

## GC/MS BATCH NUMBER: P20106

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**ESSENTIAL OIL:** PATCHOULI  
**BOTANICAL NAME:** POGOSTEMON CABLIN  
**ORIGIN:** INDONESIA

KEY CONSTITUENTS PRESENT IN THIS BATCH OF PATCHOULI OIL	%
PATCHOULOL	28.4
δ-GUAIENE	18.5
SEYCHELLENE	13.0
α-GUAIENE	7.2
α-PATCHOULENE	5.3
β-CARYOPHYLLENE	3.5
ACIPHYLLENE + EUDESMA-2,4(15),11-TRIENE	3.1
γ-PATCHOULENE + PATCHOULENE ANALOG I	2.8
β-PATCHOULENE	2.5
POGOSTOL	2.1
POGOSTONE	1.7

Comments from Robert Tisserand: Rich, mellow, honey-leather odor quality. All seven key ISO constituents are within range.

**Date :** March 29, 2018

**CERTIFICATE OF ANALYSIS - GC PROFILING**

*SAMPLE IDENTIFICATION*

**Internal code :** 18C22-PTH1-1-CC

**Customer identification :** Patchouli Dark - Indonesia - P20106710R

**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 :** March 26, 2018

Checked and approved by :



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

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*This report is digitally signed, it is only considered valid if the digital signature is intact.*

*PHYSICOCHEMICAL DATA*

**Physical aspect:** Yellow liquid

**Refractive index:**  $1.5078 \pm 0.0003$  (20 °C)

*CONCLUSION*

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

## ANALYSIS SUMMARY

Identification	DB-5 (%)	DB-WAX (%)	Classe
5-Methyl-2-hexanone	tr	tr	Aliphatic ketone
$\alpha$ -Pinene	0.09	0.09	Monoterpene
Camphene	tr	tr	Monoterpene
Sabinene	0.22*	tr	Monoterpene
$\beta$ -Pinene	[0.22]*	0.23	Monoterpene
4-Methylvaleric acid	0.01		Aliphatic acid
Octen-3-ol	tr	tr	Aliphatic alcohol
Octan-3-one	tr	tr	Aliphatic ketone
Octan-3-ol	0.01	0.01	Aliphatic alcohol
Limonene	0.02	0.02	Monoterpene
Linalool	0.01	0.01	Monoterpenic alcohol
Unknown	0.01	0.01*	Unknown
$\delta$ -Elemene	0.16	0.14	Sesquiterpene
Unknown	0.01	0.01	Sesquiterpene
$\alpha$ -Copaene	0.01	[0.01]*	Sesquiterpene
$\beta$ -Patchoulene	2.47	2.52	Sesquiterpene
$\beta$ -Bourbonene	0.02	0.02	Sesquiterpene
<i>cis</i> - $\beta$ -Elemene	0.06	0.05	Sesquiterpene
$\beta$ -Elemene	0.97	18.56*	Sesquiterpene
Cycloseychellene	0.60	0.58	Sesquiterpene
$\beta$ -Caryophyllene	3.46	[18.56]*	Sesquiterpene
Seychellene	20.22	12.98	Sesquiterpene
$\alpha$ -Guaiene	[20.22]*	[18.56]	Sesquiterpene
Selina-5,11-diene	[20.22]*	0.01	Sesquiterpene
Unknown	0.10	0.08	Sesquiterpene
$\alpha$ -Humulene	0.18	0.61*	Sesquiterpene
$\alpha$ -Patchoulene	5.34	[12.98]	Sesquiterpene
$\gamma$ -Patchoulene	2.81*	1.01*	Sesquiterpene
Patchoulene analog I	[2.81]*	[12.98]	Sesquiterpene
9-epi- $\beta$ -Caryophyllene	0.47	[0.61]*	Sesquiterpene
Unknown	0.55	[0.61]*	Sesquiterpene
$\beta$ -Selinene	0.09	3.11*	Sesquiterpene
Patchoulene analog II	0.54*	0.24	Sesquiterpene
Unknown	[0.54]*	0.17	Sesquiterpene
$\delta$ -Selinene	0.27*	0.16*	Sesquiterpene
Unknown	[0.27]*		Sesquiterpene
$\alpha$ -Selinene	0.09	0.08	Sesquiterpene
Aciphyllene	3.13*	[3.11]*	Sesquiterpene
Eudesma-2,4(15),11-triene	[3.13]*	0.12*	Sesquiterpene
$\delta$ -Guaiene	18.47	18.76	Sesquiterpene
Nootkatene	0.26*	[0.12]*	Sesquiterpene
$\gamma$ -Cadinene	[0.26]*	0.58*	Sesquiterpene
7-epi- $\alpha$ -Selinene	0.25	[0.58]*	Sesquiterpene
Unknown	0.08	[0.16]*	Sesquiterpene
Unknown	0.02	0.02	Oxygenated sesquiterpene
Unknown	0.11*	0.07	Oxygenated sesquiterpene
Unknown	[0.11]*		Oxygenated sesquiterpene
Unknown	0.10		Oxygenated sesquiterpene

