

Date : 2023-09-05

CERTIFICATE OF ANALYSIS - GC PROFILING

SAMPLE IDENTIFICATION

**Internal code :** 23H18-SDC02

**Customer Identification :** TST 814

**Type :** Essential Oil

**Source :** *Oplopanax horridus*

**Customer :** Southeast Devilsclub

Checked and approved by:

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Alexis St-Gelais, Ph. D., 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*Notes: This report may not be published, including online, without the written consent from Laboratoire PhytoChemia.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.*

This report is an update from the first version issued on 2023-09-01 to correct a faulty identification.

## *GAS CHROMATOGRAPHIC ANALYSIS*

**Method :** PC-MAT-014 - Analysis of the composition of an essential oil or other volatile liquide by FAST GC-FID

**\*ISO**

**Results :** See analysis summary (next page)

**Analyst :** Sylvain Mercier, M. Sc., Chimiste 2014-005

**Date :** 2023-09-05

## *PHYSICOCHEMICAL DATA*

**Refractive index :**  $1.489 \pm 0.0003$  (20 °C)

**Method :** PC-MAT-016 - Measure of the refractive index of a liquid.

**Analyst :** Dany Massé B. Sc. Chimiste

**Date :** 2023-08-18

## *CONCLUSION*

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

## ANALYSIS SUMMARY - CONSOLIDATED CONTENTS

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

Identification	%	Class
Hexanal	0.01	Aliphatic aldehyde
Hexanol	0.01	Aliphatic alcohol
Heptanal	0.02	Aliphatic aldehyde
(E)-1,3-Nonadiene	0.01	Alkene
$\alpha$ -Pinene	0.25	Monoterpene
Allylbenzene	0.01	Phenylpropanoid
$\beta$ -Pinene	0.01	Monoterpene
Sabinene	0.01	Monoterpene
6-Methyl-5-hepten-2-one	0.01	Aliphatic ketone
2-Pentylfuran	0.01	Furan
Myrcene	0.03	Monoterpene
6-Methyl-5-hepten-2-ol	0.01	Aliphatic alcohol
Octanal	0.13	Aliphatic aldehyde
$\alpha$ -Phellandrene	0.01	Monoterpene
$\Delta^3$ -Carene	0.01	Monoterpene
<i>para</i> -Cymene	0.01	Monoterpene
Limonene	0.05	Monoterpene
$\beta$ -Phellandrene	0.12	Monoterpene
2-Heptanyl acetate	0.02	Aliphatic ester
Octanol	0.04	Aliphatic alcohol
2-Nonanone	0.01	Aliphatic ketone
Linalool	0.04	Monoterpenic alcohol
Nonanal	0.04	Aliphatic aldehyde
(E)-4,8-Dimethyl-1,3,7-nonatriene	0.14	Monoterpene
(2E)-Nonenal	0.02	Aliphatic aldehyde
(3E,5Z)-Undeca-1,3,5-triene	0.42	Alkene
(3E,5E)-Undeca-1,3,5-triene	0.01	Alkene
3-Isobutyl-2-methoxypyrazine	0.03	Pyrazine
$\alpha$ -Terpineol	0.01	Monoterpenic alcohol
(2E)-Octenyl acetate?	0.01	Aliphatic ester
Octyl acetate	0.02	Aliphatic ester
Unknown	0.13	Unknown
(2Z)-Decenal	0.02	Aliphatic aldehyde
Decenol isomer	0.01	Aliphatic alcohol
(4Z)-Decenol	0.08	Aliphatic alcohol
(2E)-Decenal	0.06	Aliphatic aldehyde
(2E)-Decenol	0.02	Aliphatic alcohol
Decanol	0.02	Aliphatic alcohol
(2Z?,4E?)-Decadienal	0.05	Aliphatic aldehyde
4-Vinylguaiaicol	0.01	Simple phenolic

