

Date : 2025-02-25

CERTIFICATE OF ANALYSIS - GC PROFILING

SAMPLE IDENTIFICATION

**Internal code** : 25B11-PTH02

**Customer Identification** : Organic Atlas Cedarwood - Morocco - C60107R

**Type** : Essential Oil

**Source** : *Cedrus atlantica*

**Customer** : Plant Therapy

Checked and approved by:

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

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## GAS CHROMATOGRAPHIC ANALYSIS

**Method :** PC-MAT-014 - Analysis of the composition of an essential oil or other volatile liquide by FAST GC-FID

**\*ISO**

**Results :** See analysis summary (next page)

**Analyst :** Sylvain Mercier, M. Sc., Chimiste 2014-005

**Date :** 2025-02-18

## PHYSICOCHEMICAL DATA

**Refractive index :**  $1.5133 \pm 0.0003$  (20 °C)

**Method :** PC-MAT-016 - Measure of the refractive index of a liquid.

**Analyst :** Cindy Caron B. Sc.

**Date :** 2025-02-12

## 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	0.05	Aliphatic ketone
$\alpha$ -Pinene	0.03	Monoterpene
3-Methyl-3-cyclohexenone	0.01	Aliphatic ketone
6-Methyl-5-hepten-2-one	0.01	Aliphatic ketone
Limonene	0.03	Monoterpene
<i>para</i> -Cymenene	0.02	Monoterpene
Terpinolene	tr	Monoterpene
Unknown CEAT III [m/z 85, 56 (50), 43 (50), 125 (36), 140 (35)...]	0.04	Unknown
Limona ketone	0.58	Normonoterpenic ketone
$\alpha$ ,4-Dimethyl-3-cyclohexene-1-methanol	0.04	Normonoterpenic alcohol
$\alpha$ ,4-Dimethyl-3-cyclohexene-1-methanol epimer	0.04	Normonoterpenic alcohol
Borneol	0.02	Monoterpenic alcohol
4-Methylacetophenone	0.11	Simple phenolic
$\alpha$ -Terpineol	0.05	Monoterpenic alcohol
$\alpha$ -Longipinene	0.09	Sesquiterpene
Longicyclene	0.01	Sesquiterpene
$\alpha$ -Ylangene	0.06	Sesquiterpene
$\alpha$ -Copaene	0.03	Sesquiterpene
Unknown	0.30	Sesquiterpene
(3Z)-Hexenyl (3Z)-hexenoate	0.18	Aliphatic ester
Sativene	0.03	Sesquiterpene
Unknown	0.52	Sesquiterpene
$\beta$ -Elemene	0.07	Sesquiterpene
Sibirene	0.04	Sesquiterpene
Longifolene	1.14	Sesquiterpene
$\alpha$ -Cedrene	0.02	Sesquiterpene
(Z?)-Vestitenone, or analog	0.09	Terpenic ketone
$\beta$ -Cedrene	0.02	Sesquiterpene
$\beta$ -Caryophyllene	0.02	Sesquiterpene
Himachala-2,4-diene	0.49	Sesquiterpene
Unknown	0.03	Sesquiterpene
Unknown	0.13	Sesquiterpene
Himachala-2,4-diene isomer	0.17	Sesquiterpene
(E)-Vestitenone	0.51	Terpenic ketone
$\alpha$ -Himachalene	15.26	Sesquiterpene
Unknown	0.41	Sesquiterpene