Norpatchoulenol	0.55*	0.57	Norsesquiterpenic alcohol
Isocaryophyllene epoxide B	[0.55]*	0.04	Sesquiterpenic ether
α-Elemol	0.06	0.04	Sesquiterpenic alcohol
Unknown	0.01	0.01	Oxygenated sesquiterpene
Unknown	0.05		Oxygenated sesquiterpene
Unknown	0.17	0.16	Oxygenated sesquiterpene
Unknown	0.32*	0.01	Oxygenated sesquiterpene
Caryophyllene oxide	[0.32]*	0.26	Sesquiterpenic ether
Unknown	0.51	0.34	Oxygenated sesquiterpene
Unknown	0.06	0.04	Oxygenated sesquiterpene
Hexadecane	0.15	[1.01]*	Alkane
Humulene epoxide II	0.03	0.04	Sesquiterpenic ether
Unknown	0.07	0.54	Oxygenated sesquiterpene
Unknown	0.21	0.32	Oxygenated sesquiterpene
Unknown	0.24		Oxygenated sesquiterpene
Unknown	0.64	29.07*	Oxygenated sesquiterpene
Patchoulol	30.94	[29.07]*	Sesquiterpenic alcohol
Pogostol	[30.94]*	2.09	Sesquiterpenic alcohol
Unknown	[30.94]*	0.42	Oxygenated sesquiterpene
Unknown	0.16		Oxygenated sesquiterpene
Unknown	0.15	0.10*	Oxygenated sesquiterpene
Unknown	0.03	0.04	Oxygenated sesquiterpene
Unknown	0.03	0.03	Oxygenated sesquiterpene
Rotundone	0.14	0.09	Sesquiterpenic ketone
Unknown	0.06		Oxygenated sesquiterpene
Pogostone	1.65		Terpenic lactone
Unknown	0.26*	0.18	Oxygenated sesquiterpene
Unknown	[0.26]*	0.09	Oxygenated sesquiterpene
Unknown	0.04	0.02	Oxygenated sesquiterpene
Unknown	tr		Oxygenated sesquiterpene
Unknown	0.01	0.02	Oxygenated sesquiterpene
Unknown	0.03		Oxygenated sesquiterpene
Unknown	0.07	0.11	Oxygenated sesquiterpene
Unknown	0.01		Oxygenated sesquiterpene
Unknown	0.02	0.01	Oxygenated sesquiterpene
Unknown	0.02	0.01	Oxygenated sesquiterpene
Unknown	tr		Oxygenated sesquiterpene
Drima-7,9(11)-diene?		0.21	Sesquiterpene
Unknown		0.07	Oxygenated sesquiterpene
Unknown		0.02	Oxygenated sesquiterpene
Unknown		0.03	Oxygenated sesquiterpene
Unknown		[0.10]*	Oxygenated sesquiterpene
<b>Total identified</b>	<b>94.41%</b>	<b>92.44%</b>	

