

Date : April 18, 2023

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 23D12-PTH04


Customer identification : Cedarwood Atlas - Morocco - C60107R

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 2014-005

Analysis date : April 13, 2023

Checked and approved by :

Alexis St-Gelais, Ph. D., Chimiste 2013-174

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PHYSICOCHEMICAL DATA

Physical aspect: Yellow liquid

Refractive index: 1.5127 ± 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
Methyl isobutyl ketone	tr	Aliphatic ketone
Toluene	tr	Simple phenolic
Mesityl oxide	0.03	Aliphatic ketone
α -Pinene	0.03	Monoterpene
Camphene	0.01	Monoterpene
Myrcene	0.01	Monoterpene
Limonene	0.02	Monoterpene
β -Phellandrene	0.01	Monoterpene
para-Cymenene	0.01	Monoterpene
Terpinolene	tr	Monoterpene
Linalool	0.01	Monoterpenic alcohol
endo-Fenchol	0.01	Monoterpenic alcohol
Limona ketone	0.64	Normonoterpenic ketone
4-Hydroxy-4-methylcyclohex-2-enone	0.02	Aliphatic alcohol
α ,4-Dimethyl-3-cyclohexene-1-methanol	0.05	Normonoterpenic alcohol
α ,4-Dimethyl-3-cyclohexene-1-methanol epimer	0.05	Normonoterpenic alcohol
4-Methylacetophenone	0.10	Simple phenolic
α -Terpineol	0.04	Monoterpenic alcohol
Unknown	0.01	Unknown
α -Longipinene	0.09	Sesquiterpene
α -Ylangene	0.06	Sesquiterpene
α -Copaene	0.03	Sesquiterpene
Unknown	0.15	Sesquiterpene
(3Z)-Hexenyl (3Z)-hexenoate	0.15	Aliphatic ester
Sativene	0.04	Sesquiterpene
Unknown	0.36	Sesquiterpene
β -Elemene	0.04	Sesquiterpene
β -Longipinene	0.04	Sesquiterpene
Longifolene	0.61	Sesquiterpene
Sibirene	0.60	Sesquiterpene
α -Cedrene	0.01	Sesquiterpene
(Z?)-Vestitenone, or analog	0.08	Terpenic ketone
β -Caryophyllene	0.05	Sesquiterpene
Himachala-2,4-diene	0.52	Sesquiterpene
Unknown	0.02	Sesquiterpene
Unknown	0.13	Sesquiterpene
<i>trans</i> - α -Bergamotene	0.03	Sesquiterpene
Himachala-2,4-diene isomer	0.16	Sesquiterpene
(E)-Vestitenone	0.46	Terpenic ketone
α -Himachalene	16.57	Sesquiterpene
α -Humulene	0.05	Sesquiterpene
Unknown	0.31	Sesquiterpene
(E)- β -Farnesene	0.19	Sesquiterpene
Unknown	0.58	Sesquiterpene

