

**Date :** March 06, 2018

**CERTIFICATE OF ANALYSIS - GC PROFILING**

*SAMPLE IDENTIFICATION*

**Internal code :** 18B20-PLG14-1-CC

**Customer identification :** Myrrh

**Type :** Essential oil

**Source :** *Commiphora myrrha*

**Customer :** Plant Guru

*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 :** February 28, 2018

Checked and approved by :

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

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*PHYSICOCHEMICAL DATA*

**Physical aspect:** Yellow viscous liquid

**Refractive index:**  $1.5210 \pm 0.0003$  (20 °C)

*CONCLUSION*

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

ANALYSIS SUMMARY

Identification	DB-5 (%)	DB-WAX (%)	Classe
α-Pinene	0.01	0.01	Monoterpene
Camphene	0.01	0.01	Monoterpene
β-Pinene	0.01*	tr	Monoterpene
Sabinene	[0.01]*	tr	Monoterpene
Myrcene	0.01	0.01	Monoterpene
para-Cymene	tr	tr	Monoterpene
Limonene	0.02	0.02	Monoterpene
Bornyl acetate	0.02	0.03	Monoterpenic ester
δ-Elemene isomer	0.02	0.03	Sesquiterpene
δ-Elemene	1.04	1.02	Sesquiterpene
α-Cubebene	0.03	0.03	Sesquiterpene
α-Copaene	0.10	0.07	Sesquiterpene
β-Bourbonene	0.44	0.45	Sesquiterpene
cis-β-Elemene	0.23*	0.19*	Sesquiterpene
1,5-diepi-β-Bourbonene	[0.23]*	0.05	Sesquiterpene
β-Elemene	6.78	7.19*	Sesquiterpene
β-Caryophyllene	0.46	[7.19]*	Sesquiterpene
β-Copaene	0.13	[0.19]*	Sesquiterpene
γ-Elemene	2.76	2.82	Sesquiterpene
Isogermacrene D	0.10	0.08	Sesquiterpene
α-Humulene	0.22	0.19	Sesquiterpene
4,5-diepi-Aristolochene	0.07	0.08	Sesquiterpene
Selina-4,11-diene	0.18	0.18	Sesquiterpene
γ-Murolene	0.13	0.19*	Sesquiterpene
α-Amorphene	0.75*	[0.19]*	Sesquiterpene
Germacrene D	[0.75]*	0.73	Sesquiterpene
β-Selinene	0.63	0.66	Sesquiterpene
δ-Selinene	0.07	0.03	Sesquiterpene
α-Selinene	0.70	0.73*	Sesquiterpene
Curzerene	37.80	38.32	Sesquiterpenic ether
δ-Amorphene	0.14*	[0.73]*	Sesquiterpene
ε-Amorphene	[0.14]*	0.09	Sesquiterpene
γ-Cadinene	0.08	0.37	Sesquiterpene
δ-Cadinene	0.33	[0.37]	Sesquiterpene
Selina-4(15),7(11)-diene	0.21	0.38*	Sesquiterpene
Unknown	0.10	0.09	Sesquiterpene
Selina-3,7(11)-diene	0.23	[0.38]*	Sesquiterpene
α-Elemol	2.96	0.21	Sesquiterpenic alcohol
Germacrene B	[2.96]	2.83	Sesquiterpene
Furanoesdesma-1,4-diene	0.49	1.24*	Sesquiterpenic ether
β-Elementone	0.17	0.13	Sesquiterpenic ketone
Selin-6-en-4α-ol	22.74*	0.14	Sesquiterpenic alcohol
Furanoesdesma-1,3-diene	[22.74]*	24.09	Sesquiterpenic ether
γ-Eudesmol	7.99*	0.05	Sesquiterpenic alcohol
Lindestrene	[7.99]*	7.17	Sesquiterpenic ether
α-Eudesmol	0.07	0.06	Sesquiterpenic alcohol
Furanodiene	0.46		Sesquiterpenic ether
Isofuranogermacrene	0.50		Sesquiterpenic ether

$\alpha$ -Elemyl acetate	0.82	[1.24]*	Sesquiterpenic ester
Methoxyfuranodiene analog	1.52	0.86	Sesquiterpenic ether
Germacrone	0.22	0.30	Sesquiterpenic ketone
2-Methoxyfuranodiene	1.84	1.80	Sesquiterpenic ether
2-Acetoxyfuranodiene	0.63	0.65	Sesquiterpenic ester
Unknown	0.37	0.33	Unknown
<b>Total identified</b>	<b>94.11%</b>	<b>93.49%</b>	