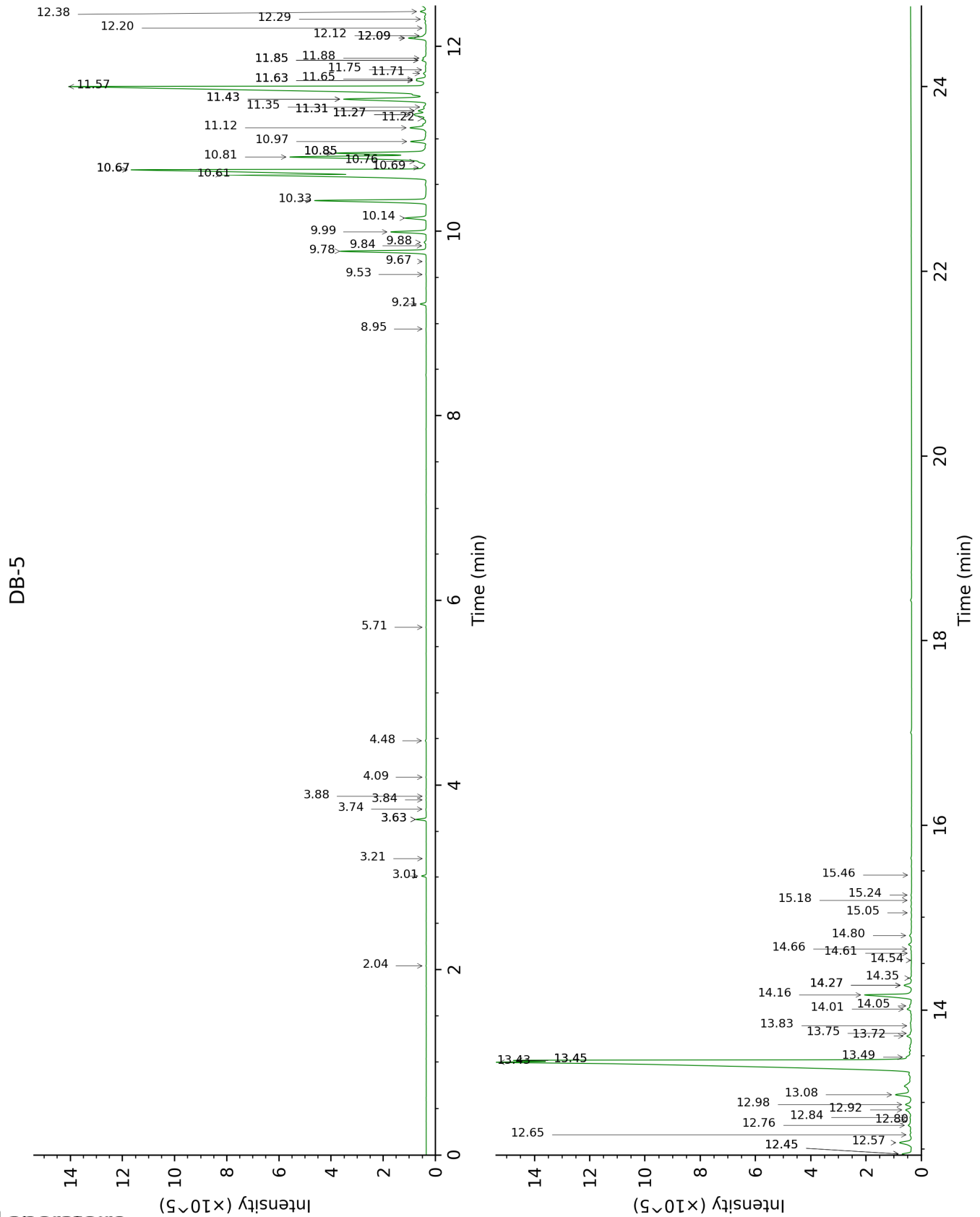
\*: Two or more compounds are coeluting on this column

