

**Date :** May 01, 2020

**CERTIFICATE OF ANALYSIS – GC PROFILING**

**SAMPLE IDENTIFICATION**

**Internal code :** 20D30-PTH03

**Customer identification :** Tangerine - T1010585R

**Type :** Essential oil

**Source :** *Citrus reticulata* cv. Tangerine

**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 :** Fanny Charlier, B. Sc.

**Analysis date :** May 01, 2020

Checked and approved by :

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

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*PHYSICOCHEMICAL DATA*

**Physical aspect:** Bright orange liquid

**Refractive index:**  $1.4739 \pm 0.0003$  (20 °C; method PC-MAT-016)

*CONCLUSION*

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

## ANALYSIS SUMMARY – CONSOLIDATED CONTENTS

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

Identification	%	Classe
α-Thujene	0.02	Monoterpene
α-Pinene	0.53	Monoterpene
Sabinene	0.27	Monoterpene
β-Pinene	0.07	Monoterpene
Myrcene	1.75	Monoterpene
α-Phellandrene	0.02	Monoterpene
Octanal	0.18	Aliphatic aldehyde
Δ <sup>3</sup> -Carene	0.07	Monoterpene
α-Terpinene	0.01	Monoterpene
para-Cymene	0.06	Monoterpene
Limonene	90.70	Monoterpene
1,8-Cineole	0.26	Monoterpenic ether
(Z)-β-Ocimene	0.02	Monoterpene
(E)-β-Ocimene	0.08	Monoterpene
γ-Terpinene	2.63	Monoterpene
cis-Sabinene hydrate	0.01	Monoterpenic alcohol
Octanol	0.01	Aliphatic alcohol
Terpinolene	0.04	Monoterpene
Linalool	0.36	Monoterpenic alcohol
Nonanal	0.04	Aliphatic aldehyde
trans-Limonene oxide	0.01	Monoterpenic ether
Citronellal	0.05	Monoterpenic aldehyde
α-Terpineol	0.04	Monoterpenic alcohol
Decanal	0.21	Aliphatic aldehyde
Octyl acetate	0.01	Aliphatic ester
trans-Carveol	0.01	Monoterpenic alcohol
Nerol	0.01	Monoterpenic alcohol
Neral	0.04	Monoterpenic aldehyde
Geraniol	0.01	Monoterpenic alcohol
Geranial	0.05	Monoterpenic aldehyde
Limonen-10-ol	0.01	Monoterpenic alcohol
Undecanal	0.01	Aliphatic aldehyde
para-Mentha-1,8-diene-4-hydroperoxide	0.01	Monoterpenic peroxide
α-Cubebene	0.01	Sesquiterpene
Neryl acetate	0.01	Monoterpenic ester
α-Copaene	0.03	Sesquiterpene
Geranyl acetate	0.03	Monoterpenic ester
β-Elemene	0.02	Sesquiterpene
Dodecanal	0.05	Aliphatic aldehyde
β-Caryophyllene	0.04	Sesquiterpene
α-Humulene	0.02	Sesquiterpene
(E)-β-Farnesene	0.01	Sesquiterpene
Germacrene D	0.04	Sesquiterpene
Valencene	0.04	Sesquiterpene
α-Murolene	0.02	Sesquiterpene
δ-Cadinene	0.03	Sesquiterpene
α-Elemol	0.01	Sesquiterpenic alcohol

