Date : November 05, 2019

Certificate of Analysis – GC Profiling

Sample identification

Internal code : 19K01-PTH05-1-CC
Customer identification : Eucalyptus Globulus Organic - China - E30112812R
Type : Essential oil
Source : *Eucalyptus globulus*
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 : Sarah-Eve Tremblay, M. Sc. A., Chimiste
Analysis date : November 04, 2019

Checked and approved by :

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

Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia. This report is digitally signed, it is only considered valid if the digital signature is intact. The results only describe the samples that were submitted to the assays.

Laboratoire PhytoChemia
628 Boulevard du Saguenay Ouest, Saguenay (Qc) G7J 1H4 | www.phytochemia.com

PHYSICOCHEMICAL DATA

Physical aspect: Clear liquid
Refractive index: 1.4606 ± 0.0003 (20 °C)

ISO 770:2002 - RECTIFIED OIL OF EUCALYPTUS GLOBULUS (80-85%)

Compound	Min. %	Max. %	Observed %	Complies?
Globulol		0.05	0	No
Aromadendrene	tr	1.00	0.02	Yes
trans-Pinocarveol	tr	3.00	0	Yes
para-Cymene	1	4	3	Yes
1,8-Cineole	80		81	Yes
Limonene	4	15	6	Yes
α-Phellandrene	0.1	1.0	1.0	Yes
α-Pinene	1	10	5	Yes
Refractive index	1.4580	1.4650	1.4606	Yes

CONCLUSION

No adulterant, contaminant or diluent has been detected using this method. The oil complies with the ISO standard for rectified eucalyptus oil, 80-85% 1,8-cineole.

Analysis summary – Consolidated contents

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

Identification	%	Classe
Isovaleral	tr	Aliphatic aldehyde
2-Methylbutanol	0.01	Aliphatic alcohol
Toluene	tr	Simple phenolic
Tricyclene	0.01	Monoterpene
α-Thujene	0.03	Monoterpene
α-Pinene	4.58	Monoterpene
α-Fenchene	0.01	Monoterpene
Camphene	0.02	Monoterpene
Thuja-2,4(10)-diene	0.01	Monoterpene
β-Pinene	0.29	Monoterpene
Sabinene	tr	Monoterpene
Octen-3-ol	tr	Aliphatic alcohol
trans-para-Menthane	tr	Monoterpene
trans-meta-Mentha-2,8-diene	0.01	Monoterpene
Myrcene	0.55	Monoterpene
Pseudolimonene	0.03	Monoterpene
α-Phellandrene	0.95	Monoterpene
Δ3-Carene	0.02	Monoterpene
α-Terpinene	0.19	Monoterpene
para-Cymene	3.41	Monoterpene
Limonene	6.27	Monoterpene
1,8-Cineole	80.78	Monoterpenic ether
(*Z*)-β-Ocimene	0.06	Monoterpene
(*E*)-β-Ocimene	0.02	Monoterpene
γ-Terpinene	1.99	Monoterpene
Unknown	0.01	Oxygenated monoterpene
cis-Linalool oxide (fur.)	0.01	Monoterpenic alcohol
Terpinolene	0.01	Monoterpene
Linalool	tr	Monoterpenic alcohol
cis-para-Menth-2-en-1-ol	tr	Monoterpenic alcohol
trans-Pinocarveol	tr	Monoterpenic alcohol
Cryptone	tr	Normonoterpenic ketone
α-Terpineol	0.01	Monoterpenic alcohol
α-Phellandrene epoxide	0.01	Monoterpenic ether
trans-Carveol	0.01	Monoterpenic alcohol
Unknown	tr	Oxygenated monoterpene
Carvotanacetone	tr	Monoterpenic ketone
Piperitone	0.01	Monoterpenic ketone
Unknown	0.01	Unknown
Bornyl acetate	tr	Monoterpenic ester
δ-Terpinyl acetate	0.01	Monoterpenic ester
Unknown	0.01	Unknown
Unknown	0.01	Sesquiterpene
α-Gurjunene	0.02	Sesquiterpene
β-Caryophyllene	0.01	Sesquiterpene
β-Gurjunene	0.01	Sesquiterpene
Aromadendrene	0.02	Sesquiterpene

α-Humulene	0.02	Sesquiterpene
α-Muurolene	0.01	Sesquiterpene
α-Calacorene	0.01	Sesquiterpene
Consolidated total	**99.49%**	

tr: The compound has been detected below 0.005% of total signal.