(2E,4E)-Decadienal	0.08	Aliphatic aldehyde
Bicycloelemene analog	0.01	Sesquiterpene
Bicycloelemene	0.11	Sesquiterpene
$\alpha$ -Cubebene	0.03	Sesquiterpene
Cyclosativene II	0.04	Sesquiterpene
$\alpha$ -Ylangene	0.24	Sesquiterpene
$\alpha$ -Copaene	0.22	Sesquiterpene
<i>cis</i> - $\beta$ -Elemene	0.01	Sesquiterpene
$\beta$ -Cubebene	0.01	Sesquiterpene
Geranyl acetate	0.03	Monoterpenic ester
$\beta$ -Elemene	0.16	Sesquiterpene
Dodecanyl acetate isomer?	0.01	Aliphatic ester
$\alpha$ -Gurjunene	0.05	Sesquiterpene
$\beta$ -Caryophyllene	0.11	Sesquiterpene
$\alpha$ -Santalene	0.02	Sesquiterpene
$\beta$ -Copaene	0.02	Sesquiterpene
$\beta$ -Gurjunene	0.04	Sesquiterpene
$\gamma$ -Elemene	0.11	Sesquiterpene
Aromadendrene	0.21	Sesquiterpene
Cadina-3,5-diene isomer I?	0.05	Sesquiterpene
Unknown	0.04	Sesquiterpene
Cadina-3,5-diene?	0.15	Sesquiterpene
$\alpha$ -Humulene	0.20	Sesquiterpene
allo-Aromadendrene	0.23	Sesquiterpene
<i>cis</i> -Muurolo-4(15),5-diene	0.09	Sesquiterpene
( <i>E</i> )- $\beta$ -Farnesene	0.19	Sesquiterpene
<i>trans</i> -Cadina-1(6),4-diene	0.07	Sesquiterpene
$\gamma$ -Muurolole	0.24	Sesquiterpene
Germacrene D	0.56	Sesquiterpene
$\beta$ -Selinene	0.09	Sesquiterpene
ar-Curcumene	0.34	Sesquiterpene
Unknown	0.13	Sesquiterpene
Viridiflorene	tr	Sesquiterpene
Bicyclosesquiphellandrene?	0.06	Sesquiterpene
Bicyclogermacrene	5.54	Sesquiterpene
$\alpha$ -Muurolole	0.27	Sesquiterpene
$\alpha$ -Zingiberene	0.16	Sesquiterpene
Germacrene A	0.32	Sesquiterpene
$\gamma$ -Cadinene	3.99	Sesquiterpene
Cubebol	0.17	Sesquiterpenic alcohol
(3E,6E)- $\alpha$ -Farnesene	0.47	Sesquiterpene
1,4,5-triepi-Kessane?	0.06	Sesquiterpenic ether
$\beta$ -Sesquiphellandrene	0.35	Sesquiterpene
<i>trans</i> -Calamenene	0.01	Sesquiterpene
10-epi-Cubebol?	0.07	Sesquiterpenic alcohol

