

Date : 2023-12-21

CERTIFICATE OF ANALYSIS - GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 23L14-PTH06

Customer Identification : Frankincense Serrata - India - F40111R

Type : Essential Oil

Source : *Boswellia serrata*

Customer : Plant Therapy

Checked and approved by:

Alexis St-Gelais, Ph. D., Chimiste 2013-174

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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 : 2023-12-19

PHYSICOCHEMICAL DATA

Refractive index : 1.4589 ± 0.0003 (20 °C)

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

Analyst : Cindy Caron B. Sc.

Date : 2023-12-19

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
2-Methyl-3-buten-2-ol	tr	Aliphatic alcohol
(E)-2-Methyl-1,3-pentadiene	tr	Alkene
Isovaleral	tr	Aliphatic aldehyde
3-Methyl-2-butanone	tr	Aliphatic ketone
Toluene	0.01	Simple phenolic
Unknown	tr	Unknown
Unknown	tr	Unknown
Unknown	0.01	Monoterpene
Unknown	0.02	Unknown
Hashishene	0.14	Monoterpene
Tricyclene	0.01	Monoterpene
α -Thujene	69.05	Monoterpene
α -Pinene	9.86	Monoterpene
Unknown	0.43	Monoterpene
Camphene	0.11	Monoterpene
Thuja-2,4(10)-diene	0.02	Monoterpene
3,7,7-Trimethylcyclohepta-1,3,5-triene	0.03	Monoterpene
β -Pinene	0.49	Monoterpene
Sabinene	4.66	Monoterpene
Pseudolimonene isomer	0.01	Monoterpene
Dehydro-1,8-cineole	0.01	Monoterpenic ether
Myrcene	1.34	Monoterpene
2-Carene	0.01	Monoterpene
α -Phellandrene	1.28	Monoterpene
Pseudolimonene	0.01	Monoterpene
Δ^3 -Carene	3.01	Monoterpene
α -Terpinene	0.27	Monoterpene
<i>meta</i> -Cymene	0.09	Monoterpene
Carvomenthene	tr	Aliphatic alcohol
<i>para</i> -Cymene	2.12	Monoterpene
Limonene	1.57	Monoterpene
β -Phellandrene	0.38	Monoterpene
Unknown	0.01	Unknown
(Z)- β -Ocimene	0.32	Monoterpene
Unknown	0.05	Unknown
(E)- β -Ocimene	0.17	Monoterpene
Unknown	0.04	Unknown
γ -Terpinene	0.61	Monoterpene
<i>cis</i> -Sabinene hydrate	0.06	Monoterpenic alcohol
Unknown	0.01	Oxygenated monoterpene

<i>para</i> -Cymenene	0.15	Monoterpene
Terpinolene	0.19	Monoterpene
α -Pinene oxide	0.01	Monoterpenic ether
<i>trans</i> -Sabinene hydrate	0.04	Monoterpenic alcohol
Perillene	0.04	Monoterpenic ether
Linalool	0.08	Monoterpenic alcohol
Unknown	0.01	Monoterpenic alcohol
β -Thujone	[0.16]	Monoterpenic ketone
Unknown	[0.16]	Oxygenated monoterpene
Unknown	0.02	Oxygenated monoterpene
α -Campholenal	0.01	Monoterpenic aldehyde
<i>cis-para</i> -Menth-2-en-1-ol	0.05	Monoterpenic alcohol
Unknown	0.01	Unknown
allo-Ocimene	0.02	Monoterpene
<i>trans</i> -Pinocarveol	0.01	Monoterpenic alcohol
<i>trans</i> -Sabinol	0.04	Monoterpenic alcohol
<i>trans</i> -Verbenol	0.03	Monoterpenic alcohol
<i>para</i> -Menth-3-en-8-ol	0.02	Monoterpenic alcohol
Unknown	0.01	Oxygenated monoterpene
Unknown	0.01	Oxygenated monoterpene
Borneol	0.02	Monoterpenic alcohol
α -Phellandren-8-ol	0.01	Monoterpenic alcohol
<i>cis</i> -Sabinol	0.05	Monoterpenic alcohol
Terpinen-4-ol	0.34	Monoterpenic alcohol
<i>meta</i> -Cymen-8-ol	0.01	Monoterpenic alcohol
<i>para</i> -Cymen-8-ol	0.02	Monoterpenic alcohol
α -Terpineol	tr	Monoterpenic alcohol
Myrtenal	0.02	Monoterpenic aldehyde
Methylchavicol	0.84	Phenylpropanoid
<i>cis</i> - α -Phellandrene epoxide (iPr vs Me)	0.04	Monoterpenic ether
Verbenone	0.02	Monoterpenic ketone
Cuminal	0.01	Monoterpenic aldehyde
Piperitone	0.04	Monoterpenic ketone
Linalyl acetate	0.02	Monoterpenic ester
Unknown	0.03	Oxygenated monoterpene
Bornyl acetate	0.02	Monoterpenic ester
Carvacrol	0.06	Monoterpenic alcohol
<i>para</i> -Menth-5-en-1,2-diol isomer III	0.06	Monoterpenic alcohol
α -Terpinyl acetate	0.02	Monoterpenic ester
α -Copaene	0.05	Sesquiterpene
β -Bourbonene	0.19	Sesquiterpene
1,5-diepi- β -Bourbonene	0.01	Sesquiterpene
β -Cubebene	0.02	Sesquiterpene
β -Elemene	0.02	Sesquiterpene
Methyleugenol	0.04	Phenylpropanoid