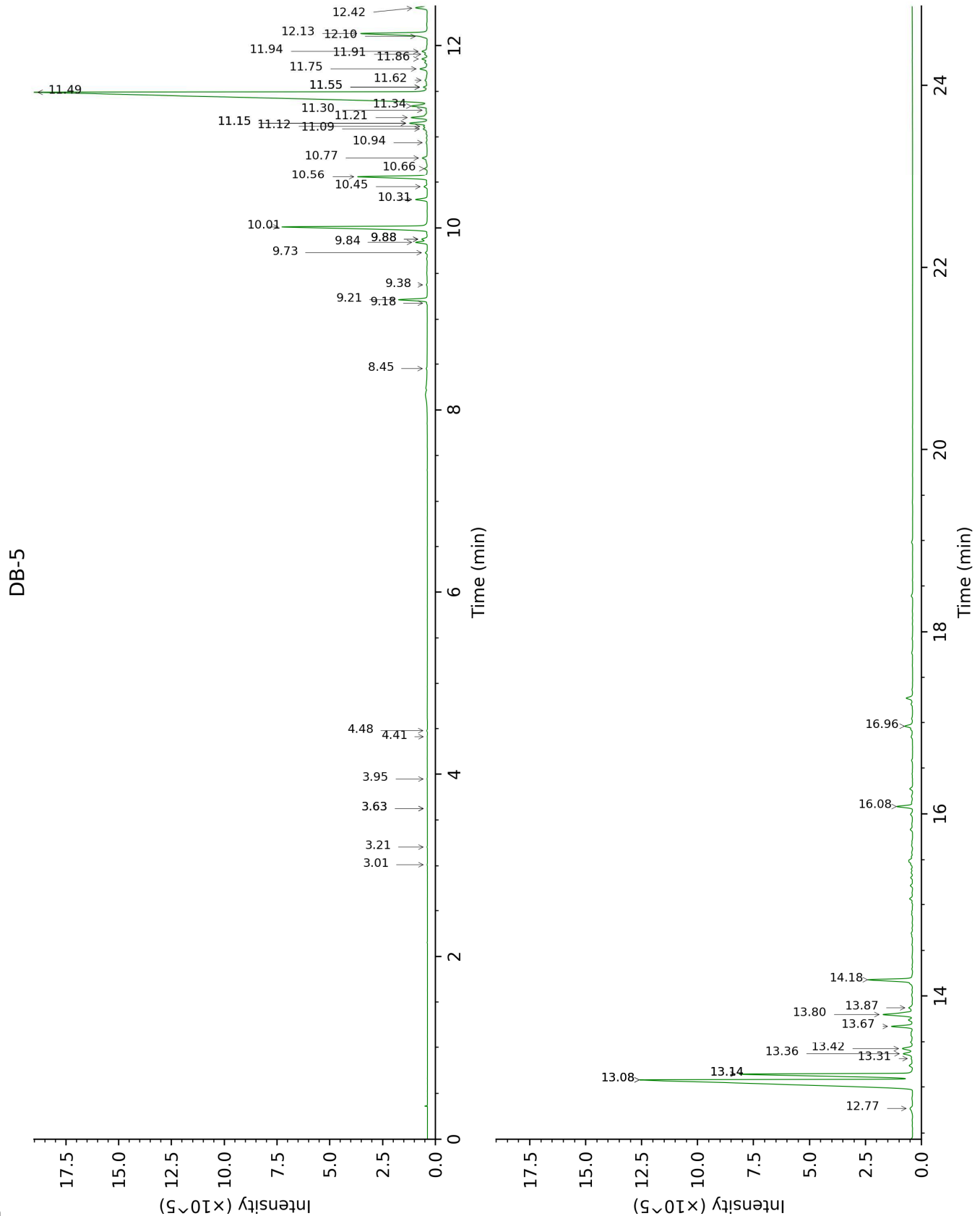
\*: Two or more compounds are coeluting on this column