$\alpha$ -Cadinene	0.21	Sesquiterpene
$\alpha$ -Calacorene	0.08	Sesquiterpene
Germacrene B	1.06	Sesquiterpene
Epiglobulol	0.02	Sesquiterpenic alcohol
Unknown	0.15	Oxygenated sesquiterpene
Palustrol	0.02	Sesquiterpenic alcohol
Spathulenol	2.08	Sesquiterpenic alcohol
Caryophyllene oxide isomer	0.03	Sesquiterpenic ether
Caryophyllene oxide	0.03	Sesquiterpenic ether
Globulol	0.13	Sesquiterpenic alcohol
(E)-Nerolidol	56.05	Sesquiterpenic alcohol
Gleenol	0.24	Sesquiterpenic alcohol
Viridiflorol	0.14	Sesquiterpenic alcohol
Unknown	0.31	Oxygenated sesquiterpene
Guaiol	0.22	Sesquiterpenic alcohol
Eudesm-5-en-11-ol analog	0.28	Sesquiterpenic alcohol
Eudesm-5-en-11-ol	0.13	Sesquiterpenic alcohol
Unknown	0.08	Oxygenated sesquiterpene
10-epi-Cubenol	1.60	Sesquiterpenic alcohol
Rosifoliol	0.06	Sesquiterpenic alcohol
Alismol?	0.02	Oxygenated sesquiterpene
1-epi-Cubenol	0.12	Sesquiterpenic alcohol
Cubenol	0.55	Sesquiterpenic alcohol
$\tau$ -Cadinol	11.64	Sesquiterpenic alcohol
$\tau$ -Muurolol	0.30	Sesquiterpenic alcohol
$\alpha$ -Muurolol	0.10	Sesquiterpenic alcohol
Unknown	0.07	Oxygenated sesquiterpene
Unknown	0.02	Oxygenated sesquiterpene
$\alpha$ -Cadinol	0.53	Sesquiterpenic alcohol
Unknown	0.13	Oxygenated sesquiterpene
Bulnesol	0.38	Sesquiterpenic alcohol
Shyobunol	0.11	Sesquiterpenic alcohol
Unknown	0.02	Oxygenated sesquiterpene
Nootkatol	0.01	Sesquiterpenic alcohol
Aromadendrane-4,10-diol	0.06	Sesquiterpenic alcohol
Unknown	0.04	Oxygenated sesquiterpene
Unknown	0.01	Oxygenated sesquiterpene
Unknown	0.01	Oxygenated sesquiterpene
<i>para</i> -Camphorene	0.03	Diterpene
(Z)-Falcarinol	0.11	Polyene
Octadecanol	0.02	Aliphatic alcohol
Unknown	0.10	Oxygenated sesquiterpene
<b>Consolidated total</b>	<b>94.55</b>	

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

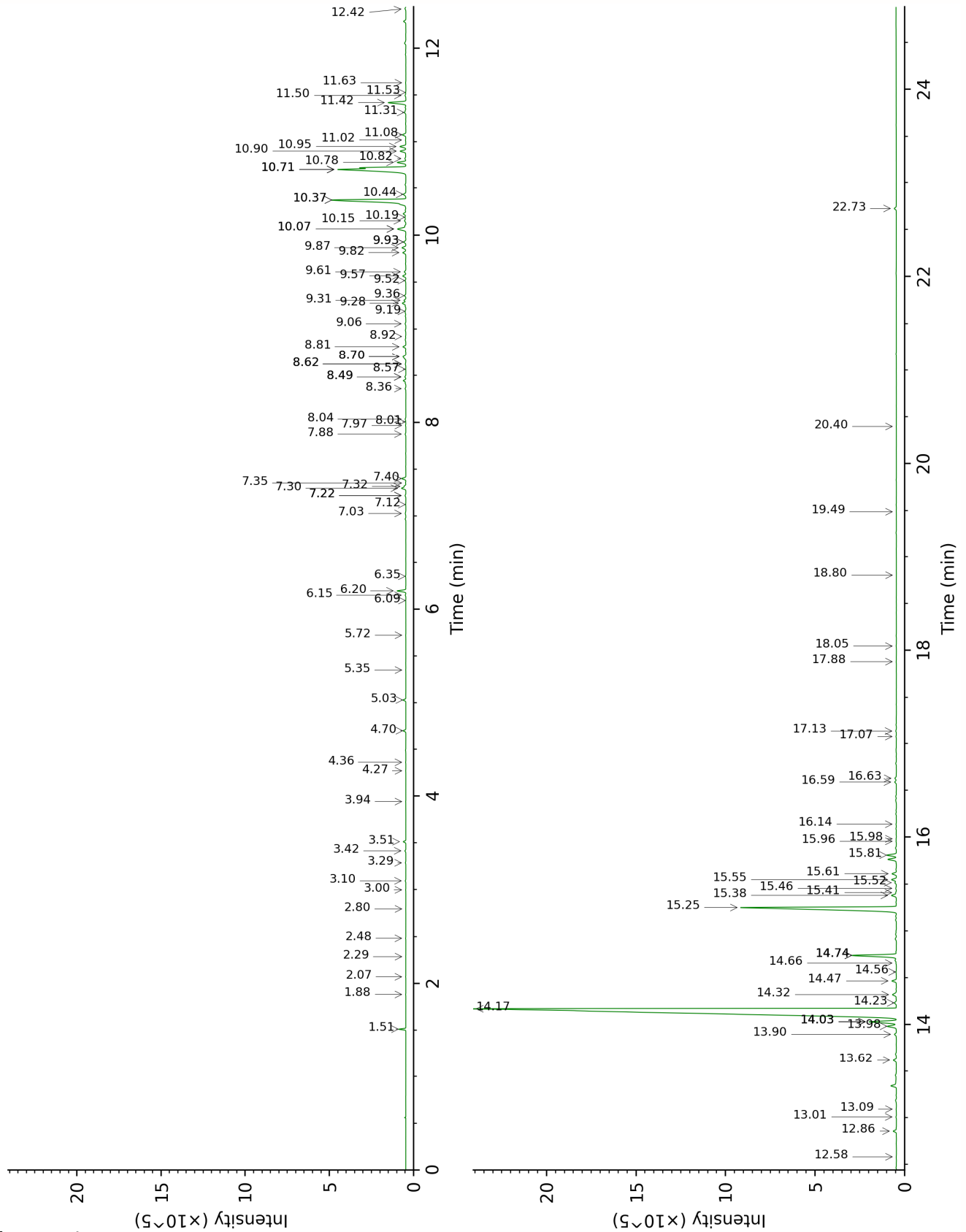
**Unknowns:** Unknown compounds' mass spectral data is presented in the "Full analysis data" table. The occurrence of unknown compounds is to be expected in many samples, and does not denote particular problems unless noted otherwise in the conclusion.

