



GC/MS BATCH NUMBER: CH0104

ESSENTIAL OIL: CLOVE BUD ORGANIC
BOTANICAL NAME: SYZYGIUM AROMATICUM
ORIGIN: SRI LANKA

KEY CONSTITUENTS PRESENT IN THIS BATCH OF CLOVE BUD ORGANIC OIL	%
Eugenol	80.44
β -Caryophyllene	6.92

Comments from Robert Tisserand: Redolent, sweet-spicy odor quality, with hints of burned wood and mulled wine. All three key ISO constituents are within range.

Date : April 05, 2018

CERTIFICATE OF ANALYSIS - GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 18D04-PTH1-1-CC

Customer identification : Clove Bud Organic - Sri Lanka - CH0104182R

Type : Essential oil

Source : *Syzygium aromaticum*

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 : Sylvain Mercier, M. Sc., Chimiste

Analysis date : April 04, 2018

Checked and approved by :

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

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This report is digitally signed, it is only considered valid if the digital signature is intact.

PHYSICOCHEMICAL DATA

Physical aspect: Faintly yellow liquid

Refractive index: 1.5343 ± 0.0003 (20 °C)

CONCLUSION

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

ANALYSIS SUMMARY

Identification	DB-5 (%)	DB-WAX (%)	Classe
Furfural	0.02	0.03	Aliphatic alcohol
α -Pinene	tr	tr	Monoterpene
5-Methylfurfural	0.01	0.02*	Furan
β -Pinene	tr	tr	Monoterpene
6-Methyl-5-hepten-2-one	tr	tr	Aliphatic ketone
Limonene	0.01	tr	Monoterpene
Linalool	0.01	[0.02]*	Monoterpenic alcohol
(E)-4,8-Dimethylnona-1,3,7-triene	0.01	0.01	Terpene derivative
Methyl salicylate	0.07	0.07	Phenolic ester
Chavicol	0.13	0.13	Phenylpropanoid
α -Cubebene	0.08	0.08	Sesquiterpene
Eugenol	80.58*	80.44	Phenylpropanoid
α -Copaene	[80.58]*	0.16	Sesquiterpene
Dihydroeugenol	[80.58]	0.03	Phenylpropanoid
β -Bourbonene	[80.58]	0.01	Sesquiterpene
β -Elemene	0.01	6.92*	Sesquiterpene
Isocaryophyllene	0.03	0.04	Sesquiterpene
Methyleugenol	0.06	0.11	Phenylpropanoid
β -Caryophyllene	6.92	[6.92]*	Sesquiterpene
Caryophylla-4(12),8(13)-diene	0.03	0.02	Sesquiterpene
α -Humulene	0.52	0.51	Sesquiterpene
allo-Aromadendrene	0.02	0.02	Sesquiterpene
<i>trans</i> -Cadina-1(6),4-diene	0.03	0.03	Sesquiterpene
γ -Muurolene	0.02	0.02	Sesquiterpene
Germacrene D	0.01	0.01	Sesquiterpene
β -Selinene	0.01	0.01	Sesquiterpene
α -Selinene	0.02	0.01	Sesquiterpene
α -Muurolene	0.01	0.02	Sesquiterpene
(3Z,6E)- α -Farnesene	0.01	0.01	Sesquiterpene
γ -Cadinene	0.03*	0.01	Sesquiterpene
Cubebol	[0.03]*	0.01	Sesquiterpenic alcohol
δ -Cadinene	0.23*	0.15	Sesquiterpene
<i>trans</i> -Calamenene	[0.23]*	0.07	Sesquiterpene
Eugenyl acetate	10.21	10.05	Phenylpropanoid ester
α -Calacorene	0.02	0.01	Sesquiterpene
Unknown	0.03	0.02	Unknown
Unknown	0.03	0.02	Phenylpropanoid
Caryophyllenyl alcohol	0.03	0.03	Sesquiterpenic alcohol
Caryophyllene oxide	0.31*	0.25	Sesquiterpenic ether
Caryophyllene oxide isomer	[0.31]*	0.02	Sesquiterpenic ether
Unknown	[0.31]*	0.01	Oxygenated sesquiterpene
Humulene epoxide I	0.01	0.01	Sesquiterpenic ether
Humulene epoxide II	0.04	0.04	Sesquiterpenic ether
1-epi-Cubenol	0.04	0.04	Sesquiterpenic alcohol
Caryophylladienol II	0.04	0.05	Sesquiterpenic alcohol
τ -Cadinol	0.02	0.02	Sesquiterpenic alcohol
14-Hydroxy-(Z)-caryophyllene	0.06	0.08*	Sesquiterpenic alcohol
14-Hydroxy-9-epi-(E)-caryophyllene	0.01	[0.08]*	Sesquiterpenic alcohol

