

**Date :** November 04, 2019

**CERTIFICATE OF ANALYSIS – GC PROFILING**

**SAMPLE IDENTIFICATION**

**Internal code :** 19K01-PTH02-1-CC

**Customer identification :** Patchouli - Sumatra - P20107810R

**Type :** Essential oil

**Source :** *Pogostemon cablin*

**Customer :** Plant Therapy

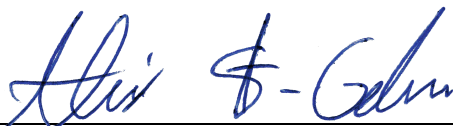
**ANALYSIS**

**Method:** PC-PA-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 :** Lindsay Girard, B. Sc.

**Analysis date :** November 04, 2019

Checked and approved by :



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

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#### PHYSICOCHEMICAL DATA

**Physical aspect:** Orange viscous liquid

**Refractive index:** 1.5096 ± 0.0003 (20 °C)

#### ISO 3757:2004 - OIL OF PATCHOULI

Compound	Min. %	Max. %	Observed %	Complies?
Pogostol	1.0	2.5	2.2	Yes
Patchoulol	27	35	32	Yes
Norpatchoulénol	0.35	1.00	0.67	Yes
δ-Guaiène	13	21	17	Yes
β-Caryophyllène	2	5	3	Yes
α-Guaiène	11	16	13	Yes
α-Copaène	tr	1.00	0.02	Yes
β-Patchoulène	1.8	3.5	2.2	Yes
<b>Refractive index</b>	1.5050	1.5150	1.5096	Yes

#### CONCLUSION

No adulterant, contaminant or diluent has been detected using this method. The oil complies with the ISO standard for oil of patchouli.

## ANALYSIS SUMMARY – CONSOLIDATED CONTENTS

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

Identification	%	Classe
α-Pinene	0.08	Monoterpene
Sabinene	0.01	Monoterpene
β-Pinene	0.19	Monoterpene
Octen-3-ol	0.01	Aliphatic alcohol
Octan-3-one	0.01	Aliphatic ketone
Octan-3-ol	0.01	Aliphatic alcohol
Limonene	0.02	Monoterpene
Linalool	0.01	Monoterpenic alcohol
δ-Elemene	0.12	Sesquiterpene
α-Copaene	0.02	Sesquiterpene
β-Patchoulene	2.25	Sesquiterpene
β-Bourbonene	0.01	Sesquiterpene
cis-β-Elemene	0.05	Sesquiterpene
β-Elemene	0.98	Sesquiterpene
Cycloseychellene	0.61	Sesquiterpene
β-Caryophyllene	3.03	Sesquiterpene
Seychellene	6.27	Sesquiterpene
Selina-5,11-diene	0.03	Sesquiterpene
α-Guaiene	12.56	Sesquiterpene
Unknown	0.04	Sesquiterpene
α-Humulene	0.39	Sesquiterpene
α-Patchoulene	5.35	Sesquiterpene
Patchoulene analog I	1.39	Sesquiterpene
γ-Patchoulene	0.76	Sesquiterpene
9-epi-β-Caryophyllene	0.36	Sesquiterpene
Selina-4,11-diene	0.20	Sesquiterpene
Unknown	0.54	Sesquiterpene
β-Selinene	0.07	Sesquiterpene
Patchoulene analog II	0.08	Sesquiterpene
Unknown	0.15	Sesquiterpene
δ-Selinene	0.26	Sesquiterpene
α-Selinene	0.21	Sesquiterpene
Aciphyllene	2.85	Sesquiterpene
Eudesma-2,4(15),11-triene	0.10	Sesquiterpene
Pentadecane	0.06	Alkane
δ-Guaiene	16.81	Sesquiterpene
Nootkatene	0.07	Sesquiterpene
7-epi-α-Selinene	0.41	Sesquiterpene
Unknown	0.05	Oxygenated sesquiterpene
Unknown	0.02	Oxygenated sesquiterpene
Unknown	0.11	Oxygenated sesquiterpene
Unknown	0.07	Oxygenated sesquiterpene
α-Elemol	0.01	Sesquiterpenic alcohol
Isocaryophyllene epoxide B	0.06	Sesquiterpenic ether
Norpatchoulenol	0.67	Norsesquiterpenic alcohol
Unknown	0.03	Oxygenated sesquiterpene
Unknown	0.03	Oxygenated sesquiterpene

