CERTIFICATE OF ANALYSIS – GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 19L04-PTH04-1-CC
Customer identification : Rose Otto - RK010094R
Type : Essential oil
Source : *Rosa x damascena*
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 : Sarah-Eve Tremblay, M. Sc. A., Chimiste
Analysis date : December 16, 2019

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: 1.4618 ± 0.0003 (20 °C)

NF T 75-345 - OIL OF ROSE - BULGARIA

Compound	Min. %	Max. %	Observed %	Complies?
Methyleugenol	0.8	3.0	0.4	No
Heneicosane	3.0	5.5	3.6	Yes
(9Z)-Nonadecene	2.3	3.7	0.8	No
Nonadecane	8.0	15.0	13.7	Yes
(8Z)-Heptadecene	0.10	0.35	0.09	No
Heptadecane	1.0	2.5	2.1	Yes
Phenylethyl alcohol		3.5	1.2	Yes
Geraniol	14.0	22.0	21.9	Yes
Nerol	5.0	12.0	12.0	Yes
Citronellol	20.0	34.0	32.8	Yes
Ethanol	tr	3.00	0.75	Yes
Refractive index	1.4520	1.4700	1.4618	Yes

CONCLUSION

No adulterant, contaminant or diluent has been detected using this method. The oil marginally does not comply with the AFNOR standard for Bulgarian rose oil.

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ANALYSIS SUMMARY – CONSOLIDATED CONTENTS

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

Identification	%	Classe
Ethanol	0.75	Aliphatic alcohol
Pentanal	0.02	Aliphatic aldehyde
Hexanol	0.06	Aliphatic alcohol
Heptanal	0.03	Aliphatic aldehyde
α-Pinene	0.24	Monoterpene
Benzaldehyde	0.01	Simple phenolic
β-Pinene	0.08	Monoterpene
Myrcene	0.16	Monoterpene
2-Carene	tr	Monoterpene
α-Phellandrene	0.01	Monoterpene
α-Terpinene	0.02	Monoterpene
para-Cymene	0.01	Monoterpene
Limonene	0.04	Monoterpene
Benzeneacetaldehyde	tr	Simple phenolic
(*Z*)-β-Ocimene	0.01	Monoterpene
(*E*)-β-Ocimene	0.02	Monoterpene
γ-Terpinene	0.03	Monoterpene
cis-Sabinene hydrate	0.01	Monoterpenic alcohol
cis-Linalool oxide (fur.)	tr	Monoterpenic alcohol
Terpinolene	0.02	Monoterpene
Linalool	0.33	Monoterpenic alcohol
Phenylethyl alcohol	1.19	Simple phenolic
cis-Rose oxide	0.05	Monoterpenic ether
trans-Rose oxide	0.05	Monoterpenic ether
Isopulegol	tr	Monoterpenic alcohol
Nerol oxide	0.03	Aliphatic ether
Borneol	0.01	Monoterpenic alcohol
Terpinen-4-ol	0.15	Monoterpenic alcohol
α-Terpineol	0.11	Monoterpenic alcohol
Nerol	11.96	Monoterpenic alcohol
Citronellol	32.79	Monoterpenic alcohol
Neral	0.36	Monoterpenic aldehyde
Geraniol	21.94	Monoterpenic alcohol
Geranial	0.43	Monoterpenic aldehyde
Citronellyl formate	0.05	Monoterpenic ester
Citronellyl acetate	0.14	Monoterpenic ester
Eugenol	1.21	Phenylpropanoid
Geranic acid	0.05	Aliphatic acid
β-Bourbonene	0.04	Sesquiterpene
Geranyl acetate	0.33	Monoterpenic ester
Methyleugenol	0.44	Phenylpropanoid
β-Caryophyllene	0.27	Sesquiterpene
β-Copaene	0.01	Sesquiterpene
α-Guaiene	0.19	Sesquiterpene
α-Humulene	0.15	Sesquiterpene
9-epi-β-Caryophyllene	0.01	Sesquiterpene
Germacrene D	0.36	Sesquiterpene