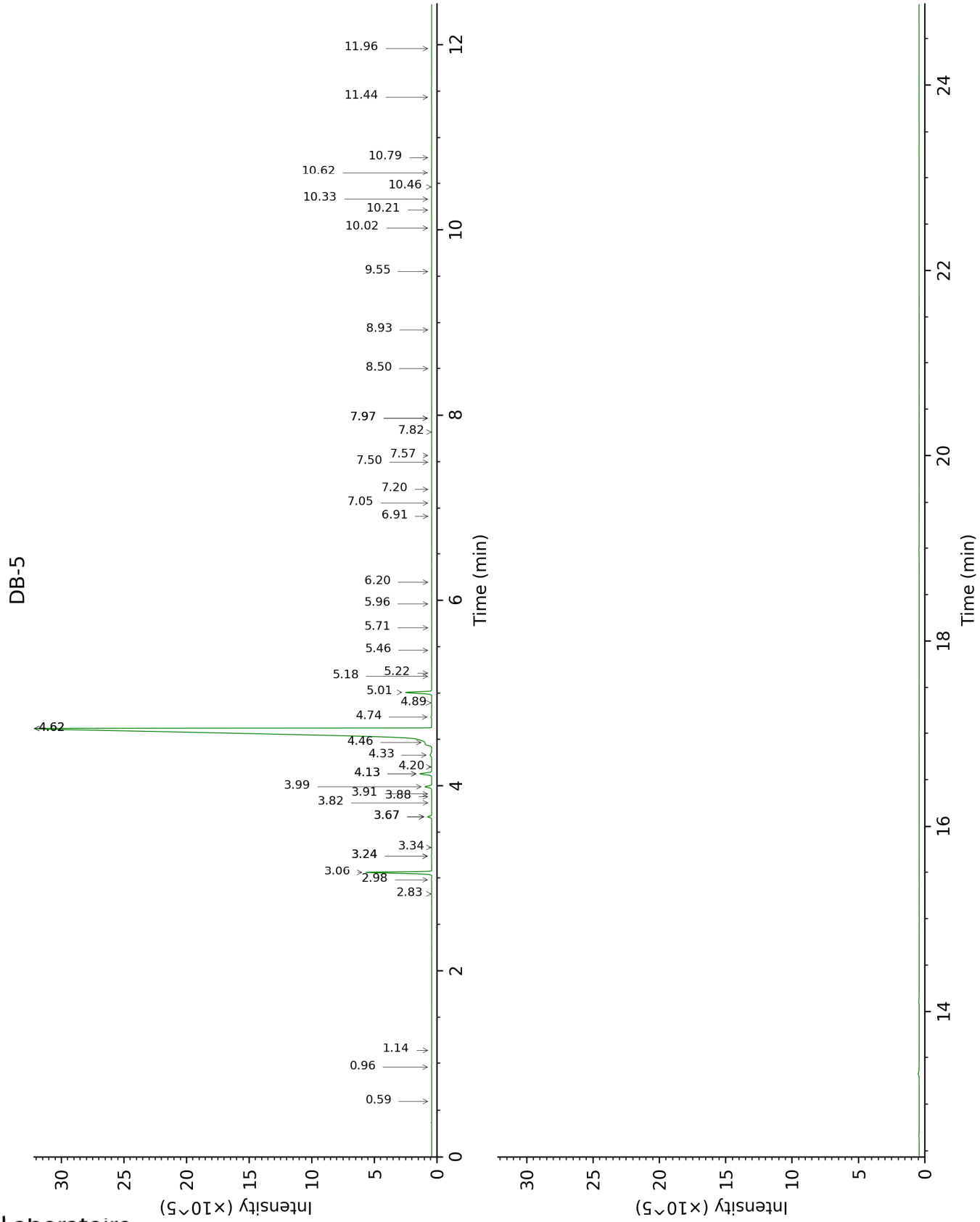
Note: no correction factor was applied

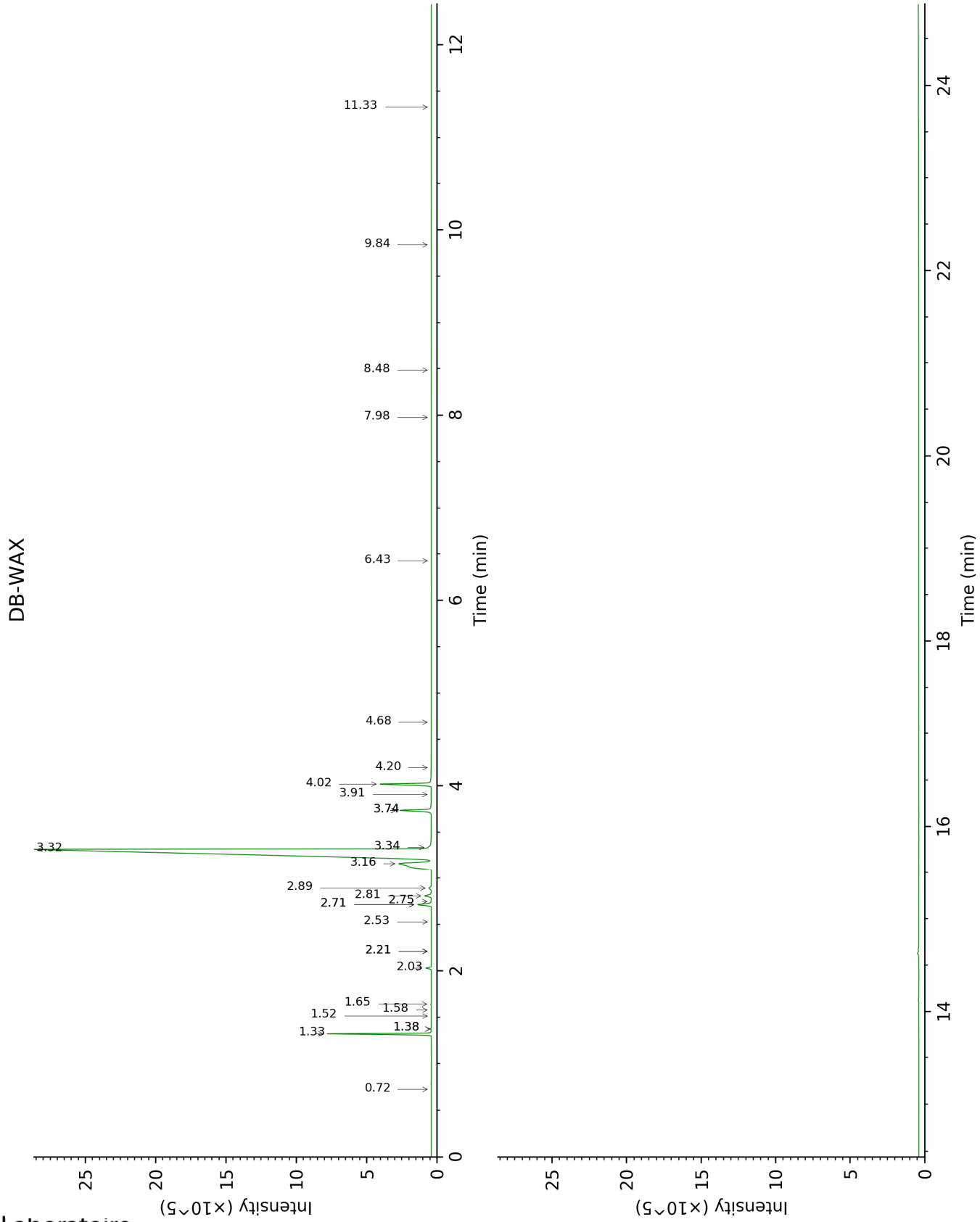
About "consolidated" data: The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm 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.

628 Boulevard du Saguenay, Saguenay (Qc) G7J 1H4 | www.phytochemia.com


DB-5
11.96
11.44
10.79
10.62
10.46
10.33
10.21
10.02
9.55
8.93
8.50
7.97
7.82
7.57
7.50
7.20
7.05
6.91
6.20
5.96
5.71
5.46
5.22
5.18
5.01
4.89
4.74
4.62
4.46
4.33
4.20
4.13
3.99
3.91
3.88
3.82
3.67
3.34
3.24
3.06
2.98
2.83
1.14
0.96
0.59
Time (min)
Intensity (×10^5)