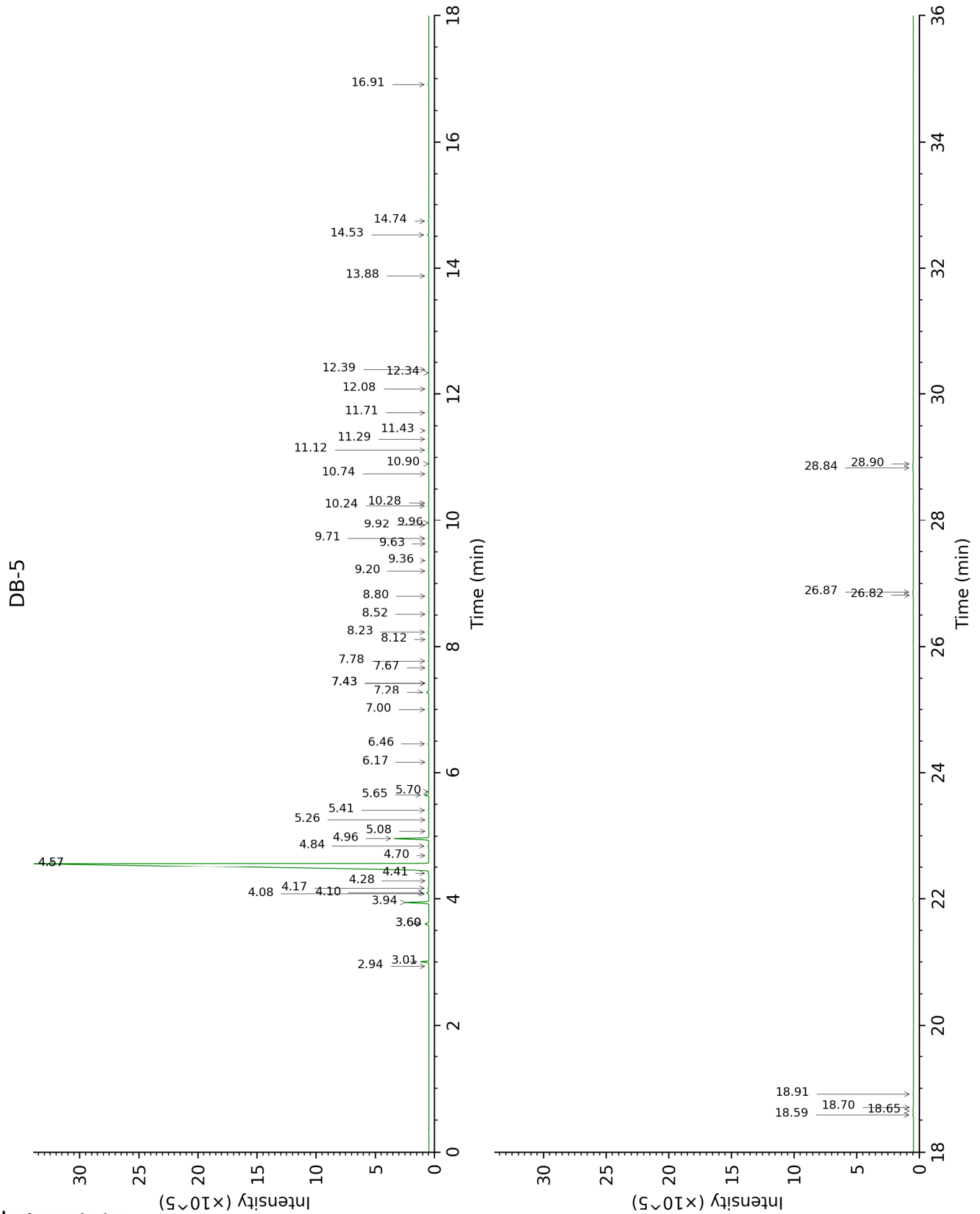
Germacrene D-4-ol	0.01	Sesquiterpenic alcohol
Caryophyllene oxide	0.03	Sesquiterpenic ether
$\beta$ -Sinensal	0.04	Sesquiterpenic aldehyde
$\alpha$ -Sinensal	0.13	Sesquiterpenic aldehyde
Myristic acid	0.06	Aliphatic acid
Palmitic acid	0.10	Aliphatic acid
Linoleic acid	0.08	Aliphatic acid
Oleic acid	0.06	Aliphatic acid
<i>cis</i> -Vaccenic acid?	0.07	Aliphatic acid
Stearic acid	0.05	Aliphatic acid
Tetramethoxyflavone isomer	0.03	Flavonoid
Tangeretin	0.10	Flavonoid
3,3',4',5,6,7,8-Heptamethoxyflavone	0.12	Flavonoid
Nobiletin	0.09	Flavonoid
<b>Consolidated total</b>	<b>98.89%</b>	

