

Date : December 21, 2018

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 18L17-PTH05-1-CC

Customer identification : Patchouli Organic - Sri Lanka - PI010186R

Type : Essential oil

Source : *Pogostemon cablin*

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 : Sylvain Mercier, M. Sc., Chimiste

Analysis date : December 18, 2018

Checked and approved by :

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

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PHYSICOCHEMICAL DATA

Physical aspect: Yellow liquid

Refractive index: 1.5075 ± 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	28	Yes
Norpatchoulenol	0.35	1.00	0.53	Yes
δ-Guaiene	13	21	18	Yes
β-Caryophyllene	2	5	3	Yes
α-Guaiene	11	16	13	Yes
α-Copaene	tr	1.00	tr	Yes
β-Patchoulene	1.8	3.5	3.5	Yes
Refractive index	1.5050	1.5150	1.5075	Yes

CONCLUSION

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

ANALYSIS SUMMARY

Identification	DB-5 (%)	DB-WAX (%)	Classe
5-Methyl-2-hexanone	0.18	0.19	Aliphatic ketone
α -Pinene	0.12	0.12	Monoterpene
Camphene	0.01	tr	Monoterpene
Sabinene	0.29*	tr	Monoterpene
β -Pinene	[0.29]*	0.28	Monoterpene
Octen-3-ol	0.01	0.01	Aliphatic alcohol
Octan-3-one	0.01	tr	Aliphatic ketone
Octan-3-ol	0.01	0.01	Aliphatic alcohol
Limonene	0.03	0.02	Monoterpene
Terpinolene	0.01	tr	Monoterpene
Linalool	0.01	0.01	Monoterpenic alcohol
α -Terpineol	tr	2.97*	Monoterpenic alcohol
Unknown	0.01	0.02*	Unknown
δ -Elemene	0.15	3.67*	Sesquiterpene
Unknown	0.01	0.01	Sesquiterpene
α -Copaene	3.48*	[0.02]*	Sesquiterpene
β -Patchoulene	[3.48]*	[3.67]*	Sesquiterpene
β -Bourbonene	0.01	0.01	Sesquiterpene
<i>cis</i> - β -Elemene	0.07	0.04	Sesquiterpene
β -Elemene	1.00	17.13*	Sesquiterpene
Cycloseychellene	0.54	[0.64]	Sesquiterpene
Isocaryophyllene	0.01	0.02	Sesquiterpene
β -Caryophyllene	3.13	[17.13]*	Sesquiterpene
α -Guaiene	18.80	[17.13]*	Sesquiterpene
Seychellene	[18.80]*	12.36*	Sesquiterpene
Selina-5,11-diene	[18.80]*	0.05	Sesquiterpene
Unknown	5.21	0.07	Sesquiterpene
α -Humulene	[5.21]*	0.56*	Sesquiterpene
α -Patchoulene	[5.21]*	[12.36]*	Sesquiterpene
Patchoulene analog I	2.90*	[12.36]*	Sesquiterpene
γ -Patchoulene	[2.90]*	0.91	Sesquiterpene
9-epi- β -Caryophyllene	0.44*	0.84*	Sesquiterpene
Unknown	[0.44]*	[0.56]*	Sesquiterpene
Selina-4,11-diene	0.56*	0.22	Sesquiterpene
Unknown	[0.56]*	[0.84]*	Sesquiterpene
β -Selinene	0.10	0.08	Sesquiterpene
Patchoulene analog II	0.56*	[2.97]*	Sesquiterpene
Unknown	[0.56]*	0.13	Sesquiterpene
δ -Selinene	0.26*	0.31	Sesquiterpene
Unknown	[0.26]*	[2.97]*	Sesquiterpene
α -Selinene	0.10	18.10*	Sesquiterpene
Aciphyllene	3.08*	[2.97]*	Sesquiterpene
Eudesma-2,4(15),11-triene	[3.08]*	0.05	Sesquiterpene
Pentadecane	0.27	0.64	Alkane
δ -Guaiene	17.73	[18.10]*	Sesquiterpene
γ -Cadinene	0.28	0.45	Sesquiterpene
Nootkatene	0.21*	0.01	Sesquiterpene
7-epi- α -Selinene	[0.21]*	0.17	Sesquiterpene