DB-WAX
11.33
9.84
8.48
7.98
6.43
4.68
4.20
4.02
3.91
3.74
3.32
3.34
3.16
2.89
2.81
2.71
2.75
2.53
2.21
2.03
1.65
1.58
1.52
1.38
1.33
0.72
Time (min)
Intensity (×10^5)
Time (min)
Intensity (×10^5)

FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Isovaleral	0.60	641	tr	0.72	886	tr
2-Methylbutanol	0.96	736	0.01	3.34	1176	0.31
Toluene	1.14	760	tr	1.38*	1001	0.04
Tricyclene	2.83	915	0.01			
α-Thujene	2.98	925	0.03	1.38*	1001	[0.04]
α-Pinene	3.06	930	4.58	1.33	993	4.71
α-Fenchene	3.24*	942	0.03	1.58	1022	0.01
Camphene	3.24*	942	[0.03]	1.64	1028	0.02
Thuja-2,4(10)-diene	3.34	948	0.01	2.21*	1084	0.01
β-Pinene	3.67*	970	0.28	2.03	1066	0.29
Sabinene	3.67*	970	[0.28]	2.21*	1084	[0.01]
Octen-3-ol	3.82	980	tr			
trans-para-Menthane	3.88	984	tr	1.52	1016	tr
trans-meta-Mentha-2,8-diene	3.91	986	0.01	2.71*	1127	0.97
Myrcene	3.99	991	0.55	2.81	1135	0.52
Pseudolimonene	4.13*	1000	1.00	2.75	1130	0.03
α-Phellandrene	4.13*	1000	[1.00]	2.71*	1127	[0.97]
Δ3-Carene	4.20	1005	0.02	2.53	1113	tr
α-Terpinene	4.33	1014	0.19	2.89	1141	0.22
para-Cymene	4.46†	1022	90.77	4.02	1229	3.41
Limonene	4.62*†	1032	[90.77]	3.16	1162	6.27
1,8-Cineole	4.62*†	1032	[90.77]	3.32	1175	80.78
(*Z*)-β-Ocimene	4.74	1039	0.06	3.74*	1208	2.11
(*E*)-β-Ocimene	4.89	1049	0.02	3.91	1221	0.03
γ-Terpinene	5.01	1057	1.99	3.74*	1208	[2.11]
Unknown [m/z 79, 93 (60), 43 (40), 94 (35), 137 (33), 77 (26), 91 (20), 152 (18)]	5.18	1068	0.01	4.68	1279	0.02
cis-Linalool oxide (fur.)	5.22	1070	0.01	6.43	1399	0.01
Terpinolene	5.46	1086	0.01	4.20	1242	0.01
Linalool	5.71	1101	tr	7.98	1517	tr
cis-para-Menth-2-en-1-ol	5.96	1118	tr			
trans-Pinocarveol	6.20	1133	tr			
Cryptone	6.91	1180	tr			
α-Terpineol	7.06	1190	0.01			
α-Phellandrene epoxide	7.20	1199	0.01			
trans-Carveol	7.50	1219	0.01	11.33	1791	tr
Unknown [m/z	7.57	1224	tr			

43, 135 (82), 91 (68), 107 (58), 79 (55), 150 (49)]						
Carvotanacetone	7.82	1242	tr			
Piperitone	7.97*	1252	0.03	9.84	1666	0.01
Unknown [m/z 43, 97 (69), 107 (46), 41 (28), 55 (21), 109 (20)...]	7.97*	1252	[0.03]			
Bornyl acetate	8.50	1283	tr			
δ-Terpinyl acetate	8.92	1312	0.01			
Unknown [m/z 43, 95 (62), 107 (45), 110 (41), 55 (28), 67 (25)...]	9.55	1357	0.01			
Unknown [m/z 93, 122 (98), 161 (98), 107 (86), 95 (46), 105 (72)... 204 (34)]	10.02	1390	0.01			
α-Gurjunene	10.21	1404	0.02			
β-Caryophyllene	10.33	1412	0.01			
β-Gurjunene	10.46	1422	0.01			
Aromadendrene	10.62	1434	0.02	8.48	1556	tr
α-Humulene	10.78	1446	0.02			
α-Muurolene	11.44	1495	0.01			
α-Calacorene	11.96	1536	0.01			
Total identified		**99.79%**			**99.76%**	
Total reported		**99.82%**			**99.77%**	

*: 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
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