β-Ylangene	0.03	Sesquiterpene
β-Copaene	0.03	Sesquiterpene
<i>trans</i> -α-Bergamotene	0.02	Sesquiterpene
Isogermacrene D	0.02	Sesquiterpene
allo-Aromadendrene	0.03	Sesquiterpene
γ-Muurolene	0.01	Sesquiterpene
Germacrene D	0.04	Sesquiterpene
Unknown	0.04	Sesquiterpene
Bicyclogermacrene	0.01	Sesquiterpene
α-Muurolene	0.01	Sesquiterpene
γ-Cadinene	0.01	Sesquiterpene
δ-Cadinene	0.05	Sesquiterpene
Elemicin	0.01	Phenylpropanoid
α-Phellandrene dimer II	0.02	Diterpene
(3 <i>E</i>)-Cembrene A	0.01	Diterpene
Serratol	0.02	Diterpenic alcohol
Consolidated total	99.46	

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

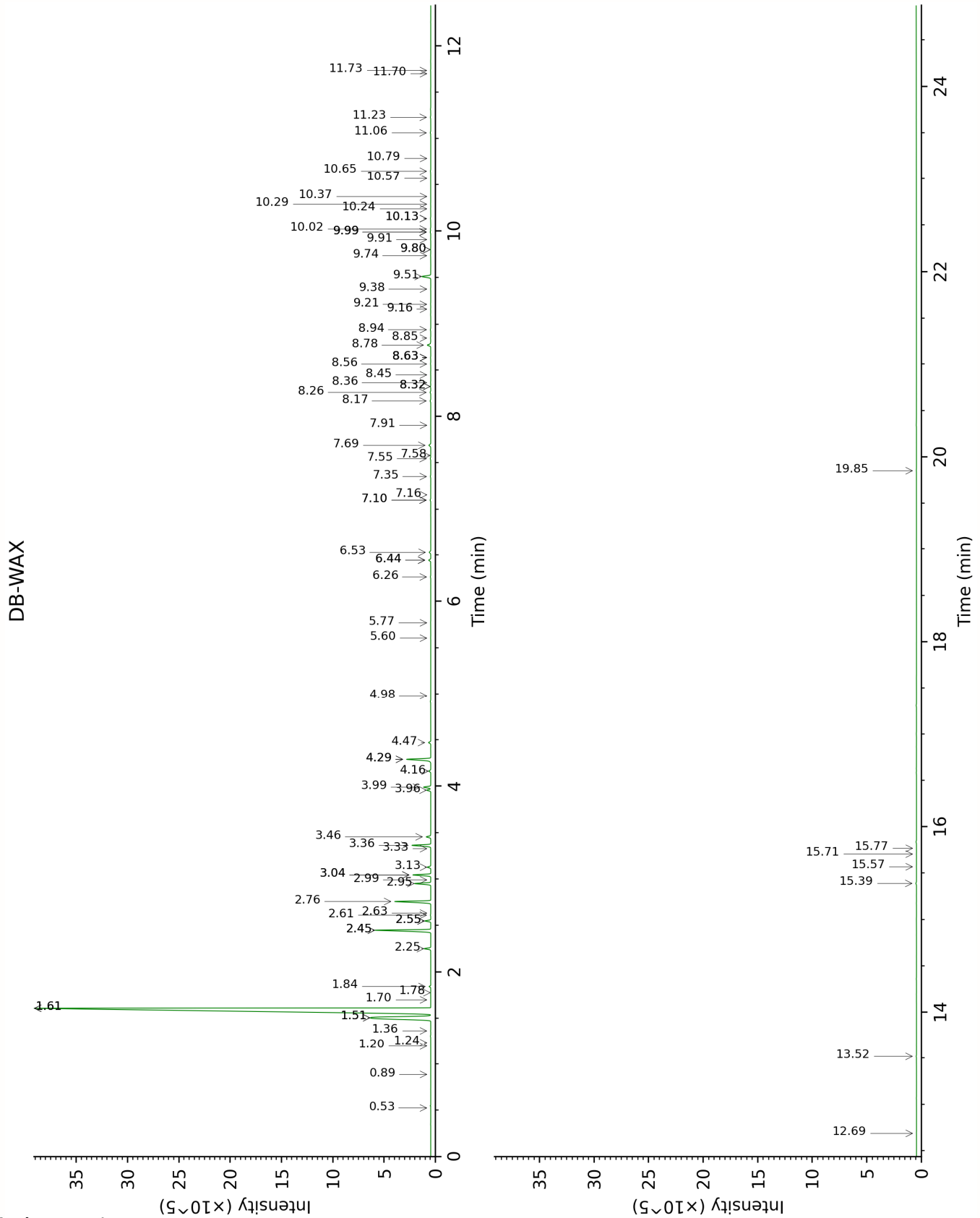
Note: no correction factor was applied

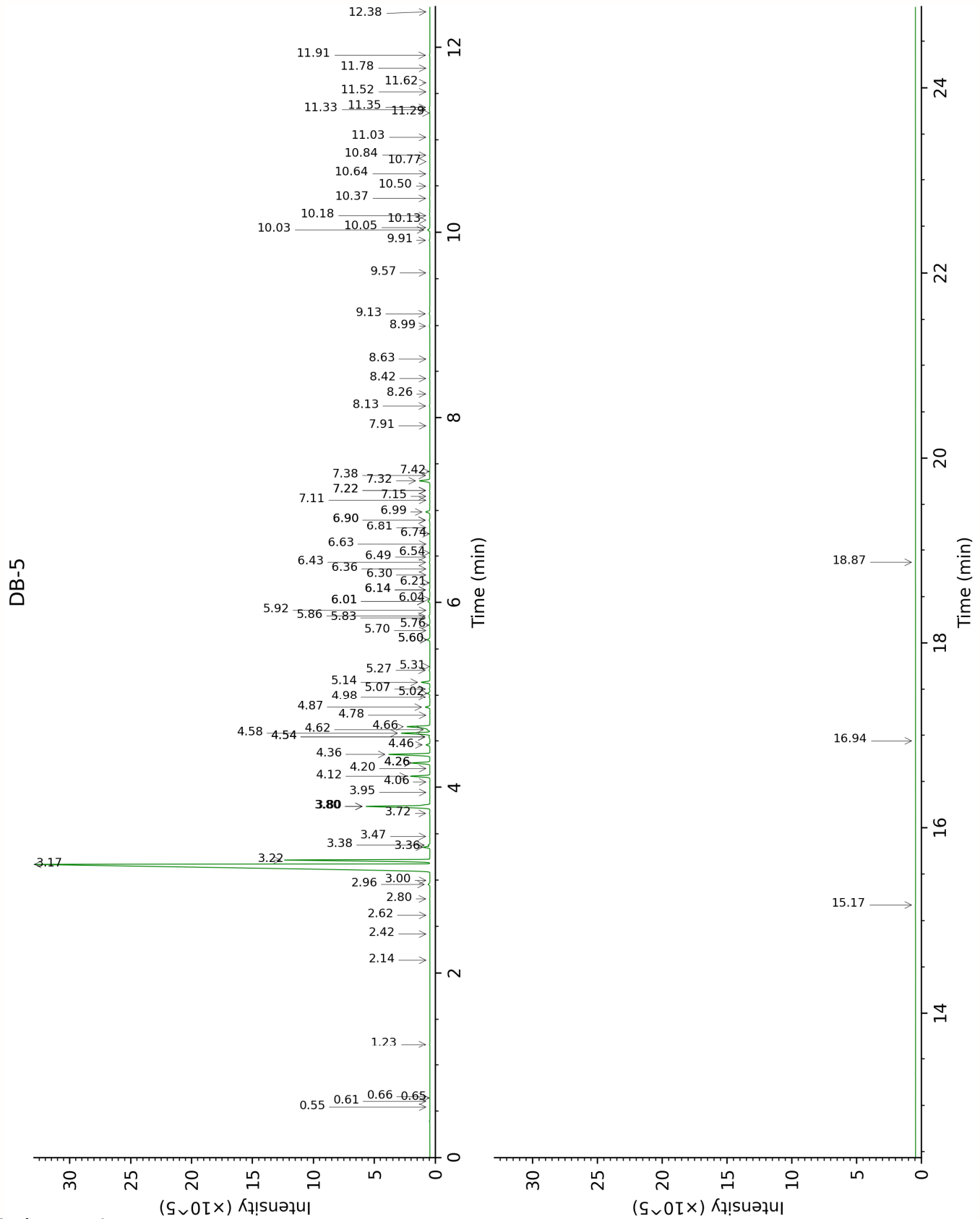
About "consolidated" data: The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm 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.