Unknown	0.08	0.19*	Sesquiterpene
Unknown	0.02	0.02*	Oxygenated sesquiterpene
Unknown	0.03	[0.02]*	Oxygenated sesquiterpene
Unknown	0.17		Oxygenated sesquiterpene
Unknown	0.14		Oxygenated sesquiterpene
Unknown	0.01		Sesquiterpene
Unknown	0.02		Oxygenated sesquiterpene
Norpatchoulenol	0.57*	0.55*	Norsesquiterpenic alcohol
Isocaryophyllene epoxide B	[0.57]*	0.04	Sesquiterpenic ether
α-Elemol	0.06	[0.55]*	Sesquiterpenic alcohol
Unknown	0.01	0.01	Oxygenated sesquiterpene
Unknown	0.04		Oxygenated sesquiterpene
Unknown	0.18	0.15	Oxygenated sesquiterpene
Caryophyllene oxide	0.30*	0.22*	Sesquiterpenic ether
Caryophyllene oxide isomer	[0.30]*	0.05	Sesquiterpenic ether
Unknown	[0.30]*	0.03	Oxygenated sesquiterpene
Unknown	0.33	0.33	Oxygenated sesquiterpene
Unknown	0.08	0.25	Oxygenated sesquiterpene
Humulene epoxide II	0.11*	0.03	Sesquiterpenic ether
Hexadecane	[0.11]*	0.04	Alkane
Unknown	0.09	28.78*	Oxygenated sesquiterpene
Unknown	0.21	0.31	Oxygenated sesquiterpene
Unknown	0.18		Oxygenated sesquiterpene
Unknown	0.59	[28.78]*	Oxygenated sesquiterpene
Hinesol	0.35*	0.22	Sesquiterpenic alcohol
Caryophylladienol II	[0.35]*	0.08*	Sesquiterpenic alcohol
Patchoulol	30.53	[28.78]*	Sesquiterpenic alcohol
Pogostol	[30.53]	2.17	Sesquiterpenic alcohol
Unknown	0.14*	0.04	Oxygenated sesquiterpene
Unknown	[0.14]*	[0.08]*	Oxygenated sesquiterpene
Unknown	0.06	0.10	Oxygenated sesquiterpene
Rotundone	0.15	0.11	Sesquiterpenic ketone
Unknown	0.09		Oxygenated sesquiterpene
Pogostone	2.30	1.68*	Terpenic lactone
Unknown	0.28	0.22	Oxygenated sesquiterpene
Unknown	0.10	0.13	Oxygenated sesquiterpene
Unknown	0.08*	0.04	Oxygenated sesquiterpene
Unknown	[0.08]*	0.02	Oxygenated sesquiterpene
Unknown	0.03		Oxygenated sesquiterpene
Unknown	0.01	0.01	Oxygenated sesquiterpene
Unknown	0.12		Oxygenated sesquiterpene
Unknown	0.11	0.13	Oxygenated sesquiterpene
Unknown	0.04	[1.68]*	Oxygenated sesquiterpene
Unknown	0.03		Oxygenated sesquiterpene
Unknown	0.01	0.01	Oxygenated sesquiterpene
Unknown	0.02	0.01	Oxygenated sesquiterpene
Unknown	0.03	0.04	Oxygenated sesquiterpene
Unknown	0.01	0.01	Oxygenated sesquiterpene
Unknown	0.02		Oxygenated sesquiterpene
2-Butanone		tr	Aliphatic ketone
Drima-7,9(11)-diene?		[0.19]*	Sesquiterpene
Unknown		[0.22]*	Oxygenated sesquiterpene

Unknown		0.05	Oxygenated sesquiterpene
Unknown		0.01	Oxygenated sesquiterpene
Total identified	93.89%	93.43%	

