

GC/MS BATCH NUMBER: RE0102

ESSENTIAL OIL: ROSE OTTO ORGANIC
BOTANICAL NAME: ROSA X DAMASCENA
ORIGIN: BULGARIA

KEY CONSTITUENTS PRESENT IN THIS BATCH OF ROSE OTTO ORGANIC OIL	%
CITRONELLOL	34.9
GERANIOL	23.7
NEROL	12.6
NONADECANE	11.0
EUGENOL	2.6
HENEICOSANE	2.6
HEPTADECANE	2.0
ETHANOL	1.2
PHENYLETHYL ALCOHOL	1.2
EICOSANE	1.2

Comments from Robert Tisserand: Has the delicate, "pink rose" potency of Bulgarian Rose otto. All eight key ISO constituents are within range.

Date : March 20, 2018

CERTIFICATE OF ANALYSIS - GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 18C19-PTH2-1-CC

Customer identification : Rose Otto Organic- Bulgaria - RE010276R

Type : Essential oil

Source : *Rosa x damascena*

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 : Sarah-Eve Tremblay, M. Sc. A., Chimiste

Analysis date : March 20, 2018

Checked and approved by :

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

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PHYSICOCHEMICAL DATA

Physical aspect: Faintly yellow liquid

Refractive index: 1.4610 ± 0.0003 (20 °C)

CONCLUSION

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

ANALYSIS SUMMARY

Identification	DB-5 (%)	DB-WAX (%)	Classe
Ethanol	1.19	1.22	Aliphatic alcohol
Isoamyl alcohol	0.02	0.02	Aliphatic alcohol
Hexanal	0.01	0.01	Aliphatic aldehyde
(3Z)-Hexenol	0.02	0.03	Aliphatic alcohol
Hexanol	0.06	0.07	Aliphatic alcohol
Heptanal	0.04	0.04	Aliphatic aldehyde
α -Pinene	0.19	0.19	Monoterpene
β -Pinene	0.07*	0.05	Monoterpene
Sabinene	[0.07]*	0.02	Monoterpene
6-Methyl-5-hepten-2-one	0.02	0.02	Aliphatic ketone
Myrcene	0.12	0.12	Monoterpene
6-Methyl-5-hepten-2-ol	tr	0.01*	Aliphatic alcohol
Δ^3 -Carene	0.01	tr	Monoterpene
α -Terpinene	0.01	0.01	Monoterpene
para-Cymene	tr	tr	Monoterpene
1,8-Cineole	0.03*	0.01*	Monoterpenic ether
Limonene	[0.03]*	0.02	Monoterpene
β -Phellandrene	[0.03]*	[0.01]*	Monoterpene
(Z)- β -Ocimene	0.02	0.01	Monoterpene
(E)- β -Ocimene	0.01	0.01	Monoterpene
γ -Terpinene	0.02	0.02	Monoterpene
cis-Sabinene hydrate	tr	[0.01]*	Monoterpenic alcohol
cis-Linalool oxide (fur.)	0.01	0.01	Monoterpenic alcohol
Terpinolene	0.01	0.01	Monoterpene
Rosefuran	0.01	0.01	Monoterpenic ether
Nonanal	0.34*	0.02	Aliphatic aldehyde
Linalool	[0.34]*	0.33	Monoterpenic alcohol
cis-Rose oxide	0.11*	0.12	Monoterpenic ether
β -Thujone	[0.11]*		Monoterpenic ketone
Phenylethyl alcohol	1.18	1.25	Simple phenolic
trans-Rose oxide	0.06	0.06	Monoterpenic ether
neo-Isopulegol	0.01	0.01	Monoterpenic alcohol
Nerol oxide	0.03*	0.03	Aliphatic ether
Citronellal	[0.03]*	0.02	Monoterpenic aldehyde
α -Phellandren-8-ol	tr	0.04*	Monoterpenic alcohol
Terpinen-4-ol	0.10	0.10	Monoterpenic alcohol
Hodiendiol	0.09	11.81*	Monoterpenic alcohol
Rhodinol	0.18	0.15	Monoterpenic alcohol
Nerol	12.62	12.15	Monoterpenic alcohol
Citronellol	34.93	35.16	Monoterpenic alcohol
(Z)-Isogeraniol	0.15	0.09	Monoterpenic alcohol
(E)-Isogeraniol?	0.12	0.12*	Monoterpenic alcohol
Geraniol	23.67	23.88*	Monoterpenic alcohol
Geranial	0.52	0.49*	Monoterpenic aldehyde
Citronellyl formate	0.02	0.01	Monoterpenic ester
Neryl formate	0.01	0.46*	Monoterpenic ester
Geranyl formate	tr	tr	Monoterpenic ester
Methyl geranate	0.03	0.12	Monoterpenic ester