This page was intentionally left blank. The following pages present the complete data of the analysis.





FULL ANALYSIS DATA

2-Methyl-3-buten-2-ol	Column DB-WAX			Column DB-5		
	1.70	1015.2	tr	0.55	608.8	tr
(E)-2-Methyl-1,3-pentadiene	0.53	760.5	tr	0.61	629.8	tr
Isovaleral				0.64	641.9	tr
3-Methyl-2-butanone	0.89	902.2	tr	0.66	646.6	tr
Toluene	1.61*	1006.6	[68.99]	1.23	759.4	0.01
Unknown PRME II [m/z 109, 43 (28), 124 (28), 41 (14), 55 (11), 79 (9), 81 (8)...]	1.78	1022.5	0.01	2.14	852.5	tr
Unknown BOCA II [m/z 79, 78 (45), 91 (28), 77 (28), 41 (13), 80 (12), 107 (11)... 122 (1)]	1.24	954.6	tr	2.42	875.6	tr
Unknown BOFR I [m/z 93, 91 (75), 121 (61), 77 (58), 79 (38), 92 (26), 43 (24), 41 (23), 105 (22), 107 (19), 136 (16)]	1.20	948.7	tr	2.62	892.2	0.01
Unknown BOFR II [m/z 93, 91 (72), 121 (58), 77 (49), 79 (41), 43 (22), 105 (20), 107 (20), 41 (18), 136 (17), 92 (17)]				2.80	906.4	0.02
Hashishene	1.51*	995.3	[9.94]	2.96	916.6	0.14
Tricyclene	1.36	973.9	0.01	3.00	919.5	0.01
α -Thujene	1.61*	1006.6	[68.99]	3.17	930.8	69.05
α -Pinene	1.51*	995.3	[9.94]	3.22	933.9	9.86
Unknown SAOF I [m/z 91, 92 (47), 65 (11)... 134 (1)]	2.55*	1095.4	[0.43]	3.36*†	943.0	[0.42]
Camphene	1.84	1028.8	0.11	3.38*†	944.5	[0.11]
Thuja-2,4(10)-diene	2.45*	1086.0	[4.69]	3.47	950.7	0.02
3,7,7-Trimethylcyclohepta-1,3,5-triene	3.04*	1133.7	[1.38]	3.72	967.0	0.03
β -Pinene	2.25	1067.2	0.49	3.80*	971.9	[5.15]
Sabinene	2.45*	1086.0	[4.69]	3.80*	971.9	[5.15]
Pseudolimonene	2.61	1100.9	0.02	3.95	981.8	0.01