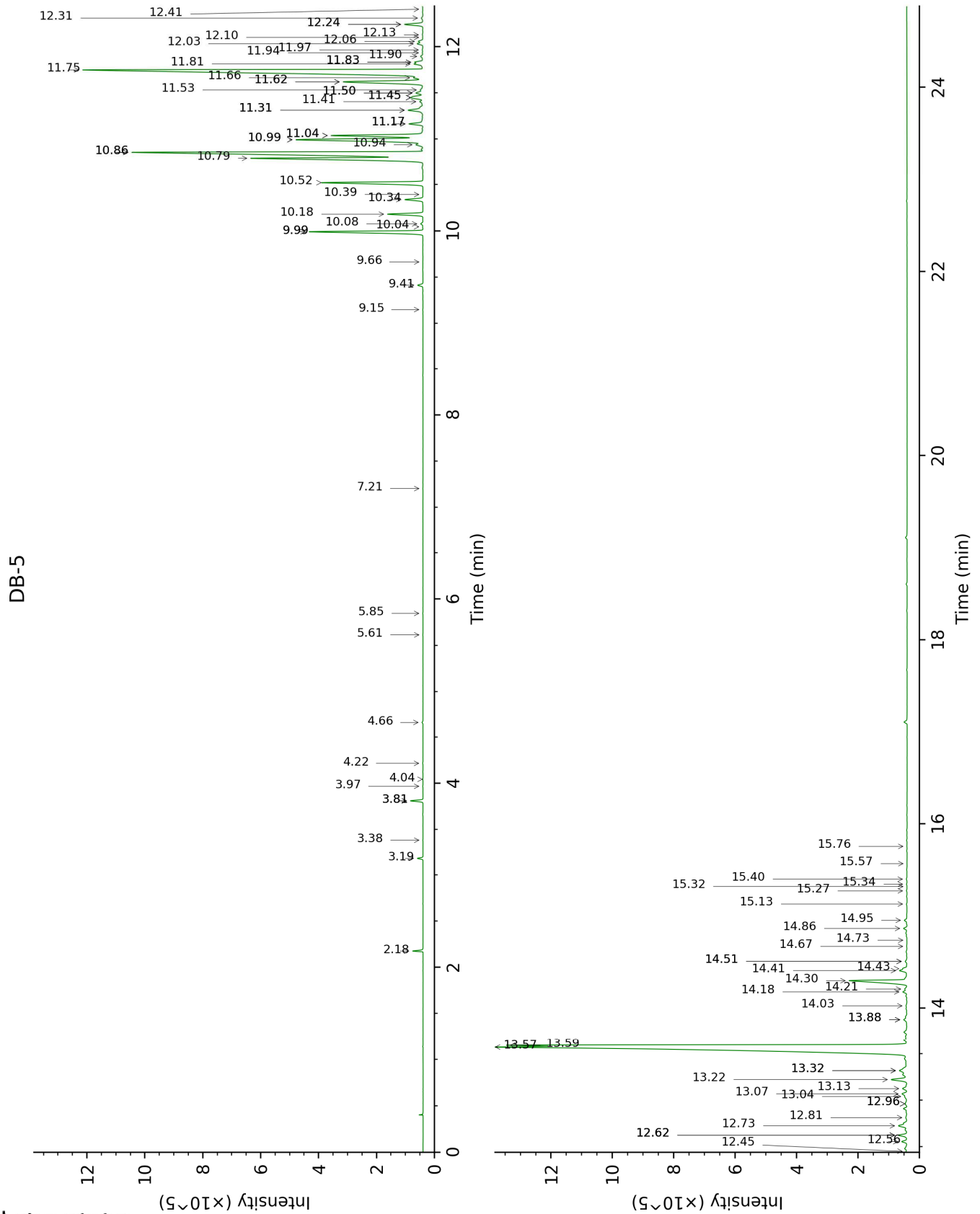
*: Two or more compounds are coeluting on this column