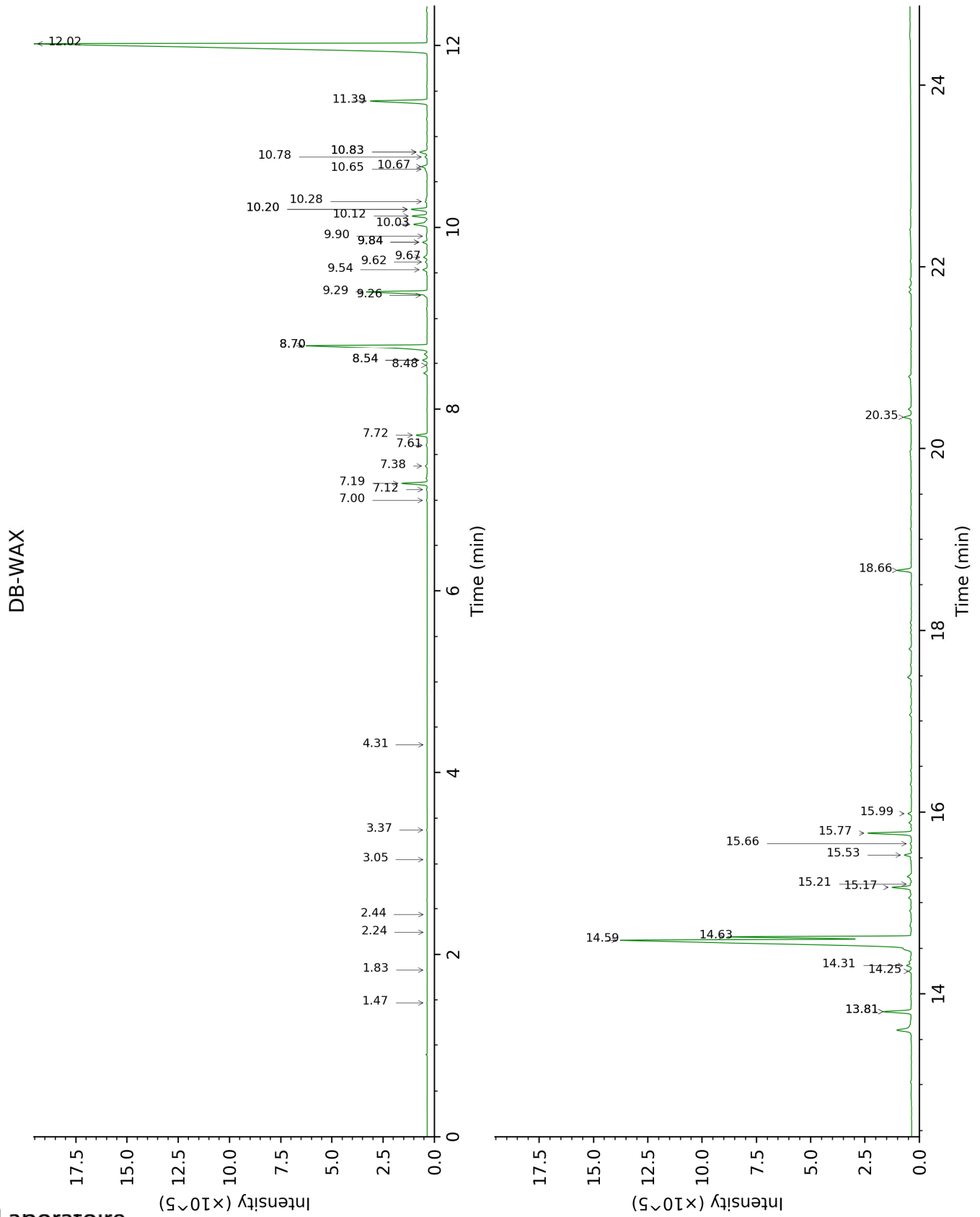
[xx]: Duplicate percentage due to coelutions, not taken account in the identified total

