Date : December 17, 2019

Certificate of Analysis – GC Profiling

Sample identification

Internal code : 19L05-PTH03-1-CC
Customer identification : Eucalyptus Globulus - China - E20108812R
Type : Essential oil
Source : *Eucalyptus globulus*
Customer : Plant Therapy

Analysis

Method: PC-MAT-007 - Analysis of the composition of an essential oil or other volatile liquide by FAST GC-FID (in French); identifications validated by GC-MS.
Analyst : Sylvain Mercier, M. Sc., Chimiste
Analysis date : December 09, 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Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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.

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PHYSICOCHEMICAL DATA

Physical aspect: Clear liquid
Refractive index: 1.4610 ± 0.0003 (20 °C)

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

Compound	Min. %	Max. %	Observed %	Complies?
Globulol		0.05	ND	Yes
Aromadendrene	tr	1.00	0.01	Yes
trans-Pinocarveol	tr	3.00	0.07	Yes
para-Cymene	1	4	4	Yes
1,8-Cineole	80		80	Yes
Limonene	4	15	6	Yes
α-Phellandrene	0.1	1.0	1.0	Yes
α-Pinene	1	10	3	Yes
Refractive index	1.4580	1.4650	1.4610	Yes

CONCLUSION

No adulterant, contaminant or diluent has been detected using this method. The oil complies with the ISO standard for rectified Eucalyptus globulus 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
Isoamyl alcohol	tr	Aliphatic alcohol
Hashishene	0.01	Monoterpene
α-Thujene	0.02	Monoterpene
α-Pinene	2.76	Monoterpene
α-Fenchene	0.01	Monoterpene
Camphene	0.02	Monoterpene
Thuja-2,4(10)-diene	0.01	Monoterpene
β-Pinene	0.37	Monoterpene
Sabinene	tr	Monoterpene
trans-meta-Mentha-2,8-diene	0.01	Monoterpene
Myrcene	0.58	Monoterpene
trans-Dehydroxylinalool oxide	0.01	Monoterpenic ether
α-Phellandrene	0.98	Monoterpene
cis-Dehydroxylinalool oxide	0.02	Monoterpenic ether
α-Terpinene	0.19	Monoterpene
para-Cymene	3.83	Monoterpene
Limonene	6.37	Monoterpene
1,8-Cineole	79.57	Monoterpenic ether
(*Z*)-β-Ocimene	0.14	Monoterpene
(*E*)-β-Ocimene	0.04	Monoterpene
γ-Terpinene	3.56	Monoterpene
Unknown	0.02	Oxygenated monoterpene
cis-Linalool oxide (fur.)	0.02	Monoterpenic alcohol
Terpinolene	0.16	Monoterpene
para-Cymenene	0.05	Monoterpene
trans-Linalool oxide (fur.)	0.01	Monoterpenic alcohol
α-Pinene oxide	0.01	Monoterpenic ether
Linalool	0.06	Monoterpenic alcohol
Isoamyl isovalerate	0.02	Aliphatic ester
allo-Ocimene	0.01	Monoterpene
trans-Pinocarveol	0.07	Monoterpenic alcohol
Unknown	0.01	Unknown
Pinocarvone	0.02	Monoterpenic ketone
Borneol	0.01	Monoterpenic alcohol
δ-Terpineol	0.02	Monoterpenic alcohol
Terpinen-4-ol	0.15	Monoterpenic alcohol
trans-Isocarveol	tr	Monoterpenic alcohol
α-Terpineol	0.24	Monoterpenic alcohol
α-Phellandrene epoxide	tr	Monoterpenic ether
Unknown	0.01	Unknown
Geraniol	tr	Monoterpenic alcohol
α-Terpinyl acetate	tr	Monoterpenic ester
α-Gurjunene	tr	Sesquiterpene
β-Caryophyllene	0.02	Sesquiterpene
Aromadendrene	0.01	Sesquiterpene
β-Eudesmol	0.01	Sesquiterpenic alcohol

α-Eudesmol	0.01	Sesquiterpenic alcohol
Consolidated total	**99.43%**	

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.

