

Date : March 16, 2021

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 21C09-PTH02

Customer identification : Patchouli Oil - P2010895R

Type : Essential oil

Source : *Pogostemon cablin*

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

Analysis date : March 16, 2021

Checked and approved by :

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

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PHYSICOCHEMICAL DATA

Physical aspect: Yellow/orange viscous liquid

Refractive index: 1.5092 ± 0.0003 (20 °C; method PC-MAT-016)

ISO 3757:2004 - OIL OF PATCHOULI

Compound	Min. %	Max. %	Observed %	Complies?
β-Patchoulene	1.8	3.5	2.4	Yes
α-Copaene	tr	1.00	0.03	Yes
α-Guaiene	11	16	13	Yes
β-Caryophyllene	2	5	3	Yes
δ-Guaiene	13	21	18	Yes
Norpatchoulenol	0.35	1.00	0.57	Yes
Patchoulol	27	35	30	Yes
Pogostol	1.0	2.5	2.2	Yes
Refractive index	1.5050	1.5150	1.5092	Yes

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
α-Pinene	0.08	Monoterpene
β-Pinene	0.21	Monoterpene
Octen-3-ol	0.01	Aliphatic alcohol
Octan-3-ol	0.01	Aliphatic alcohol
para-Cymene	0.01	Monoterpene
Limonene	0.02	Monoterpene
Linalool	0.01	Monoterpenic alcohol
α-Terpineol	0.01	Monoterpenic alcohol
δ-Elemene	0.11	Sesquiterpene
α-Copaene	0.03	Sesquiterpene
β-Patchoulene	2.37	Sesquiterpene
β-Bourbonene	0.01	Sesquiterpene
cis-β-Elemene	0.05	Sesquiterpene
β-Elemene	1.06	Sesquiterpene
Cycloseychellene	0.59	Sesquiterpene
β-Caryophyllene	3.09	Sesquiterpene
Seychellene	6.26	Sesquiterpene
α-Guaiene	12.70	Sesquiterpene
Selina-5,11-diene	0.04	Sesquiterpene
Unknown	0.05	Sesquiterpene
α-Patchoulene	5.19	Sesquiterpene
α-Humulene	0.18	Sesquiterpene
Patchoulene analog I	1.68	Sesquiterpene
γ-Patchoulene	0.94	Sesquiterpene
9-epi-β-Caryophyllene	0.01	Sesquiterpene
Unknown	0.39	Sesquiterpene
Selina-4,11-diene	0.21	Sesquiterpene
Unknown	0.38	Sesquiterpene
β-Selinene	0.09	Sesquiterpene
Patchoulene analog II	0.26	Sesquiterpene
Unknown	0.29	Sesquiterpene
δ-Selinene	0.08	Sesquiterpene
Unknown	0.17	Sesquiterpene
α-Selinene	0.08	Sesquiterpene
Aciphyllene	2.84	Sesquiterpene
Eudesma-2,4(15),11-triene	0.16	Sesquiterpene
Pentadecane	0.06	Alkane
δ-Guaiene	17.80	Sesquiterpene
γ-Cadinene	0.41	Sesquiterpene
Nootkatene	0.06	Sesquiterpene
7-epi-α-Selinene	0.01	Sesquiterpene
Unknown	0.06	Sesquiterpene
Unknown	0.02	Oxygenated sesquiterpene
Unknown	0.03	Oxygenated sesquiterpene
Unknown	0.12	Oxygenated sesquiterpene