(E)-β-Farnesene	0.18	Sesquiterpene
Unknown	0.57	Sesquiterpene
Unknown	0.28	Sesquiterpene
γ-Himachalene	9.39	Sesquiterpene
11-αH-Himachala-1,4-diene	1.87	Sesquiterpene
Unknown	0.33	Sesquiterpenic ether
Unknown	0.38	Sesquiterpene
α-Muurolene	0.02	Sesquiterpene
(Z)-α-Bisabolene	0.02	Sesquiterpene
β-Himachalene	38.49	Sesquiterpene
Cycloisolongifol-5-ol	0.27	Sesquiterpenic alcohol
Unknown	0.14	Sesquiterpene
α-Dehydro-ar-himachalene	1.64	Sesquiterpene
γ-Cadinene	0.03	Sesquiterpene
Unknown CEAT IV [m/z 146, 193 (97), 131 (89), 91 (54), 159 (54)...]	0.20	Unknown
trans-Calamenene	0.12	Sesquiterpene
γ-Dehydro-ar-himachalene	1.58	Sesquiterpene
δ-Cadinene	2.09	Sesquiterpene
Unknown	1.37	Sesquiterpene
Unknown	0.19	Sesquiterpene
ar-Himachalene	0.50	Sesquiterpene
α-Calacorene	0.69	Sesquiterpene
(E)-α-Bisabolene	0.63	Sesquiterpene
Unknown	0.11	Oxygenated sesquiterpene
Himachalene epoxide	0.52	Sesquiterpenic ether
Unknown	0.37	Unknown
Unknown	0.12	Oxygenated sesquiterpene
Longiborneol	0.43	Sesquiterpenic alcohol
ar-Dihydroturmerone	0.06	Sesquiterpenic ketone
β-Himachalene oxide	0.80	Sesquiterpenic ether
Unknown	1.01	Oxygenated sesquiterpene
1-epi-Cubenol	0.83	Sesquiterpenic alcohol
Unknown	0.23	Oxygenated sesquiterpene
Unknown	0.02	Oxygenated sesquiterpene
Himachalol	0.62	Sesquiterpenic alcohol
Allohimachalol	0.89	Sesquiterpenic alcohol
(E)-10,11-Dihydroatlantone	0.14	Sesquiterpenic ketone
β-Atlantone	0.26	Sesquiterpenic ketone
Deodarone epimer I	0.81	Sesquiterpenic ketone
(Z)-γ-Atlantone	0.83	Sesquiterpenic ketone
Deodarone epimer II	1.05	Sesquiterpenic ketone
(E)-γ-Atlantone	0.95	Sesquiterpenic ketone
(Z)-α-Atlantone	0.68	Sesquiterpenic ketone
Unknown	0.05	Oxygenated sesquiterpene

Unknown	0.05	Oxygenated sesquiterpene
Unknown	0.06	Oxygenated sesquiterpene
Unknown	0.04	Oxygenated sesquiterpene
Unknown	0.09	Oxygenated sesquiterpene
Unknown	0.02	Oxygenated sesquiterpene
(E)- $\alpha$ -Atlantone	3.43	Sesquiterpenic ketone
Unknown	0.17	Oxygenated sesquiterpene
Unknown	0.02	Oxygenated sesquiterpene
Unknown	0.02	Oxygenated sesquiterpene
Unknown	0.03	Oxygenated sesquiterpene
<b>Consolidated total</b>	<b>96.32</b>	