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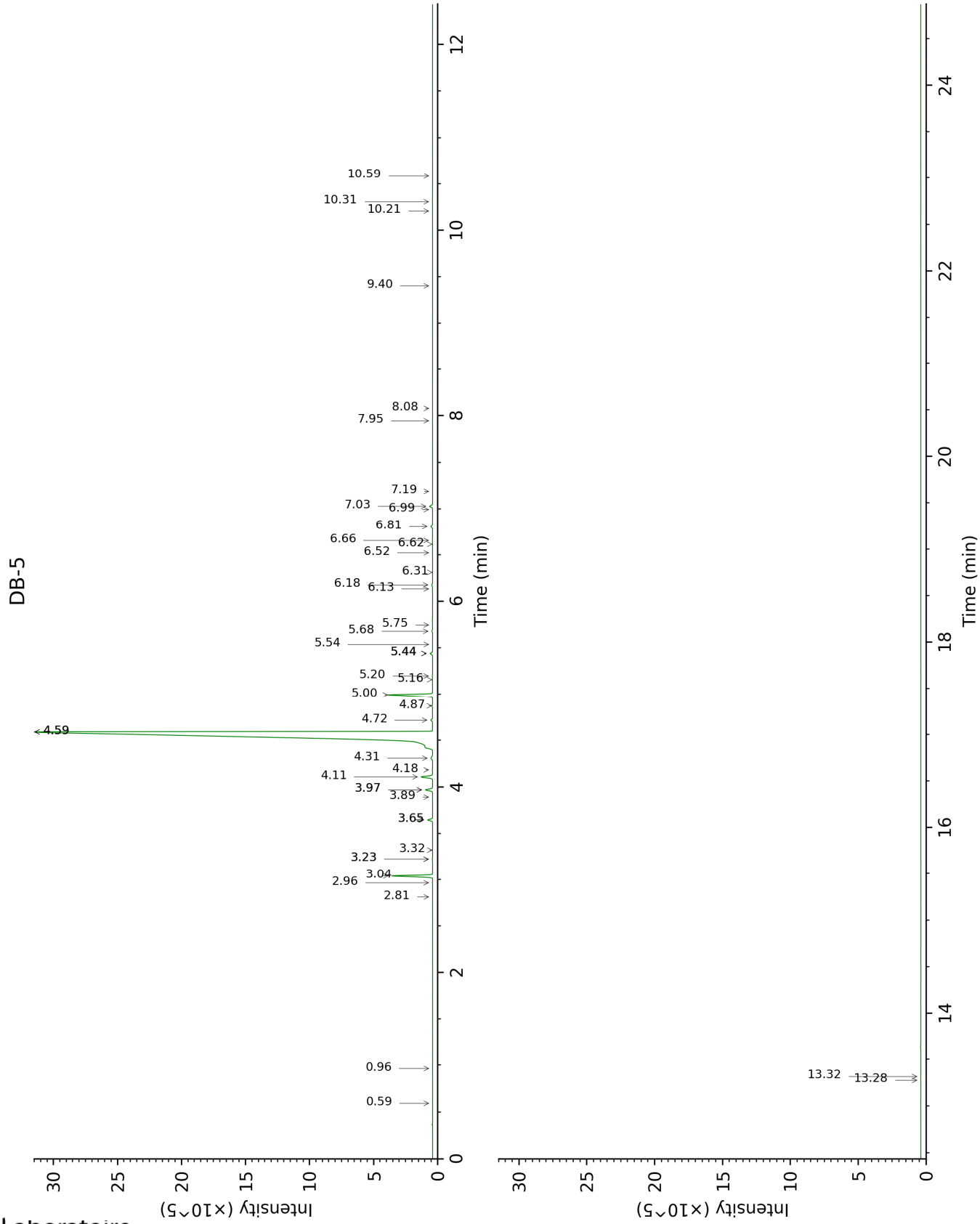
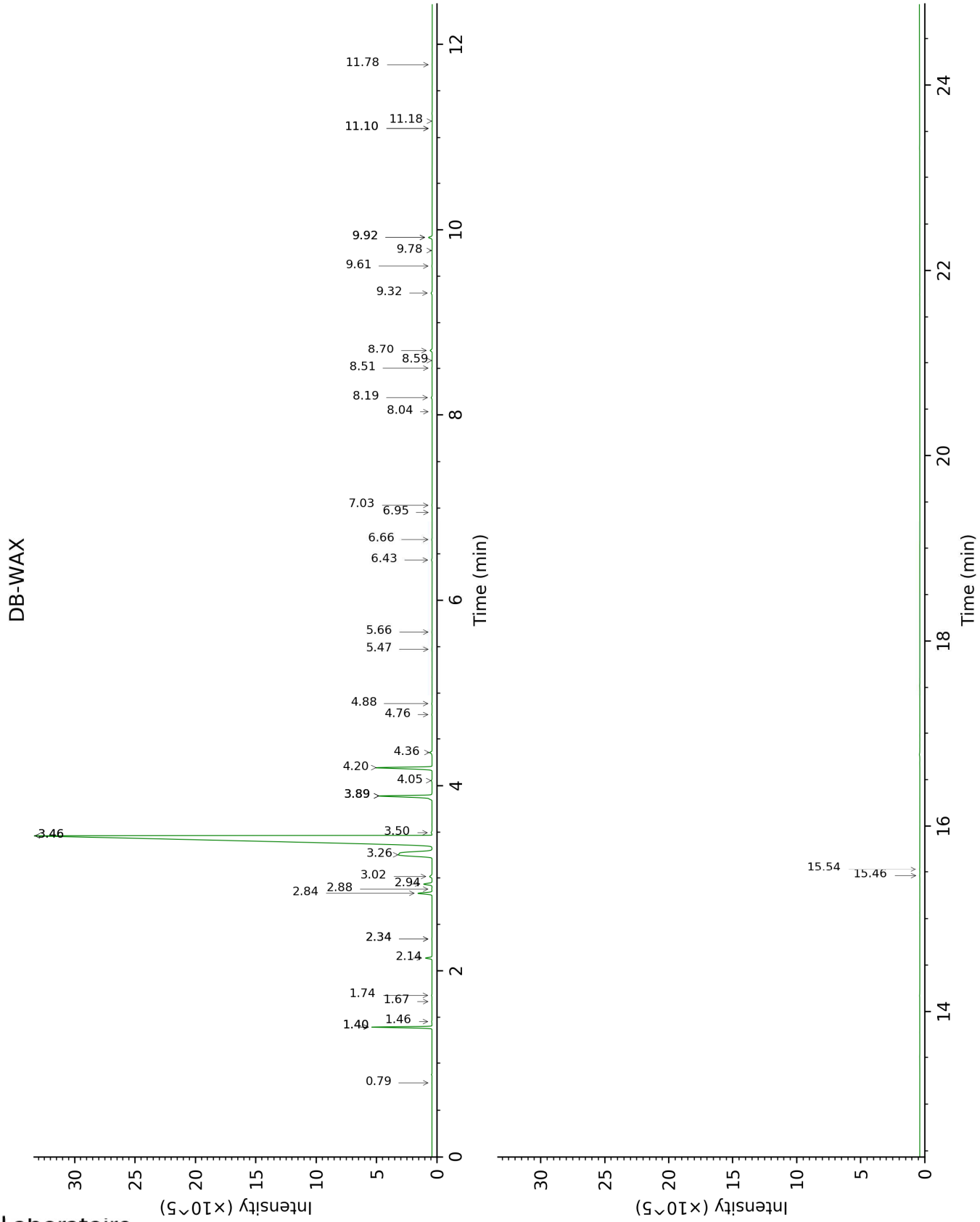

