

Date : March 07, 2019

CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 19C04-PTH07-1-SCC

Customer identification : Yuzu - Japan - Y40101812R

Type : Essential oil

Source : *Citrus junos* ct. Distilled

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 : Lindsay Girard, B. Sc.

Analysis date : March 07, 2019

Checked and approved by :



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

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PHYSICOCHEMICAL DATA

Physical aspect: Clear liquid

Refractive index: 1.4728 ± 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 -Thujene	0.34	0.32	Monoterpene
α -Pinene	1.20	1.18	Monoterpene
Camphene	0.01	0.01	Monoterpene
Sabinene	0.84*	0.21	Monoterpene
β -Pinene	[0.84]*	0.62	Monoterpene
Myrcene	1.50	1.50	Monoterpene
Pseudolimonene	0.37*	0.02	Monoterpene
α -Phellandrene	[0.37]*	0.33	Monoterpene
Δ^3 -Carene	0.02	0.02	Monoterpene
α -Terpinene	0.17	0.18	Monoterpene
para-Cymene	82.77	0.73	Monoterpene
Limonene	[82.77]*	79.47	Monoterpene
1,8-Cineole	[82.77]*	2.42*	Monoterpenic ether
β -Phellandrene	[82.77]*	[2.42]*	Monoterpene
(Z)- β -Ocimene	0.01	8.86*	Monoterpene
(E)- β -Ocimene	0.17	0.18	Monoterpene
γ -Terpinene	8.85	[8.86]*	Monoterpene
Terpinolene	0.37*	0.34	Monoterpene
para-Cymenene	[0.37]*	0.03*	Monoterpene
Linalool	1.11	1.13	Monoterpenic alcohol
Nonanal	0.01	0.01	Aliphatic aldehyde
<i>trans</i> -para-Mentha-2,8-dien-1-ol	0.02	0.01	Monoterpenic alcohol
<i>cis</i> -Limonene oxide	0.03	[0.03]*	Monoterpenic ether
<i>trans</i> -Limonene oxide	0.02	0.02	Monoterpenic ether
<i>trans</i> -Sabinol	0.02	0.12*	Monoterpenic alcohol
Epoxyterpinolene	0.01	0.01	Monoterpenic ether
Terpinen-4-ol	0.06	0.06	Monoterpenic alcohol
α -Terpineol	0.06	0.06	Monoterpenic alcohol
Decanal	0.02	0.03	Aliphatic aldehyde
Thymol methyl ether	0.02	0.13*	Monoterpenic ether
Carvone	0.01	0.01	Monoterpenic ketone
Ascaridole glycol isomer I	0.01		Monoterpenic alcohol
Geranial	0.01	0.34*	Monoterpenic aldehyde
Thymol	0.06	0.07	Monoterpenic alcohol
Carvacrol	0.01	0.01*	Monoterpenic alcohol
δ -Elemene isomer	0.05*	0.04	Sesquiterpene
δ -Elemene	[0.05]*	0.01	Sesquiterpene
α -Cubebene	0.01	0.02	Sesquiterpene
α -Copaene	0.02	0.02	Sesquiterpene
β -Cubebene	0.02	0.02	Sesquiterpene
β -Elemene	0.03	[0.13]*	Sesquiterpene
Sesquithujene	0.01	0.01	Sesquiterpene
β -Caryophyllene	0.11	[0.13]*	Sesquiterpene
γ -Elemene	0.01	0.01*	Sesquiterpene
allo-Aromadendrene	0.01	[0.01]*	Sesquiterpene
(E)- β -Farnesene	0.26	0.26*	Sesquiterpene
Germacrene D	0.11	[0.12]*	Sesquiterpene
Bicyclogermacrene	0.33*	[0.34]*	Sesquiterpene