Unknown	0.23	Oxygenated sesquiterpene
Unknown	0.11	Oxygenated sesquiterpene
Caryophyllene oxide isomer	0.02	Sesquiterpenic ether
Caryophyllene oxide	0.35	Sesquiterpenic ether
Unknown	0.05	Oxygenated sesquiterpene
Unknown	0.11	Oxygenated sesquiterpene
Hexadecane	0.18	Alkane
Humulene epoxide II	0.07	Sesquiterpenic ether
Unknown	0.11	Oxygenated sesquiterpene
Unknown	0.32	Oxygenated sesquiterpene
Unknown	0.24	Oxygenated sesquiterpene
Unknown	0.63	Oxygenated sesquiterpene
Patchoulol	32.34	Sesquiterpenic alcohol
Pogostol	2.18	Sesquiterpenic alcohol
Unknown	0.45	Oxygenated sesquiterpene
Unknown	0.23	Oxygenated sesquiterpene
Unknown	0.07	Oxygenated sesquiterpene
Unknown	0.03	Oxygenated sesquiterpene
Rotundone	0.18	Sesquiterpenic ketone
Unknown	0.12	Oxygenated sesquiterpene
Pogostone	1.45	Terpenic lactone
Unknown	0.22	Oxygenated sesquiterpene
Unknown	0.10	Oxygenated sesquiterpene
Unknown	0.09	Oxygenated sesquiterpene
Unknown	0.02	Oxygenated sesquiterpene
Unknown	0.02	Oxygenated sesquiterpene
Unknown	0.03	Oxygenated sesquiterpene
Unknown	0.04	Oxygenated sesquiterpene
Unknown	0.12	Oxygenated sesquiterpene
Unknown	0.09	Oxygenated sesquiterpene
Unknown	0.03	Oxygenated sesquiterpene
Unknown	0.05	Oxygenated sesquiterpene
Unknown	0.06	Oxygenated sesquiterpene
Unknown	0.02	Oxygenated sesquiterpene
Unknown	0.01	Oxygenated sesquiterpene
Palmitic acid	0.08	Aliphatic acid
Phytol	0.03	Diterpenic alcohol
Stearic acid	0.07	Aliphatic acid
Unknown	0.09	Oxygenated sesquiterpene
Unknown	0.02	Oxygenated sesquiterpene
Unknown	0.11	Oxygenated sesquiterpene
<b>Consolidated total</b>	<b>98.19%</b>	

