Date : December 07, 2020

Certificate of Analysis – GC Profiling

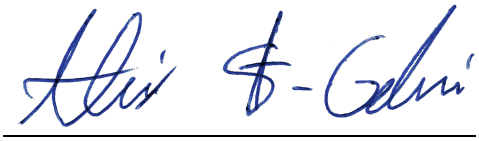
Sample identification

Internal code : 20K30-PTH05
Customer identification : Cedarwood Virginian - C70107206R
Type : Essential oil
Source : *Juniperus virginiana*
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 : Fanny Charlier, B. Sc., chimiste à l'entraînement
Analysis date : December 05, 2020

Checked and approved by :



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

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Méthode certifiée ISO 17025:2017 Certified method

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Physicochemical data

Physical aspect: Faintly yellow viscous liquid
Refractive index: 1.5047 ± 0.0003 (20 °C; method PC-MAT-016)

ISO 4724:2004 - Oil of cedarwood, Virginian

Compound	Min. %	Max. %	Observed %	Complies?
Widdrol	2	5	2	Yes
α-Cedrol	16	25	20	Yes
Cuparene	1.5	7.0	1.1	No
cis-Thujopsene	10	25	19	Yes
α-Cedrene + β-funebrene	20	35	27	Yes
β-Cedrene + β-caryophyllene	4	8	6	Yes
Refractive index	1.5010	1.5100	1.5047	Yes

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
α-Pinene	0.02	Monoterpene
Limonene	0.01	Monoterpene
Terpinolene	0.01	Monoterpene
Terpinen-4-ol	0.01	Monoterpenic alcohol
α-Terpineol	0.02	Monoterpenic alcohol
Myrtenol	0.01	Monoterpenic alcohol
Carvacrol methyl ether	0.03	Monoterpenic ether
Brasila-1,10-diene	0.04	Sesquiterpene
Carvacrol	0.02	Monoterpenic alcohol
African-1-ene	0.11	Sesquiterpene
Cyclosativene II	0.02	Sesquiterpene
2-epi-α-Funebrene	0.67	Sesquiterpene
α-Duprezianene	0.82	Sesquiterpene
Isolongifolene	0.06	Sesquiterpene
β-Elemene	0.90	Sesquiterpene
7-epi-Sesquithujene	0.16	Sesquiterpene
α-Chamipinene	0.20	Sesquiterpene
Unknown	0.07	Sesquiterpene
α-Cedrene	24.06	Sesquiterpene
β-Funebrene	2.71	Sesquiterpene
β-Cedrene	5.04	Sesquiterpene
β-Caryophyllene	1.14	Sesquiterpene
β-Duprezianene	0.81	Sesquiterpene
cis-Thujopsene	19.48	Sesquiterpene
Isobazzanene	0.20	Sesquiterpene
trans-α-Bergamotene	0.10	Sesquiterpene
β-Barbatene	0.04	Sesquiterpene
Prezizaene	0.19	Sesquiterpene
α-Himachalene	0.15	Sesquiterpene
7,8-Dehydro-α-acoradiene?	0.16	Sesquiterpene
α-Humulene	0.17	Sesquiterpene
Thujopsadiene?	0.14	Sesquiterpene
α-Acoradiene	0.30	Sesquiterpene
(*E*)-β-Farnesene	0.34	Sesquiterpene
β-Acoradiene	0.02	Sesquiterpene
Thujopsene isomer	0.25	Sesquiterpene
β-Chamigrene	0.72	Sesquiterpene
Unknown	0.39	Sesquiterpene
γ-Himachalene	0.10	Sesquiterpene
Widdra-2,4(14)-diene?	0.07	Sesquiterpene
ar-Curcumene	0.16	Sesquiterpene
Pseudowiddrene	1.63	Sesquiterpene
α-Chamigrene	1.25	Sesquiterpene
α-Cuprenene	0.81	Sesquiterpene
Cuparene	1.14	Sesquiterpene