Unknown	0.09	Oxygenated sesquiterpene
Unknown	0.03	Oxygenated sesquiterpene
Norpatchoulenol	0.57	Norsesquiterpenic alcohol
Isocaryophyllene epoxide B	0.05	Sesquiterpenic ether
Unknown	0.03	Oxygenated sesquiterpene
Unknown	0.03	Oxygenated sesquiterpene
Unknown	0.25	Oxygenated sesquiterpene
Caryophyllene oxide	0.37	Sesquiterpenic ether
Caryophyllene oxide isomer	0.09	Sesquiterpenic ether
Unknown	0.06	Oxygenated sesquiterpene
Unknown	0.48	Oxygenated sesquiterpene
Unknown	0.18	Oxygenated sesquiterpene
Humulene epoxide II	0.08	Sesquiterpenic ether
Hexadecane	0.12	Alkane
Unknown	0.26	Oxygenated sesquiterpene
Unknown	0.25	Oxygenated sesquiterpene
Unknown	0.61	Oxygenated sesquiterpene
Hinesol	0.45	Sesquiterpenic alcohol
Patchoulol	30.36	Sesquiterpenic alcohol
Pogostol	2.16	Sesquiterpenic alcohol
Unknown	0.13	Oxygenated sesquiterpene
Unknown	0.25	Oxygenated sesquiterpene
Unknown	0.08	Unknown
Unknown	0.04	Oxygenated sesquiterpene
Unknown	0.06	Oxygenated sesquiterpene
Unknown	0.02	Oxygenated sesquiterpene
Rotundone	0.18	Sesquiterpenic ketone
Unknown	0.06	Oxygenated sesquiterpene
Pogostone	0.88	Terpenic lactone
Unknown	0.21	Oxygenated sesquiterpene
Unknown	0.13	Oxygenated sesquiterpene
Unknown	0.10	Oxygenated sesquiterpene
Unknown	0.02	Oxygenated sesquiterpene
Unknown	0.02	Oxygenated sesquiterpene
Unknown	0.01	Oxygenated sesquiterpene
Unknown	0.12	Oxygenated sesquiterpene
Unknown	0.10	Oxygenated sesquiterpene
Unknown	0.03	Oxygenated sesquiterpene
Unknown	0.04	Oxygenated sesquiterpene
Unknown	0.03	Oxygenated sesquiterpene
Unknown	0.01	Oxygenated sesquiterpene
Unknown	0.05	Oxygenated sesquiterpene
Unknown	0.02	Oxygenated sesquiterpene
Unknown	0.02	Oxygenated sesquiterpene
Phytol	0.03	Diterpenic alcohol
Unknown	0.02	Oxygenated sesquiterpene
Unknown	0.12	Oxygenated sesquiterpene
Consolidated total	97.49%	