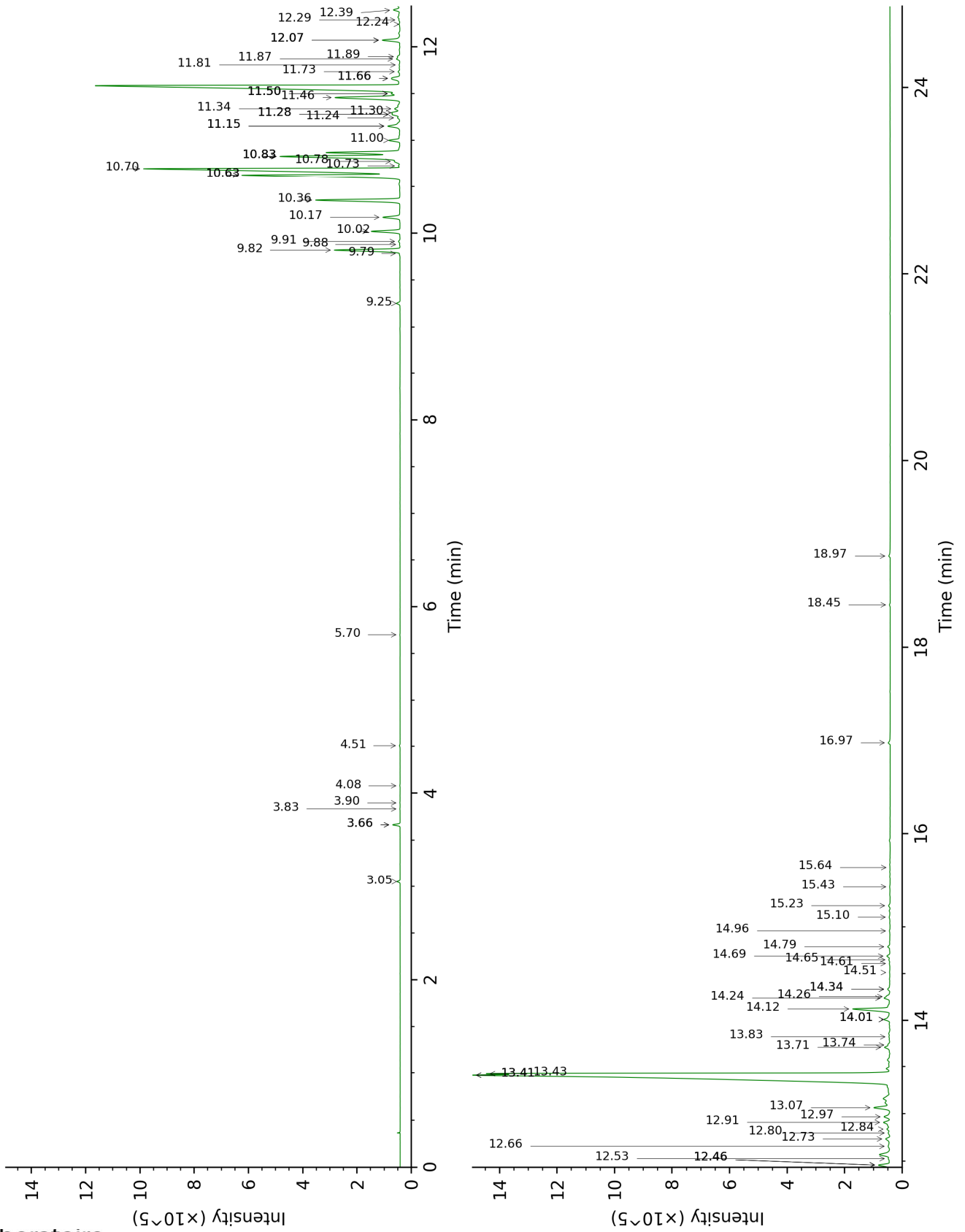
Note: no correction factor was applied

**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.

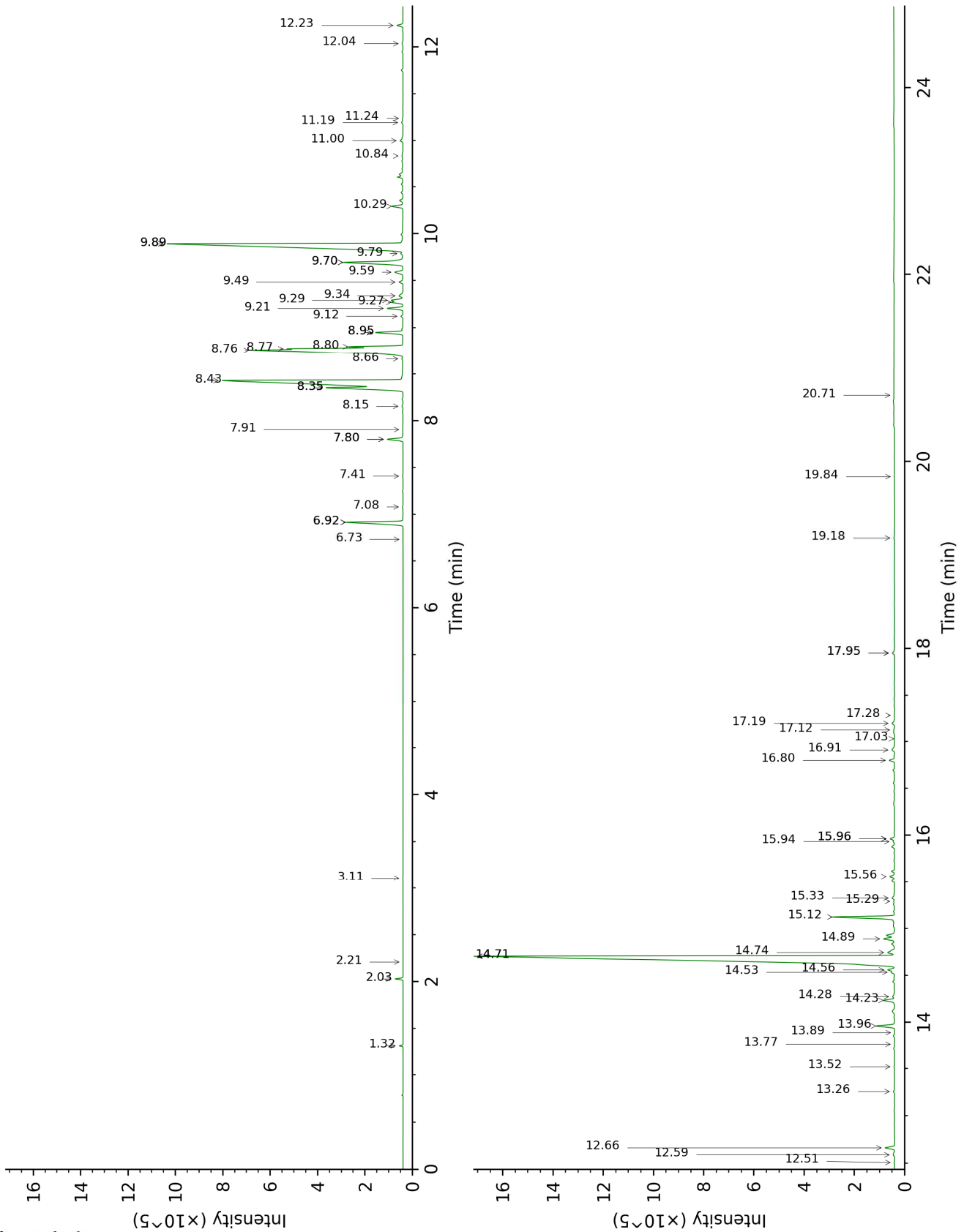
**Unknowns:** Unknown compounds' mass spectral data is presented in the "Full analysis data" table. The occurrence of unknown compounds is to be expected in many samples, and does not denote particular problems unless noted otherwise in the conclusion.