isomer						
Dehydro-1,8-cineole	3.33	1155.2	0.01	4.06	989.3	0.01
Myrcene	3.04*	1133.7	[1.38]	4.12	993.4	1.34
2-Carene	2.55*	1095.4	[0.43]	4.20	998.8	0.01
α -Phellandrene	2.95	1126.7	1.28	4.26*	1002.7	[1.28]
Pseudolimonene	2.99	1129.7	0.01	4.26*	1002.7	[1.28]
Δ 3-Carene	2.76	1112.0	3.01	4.36	1008.6	3.01
α -Terpinene	3.13	1140.0	0.28	4.46	1015.0	0.27
<i>meta</i> -Cymene	4.29*	1226.4	[2.21]	4.54*	1020.4	[0.09]
Carvomenthene	2.63	1102.6	tr	4.54*	1020.4	[0.09]
<i>para</i> -Cymene	4.29*	1226.4	[2.21]	4.58	1022.9	2.12
Limonene	3.36	1157.9	1.57	4.62*†	1025.3	[0.15]
β -Phellandrene	3.46	1164.9	0.38	4.66*†	1027.3	[1.96]
Unknown BOSA IV [m/z 67, 93 (70), 82 (70), 121 (42), 107 (39), 91 (33), 79 (28)...]				4.78	1035.0	0.01
(Z)- β -Ocimene	3.96	1202.7	0.32	4.87	1040.4	0.32
Unknown BOFR III [m/z 109, 43 (57), 91 (28), 67 (25), 93 (24), 95 (22), 77 (21), 137 (21), 41 (17), 79 (14)...]	7.55	1462.2	0.05	4.98	1047.6	0.05
(E)- β -Ocimene	4.16	1217.3	0.17	5.02	1050.2	0.17
Unknown BOFR IV [m/z 109, 45 (67), 41 (40), 67 (39), 81 (33), 79 (27), 95 (24), 91 (23), 82 (21), 55 (21), 93 (20)...]	7.10*	1429.1	[0.06]	5.07	1053.1	0.04
γ -Terpinene	3.99	1205.0	0.62	5.14	1057.7	0.61
<i>cis</i> -Sabinene hydrate	7.10*	1429.1	[0.06]	5.27	1065.8	0.06
Unknown PIMA I [m/z 79, 93 (60), 43 (40), 94 (35), 137 (33), 77 (26), 91 (20), 152 (18)]	4.98	1275.4	0.01	5.31	1068.3	0.01
<i>para</i> -Cymenene	6.53	1387.4	0.15	5.60*	1086.3	[0.21]
Terpinolene	4.47	1239.2	0.19	5.60*	1086.3	[0.21]
α -Pinene oxide	5.60	1321.4	0.02	5.70	1092.5	0.01
<i>trans</i> -Sabinene hydrate	8.17	1508.6	0.06	5.76	1096.2	0.04
Perillene	6.26	1368.5	0.04	5.84	1101.0	0.04

Linalool	8.26	1515.6	0.06	5.86	1102.3	0.08
Unknown ORMA I [m/z 119, 109 (94), 43 (61), 95 (56), 91 (48), 77 (32), 152 (32), 137 (31), 134 (24)]	8.64*	1544.6	[0.03]	5.92	1106.2	0.01
β-Thujone	6.44*	1381.4	[0.19]	6.01*	1112.3	[0.16]
Unknown BOSE I [m/z 109, 81 (54), 91 (32), 79 (22)...]	6.44*	1381.4	[0.19]	6.01*	1112.3	[0.16]
Unknown BOSE II [m/z 109, 91 (57), 93 (47), 81 (44), 77 (40)... 154 (1)]				6.04	1114.0	0.02
α-Campholenal	7.16	1433.4	0.01	6.14*	1120.2	[0.06]
<i>cis-para</i> -Menth-2-en- 1-ol	8.32*	1520.6	[0.03]	6.14*	1120.2	[0.06]
Unknown BOSE III [m/z 111, 43 (22), 55 (14), 41 (12), 110 (11)...]				6.21	1125.1	0.01
allo-Ocimene	5.77	1333.2	0.02	6.30	1130.4	0.02
<i>trans</i> -Pinocarveol	9.38	1602.0	0.02	6.36	1134.6	0.01
<i>trans</i> -Sabinol	10.02	1654.0	0.04	6.43	1139.1	0.04
<i>trans</i> -Verbenol	9.74	1631.0	0.03	6.49	1142.8	0.03
<i>para</i> -Menth-3-en-8- ol	8.94	1568.2	0.05	6.54	1145.6	0.02
Unknown BOSE IV [m/z 109, 81 (39), 41 (38), 95 (24)... 152 (1)]				6.63	1151.7	0.01
Unknown RHGR XIX [m/z 109, 43 (75), 137 (46), 67 (31), 93 (25)... 152 (4)]				6.74	1158.8	0.01
Borneol	9.99*	1651.4	[0.07]	6.81	1163.0	0.02
α-Phellandren-8-ol	10.37	1682.2	0.01	6.90*	1168.6	[0.07]
<i>cis</i> -Sabinol	11.06	1740.0	0.05	6.90*	1168.6	[0.07]
Terpinen-4-ol	8.78	1555.5	0.34	6.98	1174.3	0.34
<i>meta</i> -Cymen-8-ol	11.70	1793.8	0.01	7.11	1182.3	0.01
<i>para</i> -Cymen-8-ol	11.74	1796.7	0.02	7.15	1185.0	0.02
α-Terpineol	9.99*	1651.4	[0.07]	7.22*	1189.0	[0.03]
Myrtenal	8.85	1561.3	0.02	7.22*	1189.0	[0.03]
Methylchavicol	9.51	1612.9	0.87	7.32	1195.7	0.84
<i>cis</i> -α-Phellandrene epoxide (iPr vs Me)	11.23	1754.1	0.05	7.38	1199.4	0.04

