Date : August 21, 2020

Certificate of Analysis – GC Profiling

Sample identification

Internal code : 20H14-PTH23
Customer identification : Sweet Fennel - Moldavia - F10109911R
Type : Essential oil
Source : *Foeniculum vulgare*
Customer : Plant Therapy

Analysis

Method: PC-MAT-014 ISO - 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 : August 18, 2020

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Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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: 1.5445 ± 0.0003 (20 °C; method PC-MAT-016)

CONCLUSION

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

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Analysis summary – Consolidated contents

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

Identification	%	Class
Isovaleral	tr	Aliphatic aldehyde
2-Methylbutyral	tr	Aliphatic aldehyde
Toluene	tr	Simple phenolic
Tricyclene	0.01	Monoterpene
α-Thujene	0.01	Monoterpene
α-Pinene	2.36	Monoterpene
Camphene	0.05	Monoterpene
α-Fenchene	tr	Monoterpene
Sabinene	0.04	Monoterpene
β-Pinene	0.13	Monoterpene
Myrcene	0.27	Monoterpene
α-Phellandrene	0.79	Monoterpene
Δ3-Carene	tr	Monoterpene
α-Terpinene	0.01	Monoterpene
Carvomenthene	tr	Aliphatic alcohol
para-Cymene	0.12	Monoterpene
Limonene	5.50	Monoterpene
β-Phellandrene	0.17	Monoterpene
1,8-Cineole	0.03	Monoterpenic ether
(*Z*)-β-Ocimene	0.05	Monoterpene
(*E*)-β-Ocimene	0.01	Monoterpene
γ-Terpinene	0.18	Monoterpene
cis-Sabinene hydrate	0.02	Monoterpenic alcohol
Fenchone	5.38	Monoterpenic ketone
Terpinolene	0.04	Monoterpene
Linalool	0.01	Monoterpenic alcohol
endo-Fenchol	0.01	Monoterpenic alcohol
trans-Pinene hydrate	0.01	Monoterpenic alcohol
Camphor	0.09	Monoterpenic ketone
Terpinen-4-ol	0.02	Monoterpenic alcohol
α-Terpineol	0.01	Monoterpenic alcohol
Methylchavicol	3.99	Phenylpropanoid
Dihydroanethole	0.30	Phenylpropanoid
para-Anisaldehyde	0.27	Simple phenolic
(*E*)-Anethole	79.12	Phenylpropanoid
trans-para-Mentha-6,8-diene-2-hydroperoxide	0.01	Monoterpenic peroxide
Unknown	0.11	Phenylpropanoid
para-Acetonylanisole	0.02	Phenylpropanoid
cis-para-Mentha-6,8-diene-2-hydroperoxide	0.01	Monoterpenic peroxide
β-Caryophyllene	0.09	Sesquiterpene
trans-α-Bergamotene	0.06	Sesquiterpene
α-Humulene	0.01	Sesquiterpene
(*Z*)-para-Methoxycinnamaldehyde?	0.03	Phenylpropanoid
Unknown	0.01	Phenylpropanoid
Unknown	0.01	Phenylpropanoid

1-(4-Methoxyphenyl)propane-1,2-diol isomer I	0.02	Phenylpropanoid
1-(4-Methoxyphenyl)propane-1,2-diol isomer II	0.01	Phenylpropanoid
para-Methoxybutyrophenone?	0.01	Phenylbutanoid
Unknown	0.05	Phenylpropanoid
2,4-Bis-(4-methoxyphenyl)-3,5-dimethyltetrahydrofuran isomer I	0.02	Lignan
2,4-Bis-(4-methoxyphenyl)-3,5-dimethyltetrahydrofuran isomer II	0.02	Lignan
Consolidated total	**99.50%**	

