Terpineol	0.04	[34.89]*	Monoterpenic alcohol
α -Longipinene	0.08	0.09	Sesquiterpene
α -Ylangene	0.05	0.04	Sesquiterpene
Unknown	0.09	0.11	Sesquiterpene
Unknown	0.14	0.17	Sesquiterpene
Sativene	0.21	0.04	Sesquiterpene
Longifolene	0.62*	0.52	Sesquiterpene
Sibirene	[0.62]*	0.11	Sesquiterpene
(Z?)-Vestitenone, or analog	0.19	0.17	Terpenic ketone
Unknown	0.04	0.17	Unknown
Himachala-2,4-diene	0.56	0.40	Sesquiterpene
Unknown	0.01		Sesquiterpene
Unknown	0.32		Sesquiterpene
<i>trans</i> - α -Bergamotene	0.16	0.16	Sesquiterpene
Himachala-2,4-diene isomer	0.13	0.18	Sesquiterpene
α -Himachalene	14.27*	13.32	Sesquiterpene
(E)-Vestitenone	[14.27]*	0.92	Terpenic ketone
Unknown	0.18	0.34	Sesquiterpene
(E)- β -Farnesene	0.28	8.55*	Sesquiterpene
Unknown	0.32	0.35	Sesquiterpene
Unknown	0.50		Sesquiterpene
γ -Himachalene	8.26	[8.55]*	Sesquiterpene
11- α H-Himachala-1,4-diene	1.60	1.48	Sesquiterpene
Unknown	0.19	0.16	Sesquiterpenic ether
β -Himachalene	34.56	[34.89]*	Sesquiterpene
Cycloisolongifol-5-ol	0.21	0.11	Sesquiterpenic alcohol
α -Dehydro-ar-himachalene	0.50	0.47	Sesquiterpene

γ -Dehydro-ar-himachalene	1.11	0.54	Sesquiterpene
Unknown	[1.11]	0.54	Sesquiterpene
ar-Himachalene	0.27	0.27	Sesquiterpene
α -Calacorene	0.13	0.27	Sesquiterpene
(<i>E</i>)- α -Bisabolene	1.20	1.21	Sesquiterpene
Unknown	0.17	0.20	Oxygenated sesquiterpene
(<i>E</i>)-Nerolidol	0.11	0.10	Sesquiterpenic alcohol
Himachalene epoxide	0.46*	0.27	Sesquiterpenic ether
Unknown	[0.46]*	0.34	Unknown
Unknown	0.10	0.12	Oxygenated sesquiterpene
Longiborneol	0.36	0.33	Sesquiterpenic alcohol
β -Himachalene oxide	0.47	0.49	Sesquiterpenic ether
Unknown	0.58	0.49	Oxygenated sesquiterpene
Unknown	0.27	0.64*	Oxygenated sesquiterpene
6-Methyl-6-meta-tolyl-heptan-2-one	0.42*	0.05	Miscellaneous