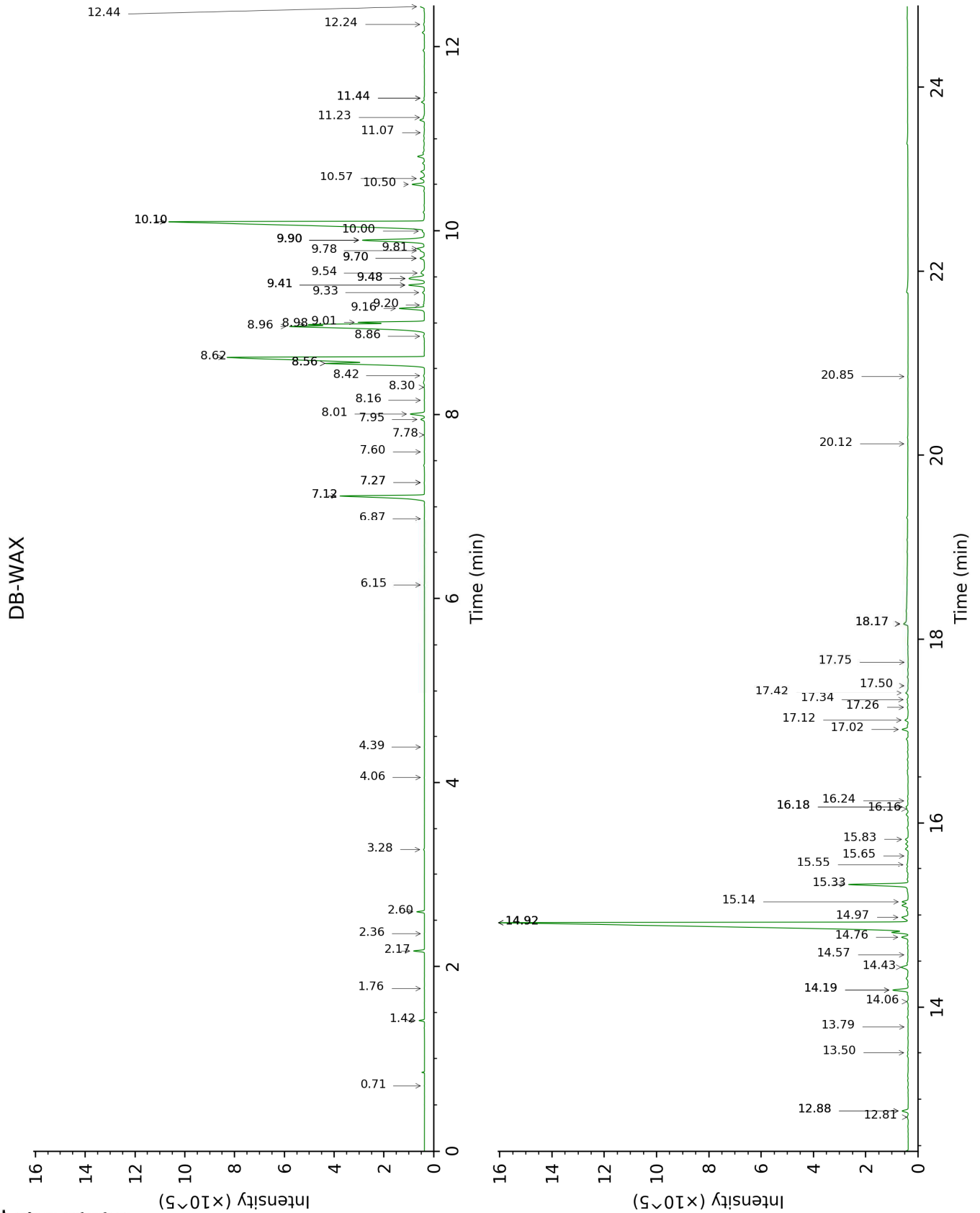
[xx]: Duplicate percentage due to coelutions, not taken account in the identified total