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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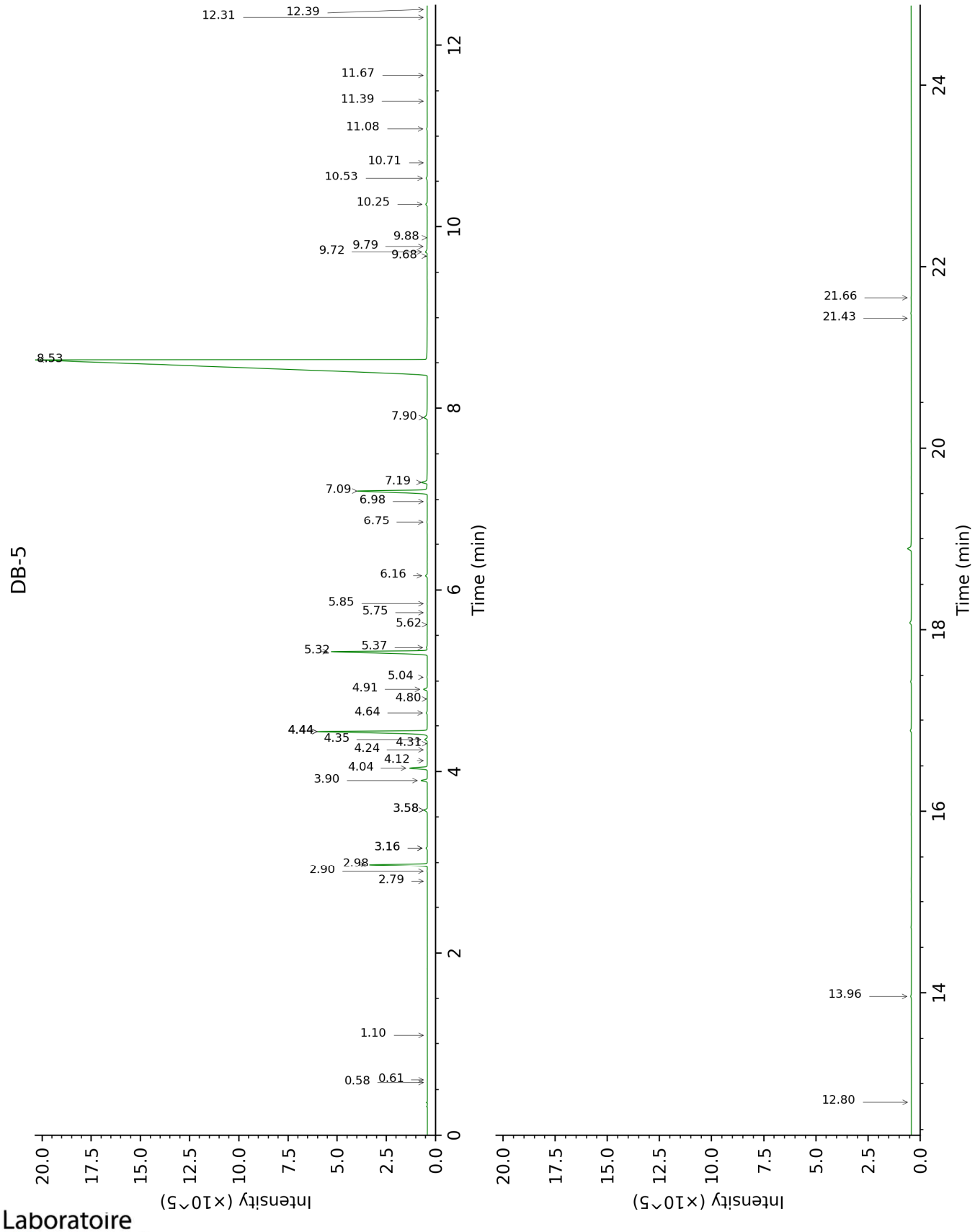
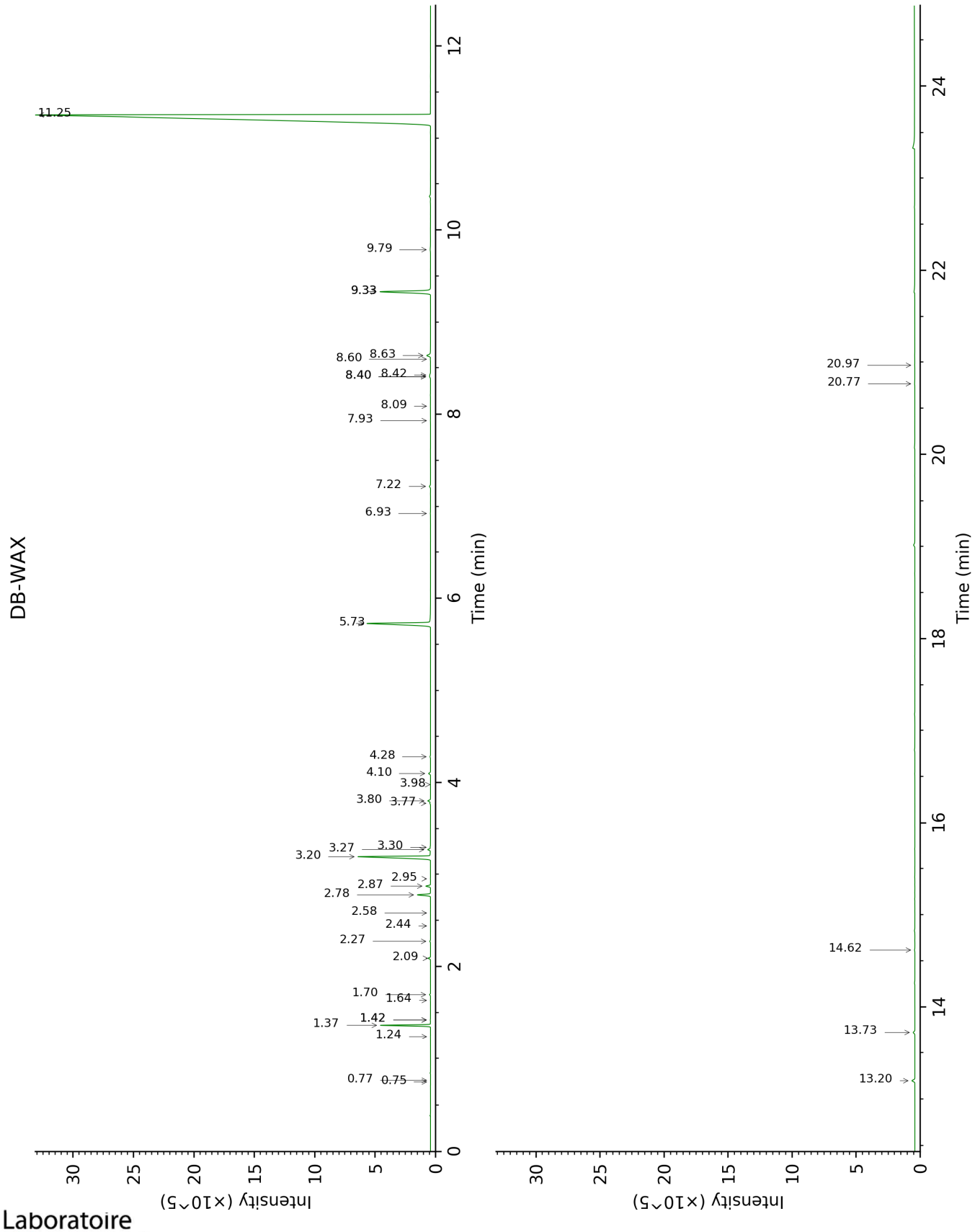