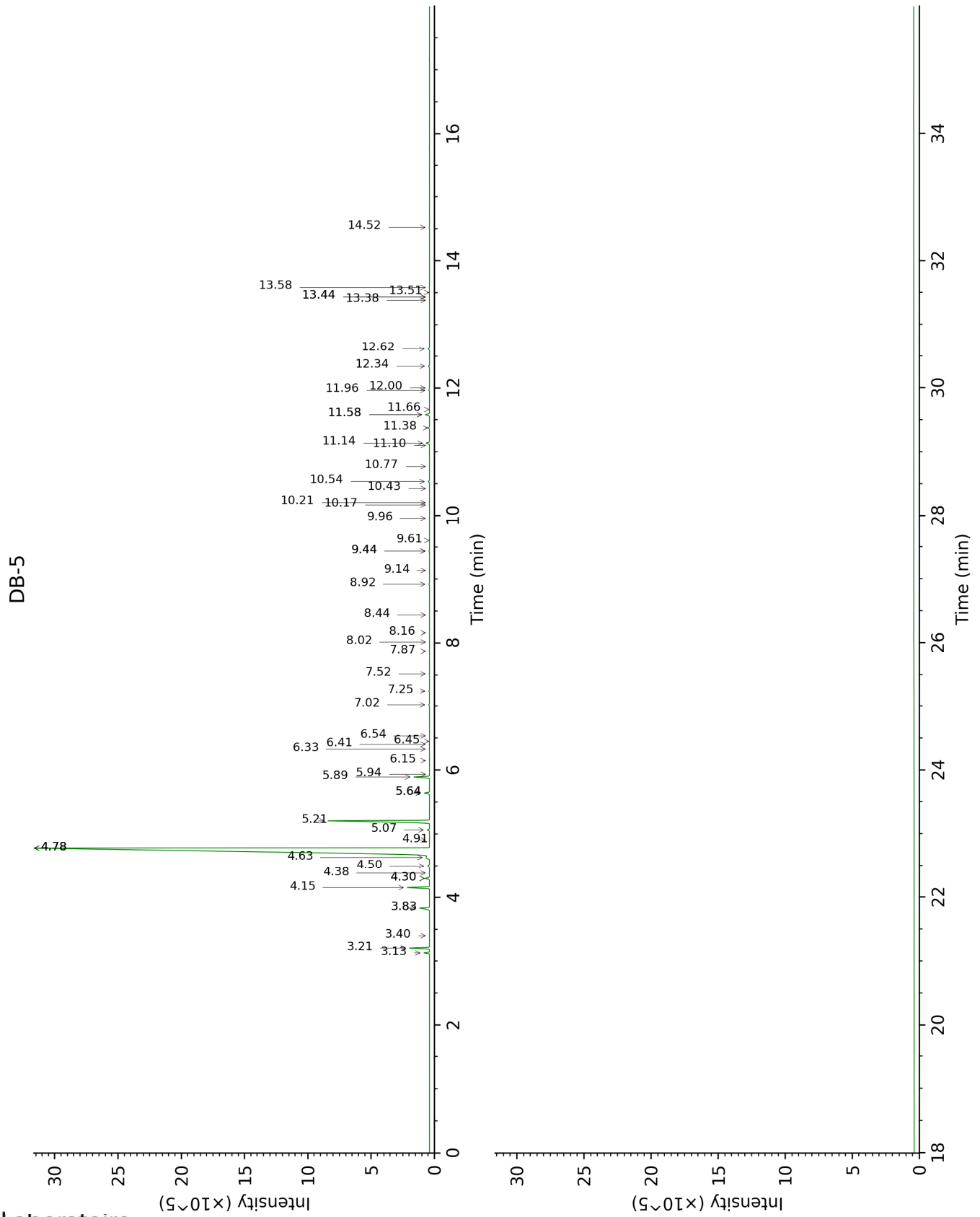
Viridiflorene	[0.33]*	[0.26]*	Sesquiterpene
α -Muurolene	0.01	[0.34]*	Sesquiterpene
δ -Cadinene	0.07	0.06	Sesquiterpene
β -Sesquiphellandrene	0.03	0.03	Sesquiterpene
Germacrene B	0.09	0.09	Sesquiterpene
Spathulenol	0.13	0.13	Sesquiterpenic alcohol
Isospathulenol	0.01	0.01	Sesquiterpenic alcohol
τ -Muurolol	0.02*	0.01	Sesquiterpenic alcohol
τ -Cadinol	[0.02]*	0.01	Sesquiterpenic alcohol
β -Eudesmol	0.01	[0.01]*	Sesquiterpenic alcohol
α -Cadinol	0.03	0.03	Sesquiterpenic alcohol
Oplopanone	0.05		Sesquiterpenic alcohol
Total identified	99.52%	99.22%	