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	%
$\alpha$ -Pinene	3.01	925	0.01	1.47	994	0.01
Camphene	3.21	938	0.01	1.83	1030	0.01
$\beta$ -Pinene	3.63*	966	0.01	2.24	1068	tr
Sabinene	3.63*	966	[0.01]	2.44	1086	tr
Myrcene	3.95	988	0.01	3.05	1134	0.01
para-Cymene	4.41	1017	tr	4.31	1227	tr
Limonene	4.48	1022	0.02	3.37	1159	0.02
Bornyl acetate	8.45	1277	0.02	8.48	1531	0.03
$\delta$ -Elemene isomer	9.18	1327	0.02	7.12	1429	0.03
$\delta$ -Elemene	9.22	1329	1.04	7.19	1434	1.02
$\alpha$ -Cubebene	9.38	1341	0.03	7.00	1420	0.03
$\alpha$ -Copaene	9.73	1366	0.10	7.38	1448	0.07
$\beta$ -Bourbonene	9.84	1374	0.44	7.72	1472	0.45
<i>cis</i> - $\beta$ -Elemene	9.88*	1376	0.23	8.54*	1535	0.19
1,5-diepi- $\beta$ -Bourbonene	9.88*	1376	[0.23]	7.60	1464	0.05
$\beta$ -Elemene	10.01	1385	6.78	8.70*	1548	7.19
$\beta$ -Caryophyllene	10.31	1407	0.46	8.70*	1548	[7.19]
$\beta$ -Copaene	10.45	1417	0.13	8.54*	1535	[0.19]
$\gamma$ -Elemene	10.56	1425	2.76	9.29	1593	2.82
Isogermacrene D	10.66	1432	0.10	9.26	1590	0.08
$\alpha$ -Humulene	10.77	1441	0.22	9.54	1613	0.19
4,5-diepi-Aristolochene	10.94	1454	0.07	9.62	1620	0.08
Selina-4,11-diene	11.09	1465	0.18	9.67	1624	0.18
$\gamma$ -Murolene	11.12	1467	0.13	9.84*	1637	0.19
$\alpha$ -Amorphene	11.15*	1470	0.75	9.84*	1637	[0.19]
Germacrene D	11.15*	1470	[0.75]	10.03	1653	0.73
$\beta$ -Selinene	11.22	1474	0.63	10.12	1660	0.66
$\delta$ -Selinene	11.30	1480	0.07	9.90	1642	0.03
$\alpha$ -Selinene	11.34	1483	0.70	10.20*	1666	0.73
Curzerene	11.49	1495	37.80	12.02	1820	38.32
$\delta$ -Amorphene	11.55*	1499	0.14	10.20*	1666	[0.73]
$\epsilon$ -Amorphene	11.55*	1499	[0.14]	10.28	1673	0.09
$\gamma$ -Cadinene	11.62	1505	0.08	10.65†	1703	0.37
$\delta$ -Cadinene	11.75	1514	0.33	10.67†	1705	[0.37]
Selina-4(15),7(11)-diene	11.86	1523	0.21	10.83*	1718	0.38
Unknown [m/z 189, 204 (92), 161 (65), 133 (51), 105 (51), 91 (51), 119 (45)]	11.91	1527	0.10	10.78	1714	0.09
Selina-3,7(11)-diene	11.94	1529	0.23	10.83*	1718	[0.38]
$\alpha$ -Elemol	12.10†	1542	2.96	14.31	2029	0.21
Germacrene B	12.13†	1545	[2.96]	11.39	1765	2.83
Furanoedesma-1,4-diene	12.42	1567	0.49	13.81*	1981	1.24
$\beta$ -Elemenone	12.77	1594	0.17	14.25	2023	0.13



Selin-6-en-4 $\alpha$ -ol	13.08*	1620	22.74	15.99	2193	0.14
Furanoeudesma-1,3-diene	13.08*	1620	[22.74]	14.59	2055	24.09
$\gamma$ -Eudesmol	13.14*	1625	7.99	15.20	2115	0.05
Lindestrene	13.14*	1625	[7.99]	14.63	2059	7.17
$\alpha$ -Eudesmol	13.31	1639	0.07	15.66	2160	0.06
Furanodiene	13.36	1643	0.46			
Isofuranogermacrene	13.42	1648	0.50			
$\alpha$ -Elemyl acetate	13.67	1668	0.82	13.81*	1981	[1.24]
Methoxyfuranodiene analog	13.80	1679	1.52	15.17	2112	0.86
Germacrene	13.87	1685	0.22	15.53	2148	0.30
2-Methoxyfuranodiene	14.18	1711	1.84	15.77	2172	1.80
2-Acetoxyfuranodiene	16.08	1879	0.63	18.66	2481	0.65
Unknown [m/z 197, 108 (83), 212 (50), 43 (42), 169 (38), 183 (31), 155 (30), 79 (26), 105 (26)]	16.96	1961	0.37	20.35	2678	0.33
<b>Total identified</b>		<b>94.11%</b>			<b>93.49%</b>	
<b>Total reported</b>		<b>94.58%</b>			<b>93.90%</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