Unknown	0.23	Sesquiterpene
γ -Himachalene	9.81	Sesquiterpene
11- α H-Himachala-1,4-diene	1.93	Sesquiterpene
Unknown	0.32	Sesquiterpenic ether
α -Muurolene	0.05	Sesquiterpene
β -Himachalene	43.85	Sesquiterpene
(Z)- α -Bisabolene	0.03	Sesquiterpene
Cycloisolongifol-5-ol	0.13	Sesquiterpenic alcohol
Unknown	0.12	Sesquiterpene
γ -Cadinene	0.11	Sesquiterpene
α -Dehydro-ar-himachalene	1.14	Sesquiterpene
<i>trans</i> -Calamenene	0.12	Sesquiterpene
δ -Cadinene	1.77	Sesquiterpene
Unknown	0.92	Sesquiterpene
γ -Dehydro-ar-himachalene	1.13	Sesquiterpene
Unknown	0.19	Sesquiterpene
ar-Himachalene	0.41	Sesquiterpene
α -Calacorene	0.66	Sesquiterpene
(E)- α -Bisabolene	0.54	Sesquiterpene
Unknown	0.14	Oxygenated sesquiterpene
(E)-Nerolidol	0.08	Sesquiterpenic alcohol
Unknown	0.19	Unknown
Himachalene epoxide	0.38	Sesquiterpenic ether
Unknown	0.06	Oxygenated sesquiterpene
Longiborneol	0.33	Sesquiterpenic alcohol
ar-Dihydroturmerone	0.04	Sesquiterpenic ketone
β -Himachalene oxide	0.95	Sesquiterpenic ether
Unknown	0.52	Oxygenated sesquiterpene
10-epi-Cubenol	0.04	Sesquiterpenic alcohol
Unknown	0.12	Oxygenated sesquiterpene