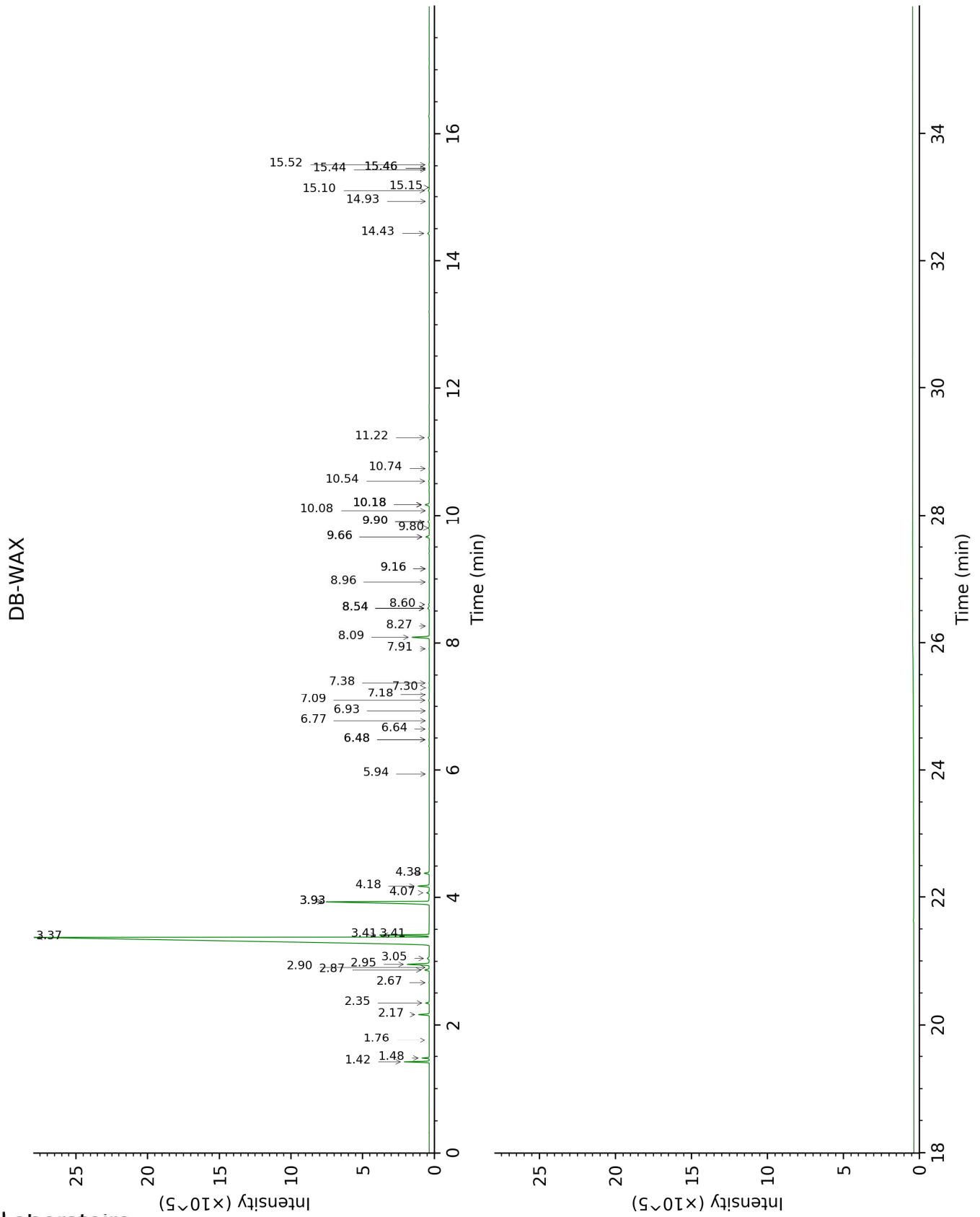
*: Two or more compounds are coeluting on this column