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

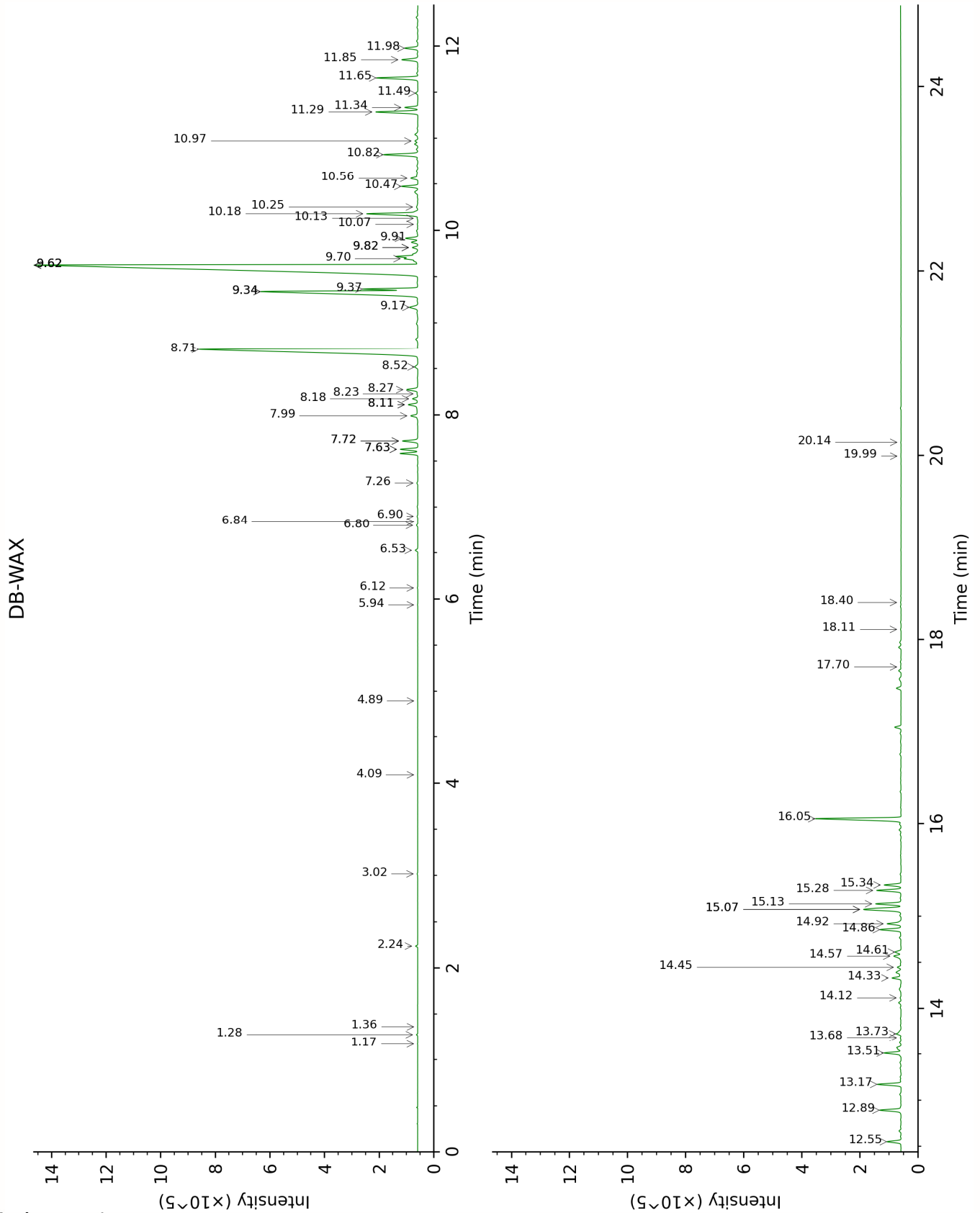
Note: no correction factor was applied

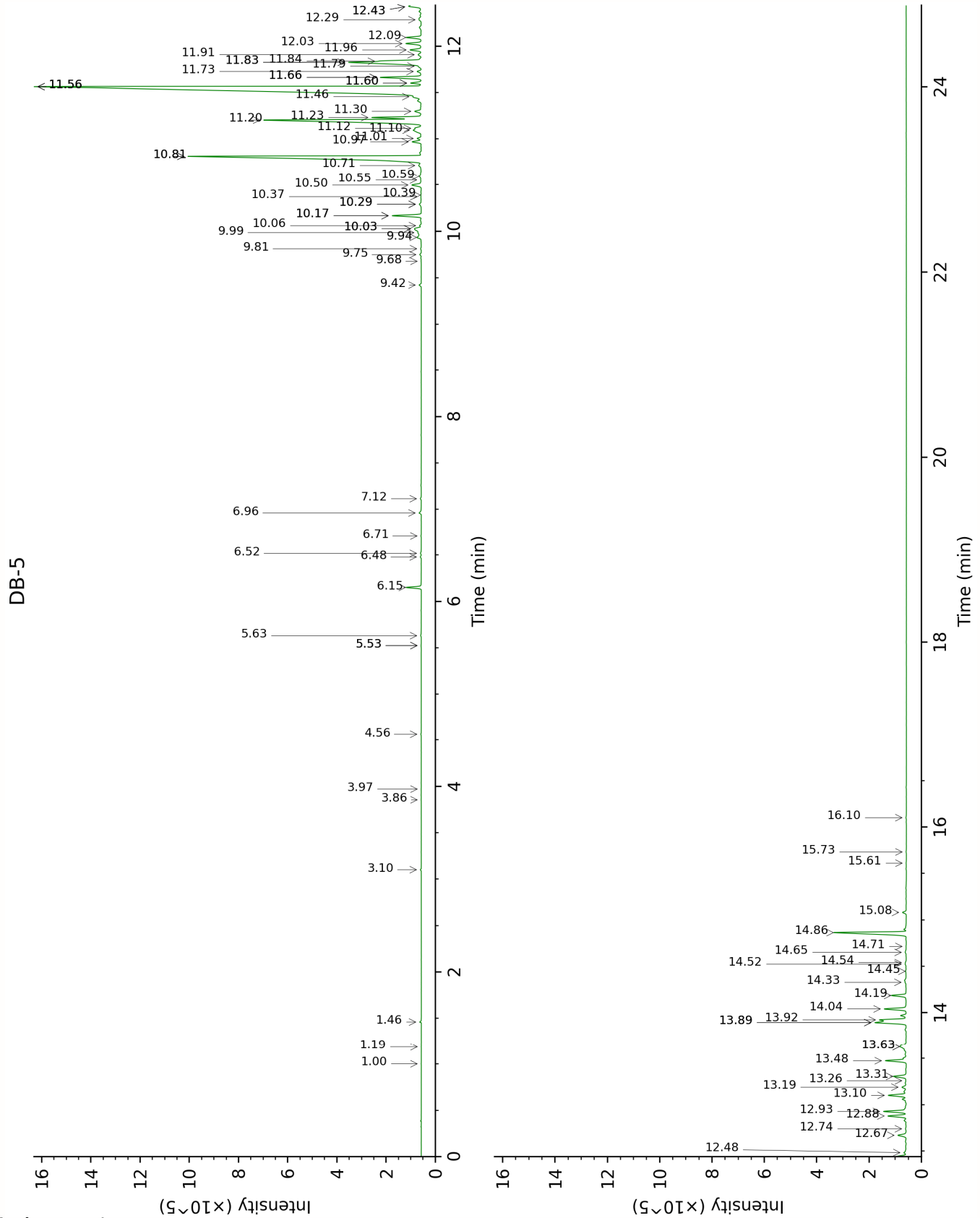
**About "consolidated" data:** The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm 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.

**Bracketed value ([xx]):** A bracketed percent value indicate that two or more compound percentage could not be solved due to coelution.