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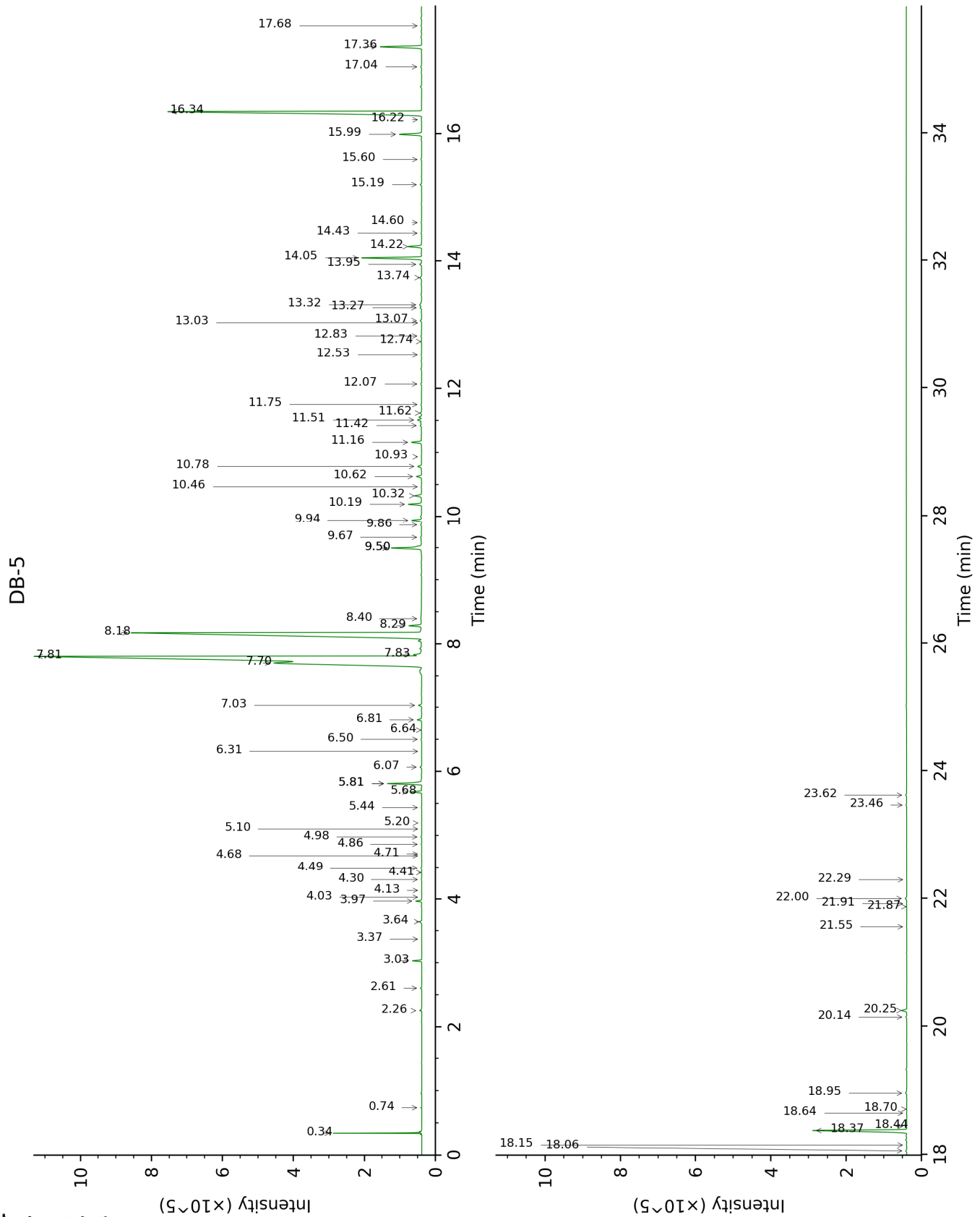|		
Aciphyllene	0.06	Sesquiterpene
δ-Guaiene	0.15	Sesquiterpene
γ-Cadinene	0.06	Sesquiterpene
δ-Cadinene	0.03	Sesquiterpene
α-Elemol	0.03	Sesquiterpenic alcohol
Phenylethyl tiglate	0.02	Phenolic ester
Hexadecane	0.02	Alkane
Methoxyeugenol	0.03	Phenylpropanoid
α-Acorenol	tr	Sesquiterpenic alcohol
γ-Eudesmol	0.05	Sesquiterpenic alcohol
β-Eudesmol	0.07	Sesquiterpenic alcohol
Phenylethyl hexanoate	0.12	Phenolic ester
(8Z)-Heptadecene	0.09	Alkene
(2E,6Z)-Farnesol	0.08	Sesquiterpenic alcohol
Heptadecane	2.14	Alkane
(2E,6E)-Farnesol	0.49	Sesquiterpenic alcohol
(2E,6E)-Farnesal	0.02	Sesquiterpenic aldehyde
Benzyl benzoate	0.03	Phenolic ester
Octadecane	0.05	Alkane
Phenylethyl benzoate	0.03	Phenolic ester
(9Z)-Nonadecene	0.85	Alkene
Phenylethyl phenylacetate	0.02	Phenolic ester
Nonadecane	13.66	Alkane
(9Z)-Eicosene	0.04	Alkene
Eicosane	1.58	Alkane
Phenylethyl decanoate	0.03	Phenolic ester
(10Z)-Heneicosene	0.05	Alkene
Isopropyl palmitate	0.02	Aliphatic ester
Heneicosane	3.61	Alkane
Citronellyl caprate	0.01	Monoterpenic ester
Geranyl caprate	0.01	Monoterpenic ester
Phenylethyl undecanoate?	tr	Phenolic ester
Stearic acid	0.07	Aliphatic acid
Tricosane	0.04	Alkane
Citronellyl laurate	0.19	Monoterpenic ester
Tetradecyl nonanoate	0.01	Aliphatic ester
Phenylethyl myristate	tr	Phenolic ester
Pentacosane	0.01	Alkane
Citronellyl myristate	0.06	Monoterpenic ester
Geranyl myristate	tr	Monoterpenic ester
Citronellyl palmitoleate?	0.03	Monoterpenic ester
Citronellyl palmitate	0.05	Monoterpenic ester
Consolidated total	**98.06%**	