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

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	%
α -Thujene	3.13	924	0.34	1.48	1002	0.32
α -Pinene	3.21	929	1.20	1.42	994	1.18
Camphene	3.40	941	0.01	1.76	1028	0.01
Sabinene	3.83*	970	0.84	2.35	1084	0.21
β -Pinene	3.83*	970	[0.84]	2.17	1067	0.62
Myrcene	4.15	991	1.50	2.95	1134	1.50
Pseudolimonene	4.30*	1000	0.37	2.90	1130	0.02
α -Phellandrene	4.30*	1000	[0.37]	2.86	1127	0.33
Δ^3 -Carene	4.38	1005	0.02	2.67	1112	0.02
α -Terpinene	4.50	1013	0.17	3.05	1141	0.18
para-Cymene	4.63†	1021	82.77	4.18	1230	0.73
Limonene	4.78*†	1030	[82.77]	3.37	1167	79.47
1,8-Cineole	4.78*†	1030	[82.77]	3.41*	1170	2.42
β -Phellandrene	4.78*†	1030	[82.77]	3.41*	1170	[2.42]
(Z)- β -Ocimene	4.91	1038	0.01	3.93*	1212	8.86
(E)- β -Ocimene	5.07	1048	0.17	4.07	1222	0.18
γ -Terpinene	5.21	1057	8.85	3.93*	1212	[8.86]
Terpinolene	5.64*	1084	0.37	4.38	1246	0.34
para-Cymenene	5.64*	1084	[0.37]	6.48*	1388	0.03
Linalool	5.89	1100	1.11	8.09	1511	1.13
Nonanal	5.94	1102	0.01	5.94	1349	0.01
<i>trans</i> -para-Mentha-2,8-dien-1-ol	6.15	1116	0.02	8.96	1579	0.01
<i>cis</i> -Limonene oxide	6.33	1128	0.03	6.48*	1388	[0.03]
<i>trans</i> -Limonene oxide	6.41	1132	0.02	6.64	1400	0.02
<i>trans</i> -Sabinol	6.45	1135	0.02	9.90*	1656	0.12
Epoxyterpinolene	6.54	1141	0.01	6.77	1410	0.01
Terpinen-4-ol	7.02	1172	0.06	8.60	1551	0.06
α -Terpineol	7.25	1187	0.06	9.80	1648	0.06
Decanal	7.52	1204	0.02	7.38	1456	0.03
Thymol methyl ether	7.87	1228	0.02	8.54*	1547	0.13
Carvone	8.02	1238	0.01	10.08	1671	0.01
Ascaridole glycol isomer I	8.16	1248	0.01			
Geranial	8.44	1266	0.01	10.18*	1679	0.34
Thymol	8.92	1299	0.06	15.10	2127	0.07
Carvacrol	9.14	1310	0.01	15.46*	2164	0.01
δ -Elemene isomer	9.44*	1332	0.05	7.09	1435	0.04
δ -Elemene	9.44*	1332	[0.05]	7.18	1442	0.01
α -Cubebene	9.61	1344	0.01	6.93	1422	0.02
α -Copaene	9.96	1369	0.02	7.30	1450	0.02
β -Cubebene	10.17	1383	0.02	7.91	1497	0.02
β -Elemene	10.21	1386	0.03	8.54*	1547	[0.13]
Sesquithujene	10.43	1402	0.01	8.27	1525	0.01
β -Caryophyllene	10.54	1410	0.11	8.54*	1547	[0.13]
γ -Elemene	10.77	1427	0.01	9.16*	1595	0.01

allo-Aromadendrene	11.10	1452	0.01	9.16*	1595	[0.01]
(E)-β-Farnesene	11.14	1454	0.26	9.66*	1636	0.26
Germacrene D	11.38	1472	0.11	9.90*	1656	[0.12]
Bicyclogermacrene	11.58*	1488	0.33	10.18*	1679	[0.34]
Viridiflorene	11.58*	1488	[0.33]	9.66*	1636	[0.26]
α-Muurolene	11.66	1494	0.01	10.18*	1679	[0.34]
δ-Cadinene	11.96	1517	0.07	10.54	1709	0.06
β-Sesquiphellandrene	12.00	1520	0.03	10.74	1726	0.03
Germacrene B	12.34	1546	0.09	11.22	1768	0.09
Spathulenol	12.62	1568	0.13	14.43	2062	0.13
Isospathulenol	13.38	1629	0.01	15.44	2161	0.01
τ-Muurolol	13.44*	1634	0.02	15.15	2132	0.01
τ-Cadinol	13.44*	1634	[0.02]	14.93	2110	0.01
β-Eudesmol	13.51	1640	0.01	15.46*	2164	[0.01]
α-Cadinol	13.58	1646	0.03	15.52	2169	0.03
Oplopanone	14.52	1725	0.05			
Total identified		99.52%			99.22%	
Total reported		99.52%			99.22%	

*: 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

Note: no correction factor was applied

R.T.: Retention time (minutes)

R.I.: Retention index