Verbenone	9.80*	1636.2	[0.02]	7.42	1202.1	0.02
Cuminal	10.79	1716.7	0.01	7.91	1234.8	0.01
Piperitone	10.13*	1663.1	[0.04]	8.13	1249.1	0.04
Linalyl acetate	8.36	1523.7	0.02	8.26	1257.8	0.02
Unknown BOSE VI [m/z 109, 41 (22), 81 (14), 43 (11)... 152 (4)]				8.42	1268.9	0.03
Bornyl acetate	8.45	1530.2	0.01	8.63	1282.9	0.02
Carvacrol	15.57	2153.9	0.01	8.99	1307.2	0.06
<i>para</i> -Menth-5-en- 1,2-diol isomer III	15.39	2136.0	0.07	9.13	1316.5	0.06
α -Terpinyl acetate	9.91	1645.0	0.02	9.57	1347.5	0.02
α -Copaene	7.35	1447.9	0.04	9.92	1372.1	0.05
β -Bourbonene	7.69	1472.8	0.20	10.03	1379.9	0.19
1,5-diepi- β - Bourbonene	7.58	1464.7	0.02	10.05	1381.7	0.01
β -Cubebene	7.90	1488.7	0.01	10.13	1387.3	0.02
β -Elemene	8.64*	1544.6	[0.03]	10.18	1390.7	0.02
Methyleugenol	13.52	1956.6	0.03	10.36	1403.8	0.04
β -Ylangene	8.32*	1520.6	[0.03]	10.50	1413.4	0.03
β -Copaene	8.56	1539.2	0.03	10.64	1423.9	0.03
<i>trans</i> - α - Bergamotene	8.64*	1544.6	[0.03]	10.77	1433.7	0.02
Isogermacrene D	9.16	1585.2	0.02	10.84	1438.9	0.02
allo-Aromadendrene	9.21	1589.3	0.03	11.03	1453.2	0.03
γ -Muurolene	9.80*	1636.2	[0.02]	11.29	1472.7	0.01
Germacrene D	9.99*	1651.4	[0.07]	11.33	1475.4	0.04
Unknown BOSE VII [m/z 91, 93 (92), 105 (71), 77 (69), 79 (68), 133 (63)... 204 (32)]	10.13*	1663.1	[0.04]	11.35	1477.2	0.04
Bicyclogermacrene	10.29	1675.6	0.02	11.52	1489.7	0.01
α -Muurolene	10.24	1671.5	0.02	11.62	1496.9	0.01
γ -Cadinene	10.57	1698.1	0.01	11.78	1508.8	0.01
δ -Cadinene	10.65	1705.1	0.05	11.91	1519.7	0.05
Elemicin	15.71	2167.5	0.01	12.38	1556.6	0.01
α -Phellandrene dimer II	12.69	1880.7	0.01	15.17	1787.7	0.02
(3E)-Cembrene A	15.77	2173.8	0.01	16.94	1949.7	0.01
Serratol	19.85	2621.6	0.02	18.87	2140.4	0.02
Total reported		99.16%			99.48%	

*: 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

Essential Oil, *Boswellia serrata*
Internal code: 23L14-PTH06

Frankincense Serrata - India - F40111R

Report prepared for:
Plant Therapy

†: 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