1,2-Dihydrocuparene	0.13	Sesquiterpene
α-Alaskene	0.63	Sesquiterpene
Unknown	0.15	Sesquiterpene
α-Dehydro-ar-himachalene	0.01	Sesquiterpene
1,4-Dihydrocuparene	0.11	Sesquiterpene
7-epi-α-Selinene	0.06	Sesquiterpene
γ-Dehydro-ar-himachalene	0.03	Sesquiterpene
β-Sesquiphellandrene	0.43	Sesquiterpene
γ-Cuprenene	0.70	Sesquiterpene
Unknown	0.39	Oxygenated sesquiterpene
(*E*)-γ-Bisabolene	0.14	Sesquiterpene
δ-Cuprenene epimer I	0.29	Sesquiterpene
Unknown	0.21	Oxygenated sesquiterpene
Unknown	0.11	Oxygenated sesquiterpene
Caryophyllenyl alcohol	0.22	Sesquiterpenic alcohol
Caryophyllene oxide	0.03	Sesquiterpenic ether
Caryophyllene oxide isomer	0.01	Sesquiterpenic ether
allo-Cedrol	0.46	Sesquiterpenic alcohol
α-Cedrol	19.62	Sesquiterpenic alcohol
Widdrol	2.05	Sesquiterpenic alcohol
β-Himachalene oxide	0.02	Sesquiterpenic ether
epi-Cedrol	0.33	Sesquiterpenic alcohol
Unknown	0.27	Oxygenated sesquiterpene
Unknown	0.17	Oxygenated sesquiterpene
2-epi-α-Cedren-3-one	0.08	Sesquiterpenic ketone
α-Acorenol	0.12	Sesquiterpenic alcohol
β-Acorenol	0.19	Sesquiterpenic alcohol
Unknown	0.09	Oxygenated sesquiterpene
Unknown	0.43	Oxygenated sesquiterpene
Unknown	0.13	Oxygenated sesquiterpene
Unknown	0.47	Oxygenated sesquiterpene
Himachalol	0.13	Sesquiterpenic alcohol
Unknown	0.13	Oxygenated sesquiterpene
Unknown	0.15	Oxygenated sesquiterpene
Cedrenol analog	0.37	Sesquiterpenic alcohol
14-Hydroxy-9-epi-(*E*)-caryophyllene	0.08	Sesquiterpenic alcohol
Cedr-8-en-13-ol	0.16	Sesquiterpenic alcohol
α-Bisabolol	0.37	Sesquiterpenic alcohol
α-Cedrenol	0.08	Sesquiterpenic alcohol
Unknown	0.16	Oxygenated sesquiterpene
Thujopsenal	0.15	Sesquiterpenic aldehyde
Unknown	0.06	Oxygenated sesquiterpene
Thujopsenal analog	0.04	Sesquiterpenic aldehyde
Unknown	0.03	Oxygenated sesquiterpene
Cuparenal	0.03	Sesquiterpenic aldehyde
Unknown	0.03	Oxygenated sesquiterpene
Unknown	0.05	Oxygenated sesquiterpene
Unknown	0.05	Oxygenated sesquiterpene
Unknown	0.05	Oxygenated sesquiterpene
Unknown	0.07	Oxygenated sesquiterpene
Nootkatone analog	0.01	Sesquiterpenic ketone
7,13-Abietadiene	0.02	Diterpene