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







FULL ANALYSIS DATA

Methyl isobutyl ketone	Column DB-WAX			Column DB-5		
	1.17	973.9	tr	1.00	734.8	tr
Toluene	1.36	1004.5	tr	1.19	761.0	tr
Mesityl oxide	2.24	1093.2	0.05	1.46	799.6	0.05
$\alpha$ -Pinene	1.28	991.8	0.03	3.10	932.2	0.03
3-Methyl-3-cyclohexenone	5.94	1373.9	0.01	3.86	982.1	0.01
6-Methyl-5-hepten-2-one	4.89	1299.4	0.01	3.97	989.8	0.01
Limonene	3.02	1157.3	0.02	4.56	1027.7	0.03
<i>para</i> -Cymenene	6.12	1387.1	0.02	5.53*	1088.0	[0.02]
Terpinolene	4.09	1240.0	tr	5.53*	1088.0	[0.02]
Unknown CEAT III [m/z 85, 56 (50), 43 (50), 125 (36), 140 (35)...]				5.63	1094.7	0.04
Limona ketone	7.63*	1498.8	[0.62]	6.15	1127.7	0.58
$\alpha$ ,4-Dimethyl-3-cyclohexene-1-methanol				6.48	1148.6	0.04
$\alpha$ ,4-Dimethyl-3-cyclohexene-1-methanol epimer				6.52	1151.1	0.04
Borneol	9.62*	1656.3	[38.55]	6.71	1163.0	0.02
4-Methylacetophenone	10.25	1707.6	0.08	6.96	1179.3	0.11
$\alpha$ -Terpineol	9.62*	1656.3	[38.55]	7.12	1189.1	0.05
$\alpha$ -Longipinene	6.53	1416.9	0.09	9.42	1344.7	0.09
Longicyclene	6.84	1440.2	0.01	9.68	1362.7	0.01
$\alpha$ -Ylangene	6.80	1437.1	0.05	9.75	1367.7	0.06
$\alpha$ -Copaene	6.90	1444.8	0.03	9.81	1372.2	0.03
Unknown CEDE XXVII epimer I [m/z 131, 146 (36), 91 (22), 145 (19), 202 (18)]	7.99	1526.8	0.34	9.94	1380.8	0.30
(3Z)-Hexenyl (3Z)-hexenoate	9.82*	1671.7	[0.20]	9.99	1384.3	0.18
Sativene	7.26	1471.6	0.03	10.03*	1387.2	[0.55]
Unknown CEDE XXVII epimer II [m/z 131, 146 (33), 91 (20), 202 (18)]	8.11*	1536.2	[0.48]	10.03*	1387.2	[0.55]
$\beta$ -Elemene	8.18	1541.1	0.22	10.06	1389.6	0.07
Sibirene	7.63*	1498.8	[0.62]	10.17*	1397.1	[1.18]

Longifolene	7.72*	1505.6	[0.59]	10.17*	1397.1	[1.18]
$\alpha$ -Cedrene	7.72*	1505.6	[0.59]	10.29*	1405.8	[0.11]
(Z?)-Vestitenone, or analog	11.49	1813.6	0.09	10.29*	1405.8	[0.11]
$\beta$ -Cedrene	8.11*	1536.2	[0.48]	10.37	1412.0	0.02
$\beta$ -Caryophyllene	8.23	1545.3	0.04	10.39	1413.2	0.02
Himachala-2,4-diene	8.27	1548.8	0.47	10.50	1421.3	0.49
Unknown CEDE III [m/z 91, 93 (90), 105 (72), 202 (71), 131 (68), 77 (63), 107 (55), 187 (54)]				10.55	1425.4	0.03
Unknown CEDE IV [m/z 105, 91 (70), 93 (65), 43 (61), 120 (57), 145 (50)... 204 (6)]				10.59	1428.4	0.13
Himachala-2,4-diene isomer	8.52	1567.9	0.16	10.71	1437.4	0.17
(E)-Vestitenone	11.98	1856.9	0.51	10.81*	1444.8	[15.75]
$\alpha$ -Himachalene	8.71	1582.9	15.26	10.81*	1444.8	[15.75]
Unknown CEDE V [m/z 187, 131 (78), 202 (76), 105 (74), 91 (74), 117 (53), 145 (52)]	9.70	1662.0	0.47	10.97	1456.5	0.41
(E)- $\beta$ -Farnesene	9.34*	1633.1	[9.32]	11.01	1459.1	0.18
Unknown CEDE VI [m/z 119, 91 (85), 93 (77), 105 (76), 79 (61), 134 (60), 94 (49), 204 (46)]	9.17	1619.3	0.42	11.10	1465.8	0.57
Unknown CEDE VII [m/z 131, 202 (78), 91 (74), 105 (68), 187 (68), 119 (53), 145 (52)]				11.12	1467.3	0.28
$\gamma$ -Himachalene	9.34*	1633.1	[9.32]	11.20	1473.9	9.39
11- $\alpha$ H-Himachala-1,4-diene	9.37	1635.3	1.65	11.23	1475.9	1.87
Unknown CEDE VIII [m/z 137, 43 (84), 138 (63), 109 (53), 95 (51), 93 (50), 207 (46)... 222 (21)]	9.92	1679.9	0.45	11.30	1480.9	0.33
Unknown CULA III				11.46	1492.7	0.38