Unknown	[0.42]*		Oxygenated sesquiterpene
Himachalol	1.86*	1.79	Sesquiterpenic alcohol
Unknown	[1.86]*		Oxygenated sesquiterpene
Allohimachalol	0.90	1.17	Sesquiterpenic alcohol
β -Atlantone	0.56	[0.64]*	Sesquiterpenic ketone
(<i>E</i>)-10,11-Dihydroatlantone	0.68	0.44	Sesquiterpenic ketone
(<i>Z</i>)- γ -Atlantone	4.78*	3.02	Sesquiterpenic ketone
Deodarone epimer I	[4.78]*	1.29	Sesquiterpenic ketone
Deodarone epimer II	0.17	0.17	Sesquiterpenic ketone
(<i>E</i>)- γ -Atlantone	3.26	4.06	Sesquiterpenic ketone
(<i>Z</i>)- α -Atlantone	2.53	2.27	Sesquiterpenic ketone
Unknown	0.25		Oxygenated sesquiterpene
Unknown	0.16	0.15	Oxygenated sesquiterpene
Unknown	0.07		Oxygenated sesquiterpene
Unknown	0.17		Oxygenated sesquiterpene
Unknown	0.03	0.03	Oxygenated sesquiterpene
(<i>E</i>)- α -Atlantone	10.50	9.92	Sesquiterpenic ketone
Unknown	0.32		Oxygenated sesquiterpene
Unknown	0.12		Oxygenated sesquiterpene
Unknown	0.13		Oxygenated sesquiterpene
Unknown	0.04		Oxygenated sesquiterpene
Himachalene isomer		0.50	Sesquiterpene
Total identified	92.04%	91.34%	

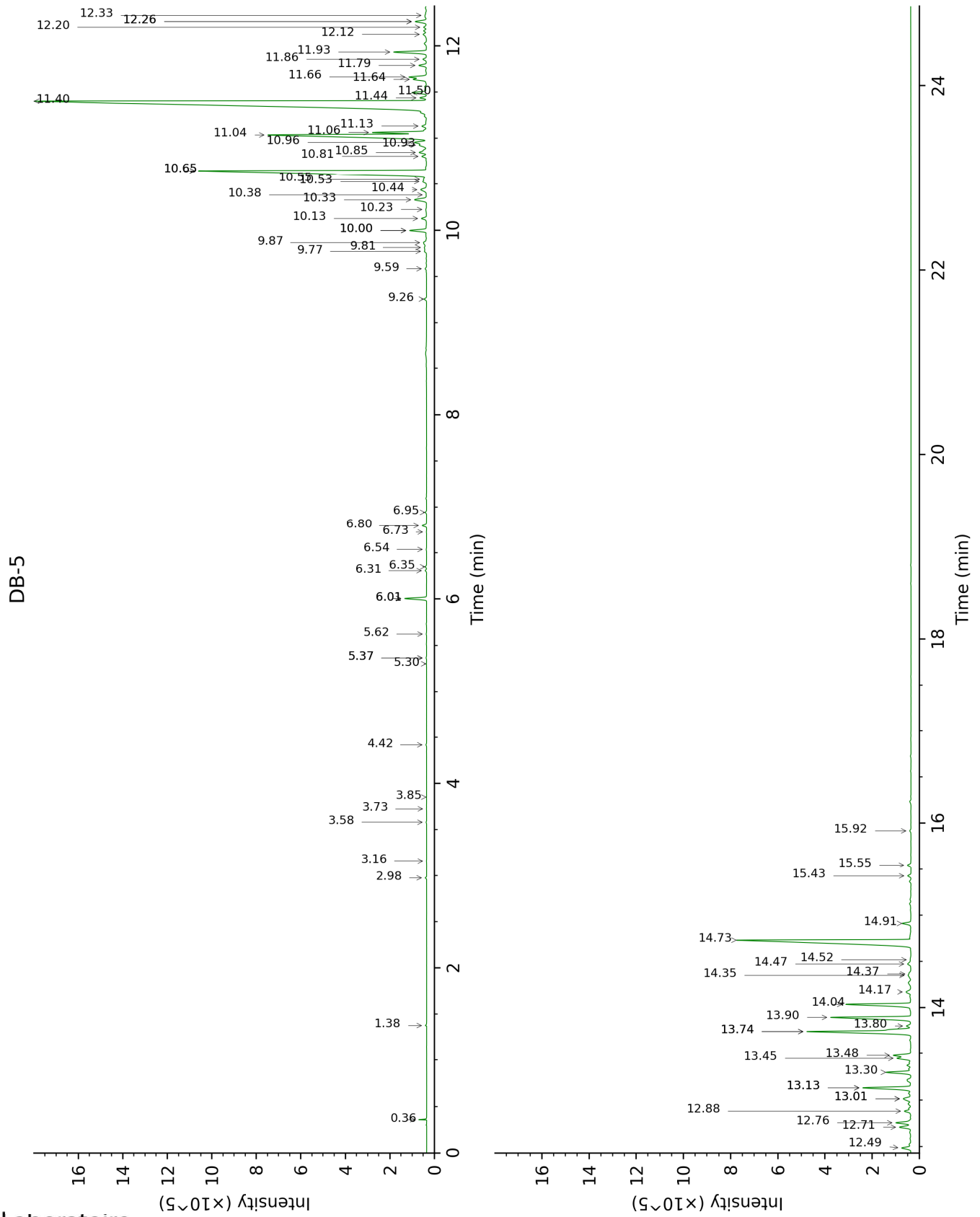
*: Two or more compounds are coeluting on this column

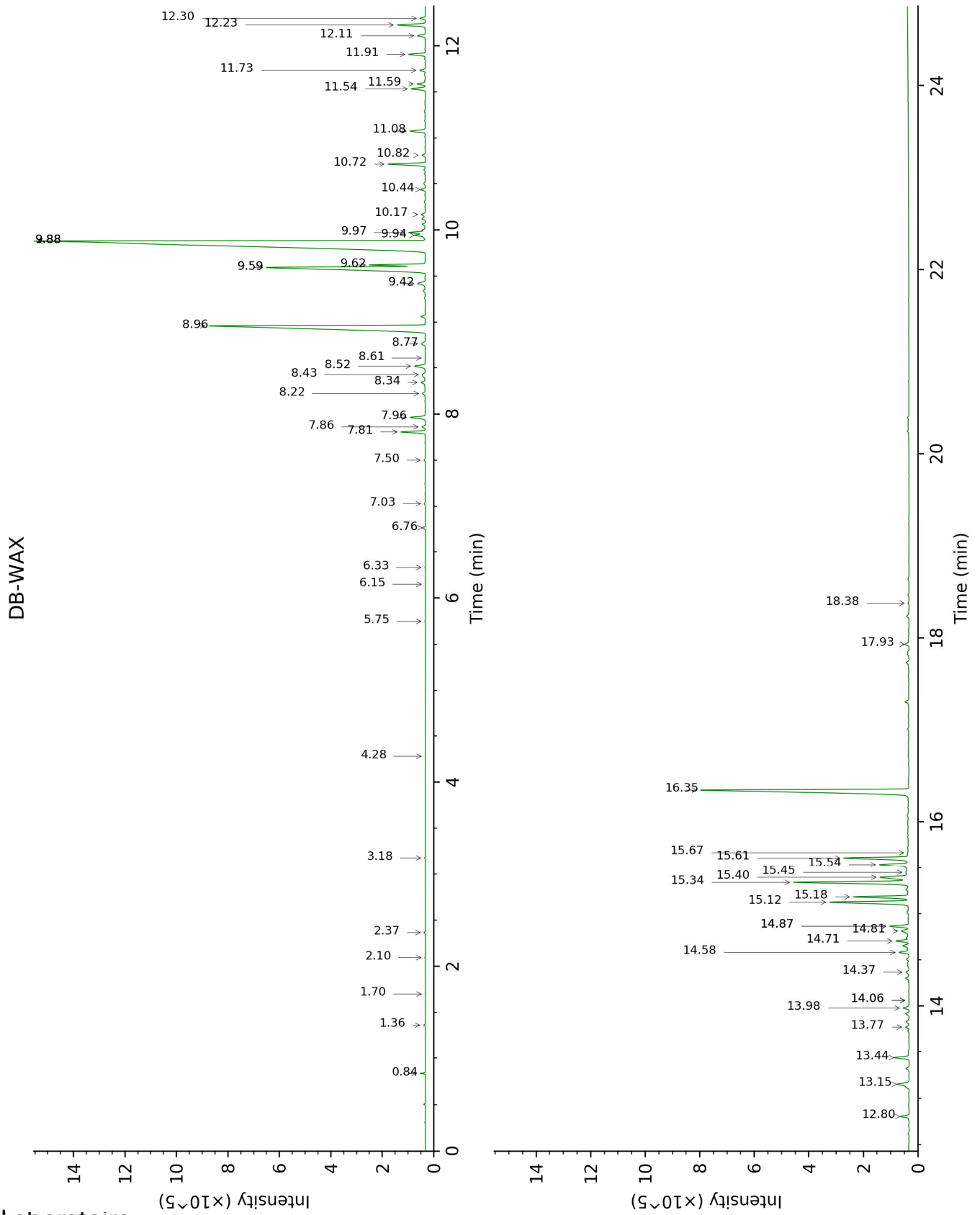
[xx]: Duplicate percentage due to coelutions, not taken account in the identified total

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	%
Ethanol	0.36	496	0.09	0.84	904	0.07
Mesityl oxide	1.38	792	0.03	2.37	1094	0.03
α -Pinene	2.98	926	0.04	1.36	992	0.04
Camphene	3.16	939	tr	1.70	1028	tr
β -Pinene	3.58	967	0.01	2.10	1067	0.01
3-Methyl-3-cyclohexenone?	3.73	977	tr	6.15	1374	tr
6-Methyl-5-hepten-2-one	3.85	985	tr			
Limonene	4.42	1022	0.02	3.18	1158	0.02
para-Cresol	5.30	1078	0.01	14.06*	2029	0.01
Terpinolene	5.36*	1082	0.02	4.28	1239	0.01