14-Hydroxy-(<i>E</i>)-caryophyllene	0.05	0.06	Sesquiterpenic alcohol
Trimethoxypropylbenzene analog	0.01		Phenylpropanoid
(<i>E</i>)-2-Methoxy-4-(3-oxo-1-propenyl)phenyl acetate	0.01		Phenylpropanoid ester
(<i>E</i>)-4-(3-Hydroxy-1-propenyl)-2-methoxyphenyl acetate	0.01		Phenylpropanoid ester
Total identified	99.75%	99.64%	

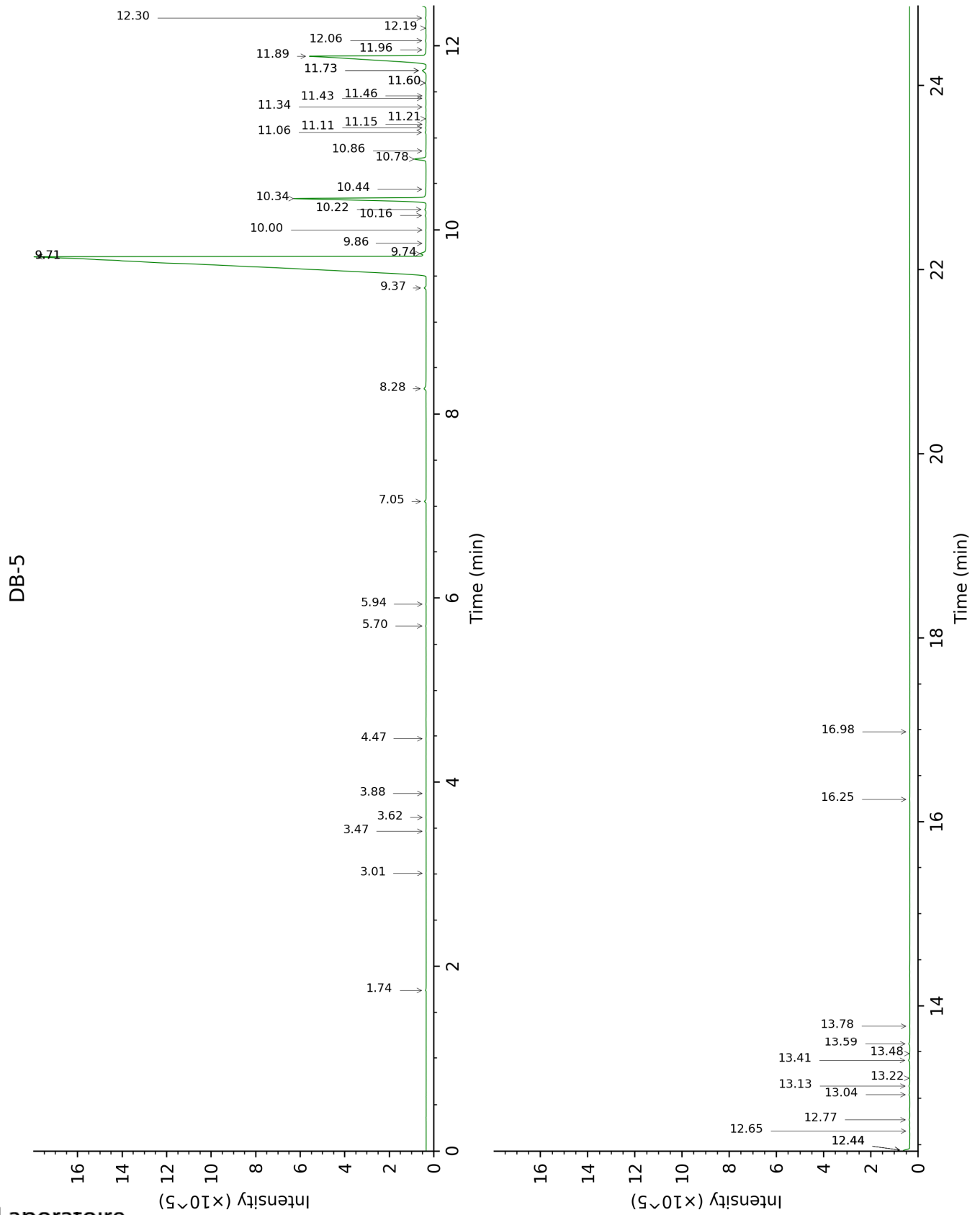
*: Two or more compounds are coeluting on this column