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	%
5-Methyl-2-hexanone	2.18	853	0.18	2.60	1104	0.19
α -Pinene	3.19	929	0.12	1.42	991	0.12
Camphene	3.38	942	0.01	1.76	1026	tr
Sabinene	3.81*	970	0.29	2.36	1083	tr
β -Pinene	3.81*	970	[0.29]	2.17	1065	0.28
Octen-3-ol	3.97	980	0.01	6.87	1418	0.01
Octan-3-one	4.04	985	0.01	4.06	1217	tr
Octan-3-ol	4.22	996	0.01	6.15	1366	0.01
Limonene	4.66	1025	0.03	3.28	1157	0.02
Terpinolene	5.61	1085	0.01	4.39	1242	tr
Linalool	5.85	1100	0.01	8.16	1514	0.01
α -Terpineol	7.20	1188	tr	9.90*	1651	2.97
Unknown [m/z 159, 117 (68), 132 (55), 200 (35)]	9.15	1314	0.01	7.27*	1447	0.02
δ -Elemene	9.41	1333	0.15	7.12*	1437	3.67
Unknown [m/z 145, 91 (67), 105 (57), 131 (56), 119 (52), 159 (49), 202 (45)]	9.66	1351	0.01	7.78	1486	0.01
α -Copaene	9.99*	1374	3.48	7.27*	1447	[0.02]
β -Patchoulene	9.99*	1374	[3.48]	7.12*	1437	[3.67]
β -Bourbonene	10.04	1378	0.01	7.60	1472	0.01
<i>cis</i> - β -Elemene	10.08	1380	0.07	8.42	1535	0.04
β -Elemene	10.18	1388	1.00	8.56*†	1545	17.13
Cycloseychellene	10.34	1399	0.54	8.01†	1503	[0.64]
Isocaryophyllene	10.39	1403	0.01	8.30	1525	0.02
β -Caryophyllene	10.52	1413	3.13	8.56*†	1545	[17.13]
α -Guaiene	10.79†	1433	18.80	8.62†	1550	[17.13]
Seychellene	10.86*†	1438	[18.80]	8.96†	1576	12.36
Selina-5,11-diene	10.86*†	1438	[18.80]	8.86	1568	0.05
Unknown [m/z 91, 93 (98), 79 (82), 81 (82), 105 (71), 107 (70)... 204 (38)]	10.94†	1444	5.21	9.33	1605	0.07
α -Humulene	11.00*†	1448	[5.21]	9.41*	1612	0.56
α -Patchoulene	11.00*†	1448	[5.21]	8.98†	1578	[12.36]
Patchoulene analog I	11.04*	1452	2.90	9.01†	1580	[12.36]
γ -Patchoulene	11.04*	1452	[2.90]	9.16	1591	0.91
9-epi- β -Caryophyllene	11.17*	1461	0.44	9.48*	1617	0.84
Unknown [m/z 159, 91 (88), 93 (72), 79 (69), 105	11.17*	1461	[0.44]	9.41*	1612	[0.56]

(68), 41 (66), 81 (54), 202? (50)...						
Selina-4,11-diene	11.31*	1472	0.56	9.54	1622	0.22
Unknown [m/z 147, 93 (87), 107 (77), 105 (77), 91 (73), 79 (63)... 204 (21)]	11.31*	1472	[0.56]	9.48*	1617	[0.84]
β-Selinene	11.41	1479	0.10	10.00	1659	0.08
Patchoulene analog II	11.45*	1482	0.56	9.90*	1651	[2.97]
Unknown [m/z 79, 107 (99), 91 (88), 93 (86), 81 (78), 105 (73), 41 (73)... 204? (12)]	11.45*	1482	[0.56]	9.78	1642	0.13
δ-Selinene	11.50*	1486	0.26	9.81	1643	0.31
Unknown [m/z 161, 189 (96), 91 (74), 204 (73), 105 (69), 41 (52)]	11.50*	1486	[0.26]	9.90*	1651	[2.97]
α-Selinene	11.53	1489	0.10	10.10*	1667	18.10
Aciphyllene	11.62*	1495	3.08	9.90*	1651	[2.97]
Eudesma-2,4(15),11-triene	11.62*	1495	[3.08]	11.23	1762	0.05
Pentadecane	11.66	1499	0.27	7.95†	1498	0.64
δ-Guaiene	11.75	1505	17.73	10.10*	1667	[18.10]
γ-Cadinene	11.81	1510	0.28	10.50	1700	0.45
Nootkatene	11.83*	1512	0.21	11.07	1748	0.01
7-epi-α-Selinene	11.83*	1512	[0.21]	10.57	1705	0.17
Unknown [m/z 159, 91 (81), 117 (68), 131 (51), 105 (46)... 202 (37)]	11.90	1517	0.08	9.70*	1635	0.19
Unknown [m/z 41, 67 (95), 93 (92), 107 (91), 55 (77), 81 (77), 79 (73)... 205 (17)...	11.94	1520	0.02	11.44*	1779	0.02
Unknown [m/z 161, 119 (92), 91 (69), 105 (52), 145 (49)... 218 (6)]	11.97	1522	0.03	11.44*	1779	[0.02]
Unknown [m/z 91, 105 (98), 108 (83), 93 (82), 133 (79), 77 (64), 79 (57), 41 (56), 145 (55)... 218? (5)]	12.03	1528	0.17			
Unknown [m/z 91, 105 (78), 93 (77), 107 (71), 79	12.06	1530	0.14			