para-Cymenene	5.36*	1082	[0.02]	6.33	1387	0.01
Unknown [m/z 95, 150 (45), 110 (35), 107 (23), 109 (21)]	5.62	1098	0.01	5.75	1345	0.01
4-Hydroxy-4-methylcyclohex-2-enone	6.01*	1123	0.71	14.06*	2029	[0.01]
Limona ketone	6.01*	1123	[0.71]	7.81	1496	0.73
α ,4-Dimethyl-3-cyclohexene-1-methanol	6.31	1142	0.04			
α ,4-Dimethyl-3-cyclohexene-1-methanol epimer	6.35	1145	0.04			
Borneol	6.54	1157	0.01	9.88*	1659	34.89
Terpinen-4-ol	6.73	1169	tr	8.61	1558	tr
4-Methylacetophenone	6.80	1174	0.14	10.44	1705	0.15
α -Terpineol	6.94	1183	0.04	9.88*	1659	[34.89]
α -Longipinene	9.26	1340	0.08	6.76	1418	0.09
α -Ylangene	9.58	1363	0.05	7.03	1438	0.04
Unknown epimer I [m/z 131, 146 (36), 91 (22), 145 (19), 202 (18)]	9.77	1377	0.09	8.22	1528	0.11
Unknown epimer II [m/z 131, 146 (33), 91 (20), 202 (18)]	9.82	1380	0.14	8.34	1537	0.17
Sativene	9.87	1383	0.21	7.50	1473	0.04
Longifolene	10.00*	1392	0.62	7.96	1508	0.52
Sibirene	10.00*	1392	[0.62]	7.86	1500	0.11
(Z?)-Vestitenone, or analog	10.13	1402	0.19	11.74	1816	0.17
Unknown [m/z 105, 93 (61), 120 (55), 145 (54), 91 (52)...]	10.23	1409	0.04	12.30	1865	0.17

Himachala-2,4-diene	10.33	1417	0.56	8.52	1551	0.40
Unknown [m/z 91, 93 (90), 105 (72), 202 (71), 131 (68), 77 (63), 107 (55), 187 (54)]	10.38	1421	0.01			
Unknown [m/z 105, 91 (70), 93 (65), 43 (61), 120 (57), 145 (50)... 204 (6)]	10.44	1425	0.32			
<i>trans</i> - α -Bergamotene	10.53	1432	0.16	8.43	1544	0.16
Himachala-2,4-diene isomer	10.55	1434	0.13	8.77	1570	0.18
α -Himachalene	10.65*†	1441	14.27	8.96	1585	13.32
(<i>E</i>)-Vestitenone	10.65*†	1441	[14.27]	12.23	1859	0.92
Unknown [m/z 187, 131 (78), 202 (76), 105 (74), 91 (74), 117 (53), 145 (52)]	10.81	1452	0.18	9.94	1664	0.34
(<i>E</i>)- β -Farnesene	10.85	1456	0.28	9.59*	1636	8.55