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

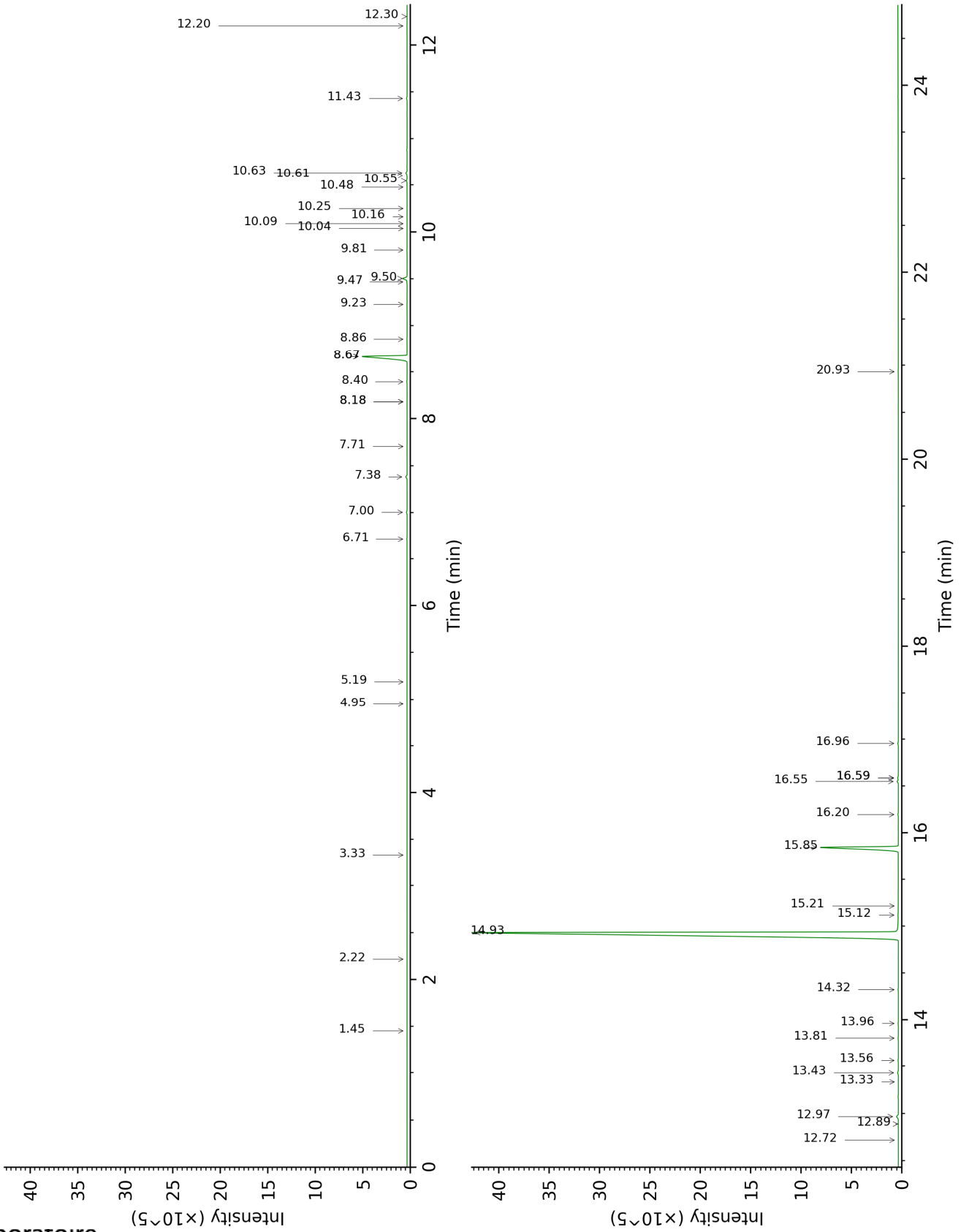
tr: The compound has been detected below 0.005% of total signal.