1-epi-Cubenol	0.63	Sesquiterpenic alcohol
6-Methyl-6-meta-tolyl-heptan-2-one	0.11	Miscellaneous
Unknown	0.14	Oxygenated sesquiterpene
Unknown	0.02	Oxygenated sesquiterpene
Himachalol	0.46	Sesquiterpenic alcohol
Allohimachalol	0.76	Sesquiterpenic alcohol
β -Atlantone	0.14	Sesquiterpenic ketone
(E)-10,11-Dihydroatlantone	0.31	Sesquiterpenic ketone
(Z)- γ -Atlantone	0.52	Sesquiterpenic ketone
Deodarone epimer I	0.70	Sesquiterpenic ketone
Deodarone epimer II	0.67	Sesquiterpenic ketone
(E)- γ -Atlantone	0.59	Sesquiterpenic ketone
(Z)- α -Atlantone	0.47	Sesquiterpenic ketone
Unknown	0.05	Oxygenated sesquiterpene
Unknown	0.08	Oxygenated sesquiterpene
Unknown	0.01	Oxygenated sesquiterpene
Unknown	0.07	Oxygenated sesquiterpene
Unknown	0.10	Oxygenated sesquiterpene
Unknown	0.02	Oxygenated sesquiterpene
(E)- α -Atlantone	2.30	Sesquiterpenic ketone
Unknown	0.10	Oxygenated sesquiterpene
Unknown	0.02	Oxygenated sesquiterpene

Unknown	0.02	Oxygenated sesquiterpene
Unknown	0.02	Oxygenated sesquiterpene
Consolidated total	97.00%	

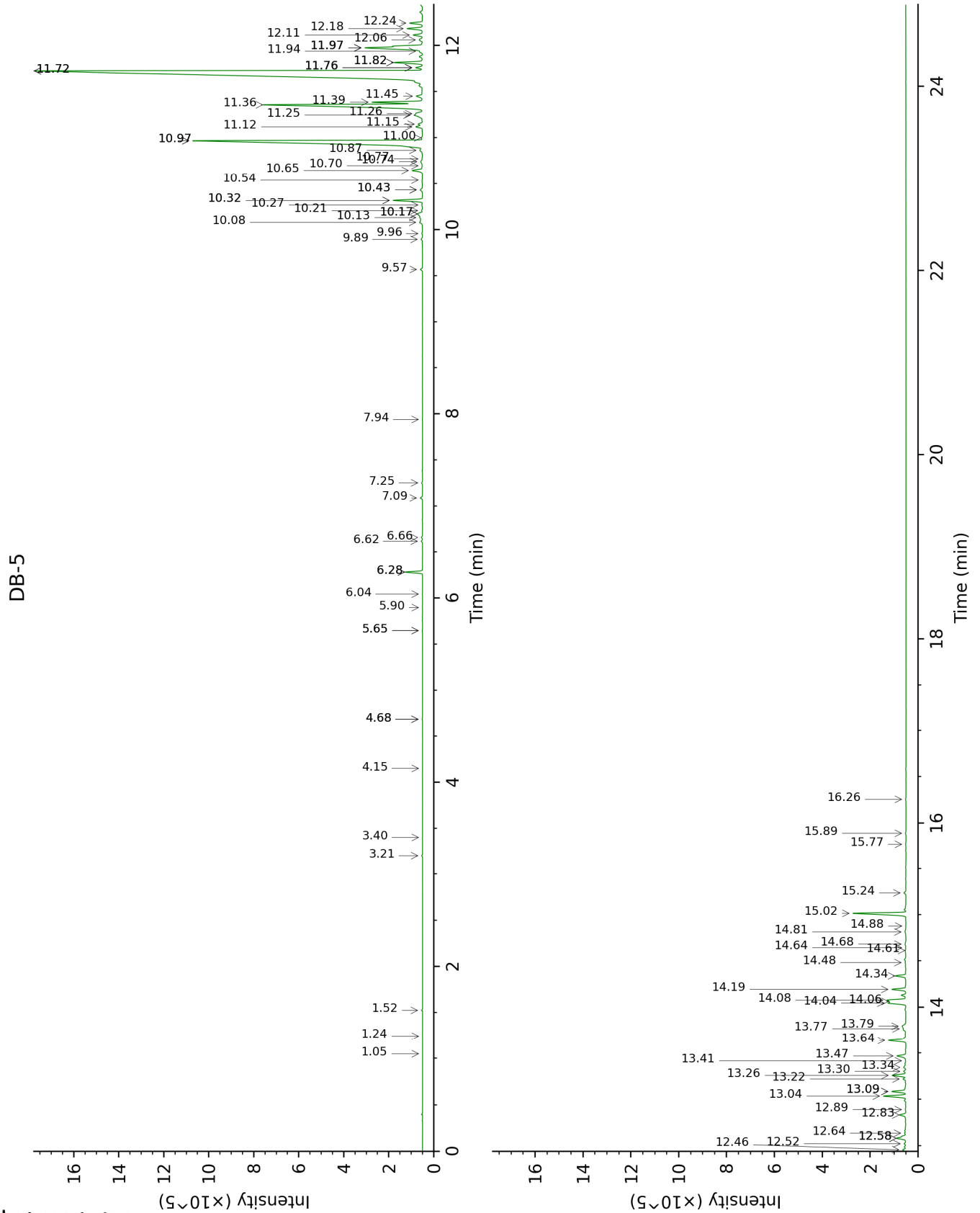
tr: The compound has been detected below 0.005% of total signal.