Eugenol	1.22*	2.61	Phenylpropanoid
Citronellyl acetate	[1.22]*	[0.46]*	Monoterpenic ester
Neryl acetate	0.05	[0.04]*	Monoterpenic ester
β -Bourbonene	0.03	0.03	Sesquiterpene
Geranyl acetate	0.34	[0.41]	Monoterpenic ester
β -Elemene	0.03	0.28*	Sesquiterpene
Methyleugenol	0.88	0.89	Phenylpropanoid
β -Caryophyllene	0.18	[0.28]*	Sesquiterpene
α -Guaiene	0.10	[0.28]*	Sesquiterpene
6,9-Guaiadiene	0.01	0.01	Sesquiterpene
α -Humulene	0.09*	0.09	Sesquiterpene
Citronellyl propionate	[0.09]*	0.01*	Monoterpenic ester
(<i>E</i>)- β -Farnesene	tr	0.01	Sesquiterpene
Geranyl propionate	0.31*	0.01	Monoterpenic ester
γ -Murolene	[0.31]*	0.01	Sesquiterpene
Germacrene D	[0.31]*	0.30	Sesquiterpene
Phenylethyl 2-methylbutyrate	0.02	[11.81]*	Phenolic ester
α -Murolene	0.04	[0.49]*	Sesquiterpene
(3 <i>Z</i> ,6 <i>E</i>)- α -Farnesene	0.04	[0.01]*	Sesquiterpene
Pentadecane	0.08	0.08	Alkane
δ -Guaiene	0.09	0.09	Sesquiterpene
γ -Cadinene	0.05	2.00*	Sesquiterpene
δ -Cadinene	0.04*	[2.00]*	Sesquiterpene
<i>trans</i> -Calamenene	[0.04]*	0.01	Sesquiterpene
Citronellyl butyrate	0.01	[0.12]*	Monoterpenic ester
α -Elemol	0.03	0.03	Sesquiterpenic alcohol
(<i>E</i>)-Nerolidol	0.02	1.20*	Sesquiterpenic alcohol
Caryophyllene oxide	0.01	[11.81]*	Sesquiterpenic ether
Hexadecane	0.01	0.01	Alkane
10- <i>epi</i> -Cubenol	tr		Sesquiterpenic alcohol
10- <i>epi</i> - γ -Eudesmol	0.01	0.01	Sesquiterpenic alcohol
γ -Eudesmol	0.04		Sesquiterpenic alcohol
τ -Muurolol	0.01	0.06	Sesquiterpenic alcohol
α -Eudesmol	0.10*	0.03	Sesquiterpenic alcohol
β -Eudesmol	[0.10]*	0.04	Sesquiterpenic alcohol
α -Cadinol	[0.10]	0.02	Sesquiterpenic alcohol
(8 <i>Z</i>)-Heptadecene	0.08	0.41	Alkene
(2 <i>E</i> ,6 <i>Z</i>)-Farnesol	0.06	0.07	Sesquiterpenic alcohol
Heptadecane	2.01	[2.00]*	Alkane
(2 <i>E</i> ,6 <i>Z</i>)-Farnesal	0.02		Sesquiterpenic aldehyde
(2 <i>E</i> ,6 <i>E</i>)-Farnesol	0.50	0.54	Sesquiterpenic alcohol
(2 <i>E</i> ,6 <i>E</i>)-Farnesal	0.03	0.05*	Sesquiterpenic aldehyde
Benzyl benzoate	0.03	0.02	Phenolic ester
(8 <i>Z</i>)-Octadecene	0.02	[23.88]*	Alkene
Octadecane	0.05		Alkane
Phenylethyl benzoate	0.02	0.02	Phenolic ester
Nonadecadiene isomer	0.02	tr	Alkene
(9 <i>Z</i>)-Nonadecene	0.89	[11.81]*	Alkene
Nonadecane	11.03	[11.81]*	Alkane
(9 <i>Z</i>)-Eicosene	0.06	0.01	Alkene
Ethyl palmitate	0.01	[0.05]*	Aliphatic ester
Eicosane	1.18	[1.20]*	Alkane