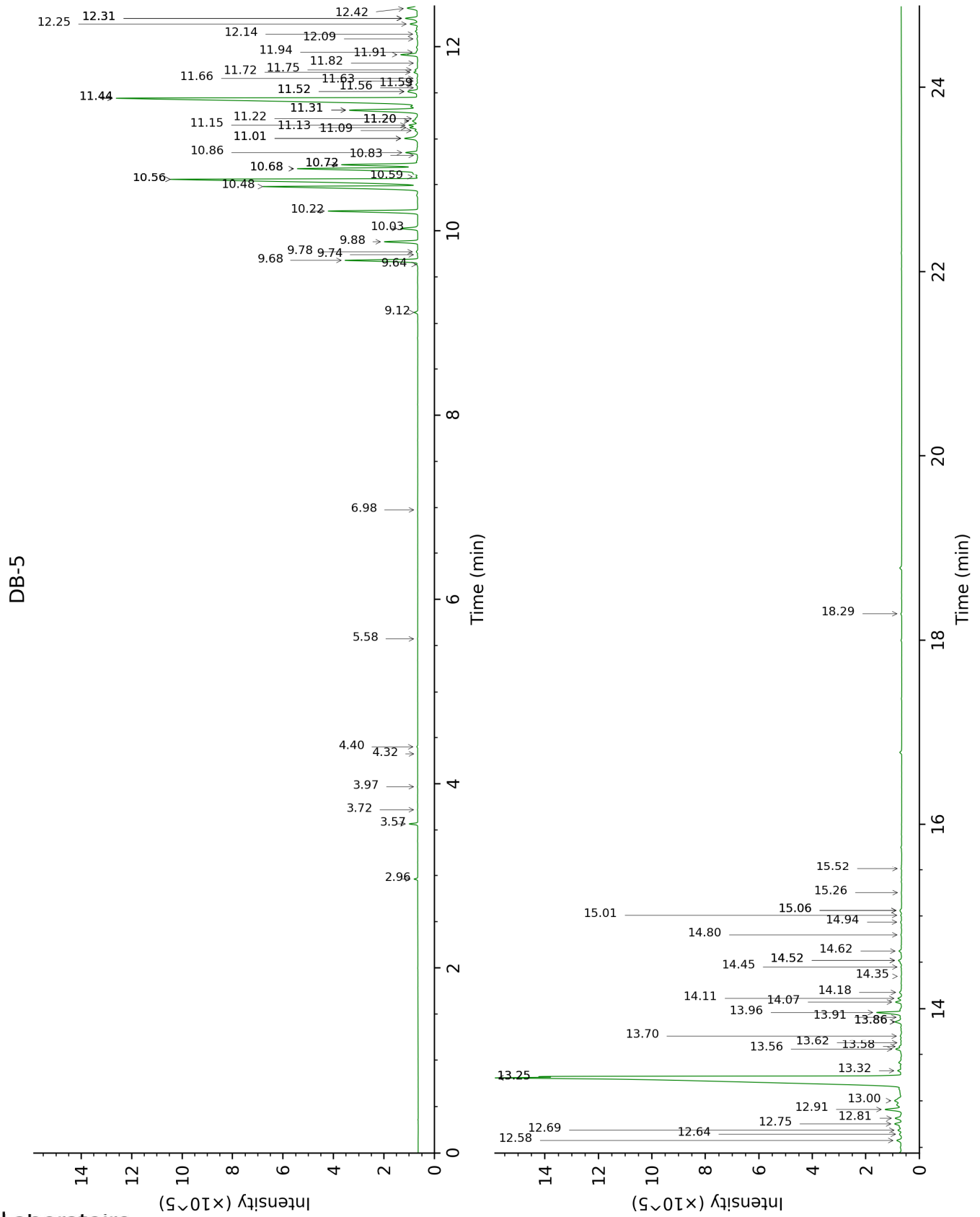
Note: no correction factor was applied

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

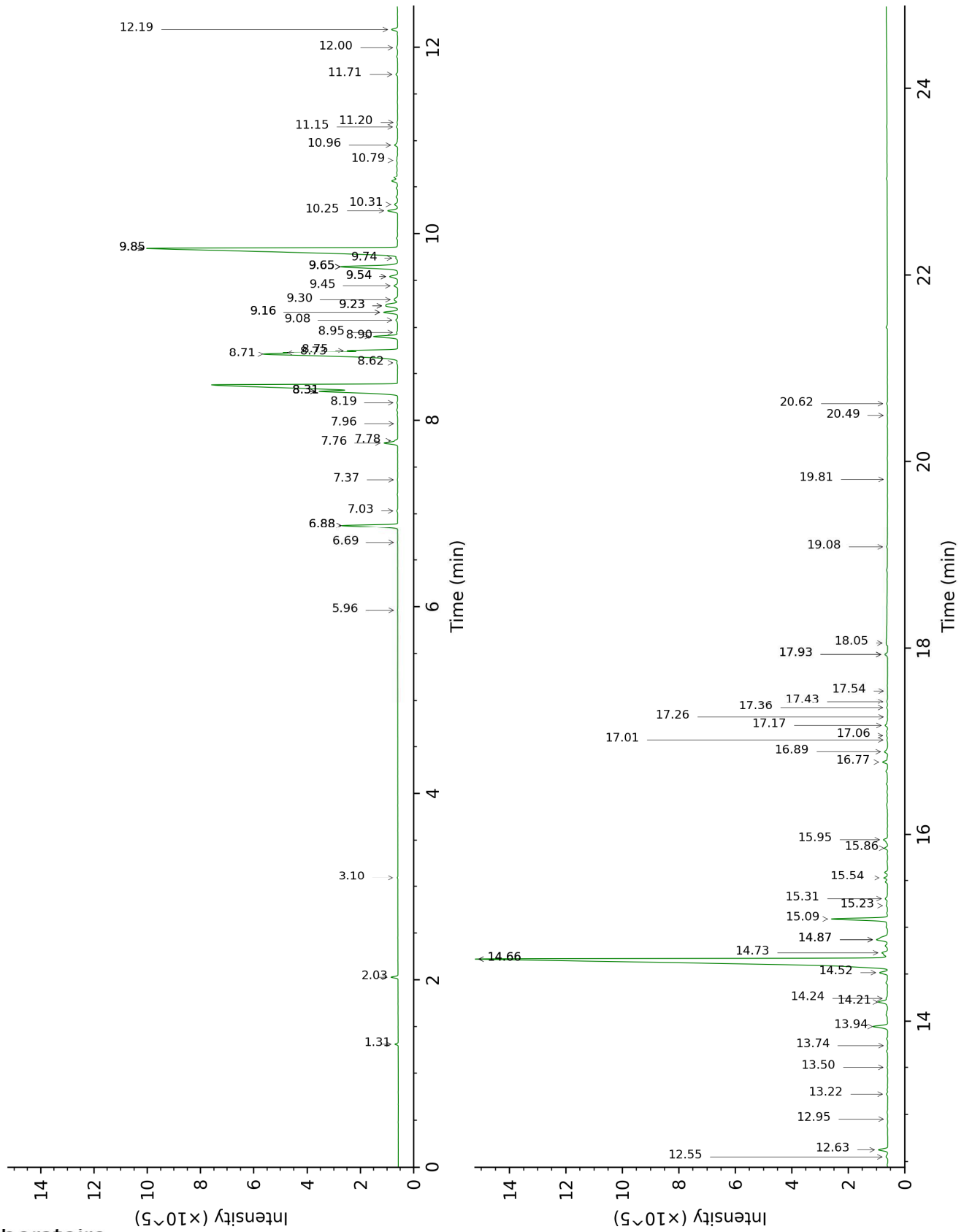
between columns, the algorithm is set to prioritize data from the most standard DB-5 column, and smallest values so as to avoid overestimating individual content. This process is semi-automatic. Advanced users are invited to consult the "Full analysis data" table after the chromatograms in this report 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.