Consolidated total	**95.05%**	

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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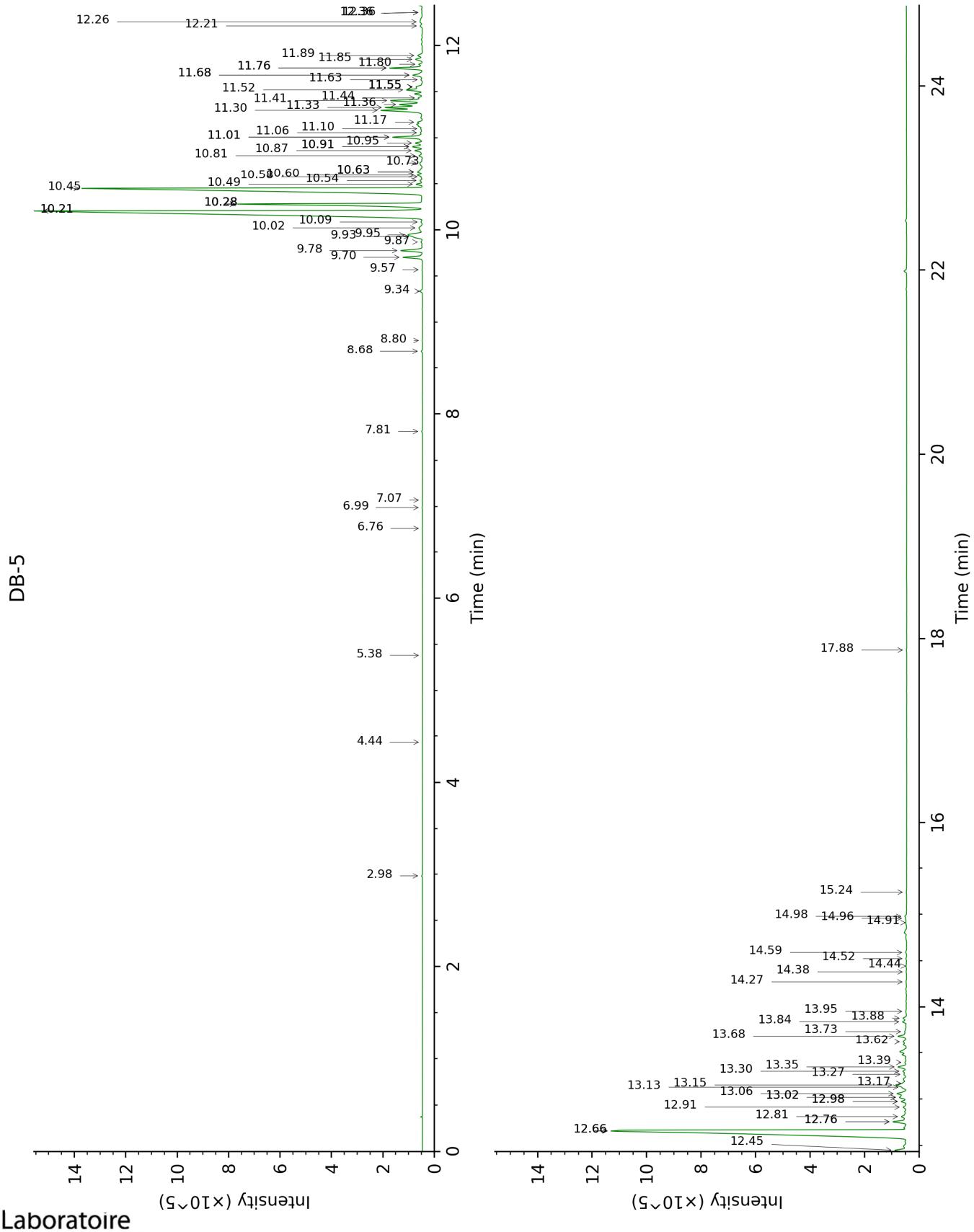
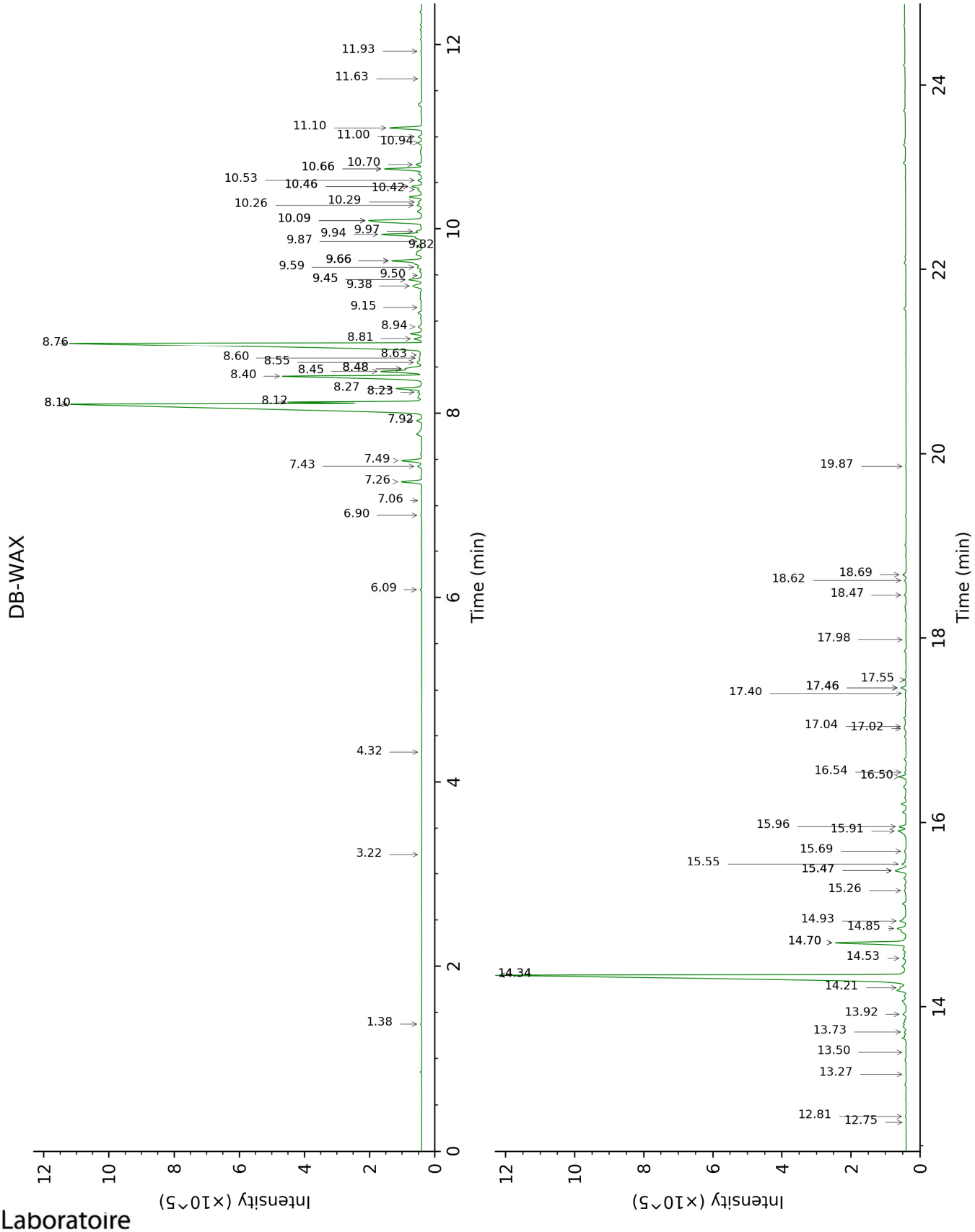