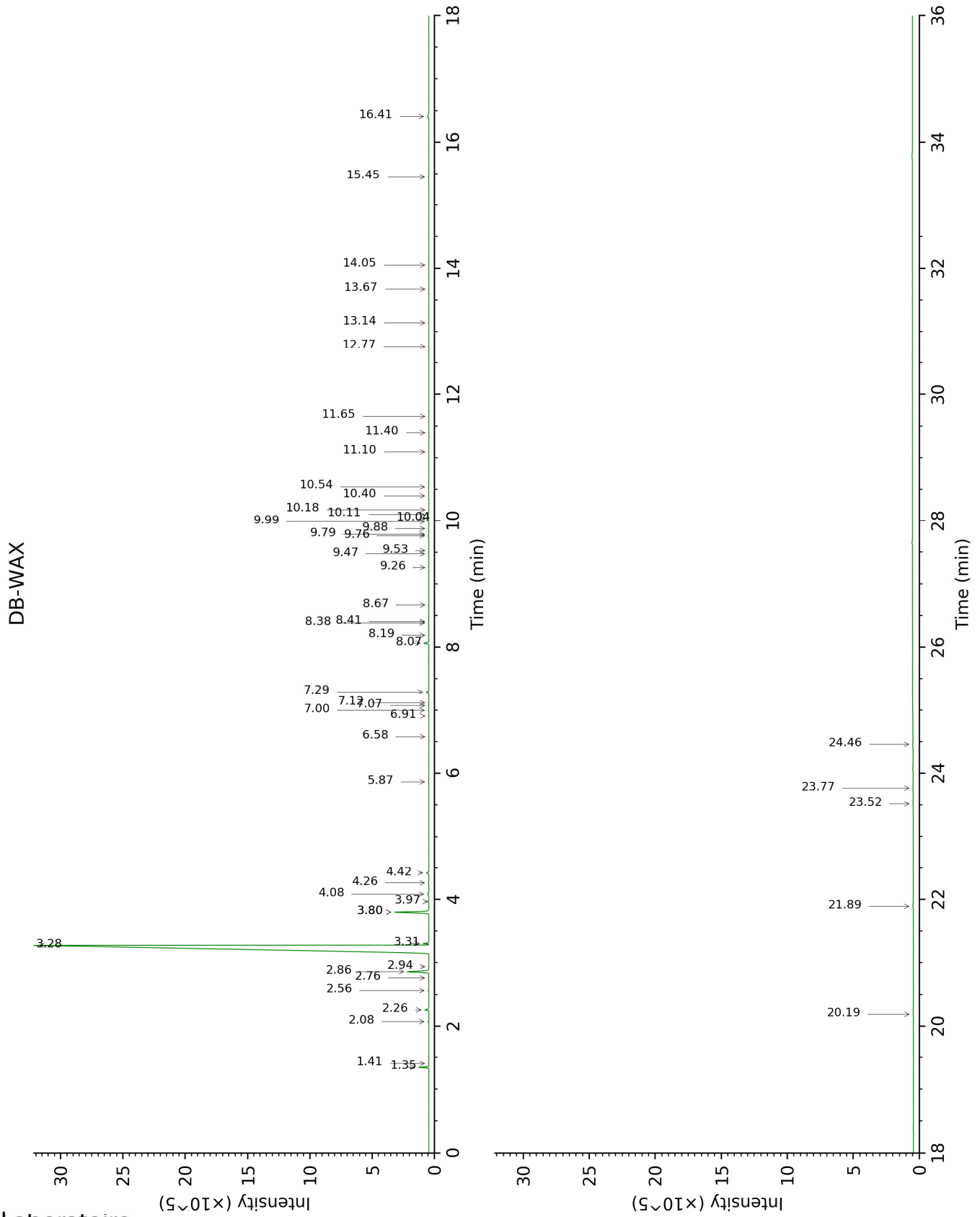
Note: no correction factor was applied

**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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FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
α-Thujene	2.94	925	0.02	1.41	999	0.02
α-Pinene	3.01	930	0.53	1.35	990	0.52
Sabinene	3.60*	969	0.33	2.26	1083	0.27
β-Pinene	3.60*	969	[0.33]	2.08	1065	0.07
Myrcene	3.94	992	1.75	2.86	1133	1.77
α-Phellandrene	4.08	1001	0.02	2.76	1125	0.03
Octanal	4.10	1002	0.18	4.42	1252	0.18
Δ <sup>3</sup> -Carene	4.17	1006	0.07	2.56	1110	0.07
α-Terpinene	4.28	1014	0.01	2.94	1139	0.01
para-Cymene	4.40	1021	0.06	4.08	1227	0.11
Limonene	4.57*	1031	91.17	3.28	1166	90.70
1,8-Cineole	4.57*	1031	[91.17]	3.31	1168	0.26
(Z)-β-Ocimene	4.70	1039	0.02	3.80*	1206	2.65
(E)-β-Ocimene	4.84	1049	0.08	3.97	1218	0.08
γ-Terpinene	4.96	1056	2.63	3.80*	1206	[2.65]
cis-Sabinene hydrate	5.08	1064	0.01	6.91	1429	0.01
Octanol	5.26	1075	0.01	8.19	1526	0.02
Terpinolene	5.41	1085	0.04	4.26	1240	0.05
Linalool	5.65	1100	0.36	8.07	1516	0.37
Nonanal	5.70	1103	0.04	5.87	1353	0.04
trans-Limonene oxide	6.17	1133	0.01	6.58	1405	0.01
Citronellal	6.46	1152	0.05	7.00	1436	0.05
α-Terpineol	7.00	1187	0.04	9.79	1652	0.04
Decanal	7.28	1206	0.21	7.29	1458	0.20
Octyl acetate	7.43*	1216	0.02	7.07	1442	0.01
trans-Carveol	7.43*	1216	[0.02]	11.40	1786	0.01
Nerol	7.67	1233	0.01	11.10	1760	0.01
Neral	7.78	1240	0.04	9.48	1627	0.04
Geraniol	8.12	1264	0.01	11.66	1808	0.01
Geranial	8.23	1272	0.05	10.10	1678	0.05
Limonen-10-ol	8.52	1291	0.01	13.14	1942	0.02
Undecanal	8.80	1306	0.01	8.67	1563	0.02