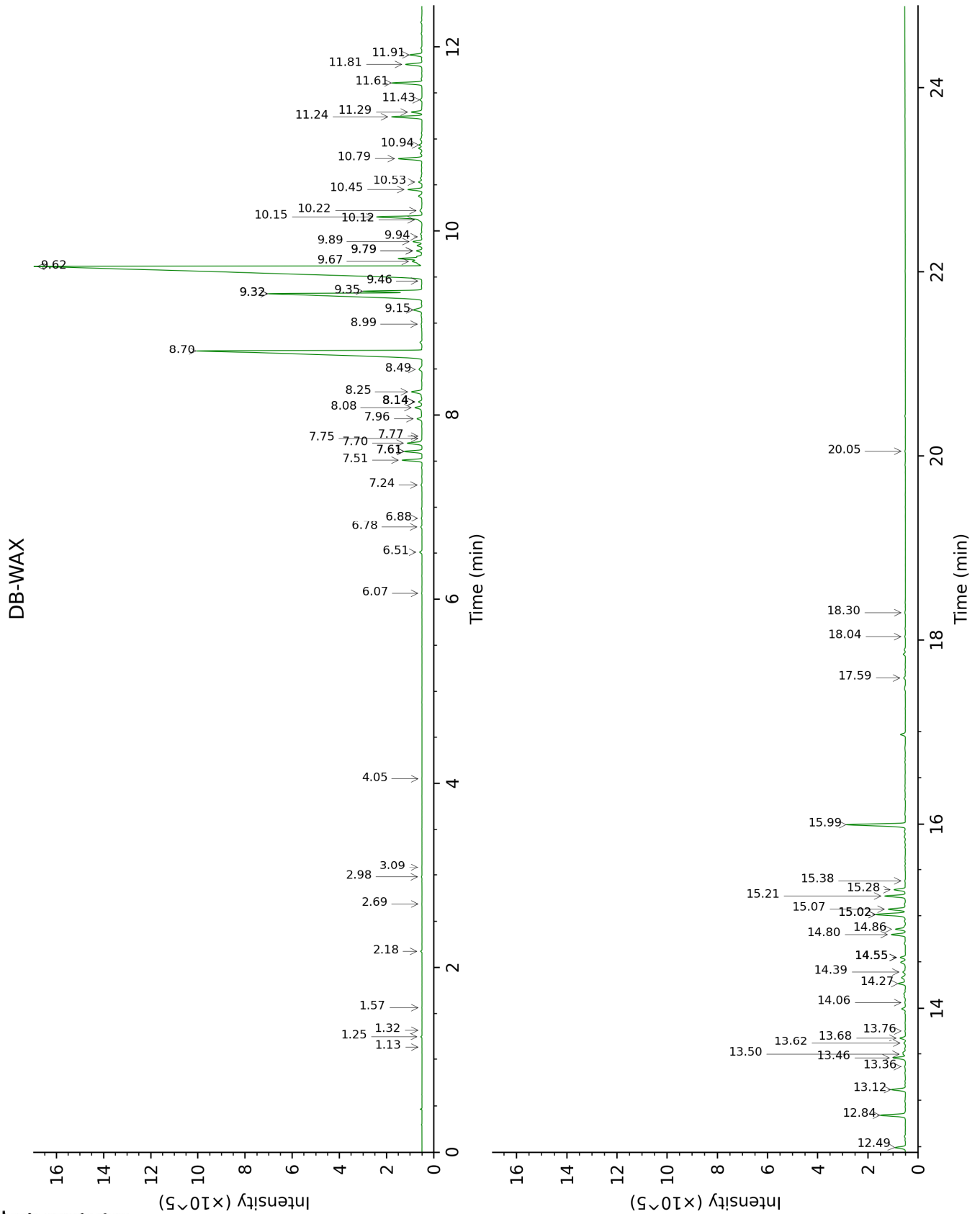
Note: no correction factor was applied

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	%
Methyl isobutyl ketone	1.05	733	tr	1.13	969	tr
Toluene	1.24	759	tr	1.32	1000	tr
Mesityl oxide	1.52	797	0.03	2.18	1089	0.03
α -Pinene	3.21	931	0.03	1.25	990	0.03
Camphene	3.40	944	0.01	1.57	1026	tr
Myrcene	4.15	993	0.01	2.69	1133	0.01
Limonene	4.68*	1027	0.02	2.98	1157	0.02
β -Phellandrene	4.68*	1027	[0.02]	3.09	1166	0.01
para-Cymenene	5.65*	1087	0.02	6.06	1385	0.01
Terpinolene	5.65*	1087	[0.02]	4.05	1242	tr
Linalool	5.90	1103	0.01	7.77	1513	0.01
endo-Fenchol	6.04	1112	0.01	8.14*	1542	0.14
Limona ketone	6.28*	1127	0.66	7.61*	1500	0.65
4-Hydroxy-4-methylcyclohex-2-enone	6.28*	1127	[0.66]	13.76	2027	0.02
α ,4-Dimethyl-3-cyclohexene-1-methanol	6.62	1148	0.05			
α ,4-Dimethyl-3-cyclohexene-1-methanol epimer	6.66	1151	0.05			
4-Methylacetophenone	7.09	1178	0.10	10.22	1710	0.10
α -Terpineol	7.25	1189	0.04	9.46	1647	0.02
Unknown [m/z 105, 145 (97), 160 (86), 119 (76), 91 (61)]	7.94	1234	0.01			
α -Longipinene	9.57	1345	0.09	6.51	1418	0.09
α -Ylangene	9.90	1368	0.06	6.78	1439	0.05
α -Copaene	9.96	1372	0.03	6.88	1446	0.03
Unknown epimer I [m/z 131, 146 (36), 91 (22), 145 (19), 202 (18)]	10.08	1381	0.15	7.96	1528	0.23
(3Z)-Hexenyl (3Z)-hexenoate	10.13	1384	0.15	9.79*	1674	0.20
Sativene	10.17*	1387	0.37	7.24	1473	0.04
Unknown epimer II [m/z 131, 146 (33), 91 (20), 202 (18)]	10.17*	1387	[0.37]	8.08	1538	0.36
β -Elemene	10.21	1390	0.04	8.14*	1542	[0.14]
β -Longipinene	10.27	1394	0.04	7.51	1493	0.68
Longifolene	10.32*	1397	1.21	7.70	1508	0.61
Sibirene	10.32*	1397	[1.21]	7.61*	1500	[0.65]
α -Cedrene	10.43*	1405	0.13	7.75	1511	0.01