**Bracketed value ([xx]):** A bracketed percent value indicate that two or more compound percentage could not be solved due to coelution.

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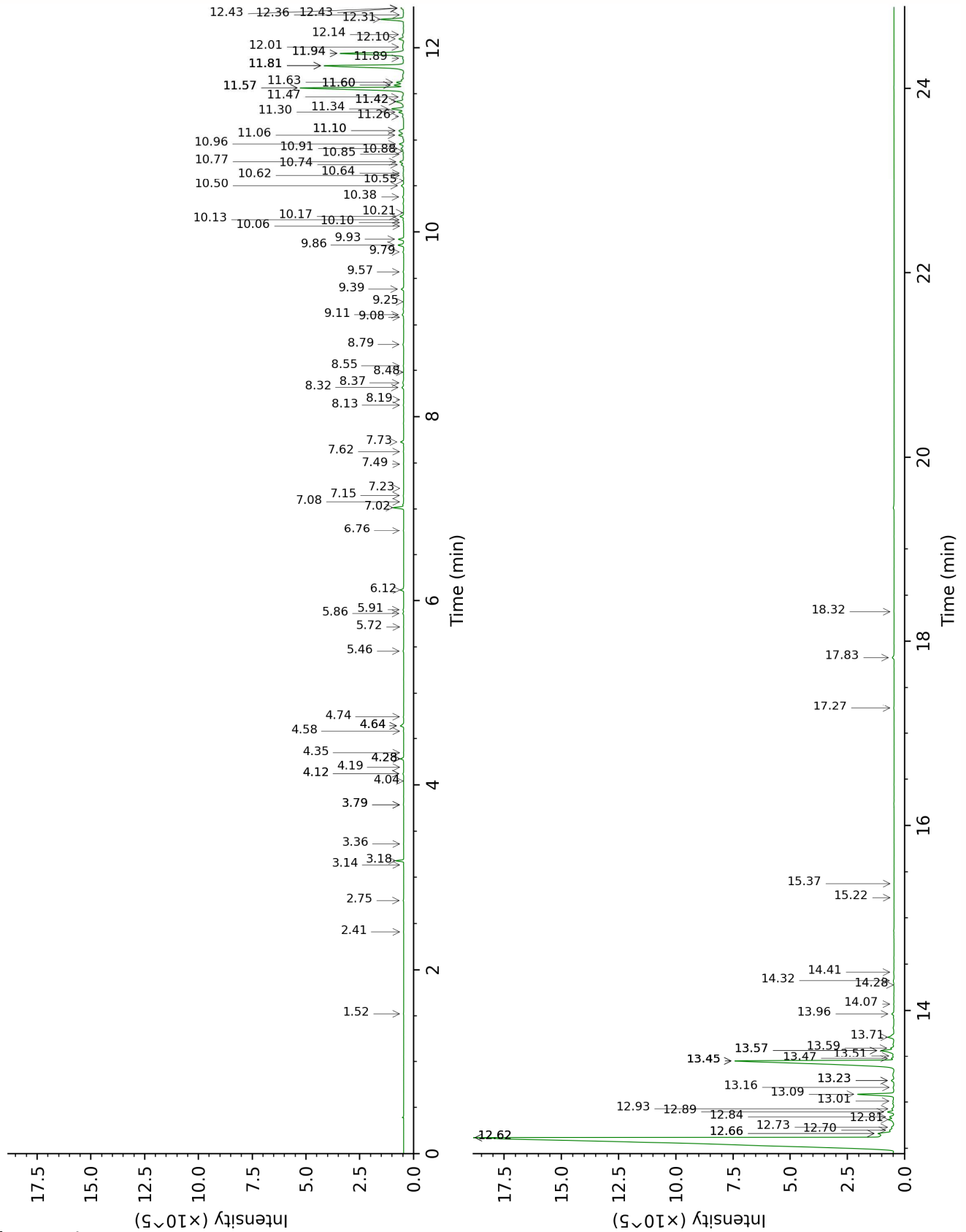
DB-WAX