DB-5
12.31
12.39
11.67
11.39
11.08
10.71
10.53
10.25
9.88
9.72
9.79
9.68
8.53
7.90
7.19
7.09
6.98
6.75
6.16
5.85
5.75
5.62
5.32
5.37
5.04
4.91
4.80
4.64
4.44
4.35
4.31
4.24
4.12
4.04
3.90
3.58
3.16
2.98
2.90
2.79
1.10
0.58
0.61
21.66
21.43
13.96
12.80
Time (min)
Intensity (×10^5)


DB-WAX
Intensity (×10^5)
Time (min)
11.25
9.79
9.33
8.60
8.63
8.40
8.42
8.09
7.93
7.22
6.93
5.73
4.28
4.10
3.98
3.80
3.77
3.20
3.27
3.30
2.87
2.95
2.78
2.58
2.44
2.27
2.09
1.70
1.64
1.37
1.42
1.24
0.77
0.75
20.97
20.77
14.62
13.73
13.20

FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Isovaleral	0.58	642	tr	0.77	888	tr
2-Methylbutyral	0.61	653	tr	0.75	881	tr
Toluene	1.10	758	tr	1.42*	1000	0.01
Tricyclene	2.79	918	0.01	1.24	972	tr
α-Thujene	2.90	925	0.01	1.42*	1000	[0.01]
α-Pinene	2.98	930	2.36	1.37	993	2.29
Camphene	3.16*	943	0.06	1.70	1028	0.05
α-Fenchene	3.16*	943	[0.06]	1.64	1022	tr
Sabinene	3.58*	971	0.18	2.27	1086	0.04
β-Pinene	3.58*	971	[0.18]	2.09	1067	0.13
Myrcene	3.90	992	0.27	2.87	1135	0.28
α-Phellandrene	4.04	1002	0.79	2.78	1128	0.78
Δ3-Carene	4.12	1007	tr	2.58	1112	tr
α-Terpinene	4.24	1014	0.01	2.95	1141	0.01
Carvomenthene	4.31	1018	tr	2.44	1101	tr
para-Cymene	4.35	1021	0.12	4.10	1229	0.13
Limonene	4.44*	1027	5.80	3.20	1161	5.50
β-Phellandrene	4.44*	1027	[5.80]	3.27	1167	0.17
1,8-Cineole	4.44*	1027	[5.80]	3.30	1169	0.03
(*Z*)-β-Ocimene	4.64	1040	0.05	3.78	1205	0.04
(*E*)-β-Ocimene	4.80	1049	0.01	3.98	1220	0.01
γ-Terpinene	4.91	1057	0.18	3.80	1207	0.18
cis-Sabinene hydrate	5.04	1065	0.02	6.93	1431	0.02
Fenchone	5.32	1083	5.38	5.73	1344	5.43
Terpinolene	5.37	1086	0.04	4.28	1242	0.04
Linalool	5.62	1102	0.01	8.09	1518	tr
endo-Fenchol	5.75	1110	0.01	8.40*†	1542	0.13
trans-Pinene hydrate	5.85	1116	0.01	7.93	1506	0.01
Camphor	6.16	1136	0.09	7.22	1452	0.09
Terpinen-4-ol	6.75	1174	0.02	8.60	1557	0.02
α-Terpineol	6.98	1189	0.01	9.79	1651	0.06
Methylchavicol	7.09	1196	3.99	9.33*	1615	4.04
Dihydroanethole	7.19	1202	0.30	8.64	1560	0.33
para-Anisaldehyde	7.90	1250	0.27	13.20	1946	0.23
(*E*)-Anethole	8.53	1293	79.12	11.25	1773	78.93
trans-para-Mentha-6,8-diene-2-hydroperoxide	9.68	1370	0.01			
Unknown [121, 91 (60), 120 (39), 164 (37), 77 (34), 135 (26)]	9.72	1374	0.11	13.73	1994	0.14
para-Acetonylanisole	9.78	1378	0.02	14.62	2080	0.03
cis-para-Mentha-6,8-diene-2-hydroperoxide	9.88	1384	0.01			
β-Caryophyllene	10.25	1411	0.09	8.40*†	1542	[0.13]
trans-α-Bergamotene	10.53	1432	0.06	8.42†	1544	[0.13]
α-Humulene	10.71	1446	0.01	9.33*	1615	[4.04]
(*Z*)-para-Methoxycinnamaldehyde?	11.08	1473	0.03			

Unknown [m/z 135, 77 (22), 92 (12), 107 (10), 136 (10)... 194 (t)]	11.39	1496	0.01			
Unknown [m/z 137, 148 (14), 121 (14), 208 (13)]	11.67	1518	0.01			
1-(4-Methoxyphenyl)propane-1,2-diol isomer I	12.31	1568	0.02	20.77	2757	0.02
1-(4-Methoxyphenyl)propane-1,2-diol isomer II	12.40	1575	0.01	20.97	2782	0.01
para-Methoxybutyrophenone?	12.80	1607	0.01			
Unknown [m/z 137, 109 (15), 43 (10), 164 (9), 138 (9)...]	13.96	1704	0.05			
2,4-Bis-(4-methoxyphenyl)-3,5-dimethyltetrahydrofuran isomer I	21.44	2448	0.02			
2,4-Bis-(4-methoxyphenyl)-3,5-dimethyltetrahydrofuran isomer II	21.66	2475	0.02			
Total identified		**99.43%**			**99.06%**	
Total reported		**99.60%**			**99.19%**	

*: 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