(10Z)-Heneicosene	0.04	1.09*	Alkene
Phenylethyl geranate	0.05		Monoterpenic ester
1-Heneicosene?	0.04		Alkene
Heneicosane	2.57	[1.09]*	Alkane
Citronellyl caprate	0.01	0.02	Monoterpenic ester
Geranyl caprate	0.02		Monoterpenic ester
Ethyl linoleate	0.02		Aliphatic ester
Docosane	0.03	0.01	Alkane
1-Tricosene?	0.05	0.05	Alkene
Tricosane	0.15	0.13	Alkane
Geranyl laurate	0.01		Monoterpenic ester
Tetracosane	0.01	0.01	Alkane
1-Pentacosene?	0.01		Alkene
Pentacosane	0.05	0.04	Alkane
Hexacosane	0.01	tr	Alkane
Heptacosane	0.04	0.03	Alkane
Total identified	99.03%	98.67%	

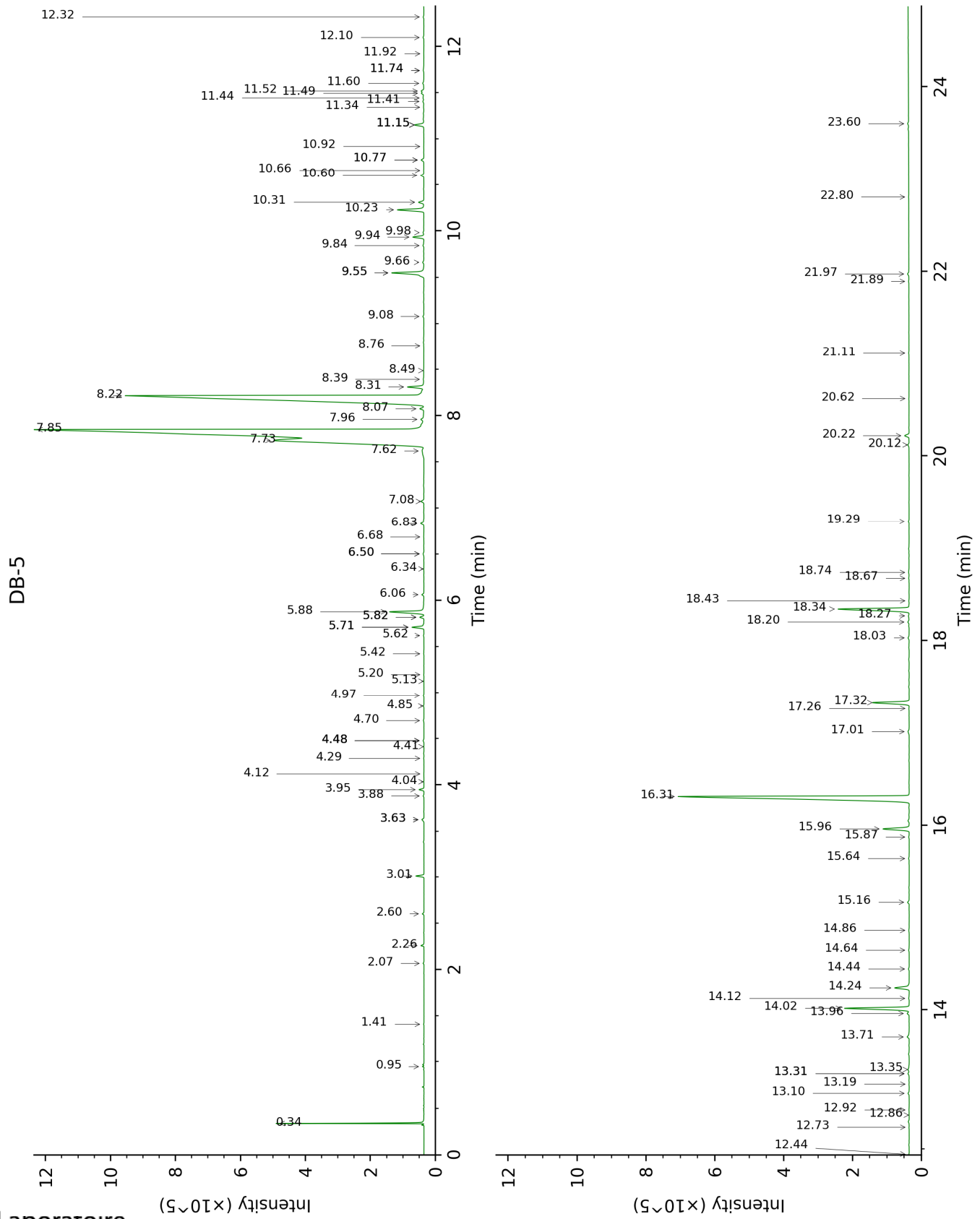
*: Two or more compounds are coeluting on this column