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DB-WAX



FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
α-Pinene	2.96	930	0.08	1.32	992	0.08
β-Pinene	3.57	970	0.21	2.03	1066	0.21
Octen-3-ol	3.72	980	0.01	6.69	1422	0.01
Octan-3-ol	3.97	997	0.01	5.96	1368	0.01
para-Cymene	4.32	1020	0.01			
Limonene	4.40	1025	0.02	3.10	1158	0.02
Linalool	5.58	1100	0.01	7.96	1518	0.01
α-Terpineol	6.98	1191	0.01	9.65*	1651	2.86
δ-Elemene	9.12	1335	0.11	6.88*	1436	2.44
α-Copaene	9.64	1371	0.03	7.03	1447	0.04
β-Patchoulene	9.68	1375	2.37	6.88*	1436	[2.44]
β-Bourbonene	9.74	1379	0.01	7.37	1472	0.02
cis-β-Elemene	9.78	1381	0.05	8.19	1535	0.03
β-Elemene	9.88	1389	1.06	8.31*†	1545	16.84
Cycloseychellene	10.03	1399	0.59	7.76	1502	0.59
β-Caryophyllene	10.22	1413	3.09	8.31*†	1545	[16.84]
Seychellene	10.48†	1433	19.00	8.71†	1576	12.34
α-Guaiene	10.56*†	1438	[19.00]	8.31*†	1545	[16.84]
Selina-5,11-diene	10.56*†	1438	[19.00]	8.62	1568	0.04
Unknown [m/z 91, 93 (98), 79 (82), 81 (82), 105 (71), 107 (70)... 204 (38)]	10.59	1440	0.05	9.08	1605	0.09
α-Patchoulene	10.68*	1448	5.36	8.73†	1577	[12.34]
α-Humulene	10.68*	1448	[5.36]	9.16*	1612	0.56
Patchoulene analog I	10.72*	1451	2.62	8.75†	1579	[12.34]
γ-Patchoulene	10.72*	1451	[2.62]	8.90	1591	0.94
9-epi-β-Caryophyllene	10.83	1458	0.01	9.23*	1617	0.80
Unknown [m/z 159, 91 (88), 93 (72), 79 (69), 105 (68), 41 (66), 81 (54), 202? (50)...]	10.86	1461	0.39	9.16*	1612	[0.56]
Selina-4,11-diene	11.01*	1472	0.59	9.30	1623	0.21
Unknown [m/z 147, 93 (87), 107 (77), 105 (77), 91 (73), 79 (63)... 204 (21)]	11.01*	1472	[0.59]	9.23*	1617	[0.80]
β-Selinene	11.09	1478	0.09	9.74	1659	0.08
Patchoulene analog II	11.13	1481	0.26	9.65*	1651	[2.86]