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DB-5



FULL ANALYSIS DATA

Hexanal	Column DB-WAX			Column DB-5		
	2.07	1045.0	0.01	1.52	800.6	0.01
Hexanol	5.72	1324.3	0.01	2.41	875.0	0.01
Heptanal	3.29	1147.5	0.02	2.75	902.7	0.02
(E)-1,3-Nonadiene	1.88	1027.2	0.01	3.14	928.5	0.01
α-Pinene	1.51	991.2	0.25	3.18	931.5	0.25
Allylbenzene	4.27	1221.6	0.01	3.36	943.4	0.01
β-Pinene	2.29	1065.3	0.01	3.79*	971.2	[0.02]
Sabinene	2.48	1083.9	0.01	3.79*	971.2	[0.02]
6-Methyl-5-hepten-2-one	5.35	1297.8	0.01	4.04	988.1	0.01
2-Pentylfuran	3.94	1197.8	0.01	4.12*	993.2	[0.04]
Myrcene	3.10	1132.8	0.03	4.12*	993.2	[0.04]
6-Methyl-5-hepten-2-ol	7.22*	1432.5	[0.05]	4.19	997.8	0.01
Octanal	4.70	1252.8	0.13	4.28*	1003.8	[0.14]
α-Phellandrene	3.00	1125.4	0.01	4.28*	1003.8	[0.14]
Δ3-Carene	2.80	1109.8	0.01	4.35	1007.9	0.01
para-Cymene	4.36	1228.3	0.01	4.58	1022.5	0.01
Limonene	3.42	1157.4	0.05	4.64*	1026.1	[0.16]
β-Phellandrene	3.51	1164.9	0.12	4.64*	1026.1	[0.16]
2-Heptyl acetate				4.74	1032.3	0.02
Octanol	8.49*	1527.2	[0.05]	5.46	1077.0	0.04
2-Nonanone	6.09	1350.7	0.01	5.72	1093.3	0.01
Linalool	8.36	1517.6	0.04	5.86	1102.4	0.04
Nonanal	6.15	1354.8	0.03	5.90	1104.9	0.04
(E)-4,8-Dimethyl-1,3,7-nonatriene	5.03	1277.5	0.13	6.12	1118.6	0.14
(2E)-Nonenal	7.97	1487.6	0.02	6.76	1159.6	0.02
(3E,5Z)-Undeca-1,3,5-triene	6.20	1358.1	0.43	7.02	1175.7	0.42
(3E,5E)-Undeca-1,3,5-triene	6.35	1369.2	0.02	7.08	1179.7	0.01
3-Isobutyl-2-methoxypyrazine	8.04	1492.6	0.04	7.15	1184.1	0.03
α-Terpineol	10.07*	1651.2	[0.59]	7.23	1189.0	0.01
(2E)-Octenyl acetate?				7.49	1205.7	0.01
Octyl acetate	7.35	1442.3	0.02	7.62	1214.7	0.02
Unknown SORU I [m/z 79, 71 (69), 59 (66), 43 (59), 81 (53), 41 (52), 93 (50)...]				7.73	1221.7	0.13
(2Z)-Decenal	8.92	1560.8	0.03	8.13	1248.3	0.02
Decenol isomer				8.18	1252.2	0.01
(4Z)-Decenal	11.32	1754.2	0.12	8.32	1261.0	0.08
(2E)-Decenal	9.36	1594.3	0.08	8.37	1264.4	0.06
(2E)-Decenol	11.63	1780.8	0.02	8.48	1272.0	0.02
Decanol	11.02	1729.6	0.02	8.55	1276.7	0.02
(2Z?,4E?)-Decadienal				8.79	1292.6	0.05