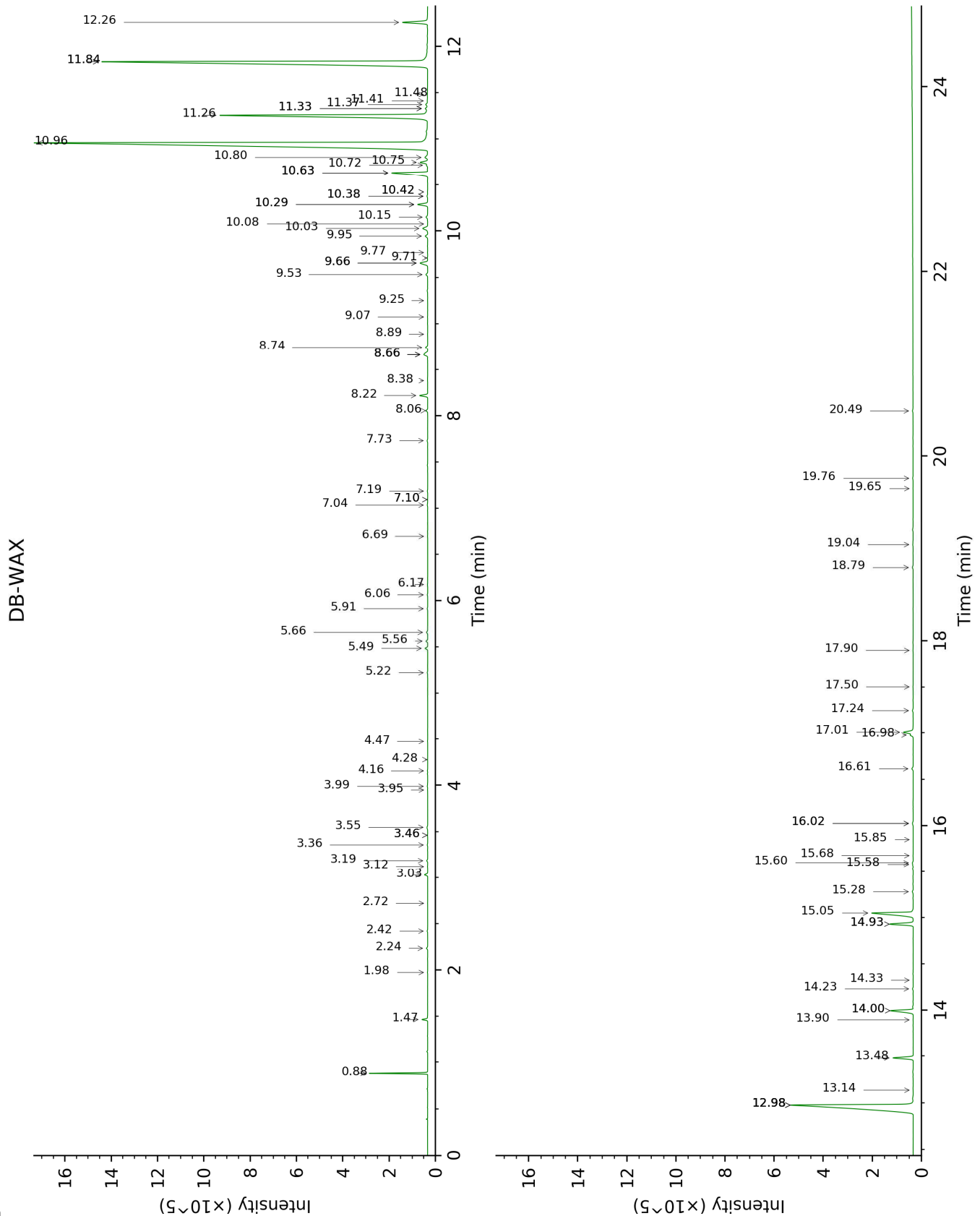
[xx]: Duplicate percentage due to coelutions, not taken account in the identified total