DB-5
Intensity (×10^5)
Time (min)
12.26
12.21
11.89
11.85
11.80
11.68
11.76
11.63
11.52
11.55
11.41
11.44
11.30
11.33
11.36
11.17
11.01
11.06
11.10
10.81
10.87
10.91
10.95
10.73
10.63
10.45
10.49
10.54
10.21
10.09
10.02
9.93
9.95
9.87
9.78
9.70
9.57
9.34
8.80
8.68
7.81
7.07
6.99
6.76
5.38
4.44
2.98
17.88
15.24
14.98
14.96
14.91
14.59
14.52
14.44
14.38
14.27
13.95
13.84
13.88
13.73
13.68
13.62
13.39
13.30
13.35
13.27
13.17
13.13
13.15
13.06
13.02
12.98
12.91
12.81
12.76
12.66
12.45


DB-WAX
Time (min)
Intensity (×10^5)
11.93
11.63
11.10
11.00
10.94
10.70
10.66
10.53
10.46
10.42
10.29
10.26
10.09
9.97
9.94
9.87
9.82
9.66
9.59
9.50
9.45
9.38
9.15
8.94
8.81
8.76
8.63
8.60
8.55
8.48
8.45
8.40
8.27
8.23
8.12
8.10
7.92
7.49
7.43
7.26
7.06
6.90
6.09
4.32
3.22
1.38
19.87
18.69
18.62
18.47
17.98
17.55
17.46
17.40
17.04
17.02
16.54
16.50
15.96
15.91
15.69
15.55
15.47
15.26
14.93
14.85
14.70
14.53
14.34
14.21
13.92
13.73
13.50
13.27
12.81
12.75

FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	%	R.T	R.I	%
α-Pinene	2.98	930	0.02	1.38	990	0.02
Limonene	4.44	1025	0.01	3.22	1157	0.01
Terpinolene	5.38	1085	0.01	4.32	1240	0.01
Terpinen-4-ol	6.76	1173	0.01	8.60†	1554	0.17
α-Terpineol	6.99	1188	0.02	9.82	1651	0.16
Myrtenol	7.07	1194	0.01	10.94	1743	0.14
Carvacrol methyl ether	7.81	1244	0.03	8.63†	1557	[0.17]
Brasila-1,10-diene	8.68	1304	0.04	6.09	1366	0.04
Carvacrol	8.80	1308	0.02	15.47*	2160	0.51
African-1-ene	9.34	1346	0.11	6.90	1426	0.04
Cyclosativene II	9.57	1362	0.02	7.06	1438	0.01
2-epi-α-Funebrene	9.70	1372	0.67	7.26	1453	0.63
α-Duprezianene	9.78	1377	0.82	7.49	1470	0.66
Isolongifolene	9.87	1383	0.06	7.43	1465	0.13
β-Elemene	9.93†	1388	1.06	8.45†	1543	1.98
7-epi-Sesquithujene	9.95†	1389	[1.06]	7.92	1502	0.16
α-Chamipinene	10.02	1394	0.20	8.10*	1516	24.26
Unknown [m/z 107, 91 (86), 93 (83), 79 (81), 162 (74), 41 (73), 133 (72)... 204 (13)]	10.09	1399	0.07	8.23	1526	0.11
α-Cedrene	10.21*	1408	27.47	8.10*	1516	[24.26]
β-Funebrene	10.21*	1408	[27.47]	8.12	1517	2.71
β-Cedrene	10.28*	1413	6.98	8.40	1539	5.04
β-Caryophyllene	10.28*	1413	[6.98]	8.48*†	1545	[1.98]
β-Duprezianene	10.28*	1413	[6.98]	8.27	1529	0.81
cis-Thujopsene	10.45	1426	19.48	8.76	1567	19.18
Isobazzanene	10.50	1429	0.20	8.55	1550	0.21
trans-α-Bergamotene	10.54	1432	0.10	8.48*†	1545	[1.98]
β-Barbatene	10.58	1435	0.04	9.15	1597	0.04
Prezizaene	10.60	1437	0.19	8.81	1571	0.22
α-Himachalene	10.63*	1440	0.29	8.94	1581	0.15
7,8-Dehydro-α-acoradiene?	10.63*	1440	[0.29]	9.59	1632	0.16
α-Humulene	10.73	1447	0.17	9.38	1616	0.40
Thujopsadiene?	10.81	1453	0.14	10.26	1686	0.14
α-Acoradiene	10.87	1457	0.30	9.45*	1621	0.41
(*E*)-β-Farnesene	10.91*	1460	0.36	9.66*	1638	1.15
β-Acoradiene	10.91*	1460	[0.36]	9.50	1625	0.02
Thujopsene isomer	10.95	1463	0.25	9.45*	1621	[0.41]
β-Chamigrene	11.01*	1468	1.11	9.66*	1638	[1.15]
Unknown [m/z 91, 105 (93), 161 (77),	11.01*	1468	[1.11]			