Unknown [m/z 79, 107 (99), 91 (88), 93 (86), 81 (78), 105 (73), 41 (73)... 204? (12)]	11.15	1483	0.29	9.54*	1643	0.37
δ-Selinene	11.20*	1486	0.25	9.54*	1643	[0.37]
Unknown [m/z 161, 189 (96), 91 (74), 204 (73), 105 (69), 41 (52)]	11.20*	1486	[0.25]	9.65*	1651	[2.86]
α-Selinene	11.22	1488	0.08	9.84*	1667	17.94
Aciphyllene	11.32*	1495	3.00	9.65*	1651	[2.86]
Eudesma-2,4(15),11-triene	11.32*	1495	[3.00]	10.96	1761	0.16
Pentadecane	11.44*	1505	17.86	7.78	1504	0.06
δ-Guaiene	11.44*	1505	[17.86]	9.84*	1667	[17.94]
γ-Cadinene	11.52*	1510	0.49	10.25	1700	0.41
Nootkatene	11.52*	1510	[0.49]	10.79	1747	0.06
7-epi-α-Selinene	11.56	1514	0.01	10.31	1706	0.14
Unknown [m/z 159, 91 (81), 117 (68), 131 (51), 105 (46)... 202 (37)]	11.59	1516	0.06	9.44	1635	0.16
Unknown [m/z 41, 67 (95), 93 (92), 107 (91), 55 (77), 81 (77), 79 (73)... 205 (17)...]	11.63	1519	0.02	11.20	1781	0.02
Unknown [m/z 161, 119 (92), 91 (69), 105 (52), 145 (49)... 218 (6)]	11.66	1522	0.03	11.15	1777	0.05
Unknown [m/z 91, 105 (98), 108 (83), 93 (82), 133 (79), 77 (64), 79 (57), 41 (56), 145 (55)... 218? (5)]	11.72	1527	0.12			
Unknown [m/z 91, 105 (78), 93 (77), 107 (71), 79 (64), 41 (63), 77 (63), 145 (60)... 218 (17)]	11.75	1529	0.09			
Unknown [m/z 145, 131 (91), 91 (86), 105 (68), 146 (66), 43 (54)... 220? (5)]	11.82	1534	0.03			
Norpatchoulenol	11.91	1542	0.57	13.94	2032	0.63

Isocaryophyllene epoxide B	11.94	1544	0.05	12.00	1852	0.06
Unknown [m/z 191, 159 (66), 133 (53), 91 (45), 41 (42), 177 (35), 105 (33), 220 (32)]	12.08	1555	0.03	13.50	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)]	12.14	1559	0.03			
Unknown [m/z 43, 107 (94), 81 (71), 41 (63), 67 (58), 111 (58), 93 (55), 83 (54)... 205 (8), 220 (1)]	12.25	1568	0.25	12.19	1869	0.25
Caryophyllene oxide	12.31*	1573	0.47	12.63	1908	0.37
Caryophyllene oxide isomer	12.31*	1573	[0.47]	12.55	1901	0.09
Unknown isomer	12.31*	1573	[0.47]	14.24	2061	0.06
Unknown [m/z 43, 79 (44), 81 (41), 93 (40), 91 (40)... 220 (5)]	12.42	1581	0.48	14.20	2057	0.45
Unknown [m/z 43, 105 (77), 91 (71), 93 (68), 41 (62), 107 (6)... 205 (41), 220 (7)]	12.58	1594	0.18	14.52	2087	0.34
Humulene epoxide II	12.64	1599	0.08	13.22	1963	0.05
Hexadecane	12.69	1602	0.12	8.95	1594	0.05
Unknown [m/z 41, 91 (92), 55 (81), 93 (81), 79 (74), 43 (71), 95 (68), 123 (65)... 220 (17)]	12.75	1608	0.26	14.73	2108	0.23
Unknown [m/z 43, 79 (41), 93 (39), 41 (39), 91 (38), 81 (36)... 220 (3)]	12.82	1613	0.25			
Unknown [m/z 41, 55 (92), 95 (80), 81 (76), 109	12.91	1621	0.61	14.66*	2101	30.98