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

DB-5



DB-WAX



FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
$\alpha$ -Pinene	3.05	929	0.08	1.32	992	0.07
Sabinene	3.66*	970	0.20	2.21	1084	0.01
$\beta$ -Pinene	3.66*	970	[0.20]	2.03	1066	0.19
Octen-3-ol	3.83	981	0.01	6.73	1422	0.01
Octan-3-one	3.90	985	0.01			
Octan-3-ol	4.08	997	0.01			
Limonene	4.51	1025	0.02	3.11	1158	0.02
Linalool	5.70	1101	0.01	7.91	1511	0.01
$\delta$ -Elemene	9.25	1335	0.12	6.92*	1436	2.36
$\alpha$ -Copaene	9.79	1373	0.02	7.08	1449	0.03
$\beta$ -Patchoulene	9.82	1376	2.25	6.92*	1436	[2.36]
$\beta$ -Bourbonene	9.88	1380	0.01	7.41	1473	0.02
<i>cis</i> - $\beta$ -Elemene	9.92	1382	0.05	8.16	1531	0.05
$\beta$ -Elemene	10.02	1390	0.98	8.35*†	1546	16.57
Cycloseychellene	10.17	1401	0.61	7.80*	1503	0.59
$\beta$ -Caryophyllene	10.36	1414	3.03	8.35*†	1546	[16.57]
Seychellene	10.63*†	1434	18.87	8.76†	1578	11.11
Selina-5,11-diene	10.63*†	1434	[18.87]	8.66	1570	0.03
$\alpha$ -Guaiene	10.70†	1440	[18.87]	8.43†	1552	[16.57]
Unknown [m/z 91, 93 (98), 79 (82), 81 (82), 105 (71), 107 (70)... 204 (38)]	10.73	1442	0.04	9.12	1607	0.07
$\alpha$ -Humulene	10.78†	1446	7.90	9.27	1619	0.39
$\alpha$ -Patchoulene	10.83*†	1450	[7.90]	8.77†	1579	[11.11]
Patchoulene analog I	10.83*†	1450	[7.90]	8.80	1581	1.39
$\gamma$ -Patchoulene	10.83*†	1450	[7.90]	8.95*	1593	0.95
9-epi- $\beta$ -Caryophyllene	11.00	1463	0.36	9.29	1621	0.40
Selina-4,11-diene	11.15*	1474	0.49	9.34	1624	0.20
Unknown [m/z 147, 93 (87), 107 (77), 105 (77), 91 (73), 79 (63)... 204 (21)]	11.15*	1474	[0.49]	9.21	1614	0.54
$\beta$ -Selinene	11.24	1481	0.07	9.79	1661	0.08
Patchoulene analog II	11.28*	1483	0.24	9.70*	1654	2.81
Unknown [m/z 79, 107 (99), 91 (88), 93 (86), 81 (78), 105 (73), 41 (73)... 204? (12)]	11.28*	1483	[0.24]	9.49	1636	0.15
$\delta$ -Selinene	11.30	1485	0.26	9.59	1645	0.36