93 (73), 119 (71), 133 (69)... 204 (31)]						
γ-Himachalene	11.06	1472	0.10	9.66*	1638	[1.15]
Widdra-2,4(14)-diene?	11.10	1475	0.07	9.86	1655	0.03
ar-Curcumene	11.17	1480	0.16	10.70	1724	0.17
Pseudowiddrene	11.30	1490	1.63	9.94†	1661	1.62
α-Chamigrene	11.33	1492	1.25	10.09*	1673	2.36
α-Cuprenene	11.36	1494	0.81	10.09*	1673	[2.36]
Cuparene	11.41	1498	1.14	11.10	1757	0.98
1,2-Dihydrocuparene	11.44	1500	0.13	10.29	1689	0.12
α-Alaskene	11.52†	1506	0.91	9.97†	1663	[1.62]
Unknown [m/z 121, 123 (45), 91 (24), 107 (24), 122 (24), 95 (23)... 204 (11)]	11.56*†	1509	[0.91]	10.42	1700	0.15
α-Dehydro-ar-himachalene	11.56*†	1509	[0.91]	11.63	1802	0.01
1,4-Dihydrocuparene	11.56*†	1509	[0.91]	10.52	1709	0.11
7-epi-α-Selinene	11.63	1515	0.06	10.46*	1703	0.30
γ-Dehydro-ar-himachalene	11.68*†	1519	0.46	11.93	1828	0.03
β-Sesquiphellandrene	11.68*†	1519	[0.46]	10.66*	1720	1.14
γ-Cuprenene	11.76*	1525	1.09	10.66*	1720	[1.14]
Unknown [m/z 91, 107 (97), 105 (93), 41 (92), 109 (78), 43 (78), 121 (76), 135 (75)... 220 (21)]	11.76*	1525	[1.09]			
(*E*)-γ-Bisabolene	11.80	1528	0.14	10.46*	1703	[0.30]
δ-Cuprenene epimer I	11.85	1533	0.29	11.00	1749	0.11
Unknown [m/z 43, 95 (81), 207 (61), 41 (55), 55 (50)... 222 (3)]	11.89	1536	0.21	13.92	2009	0.13
Unknown [m/z 95, 191 (52), 107 (50), 121 (32), 81 (31)...]	12.21	1561	0.11	14.21	2037	0.19
Caryophyllenyl alcohol	12.26	1565	0.22	13.73	1991	0.06
Caryophyllene oxide	12.36*	1573	0.05	12.82	1907	0.03
Caryophyllene oxide isomer	12.36*	1573	[0.05]	12.75	1901	0.01
allo-Cedrol	12.45	1580	0.46	14.34*	2050	20.08
α-Cedrol	12.66*†	1596	22.13	14.34*	2050	[20.08]
Widdrol	12.66*†	1596	[22.13]	14.70*	2083	2.23