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

Note: no correction factor was applied

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FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
Ethanol	0.34	496	1.19	0.88	906	1.22
Isoamyl alcohol	0.95	728	0.02	3.55	1176	0.02
Hexanal	1.41	796	0.01	1.98	1045	0.01
(3Z)-Hexenol	2.07	854	0.02	5.91	1346	0.03
Hexanol	2.26	870	0.06	5.56	1321	0.07
Heptanal	2.60	899	0.04	3.19	1148	0.04
α-Pinene	3.01	927	0.19	1.47	996	0.19
β-Pinene	3.63*	968	0.07	2.24	1070	0.05
Sabinene	3.63*	968	[0.07]	2.42	1088	0.02
6-Methyl-5-hepten-2-one	3.88	985	0.02	5.22	1296	0.02
Myrcene	3.95	990	0.12	3.03	1136	0.12
6-Methyl-5-hepten-2-ol	4.04	995	tr	7.10*	1432	0.01
Δ3-Carene	4.12	1001	0.01	2.72	1112	tr
α-Terpinene	4.29	1012	0.01	3.12	1143	0.01
para-Cymene	4.41	1020	tr	4.28	1229	tr
1,8-Cineole	4.48*	1024	0.03	3.46*	1169	0.01
Limonene	4.48*	1024	[0.03]	3.36	1161	0.02
β-Phellandrene	4.48*	1024	[0.03]	3.46*	1169	[0.01]
(Z)-β-Ocimene	4.70	1037	0.02	3.95	1206	0.01
(E)-β-Ocimene	4.85	1047	0.01	4.16	1220	0.01
γ-Terpinene	4.97	1055	0.02	3.99	1209	0.02
cis-Sabinene hydrate	5.13	1064	tr	7.10*	1432	[0.01]
cis-Linalool oxide (fur.)	5.20	1069	0.01	6.69	1402	0.01
Terpinolene	5.42	1083	0.01	4.48	1243	0.01
Rosefuran	5.62	1096	0.01	6.17	1364	0.01
Nonanal	5.71*	1101	0.34	6.06	1356	0.02
Linalool	5.71*	1101	[0.34]	8.22	1516	0.33
cis-Rose oxide	5.82*	1108	0.11	5.49	1315	0.12
β-Thujone	5.82*	1108	[0.11]			
Phenylethyl alcohol	5.88	1112	1.18	12.26	1847	1.25
trans-Rose oxide	6.06	1124	0.06	5.66	1328	0.06
neo-Isopulegol	6.34	1142	0.01	8.38	1528	0.01
Nerol oxide	6.50*	1152	0.03	7.04	1427	0.03
Citronellal	6.50*	1152	[0.03]	7.19	1438	0.02
α-Phellandren-8-ol	6.68	1164	tr	10.38*	1686	0.04
Terpinen-4-ol	6.83	1173	0.10	8.74	1556	0.10
Hodiendiol	7.08	1189	0.09	12.98*	1911	11.81
Rhodinol	7.62	1224	0.18	10.80	1722	0.15
Nerol	7.73	1232	12.62	11.26	1760	12.15
Citronellol	7.85	1240	34.93	10.96	1735	35.16
(Z)-Isogeraniol	7.96	1247	0.15	11.37	1770	0.09