(Z)-Vestitenone, or analog	10.43*	1405	[0.13]	11.43	1814	0.08
β -Caryophyllene	10.54	1413	0.05	8.14*	1542	[0.14]
Himachala-2,4-diene	10.65	1422	0.52	8.25	1551	0.49
Unknown [m/z 91, 93 (90), 105 (72), 202 (71), 131 (68), 77 (63), 107 (55), 187 (54)]	10.70	1425	0.02			
Unknown [m/z 105, 91 (70), 93 (65), 43 (61), 120 (57), 145 (50)... 204 (6)]	10.74	1429	0.13			
<i>trans</i> - α -Bergamotene	10.77	1431	0.03	8.14*	1542	[0.14]
Himachala-2,4-diene isomer	10.87	1438	0.16	8.50	1570	0.18
(<i>E</i>)-Vestitenone	10.97*	1446	17.00	11.91	1857	0.46
α -Himachalene	10.97*	1446	[17.00]	8.70	1585	16.57
α -Humulene	11.00	1448	0.05	8.99	1609	0.04
Unknown [m/z 187, 131 (78), 202 (76), 105 (74), 91 (74), 117 (53), 145 (52)]	11.12	1457	0.31	9.67	1665	0.42
(<i>E</i>)- β -Farnesene	11.15	1459	0.19	9.32*†	1636	11.65
Unknown [m/z 131, 202 (78), 91 (74), 105 (68), 187 (68), 119 (53), 145 (52)]	11.25	1466	0.58			
Unknown [m/z 119, 91 (85), 93 (77), 105 (76), 79 (61), 134 (60), 94 (49), 204 (46)]	11.26	1467	0.23	9.15	1622	0.44
γ -Himachalene	11.36	1474	9.81	9.32*†	1636	[11.65]
11- α H-Himachala-1,4-diene	11.39	1476	1.93	9.35†	1638	[11.65]
Unknown [m/z 137, 43 (84), 138 (63), 109 (53), 95 (51), 93 (50), 207 (46)... 222 (21)]	11.45	1481	0.32	9.89	1682	0.32
α -Muurolene	11.72*	1502	43.91	9.79*	1674	[0.20]
β -Himachalene	11.72*	1502	[43.91]	9.62	1660	43.85
(<i>Z</i>)- α -Bisabolene	11.76*	1504	0.28	9.94	1686	0.03
Cycloisolongifol-5-ol	11.76*	1504	[0.28]	10.53	1736	0.13
Unknown [m/z 105, 119 (89), 91 (69), 159 (62), 131 (42), 93 (41), 202 (38)]	11.76*	1504	[0.28]			
γ -Cadinene	11.82*	1509	1.19	10.12	1702	0.11
α -Dehydro-arhimachalene	11.82*	1509	[1.19]	11.24	1797	1.14
<i>trans</i> -Calamenene	11.94	1518	0.12	10.94	1771	0.11
δ -Cadinene	11.98*†	1521	3.90	10.15	1704	1.77