β-Himachalene oxide	12.76*	1604	0.57	13.27	1948	0.02
epi-Cedrol	12.76*	1604	[0.57]	14.85	2098	0.33
Unknown [m/z 138, 110 (77), 137 (75), 107 (62), 91 (61), 93 (60), 109 (57)... 220 (34)]	12.81	1608	0.27	13.50	1970	0.02
Unknown [m/z 107, 41 (86), 123 (85), 82 (79), 95 (77), 93 (76), 91 (73), 69 (71)... 220 (13)]	12.91	1617	0.17	14.70*	2083	[2.23]
2-epi-α-Cedren-3-one	12.98*	1622	0.20			
α-Acorenol	12.98*	1622	[0.20]	14.53	2067	0.12
β-Acorenol	13.02*	1626	0.37	14.93	2106	0.19
Unknown [m/z 132, 175 (22), 119 (18), 91 (18), 157 (18)... 219 (10)]	13.02*	1626	[0.37]	15.69	2182	0.09
Unknown [m/z 105, 93 (78), 95 (75), 131 (72), 119 (71), 132 (70), 91 (67), 120 (49)... 202 (39), 220 (9)]	13.06	1629	0.43	15.96	2209	0.20
Unknown [m/z 132, 91 (24), 119 (22), 105 (21), 133 (17), 117 (16)... 219 (3)]	13.13	1635	0.13			
Unknown [m/z 123, 81 (77), 95 (77), 107 (72), 41 (72), 93 (66), 55 (64)... 220? (13)]	13.15	1637	0.47			
Himachalol	13.17	1638	0.13	15.26	2139	0.08
Unknown [m/z 41, 91 (96), 79 (88), 69 (82), 123 (80), 93 (80)... 220 (8)]	13.27	1646	0.13	17.46*	2367	0.16
Unknown [m/z 43, 81 (84), 41 (64), 67 (62), 95 (58), 79 (58)... 204 (48), 220 (2)]	13.30	1649	0.15	15.55	2168	0.14
Cedrenol analog	13.35	1653	0.37	16.50	2264	0.22
14-Hydroxy-9-epi-(*E*)-caryophyllene	13.40	1657	0.08	16.54	2269	0.05
Cedr-8-en-13-ol	13.62	1675	0.16	17.02	2319	0.06
α-Bisabolol	13.68	1681	0.37	15.47*	2160	[0.51]
α-Cedrenol	13.73	1685	0.08	17.04	2322	0.08

Unknown [m/z 91, 105 (87), 123 (74), 135 (70), 107 (60), 79 (59)... 220 (13)]	13.84	1694	0.16			
Thujopsenal	13.88	1697	0.15	15.91	2204	0.24
Unknown [m/z 105, 69 (77), 91 (66), 119 (65), 111 (56), 107 (45), 55 (45)... 220? (2)]	13.95	1703	0.06	17.55	2376	0.05
Thujopsenal analog	14.27	1730	0.04	17.46*	2367	[0.16]
Unknown [m/z 105, 91 (83), 79 (78), 135 (67), 107 (56), 67 (53)... 220 (9)]	14.38	1740	0.03			
Cuparenal	14.44	1745	0.03			
Unknown [m/z 105, 69 (79), 111 (66), 119 (60), 91 (50), 55 (41)... 203 (11), 220 (1)]	14.52	1752	0.03			
Unknown [m/z 91, 105 (74), 93 (67), 79 (59), 133 (54), 41 (47), 107 (46)...]	14.59	1758	0.05	18.47	2478	0.05
Unknown [m/z 189, 91 (48), 133 (40), 105 (40), 41 (34), 187 (34)... 220 (5)]	14.91	1786	0.05	18.69	2503	0.10
Unknown [m/z 148, 141 (99), 91 (74), 105 (52), 41 (42), 121 (42), 133 (37)... 218 (32)]	14.96	1790	0.05	19.87	2639	0.02
Unknown [m/z 121, 136 (53), 91 (22), 93 (19), 79 (15), 105 (13)... 220 (3)]	14.98	1792	0.07	18.62	2496	0.05
Nootkatone analog	15.24	1815	0.01	17.98	2424	0.01
7,13-Abietadiene	17.88	2063	0.02	17.40	2360	0.03
Total identified		**93.86%**			**90.56%**	
Total reported		**96.52%**			**91.86%**	

*: 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

Note: no correction factor was applied
R.T.: Retention time (minutes)
R.I.: Retention index