(E)-Isogeraniol?	8.08	1255	0.12	11.33*	1766	0.12
Geraniol	8.22	1264	23.67	11.84*	1810	23.88
Geranial	8.31	1271	0.52	10.29*	1679	0.49
Citronellyl formate	8.39	1276	0.02	9.08	1582	0.01
Neryl formate	8.49	1282	0.01	9.66*	1628	0.46
Geranyl formate	8.76	1301	tr	10.08	1662	tr
Methyl geranate	9.08	1323	0.03	9.95	1651	0.12
Eugenol	9.55*	1356	1.22	15.05	2107	2.61
Citronellyl acetate	9.55*	1356	[1.22]	9.66*	1628	[0.46]
Neryl acetate	9.66	1364	0.05	10.38*	1686	[0.04]
β-Bourbonene	9.84	1377	0.03	7.73	1479	0.03
Geranyl acetate	9.94	1384	0.34	10.75†	1717	[0.41]
β-Elemene	9.98	1387	0.03	8.66*	1550	0.28
Methyleugenol	10.23	1404	0.88	13.48	1958	0.89
β-Caryophyllene	10.31	1410	0.18	8.66*	1550	[0.28]
α-Guaiene	10.60	1432	0.10	8.66*	1550	[0.28]
6,9-Guaiadiene	10.66	1436	0.01	8.89	1567	0.01
α-Humulene	10.77*	1445	0.09	9.53	1618	0.09
Citronellyl propionate	10.77*	1445	[0.09]	10.42*	1690	0.01
(E)-β-Farnesene	10.92	1456	tr	9.71	1632	0.01
Geranyl propionate	11.15*	1473	0.31	11.48	1779	0.01
γ-Murolene	11.15*	1473	[0.31]	9.77	1637	0.01
Germacrene D	11.15*	1473	[0.31]	10.03	1658	0.30
Phenylethyl 2-methylbutyrate	11.34	1487	0.02	12.98*	1911	[11.81]
α-Murolene	11.41	1492	0.04	10.29*	1679	[0.49]
(3Z,6E)-α-Farnesene	11.44	1495	0.04	10.42*	1690	[0.01]
Pentadecane	11.49	1499	0.08	8.06	1503	0.08
δ-Guaiene	11.52	1500	0.09	10.15	1668	0.09
γ-Cadinene	11.60	1507	0.05	10.63*	1707	2.00
δ-Cadinene	11.74*	1518	0.04	10.63*	1707	[2.00]
trans-Calamenene	11.74*	1518	[0.04]	11.41	1773	0.01
Citronellyl butyrate	11.92	1532	0.01	11.33*	1766	[0.12]
α-Elemol	12.10	1546	0.03	14.23	2028	0.03
(E)-Nerolidol	12.32	1563	0.02	14.00*	2006	1.20
Caryophyllene oxide	12.44	1573	0.01	12.98*	1911	[11.81]
Hexadecane	12.73	1596	0.01	9.25	1595	0.01
10-epi-Cubenol	12.86	1606	tr			
10-epi-γ-Eudesmol	12.92	1611	0.01	14.33	2037	0.01
γ-Eudesmol	13.10	1625	0.04			

τ-Muurolol	13.19	1633	0.01	15.28	2130	0.06
α-Eudesmol	13.31*†	1643	0.10	15.58	2160	0.03
β-Eudesmol	13.31*†	1643	[0.10]	15.60	2162	0.04
α-Cadinol	13.35†	1646	[0.10]	15.68	2170	0.02
(8Z)- Heptadecene	13.71	1676	0.08	10.72†	1714	0.41
(2E,6Z)-Farnesol	13.96	1697	0.06	16.61	2267	0.07
Heptadecane	14.02	1701	2.01	10.63*	1707	[2.00]
(2E,6Z)-Farnesal	14.12	1710	0.02			
(2E,6E)-Farnesol	14.24	1720	0.50	17.01	2308	0.54
(2E,6E)-Farnesal	14.44	1738	0.03	16.02*	2205	0.05
Benzyl benzoate	14.64	1755	0.03	19.04	2534	0.02
(8Z)- Octadecene	14.86	1774	0.02	11.84*	1810	[23.88]
Octadecane	15.16	1800	0.05			
Phenylethyl benzoate	15.64	1844	0.02	19.76	2618	0.02
Nonadecadiene isomer	15.87	1865	0.02	13.14	1926	tr
(9Z)- Nonadecene	15.96	1873	0.89	12.98*	1911	[11.81]
Nonadecane	16.31	1904	11.03	12.98*	1911	[11.81]
(9Z)-Eicosene	17.01	1971	0.06	13.90	1996	0.01
Ethyl palmitate	17.26	1995	0.01	16.02*	2205	[0.05]
Eicosane	17.32	2001	1.18	14.00*	2006	[1.20]
(10Z)- Heneicosene	18.03	2071	0.04	14.93*	2096	1.09
Phenylethyl geranate	18.20	2088	0.05			
1-Heneicosene?	18.27	2094	0.04			
Heneicosane	18.34	2102	2.57	14.93*	2096	[1.09]
Citronellyl caprate	18.43	2111	0.01	17.50	2362	0.02
Geranyl caprate	18.67	2136	0.02			
Ethyl linoleate	18.74	2142	0.02			
Docosane	19.29	2200	0.03	15.85	2187	0.01
1-Tricosene?	20.12	2289	0.05	17.24	2333	0.05
Tricosane	20.22	2300	0.15	16.98	2305	0.13
Geranyl laurate	20.62	2344	0.01			
Tetracosane	21.11	2399	0.01	17.90	2404	0.01
1-Pentacosene?	21.89	2490	0.01			
Pentacosane	21.97	2499	0.05	18.79	2505	0.04
Hexacosane	22.80	2599	0.01	19.65	2605	tr
Heptacosane	23.60	2699	0.04	20.49	2706	0.03
Total identified		99.03%			98.67%	
Total reported		99.03%			98.67%	

*: 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