(64), 41 (63), 77 (63), 145 (60)... 218 (17)]						
Unknown [m/z 133, 105 (70), 146 (69), 145 (61), 91 (55), 131 (45), 187 (42), 159 (39), 119 (33), 202 (30)...]	12.10	1533	0.01			
Unknown [m/z 145, 131 (91), 91 (86), 105 (68), 146 (66), 43 (54)... 220? (5)]	12.13	1535	0.02			
Norpatchoulenol	12.24*	1544	0.57	14.19*	2028	0.55
Isocaryophyllene epoxide B	12.24*	1544	[0.57]	12.24	1849	0.04
α-Elemol	12.31	1550	0.06	14.19*	2028	[0.55]
Unknown [m/z 191, 159 (66), 133 (53), 91 (45), 41 (42), 177 (35), 105 (33), 220 (32)]	12.41	1557	0.01	13.79	1989	0.01
Unknown [m/z 41, 67 (90), 55 (87), 79 (85), 107 (84), 81 (84), 93 (84), 121 (77), 91 (74)... 220 (7)]	12.45	1561	0.04			
Unknown [m/z 43, 107 (94), 81 (71), 41 (63), 67 (58), 111 (58), 93 (55), 83 (54)... 205 (8), 220 (1)]	12.56	1569	0.18	12.44	1866	0.15
Caryophyllene oxide	12.62*	1574	0.30	12.88*	1906	0.22
Caryophyllene oxide isomer	12.62*	1574	[0.30]	12.81	1899	0.05
Unknown isomer	12.62*	1574	[0.30]	14.57	2064	0.03
Unknown [m/z 43, 79 (44), 81 (41), 93 (40), 91 (40)... 220 (5)]	12.73	1582	0.33	14.43	2051	0.33
Unknown [m/z 43, 105 (77), 91 (71), 93 (68), 41 (62), 107 (6)... 205 (41), 220 (7)]	12.81	1589	0.08	14.76	2082	0.25
Humulene epoxide II	12.96*	1601	0.11	13.50	1963	0.03
Hexadecane	12.96*	1601	[0.11]	9.20	1594	0.04

Unknown [m/z 43, 161 (73), 91 (53), 95 (52), 79 (46), 119 (45)... 205 (29), 220? (1)]	13.04	1607	0.09	14.92*	2098	28.78
Unknown [m/z 41, 91 (92), 55 (81), 93 (81), 79 (74), 43 (71), 95 (68), 123 (65)... 220 (17)]	13.07	1610	0.21	14.97	2104	0.31
Unknown [m/z 43, 79 (41), 93 (39), 41 (39), 91 (38), 81 (36)... 220 (3)]	13.13	1614	0.18			
Unknown [m/z 41, 55 (92), 95 (80), 81 (76), 109 (76), 67 (66), 125 (65)... 220 (12)]	13.22	1623	0.59	14.92*	2098	[28.78]
Hinesol	13.32*	1631	0.35	15.14	2120	0.22
Caryophylladienol II	13.32*	1631	[0.35]	16.18*	2225	0.08
Patchoulol	13.57†	1652	30.53	14.92*	2098	[28.78]
Pogostol	13.59†	1653	[30.53]	15.33	2139	2.17
Unknown [m/z 91, 41 (100), 107 (98), 108 (95), 95 (87), 93 (87), 105 (85), 79 (77), 119 (72)... 220? (15)]	13.88*	1677	0.14	16.16	2222	0.04
Unknown [m/z 95, 107 (99), 41 (85), 93 (82), 91 (82), 109 (71), 105 (71), 105 (71), 108 (66)... 220 (29)]	13.88*	1677	[0.14]	16.18*	2225	[0.08]
Unknown [m/z 43, 41 (95), 97 (89), 109 (71), 55 (71), 107 (70), 95 (69), 110 (65)... 222 (5)]	14.02	1689	0.06	15.55	2161	0.10
Rotundone	14.18	1702	0.15	15.83	2189	0.11
Unknown [m/z 43, 41 (82), 137 (78), 109 (76), 95 (75), 91 (72), 55 (67)... 220? (14)]	14.21	1704	0.09			
Pogostone	14.30	1712	2.30	18.17*	2438	1.68
Unknown [m/z	14.41	1722	0.28	17.02	2313	0.22