DB-5
Time (min)
Intensity (×10^5)
10.59
10.31
10.21
9.40
8.08
7.95
7.19
7.03
6.99
6.81
6.66
6.62
6.52
6.31
6.18
6.13
5.75
5.68
5.54
5.44
5.20
5.16
5.00
4.87
4.72
4.59
4.31
4.18
4.11
3.97
3.89
3.65
3.32
3.23
3.04
2.96
2.81
0.96
0.59
13.32
13.28



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FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Isovaleral	0.59	641	tr	0.79	890	tr
Isoamyl alcohol	0.96	737	tr	3.50	1178	0.06
Hashishene	2.81	914	0.01	1.40*	991	2.82
α-Thujene	2.96	924	0.02	1.46	998	0.02
α-Pinene	3.04	929	2.76	1.40*	991	[2.82]
α-Fenchene	3.22*	941	0.03	1.67	1019	0.01
Camphene	3.22*	941	[0.03]	1.74	1026	0.02
Thuja-2,4(10)-diene	3.32	948	0.01	2.34*	1086	0.01
β-Pinene	3.65*	969	0.37	2.14	1066	0.37
Sabinene	3.65*	969	[0.37]	2.34*	1086	[0.01]
trans-meta-Mentha-2,8-diene	3.89	986	0.01	2.88	1130	0.02
Myrcene	3.97*	991	0.59	2.94	1134	0.58
trans-Dehydroxylinalool oxide	3.97*	991	[0.59]	3.46*	1175	79.58
α-Phellandrene	4.11	1000	0.98	2.84	1126	0.95
cis-Dehydroxylinalool oxide	4.18	1005	0.02	3.89*	1207	3.84
α-Terpinene	4.31	1013	0.19	3.02	1140	0.19
para-Cymene	4.59*	1031	90.17	4.20	1230	3.83
Limonene	4.59*	1031	[90.17]	3.26	1159	6.37
1,8-Cineole	4.59*	1031	[90.17]	3.46*	1175	[79.58]
(*Z*)-β-Ocimene	4.72	1039	0.14	3.89*	1207	[3.84]
(*E*)-β-Ocimene	4.87	1049	0.04	4.06	1219	0.04
γ-Terpinene	5.00	1057	3.56	3.89*	1207	[3.84]
Unknown [m/z 79, 93 (60), 43 (40), 94 (35), 137 (33), 77 (26), 91 (20), 152 (18)]	5.16	1067	0.02	4.88	1279	0.02
cis-Linalool oxide (fur.)	5.20	1070	0.02	6.66	1406	0.02
Terpinolene	5.44*	1085	0.20	4.36	1241	0.16
para-Cymenene	5.44*	1085	[0.20]	6.44	1390	0.05
trans-Linalool oxide (fur.)	5.44*	1085	[0.20]	7.03	1434	0.01
α-Pinene oxide	5.54	1092	0.01	5.48	1321	0.01
Linalool	5.68	1101	0.06	8.19	1520	0.05
Isoamyl isovalerate	5.75	1105	0.02	4.76	1271	0.02
allo-Ocimene	6.13	1130	0.01	5.66	1334	0.01
trans-Pinocarveol	6.18	1133	0.07	9.32	1608	0.07
Unknown [m/z 109, 124 (45), 119 (41), 43 (35), 91	6.31	1142	0.01	6.95	1428	tr

(28), 95 (25)...]						
Pinocarvone	6.52	1156	0.02	8.04	1509	0.01
Borneol	6.62	1162	0.01	9.92*	1656	0.26
δ-Terpineol	6.66	1165	0.02	9.61	1632	0.02
Terpinen-4-ol	6.81	1175	0.15	8.70	1559	0.14
trans-Isocarveol	6.99	1188	tr	11.10*	1754	0.01
α-Terpineol	7.03	1190	0.24	9.92*	1656	[0.26]
α-Phellandrene epoxide	7.19	1201	tr	11.10*	1754	[0.01]
Unknown [m/z 43, 97 (69), 107 (46), 41 (28), 55 (21), 109 (20)...]	7.95	1249	0.01	11.18	1761	0.01
Geraniol	8.08	1258	tr	11.78	1813	0.01
α-Terpinyl acetate	9.40	1348	tr	9.78	1645	0.01
α-Gurjunene	10.21	1404	tr			
β-Caryophyllene	10.31	1412	0.02	8.51	1545	0.02
Aromadendrene	10.58	1432	0.01	8.59	1551	0.01
β-Eudesmol	13.28	1641	0.01	15.54	2162	0.02
α-Eudesmol	13.32	1644	0.01	15.46	2155	0.02
Total identified		**99.78%**			**99.64%**	
Total reported		**99.82%**			**99.67%**	

*: Two or more compounds are coeluting on this column
[xx]: Duplicate percentage due to coelutions, not taken into account in the consolidated total
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