4-Vinylguaiaicol	15.41	2127.6	0.04	9.08	1312.6	0.01
(2E,4E)-Decadienal	11.50	1769.5	0.05	9.11	1314.5	0.08
Bicycloelemene analog	7.12	1425.4	0.02	9.25	1324.3	0.01
Bicycloelemene	7.32	1439.7	0.07	9.39	1333.9	0.11
$\alpha$ -Cubebene	7.03	1418.4	0.05	9.57	1347.0	0.03
Cyclosativene II	7.22*	1432.5	[0.05]	9.79	1362.1	0.04
$\alpha$ -Ylangene	7.30	1438.2	0.26	9.86	1367.3	0.24
$\alpha$ -Copaene	7.40	1445.9	0.22	9.92	1371.8	0.22
<i>cis</i> - $\beta$ -Elemene	8.57	1533.5	0.01	10.06	1381.6	0.01
$\beta$ -Cubebene	8.01	1490.4	0.01	10.10	1384.4	0.01
Geranyl acetate	10.82	1713.0	0.06	10.13	1386.5	0.03
$\beta$ -Elemene	8.70*	1543.9	[0.24]	10.17	1389.0	0.16
Dodeceny acetate isomer?				10.21	1391.8	0.01
$\alpha$ -Gurjunene	7.88	1480.8	0.04	10.38	1403.8	0.05
$\beta$ -Caryophyllene	8.70*	1543.9	[0.24]	10.50	1412.8	0.11
$\alpha$ -Santalene	8.49*	1527.2	[0.05]	10.55	1416.7	0.02
$\beta$ -Copaene	8.62*	1537.9	[0.04]	10.62	1421.5	0.02
$\beta$ -Gurjunene	8.62*	1537.9	[0.04]	10.64	1423.4	0.04
$\gamma$ -Elemene	9.31	1590.3	0.10	10.74	1430.2	0.11
Aromadendrene	8.82	1552.5	0.16	10.77	1432.6	0.21
Cadina-3,5-diene isomer I?				10.85	1438.6	0.05
Unknown BOCA IV [m/z 91, 161 (92), 105 (85), 119 (63), 133 (53), 79 (49), 204 (46)]	9.06	1571.3	0.05	10.88	1441.1	0.04
Cadina-3,5-diene?	9.19	1581.4	0.07	10.91	1443.1	0.15
$\alpha$ -Humulene	9.57	1611.1	0.18	10.96	1446.8	0.20
allo-Aromadendrene	9.28	1588.0	0.22	11.06	1454.0	0.23
<i>cis</i> -Muurolo-4(15),5-diene	9.61	1614.7	0.09	11.10*	1457.6	[0.32]
( <i>E</i> )- $\beta$ -Farnesene	9.82	1631.1	0.19	11.10*	1457.6	[0.32]
<i>trans</i> -Cadina-1(6),4-diene	9.52	1607.2	0.05	11.26	1468.9	0.07
$\gamma$ -Muurolole	9.87	1635.2	0.24	11.30	1472.4	0.24
Germacrene D	10.07*	1651.2	[0.59]	11.34	1475.1	0.56
$\beta$ -Selinene	10.15	1658.3	0.09	11.42*	1480.9	[0.45]
ar-Curcumene	10.95	1723.8	0.34	11.42*	1480.9	[0.45]
Unknown POCA VI [m/z 79, 107 (99), 91 (88), 93 (86), 81 (78), 105 (73), 41 (73)... 204? (12)]	9.93*	1640.1	[0.14]	11.47	1484.6	0.13
Viridiflorene	9.93*	1640.1	[0.14]	11.57*	1491.9	[5.55]
Bicyclosesquiphellandrene?	10.19	1661.3	0.06	11.57*	1491.9	[5.55]
Bicyclogermacrene	10.37*	1675.9	[5.80]	11.57*	1491.9	[5.55]
$\alpha$ -Muurolole	10.37*	1675.9	[5.80]	11.60*	1494.2	[0.42]
$\alpha$ -Zingiberene	10.44	1680.8	0.16	11.60*	1494.2	[0.42]
Germacrene A	10.71*†	1703.2	[4.99]	11.63	1496.4	0.32
$\gamma$ -Cadinene	10.71*†	1703.2	[4.99]	11.81*	1510.1	[4.63]