[m/z 161, 119 (97), 93 (74), 105 (70), 91 (59), 120 (40), 79 934), 77 (28)... 204 (26)]						
$\alpha$ -Muurolene	9.82*	1671.7	[0.20]	11.56*	1500.7	[38.85]
(Z)- $\alpha$ -Bisabolene	10.07	1692.1	0.02	11.56*	1500.7	[38.85]
$\beta$ -Himachalene	9.62*	1656.3	[38.55]	11.56*	1500.7	[38.85]
Cycloisolongifol-5-ol	10.56	1734.1	0.27	11.60*	1503.6	[0.41]
Unknown CEAT I [m/z 105, 119 (89), 91 (69), 159 (62), 131 (42), 93 (41), 202 (38)]				11.60*	1503.6	[0.41]
$\alpha$ -Dehydro-ar-himachalene	11.29	1795.6	1.64	11.66*	1508.3	[1.71]
$\gamma$ -Cadinene	10.13	1697.3	0.03	11.66*	1508.3	[1.71]
Unknown CEAT IV [m/z 146, 193 (97), 131 (89), 91 (54), 159 (54)...]				11.73	1513.3	0.20
<i>trans</i> -Calamenene	10.97	1768.9	0.11	11.79	1517.9	0.12
$\gamma$ -Dehydro-ar-himachalene	11.66	1828.2	1.58	11.83*†	1521.1	[4.07]
$\delta$ -Cadinene	10.18	1701.4	2.09	11.83*†	1521.1	[4.07]
Unknown CEDE IX [m/z 131, 202 (28), 91 (22), 159 (16), 145 (16), 132 (15), 115 (14)]	10.82	1756.3	1.37	11.84*†	1522.0	[0.91]
Unknown CEAT II [m/z 93, 187 (70), 145 (59), 119 (42), 131 (39), 202 (33)]				11.91	1527.5	0.19
ar-Himachalene	11.34	1799.8	0.46	11.96	1531.6	0.50
$\alpha$ -Calacorene	11.85	1845.8	0.64	12.03	1536.9	0.69
(E)- $\alpha$ -Bisabolene	10.48	1726.6	0.58	12.09	1542.1	0.63
Unknown CEDE X [m/z 189, 91 (85), 43 (74), 105 (67), 133 (66), 107 (63), 135 (52)... 220 (20)]	13.73	2018.4	0.26	12.29	1557.1	0.11
Himachalene epoxide	12.55	1908.4	0.52	12.43*	1568.6	[0.84]
Unknown CEDE XI [m/z 96, 95 (18), 83 (15), 125 (13), 119	14.57	2099.9	0.37	12.43*	1568.6	[0.84]