α-Selinene	11.34	1488	0.21	9.89*	1670	17.02
Aciphyllene	11.46	1497	2.85	9.70*	1654	[2.81]
Eudesma-2,4(15),11-triene	11.50*†	1500	16.96	11.00	1763	0.10
Pentadecane	11.50*†	1500	[16.96]	7.80*	1503	[0.59]
δ-Guaiene	11.50*†	1500	[16.96]	9.89*	1670	[17.02]
Nootkatene	11.66*	1512	0.44	10.84	1749	0.07
7-epi-α-Selinene	11.66*	1512	[0.44]	10.29	1703	0.41
Unknown [m/z 41, 67 (95), 93 (92), 107 (91), 55 (77), 81 (77), 79 (73)... 205 (17)...]	11.74	1518	0.05	11.19	1780	0.06
Unknown [m/z 161, 119 (92), 91 (69), 105 (52), 145 (49)... 218 (6)]	11.81	1524	0.02	11.24	1784	0.02
Unknown [m/z 91, 105 (98), 108 (83), 93 (82), 133 (79), 77 (64), 79 (57), 41 (56), 145 (55)... 218? (5)]	11.87	1529	0.11			
Unknown [m/z 91, 105 (78), 93 (77), 107 (71), 79 (64), 41 (63), 77 (63), 145 (60)... 218 (17)]	11.90	1531	0.07			
α-Elemol	12.07*	1544	0.65	13.89	2025	0.01
Isocaryophyllene epoxide B	12.07*	1544	[0.65]	12.04	1854	0.06
Norpatchoulenol	12.07*	1544	[0.65]	13.96	2032	0.67
Unknown [m/z 191, 159 (66), 133 (53), 91 (45), 41 (42), 177 (35), 105 (33), 220 (32)]	12.24	1558	0.03	13.52	1990	0.02
Unknown [m/z 41, 67 (90), 55 (87), 79 (85), 107 (84), 81 (84), 93 (84), 121 (77), 91 (74)... 220 (7)]	12.29	1562	0.03			
Unknown [m/z 43, 107 (94), 81 (71), 41 (63), 67 (58), 111 (58), 93 (55), 83 (54)... 205 (8), 220 (1)]	12.39	1570	0.23	12.23	1871	0.22

Unknown isomer	12.46*	1575	0.44	14.28	2062	0.11
Caryophyllene oxide isomer	12.46*	1575	[0.44]	12.51	1896	0.02
Caryophyllene oxide	12.46*	1575	[0.44]	12.66	1910	0.35
Unknown [m/z 43, 79 (44), 81 (41), 93 (40), 91 (40)... 220 (5)]	12.53	1580	0.05	14.24	2058	0.44
Unknown [m/z 43, 105 (77), 91 (71), 93 (68), 41 (62), 107 (6)... 205 (41), 220 (7)]	12.66	1591	0.11	14.53	2087	0.11
Hexadecane	12.74	1597	0.18	8.95*	1593	[0.95]
Humulene epoxide II	12.80	1602	0.07	13.26	1965	0.05
Unknown [m/z 43, 161 (73), 91 (53), 95 (52), 79 (46), 119 (45)... 205 (29), 220? (1)]	12.84	1605	0.11	14.56	2090	0.24
Unknown [m/z 41, 91 (92), 55 (81), 93 (81), 79 (74), 43 (71), 95 (68), 123 (65)... 220 (17)]	12.91	1611	0.32	14.74	2107	0.27
Unknown [m/z 43, 79 (41), 93 (39), 41 (39), 91 (38), 81 (36)... 220 (3)]	12.97	1616	0.24			
Unknown [m/z 41, 55 (92), 95 (80), 81 (76), 109 (76), 67 (66), 125 (65)... 220 (12)]	13.07	1624	0.63	14.70*	2104	33.07
Patchoulol	13.41*†	1652	34.97	14.70*	2104	[33.07]
Pogostol	13.41*†	1652	[34.97]	15.12	2145	2.18
Unknown [m/z 175, 218 (59), 133 (49), 91 (43), 41 (38), 147 (36)]	13.43†	1654	[34.97]	14.89	2122	0.45
Unknown [m/z 95, 107 (99), 41 (85), 93 (82), 91 (82), 109 (71), 105 (71), 105 (71), 108 (66)... 220 (29)]	13.72	1678	0.23	15.96*	2231	0.17