Cubebol	12.86	1887.6	0.17	11.81*	1510.1	[4.63]
(3E,6E)- $\alpha$ -Farnesene	10.78	1709.6	0.47	11.81*	1510.1	[4.63]
1,4,5-triepi-Kessane?	10.71*†	1703.2	[4.99]	11.89	1516.4	0.06
$\beta$ -Sesquiphellandrene	10.90	1719.6	0.35	11.94*	1520.6	[3.29]
<i>trans</i> -Calamenene	11.53	1772.1	0.01	11.94*	1520.6	[3.29]
10-epi-Cubebol?	14.03*	1995.3	[1.54]	12.01	1525.9	0.07
$\alpha$ -Cadinene	11.08	1734.3	0.20	12.10	1532.8	0.21
$\alpha$ -Calacorene	12.42	1849.6	0.05	12.14	1536.5	0.08
Germacrene B	11.42	1763.0	1.02	12.31	1549.4	1.06
Epiglobulol	13.62	1957.1	0.18	12.36	1553.1	0.02
Unknown ENKR VI [m/z 109, 69 (60), 43 (46), 93 (29), 41 (26), 55 (23), 111 (20)...]				12.43*	1559.1	[0.17]
Palustrol	12.58	1863.6	0.02	12.43*	1559.1	[0.17]
Spathulenol	14.74*	2062.5	[2.52]	12.62*†	1573.4	[58.29]
Caryophyllene oxide isomer	13.01	1901.5	0.03	12.62*†	1573.4	[58.29]
Caryophyllene oxide	13.09	1909.1	0.03	12.62*†	1573.4	[58.29]
Globulol	14.23	2014.4	0.13	12.66*†	1576.9	[0.99]
( <i>E</i> )-Nerolidol	14.17	2008.4	56.05	12.66*†	1576.9	[0.99]
Gleenol	13.90	1982.7	0.13	12.70	1579.7	0.24
Viridiflorol	14.32	2022.7	0.28	12.73	1582.2	0.14
Unknown LEOF XV [m/z 120, 59 (55), 121 (24), 93 (24), 81 (23), 107 (20)...]	14.74*	2062.5	[2.52]	12.81	1588.8	0.31
Guaiol	14.47	2036.6	0.26	12.84	1591.0	0.22
Eudesm-5-en-11-ol analog	14.56	2045.6	0.04	12.90	1595.3	0.28
Eudesm-5-en-11-ol	14.74*	2062.5	[2.52]	12.93	1597.8	0.13
Unknown UNKN CCCXII [m/z 162, 105 (46), 43 (44), 119 (42), 107 (39), 149 (38)... 220 (13)]				13.01	1604.5	0.08
10-epi-Cubebol	14.03*	1995.3	[1.54]	13.09	1610.6	1.60
Rosifoliol	14.66	2054.6	0.03	13.16	1616.7	0.06
Alismol?	15.98	2184.4	0.02	13.23*	1622.8	[0.15]
1-epi-Cubebol	14.03*	1995.3	[1.54]	13.23*	1622.8	[0.15]
Cubebol	13.98	1990.7	0.55	13.45*	1640.3	[12.54]
$\tau$ -Cadinol	15.25	2111.9	11.64	13.45*	1640.3	[12.54]
$\tau$ -Muurolol	15.38	2124.8	0.30	13.45*	1640.3	[12.54]
$\alpha$ -Muurolol	15.52	2138.1	0.08	13.48	1642.7	0.10
Unknown CAIN XXXVII [m/z 204, 161 (97), 59 (87), 189 (78), 105 (45)...]	15.55	2141.3	0.28	13.51	1645.4	0.07
Unknown CASA XVI [m/z 202, 187 (89), 121 (45), 105	15.96	2181.7	0.02	13.57*	1650.2	[0.72]