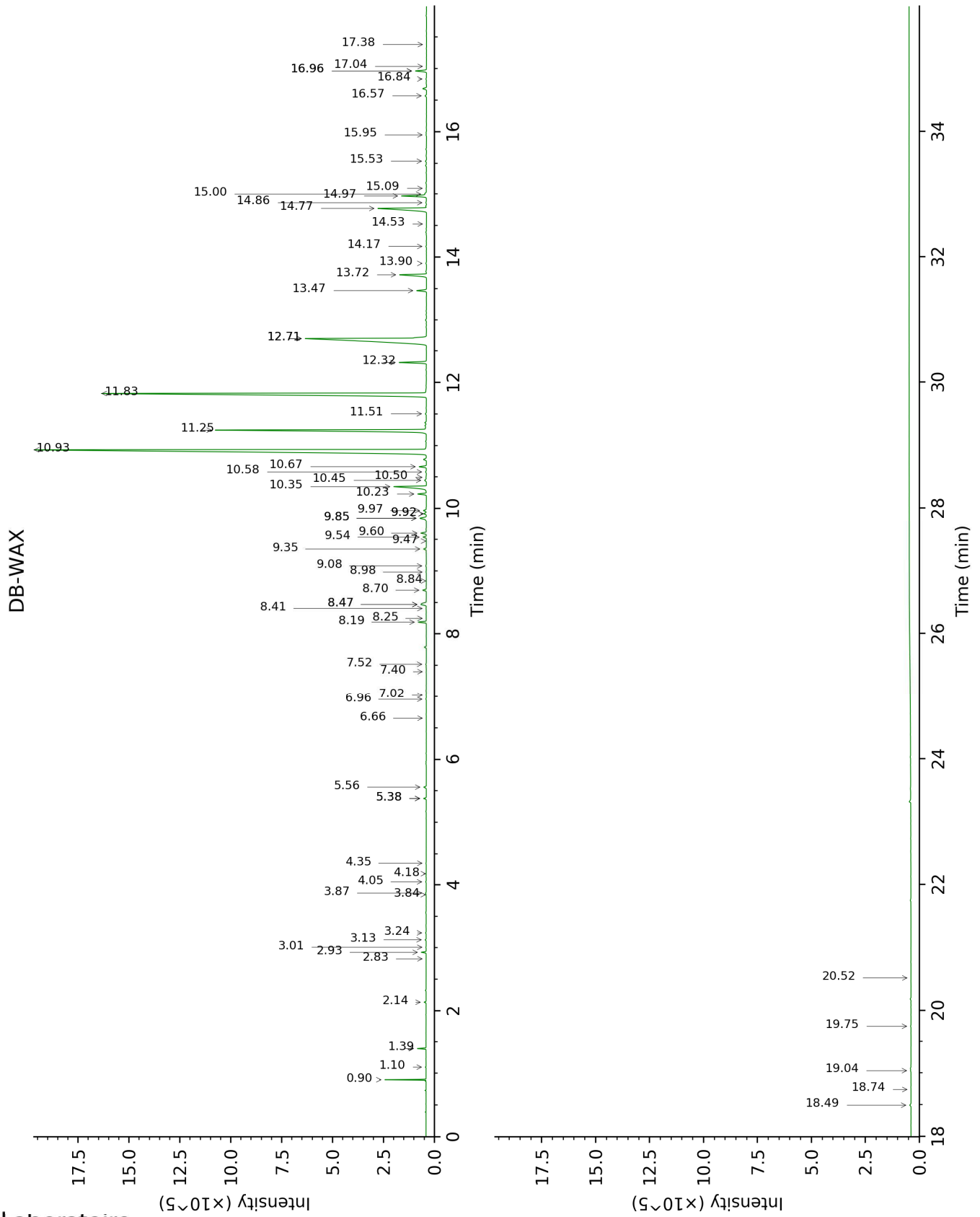tr: The compound has been detected below 0.005% of total signal.