Note: no correction factor was applied

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DB-WAX



FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Furfural	1.74	826	0.02	6.71	1403	0.03
α -Pinene	3.01	927	tr	1.45	994	tr
5-Methylfurfural	3.47	958	0.01	8.18*	1513	0.02
β -Pinene	3.62	968	tr	2.22	1068	tr
6-Methyl-5-hepten-2-one	3.88	985	tr	5.19	1294	tr
Limonene	4.47	1023	0.01	3.34	1159	tr
Linalool	5.70	1100	0.01	8.18*	1513	[0.02]
(E)-4,8-Dimethylnona-1,3,7-triene	5.94	1116	0.01	4.95	1277	0.01
Methyl salicylate	7.06	1187	0.07	10.55	1700	0.07
Chavicol	8.28	1268	0.13	16.55	2260	0.13
α -Cubebene	9.37	1344	0.08	7.00	1425	0.08
Eugenol	9.71*†	1368	80.58	14.93	2096	80.44
α -Copaene	9.71*†	1368	[80.58]	7.38	1453	0.16
Dihydroeugenol	9.74†	1370	[80.58]	14.32	2037	0.03
β -Bourbonene	9.86†	1378	[80.58]	7.71	1477	0.01
β -Elemene	10.00	1388	0.01	8.67*	1550	6.92
Isocaryophyllene	10.16	1399	0.03	8.40	1529	0.04
Methyleugenol	10.22	1404	0.06	13.43	1953	0.11
β -Caryophyllene	10.34	1413	6.92	8.67*	1550	[6.92]
Caryophylla-4(12),8(13)-diene	10.44	1420	0.03	8.86	1565	0.02
α -Humulene	10.78	1445	0.52	9.50	1616	0.51
allo-Aromadendrene	10.86	1452	0.02	9.23	1593	0.02
trans-Cadina-1(6),4-diene	11.06	1467	0.03	9.47	1613	0.03
γ -Murolene	11.11	1470	0.02	9.81	1640	0.02
Germacrene D	11.15	1473	0.01	10.04	1659	0.01
β -Selinene	11.21	1478	0.01	10.09	1663	0.01
α -Selinene	11.34	1487	0.02	10.16	1669	0.01
α -Murolene	11.43	1494	0.01	10.25	1676	0.02
(3Z,6E)- α -Farnesene	11.46	1496	0.01	10.48	1694	0.01
γ -Cadinene	11.60*	1507	0.03	10.60	1705	0.01
Cubebol	11.60*	1507	[0.03]	12.72	1888	0.01
δ -Cadinene	11.73*	1517	0.23	10.64	1708	0.15
trans-Calamenene	11.73*	1517	[0.23]	11.43	1775	0.07
Eugenyl acetate	11.89	1529	10.21	15.85	2187	10.05
α -Calacorene	11.96	1535	0.02	12.30	1851	0.01
Unknown [m/z 164, 135 (98), 93 (86), 107 (83), 79 (69)...]	12.06	1542	0.03	12.20	1842	0.02
Unknown [m/z 180, 93 (70), 55 (62), 77 (55), 164 (55), 103 (50)]	12.19	1553	0.03	20.93	2761	0.02
Caryophyllenyl alcohol	12.30	1562	0.03	13.81	1987	0.03
Caryophyllene oxide	12.44*	1572	0.31	12.97	1910	0.25
Caryophyllene oxide isomer	12.44*	1572	[0.31]	12.89	1903	0.02
Unknown [m/z 161, 187]	12.44*	1572	[0.31]	15.22	2124	0.01

(32), 105 (30), 205 (24)... 222 (3)]						
Humulene epoxide I	12.65	1589	0.01	13.33	1944	0.01
Humulene epoxide II	12.77	1598	0.04	13.56	1965	0.04
1-epi-Cubenol	13.04	1620	0.04	13.96	2002	0.04
Caryophylladienol II	13.13	1628	0.04	16.20	2223	0.05
τ-Cadinol	13.22	1635	0.02	15.12	2114	0.02
14-Hydroxy-(Z)- caryophyllene	13.41	1651	0.06	16.59*	2264	0.08
14-Hydroxy-9-epi-(E)- caryophyllene	13.48	1657	0.01	16.59*	2264	[0.08]
14-Hydroxy-(E)- caryophyllene	13.58	1666	0.05	16.96	2302	0.06
Trimethoxypropylbenzene analog	13.78	1682	0.01			
(E)-2-Methoxy-4-(3-oxo-1- propenyl)phenyl acetate	16.24	1898	0.01			
(E)-4-(3-Hydroxy-1- propenyl)-2- methoxyphenyl acetate	16.98	1968	0.01			
Total identified		99.75%			99.64%	
Total reported		99.81%			99.69%	

*: 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