Unknown [m/z 119, 91 (85), 93 (77), 105 (76), 79 (61), 134 (60), 94 (49), 204 (46)]	10.93	1462	0.32	9.42	1622	0.35
Unknown [m/z 131, 202 (78), 91 (74), 105 (68), 187 (68), 119 (53), 145 (52)]	10.96	1464	0.50			
γ -Himachalene	11.04	1470	8.26	9.59*	1636	[8.55]
11- α H-Himachala-1,4-diene	11.06	1472	1.60	9.62	1638	1.48
Unknown [m/z 137, 43 (84), 138 (63), 109 (53), 95 (51), 93 (50), 207 (46)... 222 (21)]	11.13	1477	0.19	10.17	1682	0.16
β -Himachalene	11.40	1497	34.56	9.88*	1659	[34.89]
Cycloisolongifol-5-ol	11.44	1500	0.21	10.82	1737	0.11
α -Dehydro-ar-himachalene	11.50	1504	0.50	11.54	1798	0.47
γ -Dehydro-ar-himachalene	11.64†	1516	1.11	11.91	1831	0.54
Unknown [m/z 131, 202 (28), 91 (22), 159 (16), 145 (16), 132 (15), 115 (14)]	11.66†	1517	[1.11]	11.08	1759	0.54
ar-Himachalene	11.79	1527	0.27	11.59	1802	0.27
α -Calacorene	11.86	1532	0.13	12.11	1849	0.27
(<i>E</i>)- α -Bisabolene	11.93	1539	1.20	10.72	1729	1.21
Unknown [m/z 189, 91 (85), 43 (74), 105 (67), 133 (66), 107 (63), 135 (52)... 220 (20)]	12.12	1554	0.17	13.98	2021	0.20

(E)-Nerolidol	12.20	1560	0.11	13.77	2001	0.10
Himachalene epoxide	12.26*	1565	0.46	12.80	1911	0.27
Unknown [m/z 96, 95 (18), 83 (15), 125 (13), 119 (12), 55 (12), 41 (11)... 218? (tr)]	12.26*	1565	[0.46]	14.81	2101	0.34
Unknown [m/z 177, 202 (79), 91 (76), 159 (75), 43 (65), 107 (59), 105 (57)...]	12.33	1570	0.10	14.37	2058	0.12
Longiborneol	12.49	1582	0.36	14.58	2079	0.33
β-Himachalene oxide	12.71	1600	0.47	13.15	1943	0.49
Unknown [m/z 138, 110 (77), 137 (75), 107 (62), 91 (61), 93 (60), 109 (57)... 220 (34)]	12.76	1604	0.58	13.44	1969	0.49
Unknown [m/z 137, 119 (69), 43 (51), 95 (50), 109 (40)... 222 (1)]	12.88	1614	0.27	14.86*	2106	0.64
6-Methyl-6-methyl-heptan-2-one	13.01*	1625	0.42	15.67	2187	0.05