(76), 67 (66), 125 (65)... 220 (12)]						
Hinesol	13.00	1629	0.45	14.87*	2122	0.75
Patchoulol	13.25*	1649	32.99	14.66*	2101	[30.98]
Pogostol	13.25*	1649	[32.99]	15.09	2144	2.16
Unknown [m/z 175, 218 (59), 133 (49), 91 (43), 41 (38), 147 (36)]	13.32	1656	0.13	14.87*	2122	[0.75]
Unknown [m/z 95, 107 (99), 41 (85), 93 (82), 91 (82), 109 (71), 105 (71), 105 (71), 108 (66)... 220 (29)]	13.56	1675	0.25	15.95	2232	0.22
Unknown [m/z 111, 250 (38), 126 (27), 139 (26), 43 (16), 41 (15), 166 (15)]	13.58	1677	0.08	11.71	1826	0.07
Unknown [m/z 91, 41 (100), 107 (98), 108 (95), 95 (87), 93 (87), 105 (85), 79 (77), 119 (72)... 220? (15)]	13.62	1680	0.04	15.86	2222	0.12
Unknown [m/z 43, 41 (95), 97 (89), 109 (71), 55 (71), 107 (70), 95 (69), 110 (65)... 222 (5)]	13.70	1687	0.06	15.23	2159	0.06
Unknown [m/z 105, 107 (98), 91 (95), 166 (80), 248 (80), 93 (76)... 233 (66)]	13.86*	1700	0.29	12.95	1938	0.02
Rotundone	13.86*	1700	[0.29]	15.54	2189	0.18
Unknown [m/z 43, 41 (82), 137 (78), 109 (76), 95 (75), 91 (72), 55 (67)... 220? (14)]	13.91	1704	0.06			
Pogostone	13.96	1708	0.88	18.05	2460	0.78
Unknown [m/z 107, 93 (87), 41 (83), 81 (82), 67 (80), 55 (76)... 204 (53), 207 (34), 222 (9)]	14.07	1718	0.21	16.78	2319	0.22

Unknown [m/z 83, 43 (85), 55 (39), 41 (29), 121 (27), 120 (25)... 218 (3)]	14.11	1722	0.13	16.89	2331	0.16
Unknown [m/z 133, 148 (68), 147 (59), 91 (56), 79 (45), 105 (44)... 218 (8)]	14.18	1727	0.10	17.01	2345	0.03
Unknown [m/z 43, 83 (93), 55 (42), 41 (37), 121 (34), 111 (28)... 222? (1)]	14.35	1742	0.02	17.36	2382	0.03
Unknown [m/z 134, 107 (96), 91 (84), 93 (78), 79 (77), 41 (74), 43 (66), 77 (65)...]	14.45	1751	0.02	17.26	2372	0.02
Unknown [m/z 91, 105 (88), 95 (79), 93 (78), 81 (72), 79 (66)... 205 (33), 220 (7)...]	14.52*	1757	0.13	17.54	2402	0.01
Unknown [m/z 43, 191 (68), 41 (62), 91 (51), 95 (49), 110 (44)... 234 (22)]	14.52*	1757	[0.13]			
Unknown [m/z 149, 131 (54), 105 (48), 91 (46), 41 (30), 93 (27)... 218 (23)]	14.62	1766	0.10	17.17	2362	0.14
Unknown [m/z 43, 95 (58), 67 (50), 41 (47), 55 (38), 109 (37)... 221 (9)... 236? (3)]	14.80	1781	0.03	17.93*	2446	0.11
Unknown [m/z 219, 43 (67), 91 (46), 79 (42), 41 (41), 55 (36)... 234 (6)]	14.94	1794	0.04	17.93*	2446	[0.11]
Unknown [m/z 43, 91 (77), 79 (74), 109 (73), 110 (71)... 218 (52), 234? (1)]	15.01	1800	0.03	17.43	2390	0.05

Unknown [m/z 43, 91 (43), 41 (37), 79 (32), 219 (31)... 234 (14)]	15.06*	1804	0.08	20.49	2748	0.01
Unknown [m/z 91, 41 (79), 43 (74), 79 (72), 105 (65), 77 (64), 147 (64), 93 (61)... 218 (26), 234 (14)]	15.06*	1804	[0.08]	17.06	2350	0.05
Unknown [m/z 43, 69 (60), 41 (55), 55 (40), 95 (33), 163 (27)... 234 (17)]	15.26	1822	0.02	19.81	2665	0.01
Unknown [m/z 41, 110 (77), 55 (75), 69 (74), 43 (74), 95 (71), 97 (71), 123 (71), 67 (63), 136 (56)... 236? (7)]	15.52	1846	0.02	20.62	2764	0.04
Phytol	18.29	2113	0.03	19.08	2578	0.07
Unknown [m/z 41, 79 (97), 43 (97), 69 (72), 93 (70), 91 (62), 95 (58)... 220 (2)]				13.74	2012	0.02
Unknown [m/z 163, 119 (50), 91 (48), 95 (47), 41 (44), 105 (41)... 220 (18)]				15.31	2166	0.12
Total identified		93.43%			93.58%	
Total reported		97.91%			96.65%	

*: 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