para-Mentha-1,8-diene-4-hydroperoxide	9.20	1334	0.01			
α-Cubebene	9.36	1346	0.01			
Neryl acetate	9.63	1364	0.01	10.18	1684	0.01
α-Copaene	9.71	1370	0.03	7.12	1445	0.03
Geranyl acetate	9.92	1385	0.03	10.54	1714	0.04
β-Elemene	9.96	1388	0.02	8.41	1542	0.02
Dodecanal	10.24	1408	0.05	9.99	1668	0.05
β-Caryophyllene	10.28	1411	0.04	8.38	1541	0.03
α-Humulene	10.74	1445	0.02	9.26	1609	0.01
(E)-β-Farnesene	10.90	1457	0.01	9.53	1631	0.01
Germacrene D	11.12	1473	0.04	9.76	1650	0.03
Valencene	11.29	1486	0.04	9.88	1659	0.04
α-Muurolene	11.43	1496	0.02	10.04	1672	0.01
δ-Cadinene	11.71	1518	0.03	10.40	1702	0.03



α-Elemol	12.08	1547	0.01	14.05	2027	0.01
Germacrene D-4-ol	12.34	1568	0.01	13.67	1990	0.01
Caryophyllene oxide	12.39	1572	0.03	12.76	1907	0.01
β-Sinensal	13.88	1693	0.04	15.44	2163	0.04
α-Sinensal	14.52	1749	0.13	16.41	2261	0.14
Myristic acid	14.74	1768	0.06	20.19	2686	0.08
Palmitic acid	16.91	1966	0.10	21.89	2899	0.12
Linoleic acid	18.58	2132	0.08	24.46	3248	0.08
Oleic acid	18.65	2139	0.06	23.76	3150	0.06
<i>cis</i> -Vaccenic acid?	18.70	2145	0.07			
Stearic acid	18.91	2166	0.05	23.52	3116	0.05
Tetramethoxyflavone isomer	26.82	3136	0.03			
Tangeretin	26.87	3142	0.10			
3,3',4',5,6,7,8-Heptamethoxyflavone	28.84	3326	0.12			
Nobiletin	28.90	3331	0.09			
<b>Total identified</b>		<b>99.10%</b>			<b>98.63%</b>	
<b>Total reported</b>		<b>99.10%</b>			<b>98.63%</b>	

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

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

Note: no correction factor was applied

R.T.: Retention time (minutes)

R.I.: Retention index