107, 93 (87), 41 (83), 81 (82), 67 (80), 55 (76)... 204 (53), 207 (34), 222 (9)]						
Unknown [m/z 83, 43 (85), 55 (39), 41 (29), 121 (27), 120 (25)... 218 (3)]	14.43	1724	0.10	17.12	2324	0.13
Unknown [m/z 133, 148 (68), 147 (59), 91 (56), 79 (45), 105 (44)... 218 (8)]	14.51*	1730	0.08	17.26	2339	0.04
Unknown [m/z 91, 108 (86), 107 (85), 93 (80), 120 (75), 105 (71), 95 (72)... 218 (37)]	14.51*	1730	[0.08]	16.24	2232	0.02
Unknown [m/z 43, 83 (93), 55 (42), 41 (37), 121 (34), 111 (28)... 222? (1)]	14.67	1745	0.03			
Unknown [m/z 134, 107 (96), 91 (84), 93 (78), 79 (77), 41 (74), 43 (66), 77 (65)...]	14.74	1750	0.01	17.50	2364	0.01
Unknown [m/z 43, 191 (68), 41 (62), 91 (51), 95 (49), 110 (44)... 234 (22)]	14.86	1762	0.12			
Unknown [m/z 149, 131 (54), 105 (48), 91 (46), 41 (30), 93 (27)... 218 (23)]	14.95	1769	0.11	17.42	2356	0.13
Unknown [m/z 43, 95 (58), 67 (50), 41 (47), 55 (38), 109 (37)... 221 (9)... 236? (3)]	15.13	1785	0.04	18.17*	2438	[1.68]
Unknown [m/z 219, 43 (67), 91 (46), 79 (42), 41 (41), 55 (36)... 234 (6)]	15.27	1797	0.03			
Unknown [m/z 43, 91 (77), 79	15.32	1801	0.01	17.75	2392	0.01

(74), 109 (73), 110 (71)... 218 (52), 234? (1)] Unknown [m/z 43, 91 (43), 41 (37), 79 (32), 219 (31)... 234 (14)]	15.34	1803	0.02	20.85	2755	0.01
Unknown [m/z 91, 41 (79), 43 (74), 79 (72), 105 (65), 77 (64), 147 (64), 93 (61)... 218 (26), 234 (14)]	15.40	1808	0.03	17.34	2348	0.04
Unknown [m/z 43, 69 (60), 41 (55), 55 (40), 95 (33), 163 (27)... 234 (17)]	15.57	1824	0.01	20.12	2666	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)]	15.76	1841	0.02			
2-Butanone				0.71	863	tr
Drima-7,9(11)-diene?				9.70*	1635	[0.19]
Unknown [m/z 43, 41 (59), 109 (57), 79 (54), 95 (53), 107 (49), 93 (48), 67 (48)... 205 (18), 220 (4)]				12.88*	1906	[0.22]
Unknown [m/z 41, 79 (97), 43 (97), 69 (72), 93 (70), 91 (62), 95 (58)... 220 (2)]				14.06	2016	0.05
Unknown [m/z 163, 119 (50), 91 (48), 95 (47), 41 (44), 105 (41)... 220 (18)]				15.65	2171	0.01
Total identified		93.89%			93.43%	
Total reported		97.26%			95.53%	

*: 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)