(12), 55 (12), 41 (11)... 218? (tr)]						
Unknown CEDE XII [m/z 177, 202 (79), 91 (76), 159 (75), 43 (65), 107 (59), 105 (57)...]	14.12	2056.1	0.04	12.48	1572.6	0.12
Longiborneol	14.33	2076.9	0.35	12.67	1587.3	0.43
ar-Dihydroturmerone	13.68	2014.2	0.03	12.74	1592.8	0.06
β-Himachalene oxide	12.89	1940.2	0.82	12.88	1603.7	0.80
Unknown CEDE XIII [m/z 138, 110 (77), 137 (75), 107 (62), 91 (61), 93 (60), 109 (57)... 220 (34)]	13.17	1966.1	0.88	12.93	1607.7	1.01
1-epi-Cubenol	13.51	1997.7	0.64	13.10	1622.0	0.83
Unknown CEDE XV [m/z 119, 163 (80), 107 (64), 95 (61), 93 (57), 91 (53)... 220 (11)]				13.19	1629.3	0.23
Unknown CEDE XVI [m/z 119, 91 (44), 94 (36), 107 (35), 93 (29)... 202 (19)...]				13.26	1635.1	0.02
Himachalol	14.92	2135.1	0.56	13.31	1638.9	0.62
Allohimachalol	15.28	2171.4	0.90	13.48	1652.9	0.89
(E)-10,11- Dihydroatlantone	14.45	2088.1	0.14	13.63*	1665.5	[0.57]
β-Atlantone	14.61	2104.4	0.26	13.63*	1665.5	[0.57]
Deodarone epimer I (Z)-γ-Atlantone	15.07*	2150.7	[1.88]	13.89*	1687.4	[1.63]
Deodarone epimer II (E)-γ-Atlantone	14.86	2128.8	0.83	13.89*	1687.4	[1.63]
(E)-γ-Atlantone	15.13	2156.9	0.94	13.92	1689.8	1.05
(Z)-α-Atlantone	15.07*	2150.7	[1.88]	14.04	1699.6	0.95
(Z)-α-Atlantone	15.34	2177.4	0.61	14.19	1711.9	0.68
Unknown CEDE XVII [m/z 105, 119 (89), 59 (68), 120 (65), 43 (65), 93 (62), 121 (61)...]				14.33	1724.2	0.05
Unknown CEDE XVIII [m/z 91, 79 (83), 105 (68), 109 (63), 41 (590), 93 (58), 107 (57)...]	17.70	2430.6	0.02	14.45	1734.6	0.05
Unknown CEDE XIX [m/z 83, 91 (28), 105				14.52	1741.2	0.06

(25), 55 (21), 43 (17), 119 (17)...						
Unknown CEDE XX [m/z 43, 105 (99), 119 (90), 91 (87), 147 (76), 41 (69), 93 (63)...				14.54	1742.7	0.04
Unknown CEDE XXI [m/z 83, 55 (17), 91 (14), 105 (9), 216 (6)...				14.65	1752.2	0.09
Unknown CEDE XXII [m/z 91, 105 (74), 93 (67), 79 (59), 133 (54), 41 (47), 107 (46)...	18.11	2476.6	0.02	14.72	1757.8	0.02
(E)- $\alpha$ -Atlantone	16.06	2251.7	3.42	14.86	1770.7	3.43
Unknown CEDE XXIII [m/z 95, 43 (59), 69, (57), 67 (43), 163 (42), 94 (37), 107 (37)... 178 (26), 218 (2)]				15.08	1789.6	0.17
Unknown CEDE XXIV [m/z 83, 134 (28), 119 (19), 55 (18), 91 (14), 43 (11), 109 (10)... 216 (4), 249? (0)]	19.99	2699.0	0.01	15.61	1837.2	0.02
Unknown CEDE XXV [m/z 83, 134 (30), 119 (19), 55 (18), 91 (12)... 216 (4)...	20.14	2717.7	0.02	15.73	1848.3	0.02
Unknown CEDE XXVI [m/z 173, 83 (83), 91 (80), 201 (79), 115 (65)... 216 (31)]	18.40	2509.9	0.02	16.10	1881.9	0.03
Total reported		92.60%			96.71%	

\*: Two or more compounds are coeluting on this column

[xx]: Duplicate percentage due to coelutions, only the first one is 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