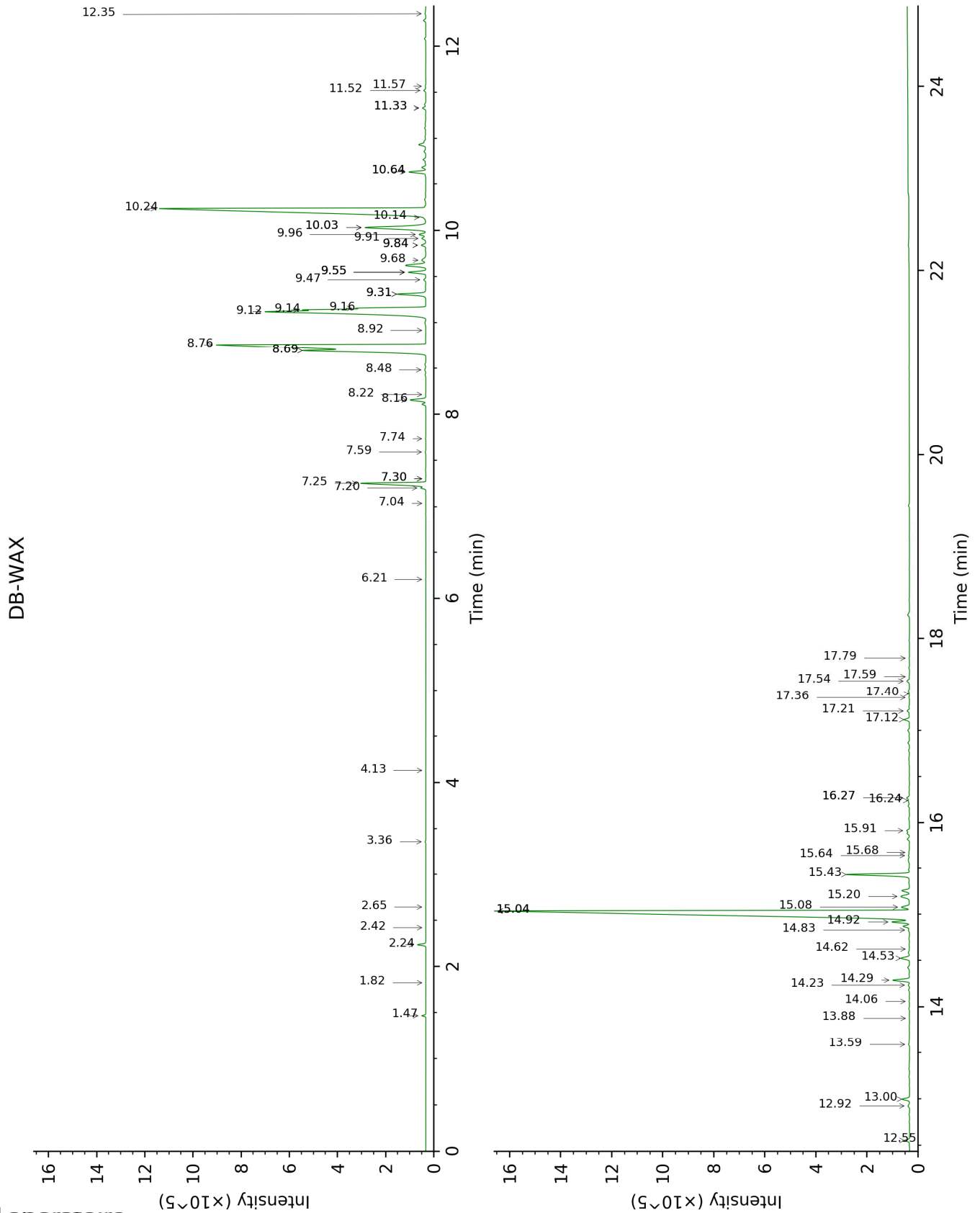
[xx]: Duplicate percentage due to coelutions, not taken account in the identified total