Unknown [m/z 119, 163 (80), 107 (64), 95 (61), 93 (57), 91 (53)... 220 (11)]	13.01*	1625	[0.42]			
Himachalol	13.13*	1635	1.86	15.18	2138	1.79
Unknown [m/z 119, 91 (44), 94 (36), 107 (35), 93 (29)... 202 (19)...]	13.13*	1635	[1.86]			
Allohimachalol	13.30	1648	0.90	15.54	2174	1.17
β-Atlantone	13.45	1661	0.56	14.86*	2106	[0.64]
(E)-10,11-Dihydroatlantone	13.48	1664	0.68	14.70	2090	0.44
(Z)-γ-Atlantone	13.74*	1685	4.78	15.12	2132	3.02
Deodarone epimer I	13.74*	1685	[4.78]	15.40	2160	1.29
Deodarone epimer II	13.80	1690	0.17	15.45	2165	0.17
(E)-γ-Atlantone	13.90	1698	3.26	15.34	2154	4.06
(Z)-α-Atlantone	14.04	1710	2.53	15.61	2181	2.27
Unknown [m/z 105, 119 (89), 59 (68), 120 (65), 43 (65), 93 (62), 121 (61)...]	14.17	1722	0.25			
Unknown [m/z 91, 79 (83), 105 (68), 109 (63), 41 (590), 93 (58), 107 (57)...]	14.35	1738	0.16	17.93	2429	0.15
Unknown [m/z 83, 91 (28), 105 (25), 55 (21),	14.37	1739	0.07			

43 (17), 119 (17)...						
Unknown [m/z 83, 55 (17), 91 (14), 105 (9), 216 (6)...]	14.47	1748	0.17			
Unknown [m/z 91, 105 (74), 93 (67), 79 (59), 133 (54), 41 (47), 107 (46)...]	14.52	1752	0.03	18.38	2478	0.03
(E)- α -Atlantone	14.73	1771	10.50	16.35	2257	9.92
Unknown [m/z 95, 43 (59), 69, (57), 67 (43), 163 (42), 94 (37), 107 (37)... 178 (26), 218 (2)]	14.91	1786	0.32			
Unknown [m/z 83, 134 (28), 119 (19), 55 (18), 91 (14), 43 (11), 109 (10)... 216 (4), 249? (0)]	15.43	1833	0.12			
Unknown [m/z 83, 134 (30), 119 (19), 55 (18), 91 (12)... 216 (4)...]	15.55	1844	0.13			
Unknown [m/z 173, 83 (83), 91 (80), 201 (79), 115 (65)... 216 (31)]	15.92	1878	0.04			
Himachalene isomer				9.97	1667	0.50
Total identified		92.04%			91.34%	
Total reported		96.87%			94.51%	

*: 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