(42), 93 (40), 95 (38)...						
$\alpha$ -Cadinol	15.81	2167.1	0.53	13.57*	1650.2	[0.72]
Unknown UNKN XIII [m/z 59, 81 (40), 149 (34), 161 (34), 107 (29)... 204 (19)]	15.46	2132.2	0.05	13.59	1652.4	0.13
Bulnesol	15.61	2147.6	0.24	13.71	1662.2	0.38
Shyobunol	16.63	2250.4	0.10	13.96	1682.9	0.11
Unknown ZIOF XXVI [m/z 69, 41 (59), 118 (33), 43 (32), 55 (31)... 234? (t)]	17.08	2296.7	0.03	14.07	1691.6	0.02
Nootkatol	17.88	2382.5	0.01	14.28	1709.0	0.01
Aromadendrane-4,10-diol	17.13	2302.9	0.04	14.32	1713.1	0.06
Unknown PIMA XVII [m/z 159, 220 (92), 93 (88), 177 (63), 91 (57), 107 (55)]	18.05	2400.7	0.02	14.42	1721.0	0.04
Unknown ZIOF XXXII [m/z 69, 41 (96), 43 (90), 109 (51), 55 (42), 81 (33)...	18.80	2484.2	0.01	15.22	1790.8	0.01
Unknown AMBA XVIII [m/z 69, 43 (95), 41 (84), 109 (78), 95 (54), 93 (49)... 177 (36), 220 (2)...	20.40	2668.3	0.01	15.37	1804.0	0.01
<i>para</i> -Camphorene	16.14	2200.4	0.03	17.27	1980.1	0.03
( <i>Z</i> )-Falcarinol	22.72	2958.2	0.12	17.83	2033.9	0.11
Octadecanol	19.49	2561.9	0.01	18.32	2083.1	0.02
Unknown PEHY XXXVIII [m/z 159, 93 (89), 205 (88), 91 (81), 107 (75), 105 (74), 119 (70)... 220 (16)]	16.59	2246.4	0.10			
Total reported		95.95%			98.55%	

\*: Two or more compounds are coeluting on this column

[xx]: Duplicate percentage due to coelutions, only the first one is 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