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	2.04	852	tr	2.64	1107	tr
$\alpha$ -Pinene	3.01	927	0.09	1.47	996	0.09
Camphene	3.21	940	tr	1.82	1031	tr
Sabinene	3.63*	968	0.22	2.42	1088	tr
$\beta$ -Pinene	3.63*	968	[0.22]	2.24	1070	0.23
4-Methylvaleric acid	3.74	976	0.01			
Octen-3-ol	3.84	982	tr	7.04	1427	tr
Octan-3-one	3.88	985	tr	4.13	1219	tr
Octan-3-ol	4.09	999	0.01	6.21	1367	0.01
Limonene	4.48	1024	0.02	3.36	1161	0.02
Linalool	5.71	1101	0.01	8.22	1515	0.01
Unknown [m/z 159, 117 (68), 132 (55), 200 (35)]	8.94	1314	0.01	7.30*	1447	0.01
$\delta$ -Elemene	9.21	1333	0.16	7.20	1440	0.14
Unknown [m/z 145, 91 (67), 105 (57), 131 (56), 119 (52), 159 (49), 202 (45)]	9.53	1355	0.01	7.74	1479	0.01
$\alpha$ -Copaene	9.67	1365	0.01	7.30*	1447	[0.01]
$\beta$ -Patchoulene	9.78	1373	2.47	7.26	1443	2.52
$\beta$ -Bourbonene	9.84	1377	0.02	7.59	1468	0.02
<i>cis</i> - $\beta$ -Elemene	9.88	1380	0.06	8.48	1536	0.05
$\beta$ -Elemene	9.99	1388	0.97	8.69*†	1552	18.56
Cycloseychellene	10.14	1398	0.60	8.16	1511	0.58
$\beta$ -Caryophyllene	10.33	1412	3.46	8.69*†	1552	[18.56]
Seychellene	10.61†	1433	20.22	9.12†	1585	12.98
$\alpha$ -Guaiene	10.67*†	1437	[20.22]	8.76†	1557	[18.56]
Selina-5,11-diene	10.67*†	1437	[20.22]	8.92	1569	0.01
Unknown [m/z 91, 93 (98), 79 (82), 81 (82), 105 (71), 107 (70)... 204 (38)]	10.69	1439	0.10	9.47	1612	0.08
$\alpha$ -Humulene	10.76	1444	0.18	9.55*	1619	0.61
$\alpha$ -Patchoulene	10.81	1448	5.34	9.14†	1586	[12.98]
$\gamma$ -Patchoulene	10.85*	1451	2.81	9.31*	1600	1.01
Patchoulene analog I	10.85*	1451	[2.81]	9.16†	1588	[12.98]
9-epi- $\beta$ -Caryophyllene	10.98	1460	0.47	9.55*	1619	[0.61]
Unknown [m/z 147, 93 (87), 107	11.12	1471	0.55	9.55*	1619	[0.61]