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.

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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

Time (min)

Intensity (×10^5)

Time (min)

Intensity (×10^5)

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DB-WAX

Top chromatogram peaks:
17.38, 16.96, 17.04, 16.84, 16.57, 15.95, 15.53, 15.00, 14.86, 14.97, 15.09, 14.77, 14.53, 14.17, 13.90, 13.72, 13.47, 12.71, 12.32, 11.83, 11.51, 11.25, 10.93, 10.58, 10.67, 10.35, 10.45, 10.50, 10.23, 9.85, 9.97, 9.92, 9.54, 9.60, 9.47, 9.35, 9.08, 8.98, 8.84, 8.70, 8.47, 8.41, 8.19, 8.25, 7.52, 7.40, 6.96, 7.02, 6.66, 5.56, 5.38, 4.35, 4.18, 4.05, 3.87, 3.84, 3.01, 3.13, 3.24, 2.93, 2.83, 2.14, 1.39, 1.10, 0.90

Time (min)

Intensity (×10^5)

Bottom chromatogram peaks:
20.52, 19.75, 19.04, 18.74, 18.49

Time (min)

Intensity (×10^5)

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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	522	0.75	0.90	910	0.80
Pentanal	0.74	698	0.02	1.10	942	0.02
Hexanol	2.26	871	0.06	5.38*	1314	0.11
Heptanal	2.61	900	0.03	3.13	1149	0.04
α-Pinene	3.03	929	0.24	1.39	990	0.25
Benzaldehyde	3.37	951	0.01	7.40	1461	0.01
β-Pinene	3.64	969	0.08	2.14	1066	0.06
Myrcene	3.97	991	0.16	2.93	1133	0.17
2-Carene	4.03	995	tr			
α-Phellandrene	4.13	1002	0.01	2.83	1125	tr
α-Terpinene	4.30	1013	0.02	3.01	1140	0.01
para-Cymene	4.41	1020	0.01	4.18	1228	0.01
Limonene	4.49	1024	0.04	3.24	1158	0.02
Benzeneacetaldehyde	4.68	1037	tr	8.84	1571	tr
(*Z*)-β-Ocimene	4.71	1038	0.01	3.84	1204	0.01
(*E*)-β-Ocimene	4.86	1048	0.02	4.05	1219	0.02
γ-Terpinene	4.98	1056	0.03	3.87	1206	0.03
cis-Sabinene hydrate	5.10	1064	0.01	7.02	1433	0.01
cis-Linalool oxide (fur.)	5.20	1070	tr	6.66	1406	0.01
Terpinolene	5.44	1085	0.02	4.35	1241	0.01
Linalool	5.68	1101	0.33	8.19	1520	0.34
Phenylethyl alcohol	5.81*	1109	1.25	12.32	1860	1.19
cis-Rose oxide	5.81*	1109	[1.25]	5.38*	1314	[0.11]
trans-Rose oxide	6.07	1126	0.05	5.56	1327	0.12
Isopulegol	6.31	1142	tr	8.25	1525	tr
Nerol oxide	6.50	1155	0.03	6.96	1428	0.02
Borneol	6.64	1164	0.01	9.92*	1656	0.13
Terpinen-4-ol	6.81	1175	0.15	8.70	1559	0.16
α-Terpineol	7.03	1190	0.11	9.92*	1656	[0.13]
Nerol	7.70	1233	11.96	11.25	1766	11.42
Citronellol	7.81	1240	32.79	10.93	1740	33.70
Neral	7.83	1242	0.36	9.60	1631	0.26
Geraniol	8.18	1264	21.94	11.83	1816	22.14
Geranial	8.29	1272	0.43	10.23	1682	0.39
Citronellyl formate	8.40	1279	0.05	8.98	1582	0.01
Citronellyl acetate	9.50*	1355	1.24	9.54	1626	0.14
Eugenol	9.50*	1355	[1.24]	14.97	2106	1.21
Geranic acid	9.67	1366	0.05	16.96*	2309	0.53
β-Bourbonene	9.86	1380	0.04	7.52	1470	0.03
Geranyl acetate	9.94	1386	0.33	10.67	1718	0.33
Methyleugenol	10.19	1403	0.44	13.47	1964	0.45
β-Caryophyllene	10.32	1413	0.27	8.47*	1542	0.43
β-Copaene	10.46	1424	0.01	8.41	1537	0.01
α-Guaiene	10.62	1435	0.19	8.47*	1542	[0.43]
α-Humulene	10.78	1447	0.15	9.35	1611	0.13
9-epi-β-Caryophyllene	10.93	1458	0.01	9.48	1621	tr