Unknown [m/z 91, 41 (100), 107 (98), 108 (95), 95 (87), 93 (87), 105 (85), 79 (77), 119 (72)... 220? (15)]	13.74	1680	0.07	15.94	2228	0.05
Unknown [m/z 43, 41 (95), 97 (89), 109 (71), 55 (71), 107 (70), 95 (69), 110 (65)... 222 (5)]	13.83	1687	0.03	15.29	2162	0.03
Rotundone	14.01*	1702	0.30	15.56	2189	0.18
Unknown [m/z 43, 41 (82), 137 (78), 109 (76), 95 (75), 91 (72), 55 (67)... 220? (14)]	14.01*	1702	[0.30]			
Pogostone	14.12	1712	1.45			
Unknown [m/z 107, 93 (87), 41 (83), 81 (82), 67 (80), 55 (76)... 204 (53), 207 (34), 222 (9)]	14.24	1722	0.22	16.80	2318	0.20
Unknown [m/z 83, 43 (85), 55 (39), 41 (29), 121 (27), 120 (25)... 218 (3)]	14.26	1723	0.10	16.91	2330	0.15
Unknown [m/z 91, 108 (86), 107 (85), 93 (80), 120 (75), 105 (71), 95 (72)... 218 (37)]	14.34*	1730	0.10	15.96*	2231	[0.17]
Unknown [m/z 133, 148 (68), 147 (59), 91 (56), 79 (45), 105 (44)... 218 (8)]	14.34*	1730	[0.10]	17.03	2343	0.02
Unknown [m/z 43, 83 (93), 55 (42), 41 (37), 121 (34), 111 (28)... 222? (1)]	14.51	1746	0.02			
Unknown [m/z 134, 107 (96), 91 (84), 93 (78), 79 (77), 41 (74), 43 (66), 77 (65)...]	14.61	1754	0.03	17.28	2370	0.02
Unknown [m/z 43, 191 (68), 41	14.65	1757	0.04			

(62), 91 (51), 95 (49), 110 (44)... 234 (22)]						
Unknown [m/z 91, 105 (88), 95 (79), 93 (78), 81 (72), 79 (66)... 205 (33), 220 (7)...]	14.69	1761	0.12			
Unknown [m/z 149, 131 (54), 105 (48), 91 (46), 41 (30), 93 (27)... 218 (23)]	14.79	1770	0.09	17.19	2361	0.13
Unknown [m/z 43, 95 (58), 67 (50), 41 (47), 55 (38), 109 (37)... 221 (9)... 236? (3)]	14.96	1784	0.03	17.95*	2444	0.11
Unknown [m/z 219, 43 (67), 91 (46), 79 (42), 41 (41), 55 (36)... 234 (6)]	15.10	1797	0.05	17.95*	2444	[0.11]
Unknown [m/z 91, 41 (79), 43 (74), 79 (72), 105 (65), 77 (64), 147 (64), 93 (61)... 218 (26), 234 (14)]	15.23	1808	0.06	17.12	2353	0.04
Unknown [m/z 43, 69 (60), 41 (55), 55 (40), 95 (33), 163 (27)... 234 (17)]	15.43	1826	0.02	19.84	2662	0.02
Unknown [m/z 41, 110 (77), 55 (75), 69 (74), 43 (74), 95 (71), 97 (71), 123 (71), 67 (63), 136 (56)... 236? (7)]	15.64	1845	0.01	20.71	2767	0.01
Palmitic acid	16.97	1969	0.08			
Phytol	18.45	2115	0.03	19.18	2583	0.04
Stearic acid	18.97	2169	0.07			
Unknown [m/z 43, 41 (59), 109 (57), 79 (54), 95 (53), 107 (49), 93 (48), 67 (48)...]				12.59	1903	0.09

205 (18), 220 (4)]				
Unknown [m/z 41, 79 (97), 43 (97), 69 (72), 93 (70), 91 (62), 95 (58)... 220 (2)]		13.77	2013	0.02
Unknown [m/z 163, 119 (50), 91 (48), 95 (47), 41 (44), 105 (41)... 220 (18)]		15.33	2166	0.11
<b>Total identified</b>	<b>94.41%</b>		<b>92.14%</b>	
<b>Total reported</b>	<b>97.56%</b>		<b>95.73%</b>	

\*: 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

Note: no correction factor was applied

R.T.: Retention time (minutes)

R.I.: Retention index