(77), 105 (77), 91 (73), 79 (63)... 204 (21)]						
β-Selinene	11.22	1478	0.09	10.03*	1658	3.11
Patchoulene analog II	11.26*	1482	0.54	9.96	1652	0.24
Unknown [m/z 79, 107 (99), 91 (88), 93 (86), 81 (78), 105 (73), 41 (73)... 204? (12)]	11.26*	1482	[0.54]	9.91	1649	0.17
δ-Selinene	11.31*	1485	0.27	9.84*	1643	0.16
Unknown [m/z 161, 189 (96), 91 (74), 204 (73), 105 (69), 41 (52)]	11.31*	1485	[0.27]			
α-Selinene	11.35	1488	0.09	10.14	1667	0.08
Aciphyllene	11.43*	1494	3.13	10.03*	1658	[3.11]
Eudesma-2,4(15),11-triene	11.43*	1494	[3.13]	11.33*	1766	0.12
δ-Guaiene	11.57	1504	18.47	10.24	1675	18.76
Nootkatene	11.63*	1509	0.26	11.33*	1766	[0.12]
γ-Cadinene	11.63*	1509	[0.26]	10.64*	1708	0.58
7-epi-α-Selinene	11.65	1510	0.25	10.64*	1708	[0.58]
Unknown [m/z 159, 91 (81), 117 (68), 131 (51), 105 (46)... 202 (37)]	11.71	1515	0.08	9.84*	1643	[0.16]
Unknown [m/z 41, 67 (95), 93 (92), 107 (91), 55 (77), 81 (77), 79 (73)... 205 (17)...]	11.75	1518	0.02	11.57	1786	0.02
Unknown [m/z 161, 119 (92), 91 (69), 105 (52), 145 (49)... 218 (6)]	11.85*	1526	0.11	11.52	1782	0.07
Unknown [m/z 91, 105 (98), 108 (83), 93 (82), 133 (79), 77 (64), 79 (57), 41 (56), 145 (55)... 218? (5)]	11.85*	1526	[0.11]			
Unknown [m/z 91, 105 (78), 93 (77), 107 (71), 79 (64), 41 (63), 77 (63), 145 (60)... 218 (17)]	11.88	1528	0.10			
Norpatchoulenol	12.09*	1545	0.55	14.29	2034	0.57

Isocaryophyllene epoxide B	12.09*	1545	[0.55]	12.35	1855	0.04
α-Elemol	12.12	1547	0.06	14.24	2028	0.04
Unknown [m/z 191, 159 (66), 133 (53), 91 (45), 41 (42), 177 (35), 105 (33), 220 (32)]	12.20	1554	0.01	13.88	1994	0.01
Unknown [m/z 41, 67 (90), 55 (87), 79 (85), 107 (84), 81 (84), 93 (84), 121 (77), 91 (74)... 220 (7)]	12.29	1561	0.05			
Unknown [m/z 43, 107 (94), 81 (71), 41 (63), 67 (58), 111 (58), 93 (55), 83 (54)... 205 (8), 220 (1)]	12.38	1568	0.17	12.55	1873	0.16
Unknown isomer	12.45*	1573	0.32	14.62	2066	0.01
Caryophyllene oxide	12.45*	1573	[0.32]	13.00	1913	0.26
Unknown [m/z 43, 79 (44), 81 (41), 93 (40), 91 (40)... 220 (5)]	12.57	1583	0.51	14.53	2056	0.34
Unknown [m/z 43, 105 (77), 91 (71), 93 (68), 41 (62), 107 (6)... 205 (41), 220 (7)]	12.65	1590	0.06	14.83	2086	0.04
Hexadecane	12.76	1598	0.15	9.31*	1600	[1.01]
Humulene epoxide II	12.80	1601	0.03	13.59	1967	0.04
Unknown [m/z 43, 161 (73), 91 (53), 95 (52), 79 (46), 119 (45)... 205 (29), 220? (1)]	12.84	1604	0.07	14.92	2094	0.54
Unknown [m/z 41, 91 (92), 55 (81), 93 (81), 79 (74), 43 (71), 95 (68), 123 (65)... 220 (17)]	12.92	1611	0.21	15.08	2110	0.32
Unknown [m/z 43, 79 (41), 93 (39), 41 (39), 91 (38), 81 (36)...	12.98	1616	0.24			