Unknown [m/z 131, 202 (28), 91 (22), 159 (16), 145 (16), 132 (15), 115 (14)]	11.98*†	1521	[3.90]	10.79	1759	0.92
γ-Dehydro-ar-himachalene	11.98*†	1521	[3.90]	11.61	1830	1.13
Unknown [m/z 93, 187 (70), 145 (59), 119 (42), 131 (39), 202 (33)]	12.06	1528	0.19			
ar-Himachalene	12.11	1532	0.41	11.30	1802	0.39
α-Calacorene	12.18	1537	0.66	11.81	1848	0.65
(E)-α-Bisabolene	12.24	1542	0.54	10.45	1730	0.50
Unknown [m/z 189, 91 (85), 43 (74), 105 (67), 133 (66), 107 (63), 135 (52)... 220 (20)]	12.46	1559	0.14	13.68	2020	0.20
(E)-Nerolidol	12.52	1564	0.08	13.50	2002	0.07
Unknown [m/z 96, 95 (18), 83 (15), 125 (13), 119 (12), 55 (12), 41 (11)... 218? (tr)]	12.58*†	1569	0.57	14.55*	2104	0.19
Himachalene epoxide	12.58*†	1569	[0.57]	12.49	1909	0.38
Unknown [m/z 177, 202 (79), 91 (76), 159 (75), 43 (65), 107 (59), 105 (57)...]	12.64	1573	0.06	14.06	2057	0.03
Longiborneol	12.83	1588	0.33	14.27	2077	0.26
ar-Dihydroturmerone	12.89	1593	0.04	13.62	2014	0.06
β-Himachalene oxide	13.04	1604	0.95	12.84	1941	0.98
Unknown [m/z 138, 110 (77), 137 (75), 107 (62), 91 (61), 93 (60), 109 (57)... 220 (34)]	13.08*	1608	0.59	13.12	1967	0.52
10-epi-Cubenol	13.08*	1608	[0.59]	13.36	1990	0.04
Unknown [m/z 137, 119 (69), 43 (51), 95 (50), 109 (40)... 222 (1)]	13.22	1620	0.12	14.55*	2104	[0.19]
1-epi-Cubenol	13.26	1623	0.63	13.46	1999	0.46
6-Methyl-6-metatolyl-heptan-2-one	13.30	1626	0.11	15.38	2188	0.03
Unknown [m/z 119, 163 (80), 107 (64), 95 (61), 93 (57), 91 (53)... 220 (11)]	13.34	1630	0.14			
Unknown [m/z 119, 91 (44), 94 (36), 107	13.42	1636	0.02			

(35), 93 (29)... 202 (19)...						
Himachalol	13.47	1640	0.46	14.86	2135	0.37
Allohimachalol	13.64	1654	0.76	15.22	2171	0.76
β -Atlantone	13.77	1665	0.14	14.55*	2104	[0.19]
(E)-10,11- Dihydroatlantone	13.79	1667	0.31	14.39	2089	0.11
(Z)- γ -Atlantone	14.04†	1688	1.89	14.80	2129	0.52
Deodarone epimer I	14.06†	1689	[1.89]	15.02*	2151	1.30
Deodarone epimer II	14.08†	1690	[1.89]	15.07	2157	0.67
(E)- γ -Atlantone	14.19	1700	0.59	15.02*	2151	[1.30]
(Z)- α -Atlantone	14.34	1712	0.47	15.28	2178	0.44
Unknown [m/z 105, 119 (89), 59 (68), 120 (65), 43 (65), 93 (62), 121 (61)...	14.48	1725	0.05			
Unknown [m/z 91, 79 (83), 105 (68), 109 (63), 41 (590), 93 (58), 107 (57)...	14.61	1736	0.08	17.59	2424	0.07
Unknown [m/z 83, 91 (28), 105 (25), 55 (21), 43 (17), 119 (17)...	14.64	1738	0.01			
Unknown [m/z 43, 105 (99), 119 (90), 91 (87), 147 (76), 41 (69), 93 (63)...	14.68	1742	0.07			
Unknown [m/z 83, 55 (17), 91 (14), 105 (9), 216 (6)...	14.81	1753	0.10			
Unknown [m/z 91, 105 (74), 93 (67), 79 (59), 133 (54), 41 (47), 107 (46)...	14.88	1759	0.02	18.04	2474	0.03
(E)- α -Atlantone	15.02	1771	2.30	16.00	2252	2.32
Unknown [m/z 95, 43 (59), 69, (57), 67 (43), 163 (42), 94 (37), 107 (37)... 178 (26), 218 (2)]	15.24	1790	0.10			
Unknown [m/z 83, 134 (28), 119 (19), 55 (18), 91 (14), 43 (11), 109 (10)... 216 (4), 249? (0)]	15.77	1838	0.02			
Unknown [m/z 83, 134 (30), 119 (19), 55 (18), 91 (12)... 216 (4)...	15.89	1848	0.02	20.05	2712	0.02
Unknown [m/z 173, 83 (83), 91 (80), 201	16.26	1882	0.02	18.30	2504	0.03

(79), 115 (65)... 216 (31)]		
Total identified	94.12%	90.99%
Total reported	97.03%	94.58%

*: 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