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Germacrene D	11.16	1475	0.36	9.85*	1651	0.42
Aciphyllene	11.42	1494	0.06	9.85*	1651	[0.42]
δ-Guaiene	11.51	1501	0.15	9.97	1661	0.15
γ-Cadinene	11.62	1509	0.06	10.45	1700	0.11
δ-Cadinene	11.75	1520	0.03	10.50	1704	0.02
α-Elemol	12.07	1545	0.03	14.17	2030	0.03
Phenylethyl tiglate	12.53	1580	0.02	15.09	2118	0.02
Hexadecane	12.74	1597	0.02	9.08	1589	0.04
Methoxyeugenol	12.83	1604	0.03	18.49	2475	0.07
α-Acorenol	13.03	1621	tr	14.53	2063	0.01
γ-Eudesmol	13.07	1624	0.05	15.00	2110	0.11
β-Eudesmol	13.27	1641	0.07	15.53	2162	0.05
Phenylethyl hexanoate	13.32	1644	0.12			
(8Z)-Heptadecene	13.74	1679	0.09	10.58	1711	0.05
(2E,6Z)-Farnesol	13.95	1696	0.08	16.57	2268	0.07
Heptadecane	14.05	1705	2.14	10.35	1691	2.11
(2E,6E)-Farnesol	14.22	1720	0.49	16.96*	2309	[0.53]
(2E,6E)-Farnesal	14.43	1738	0.02	15.95	2204	0.03
Benzyl benzoate	14.60	1753	0.03	19.04	2537	0.03
Octadecane	15.19	1804	0.05	11.50	1788	0.05
Phenylethyl benzoate	15.60	1841	0.03	19.75	2619	0.02
(9Z)-Nonadecene	15.99	1877	0.85	12.71*	1894	14.09
Phenylethyl phenylacetate	16.22	1898	0.02	20.52	2711	tr
Nonadecane	16.34	1910	13.66	12.71*	1894	[14.09]
(9Z)-Eicosene	17.04	1977	0.04	13.90	2004	0.03
Eicosane	17.36	2007	1.58	13.72	1987	1.54
Phenylethyl decanoate	17.68	2040	0.03			
(10Z)-Heneicosene	18.06	2077	0.05	14.86	2096	0.05
Isopropyl palmitate	18.15	2086	0.02	17.04	2317	0.01
Heneicosane	18.37	2109	3.61	14.77	2087	3.50
Citronellyl caprate	18.44	2116	0.01	17.38	2354	0.01
Geranyl caprate	18.64	2137	0.01			
Phenylethyl undecanoate?	18.70	2143	tr			
Stearic acid	18.95	2170	0.07			
Tricosane	20.14	2298	0.04	16.84	2296	0.04
Citronellyl laurate	20.25	2310	0.19			
Tetradecyl nonanoate	21.55	2461	0.01			
Phenylethyl myristate	21.87	2498	tr			
Pentacosane	21.91	2504	0.01	18.74	2503	0.01
Citronellyl myristate	22.00	2513	0.06			
Geranyl myristate	22.29	2550	tr			
Citronellyl palmitoleate?	23.46	2698	0.03			
Citronellyl palmitate	23.62	2717	0.05			
Total identified		**97.96%**			**97.38%**	
Total reported		**97.96%**			**97.38%**	

*: Two or more compounds are coeluting on this column

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

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