220 (3)]						
Unknown [m/z 41, 55 (92), 95 (80), 81 (76), 109 (76), 67 (66), 125 (65)... 220 (12)]	13.08	1624	0.64	15.04*	2106	29.07
Patchoulol	13.43†	1653	30.94	15.04*	2106	[29.07]
Pogostol	13.45*†	1655	[30.94]	15.43	2146	2.09
Unknown [m/z 175, 218 (59), 133 (49), 91 (43), 41 (38), 147 (36)]	13.45*†	1655	[30.94]	15.20	2122	0.42
Unknown [m/z 43, 41 (87), 91 (64), 55 (63), 81 (58), 95 (54), 107 (52)... 222 (12)]	13.49	1657	0.16			
Unknown [m/z 95, 107 (99), 41 (85), 93 (82), 91 (82), 109 (71), 105 (71), 105 (71), 108 (66)... 220 (29)]	13.72	1677	0.15	16.27*	2231	0.10
Unknown [m/z 91, 41 (100), 107 (98), 108 (95), 95 (87), 93 (87), 105 (85), 79 (77), 119 (72)... 220? (15)]	13.75	1679	0.03	16.24	2228	0.04
Unknown [m/z 43, 41 (95), 97 (89), 109 (71), 55 (71), 107 (70), 95 (69), 110 (65)... 222 (5)]	13.83	1686	0.03	15.64	2167	0.03
Rotundone	14.01	1701	0.14	15.92	2194	0.09
Unknown [m/z 43, 41 (82), 137 (78), 109 (76), 95 (75), 91 (72), 55 (67)... 220? (14)]	14.05	1704	0.06			
Pogostone	14.16	1714	1.65			
Unknown [m/z 107, 93 (87), 41 (83), 81 (82), 67 (80), 55 (76)... 204 (53), 207 (34), 222 (9)]	14.27*	1723	0.26	17.12	2320	0.18
Unknown [m/z 83, 43 (85), 55 (39), 41 (29), 121	14.27*	1723	[0.26]	17.21	2330	0.09

(27), 120 (25)... 218 (3)]						
Unknown [m/z 133, 148 (68), 147 (59), 91 (56), 79 (45), 105 (44)... 218 (8)]	14.35	1730	0.04	17.36	2346	0.02
Unknown [m/z 43, 83 (93), 55 (42), 41 (37), 121 (34), 111 (28)... 222? (1)]	14.54	1746	tr			
Unknown [m/z 134, 107 (96), 91 (84), 93 (78), 79 (77), 41 (74), 43 (66), 77 (65)...]	14.61	1753	0.01	17.59	2371	0.02
Unknown [m/z 43, 191 (68), 41 (62), 91 (51), 95 (49), 110 (44)... 234 (22)]	14.66	1757	0.03			
Unknown [m/z 149, 131 (54), 105 (48), 91 (46), 41 (30), 93 (27)... 218 (23)]	14.80	1769	0.07	17.54	2366	0.11
Unknown [m/z 219, 43 (67), 91 (46), 79 (42), 41 (41), 55 (36)... 234 (6)]	15.05	1791	0.01			
Unknown [m/z 43, 91 (77), 79 (74), 109 (73), 110 (71)... 218 (52), 234? (1)]	15.18	1802	0.02	17.79	2392	0.01
Unknown [m/z 91, 41 (79), 43 (74), 79 (72), 105 (65), 77 (64), 147 (64), 93 (61)... 218 (26), 234 (14)]	15.24	1807	0.02	17.40	2350	0.01
Unknown [m/z 43, 69 (60), 41 (55), 55 (40), 95 (33), 163 (27)... 234 (17)]	15.46	1827	tr			
Drima-7,9(11)- diene?				9.68	1630	0.21
Unknown [m/z				12.92	1906	0.07

43, 41 (59), 109 (57), 79 (54), 95 (53), 107 (49), 93 (48), 67 (48)...				
205 (18), 220 (4)] Unknown [m/z 41, 79 (97), 43 (97), 69 (72), 93 (70), 91 (62), 95 (58)... 220 (2)]		14.06	2012	0.02
Unknown [m/z 163, 119 (50), 91 (48), 95 (47), 41 (44), 105 (41)...		15.68	2170	0.03
220 (18)] Unknown [m/z 91, 108 (86), 107 (85), 93 (80), 120 (75), 105 (71), 95 (72)... 218 (37)]		16.27*	2231	[0.10]
<b>Total identified</b>	<b>94.41%</b>		<b>92.44%</b>	
<b>Total reported</b>	<b>97.86%</b>		<b>95.26%</b>	

\*: 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)

R.I.: Retention index