Date : September 05, 2018

Certificate of Analysis – GC Profiling

Sample identification

Internal code : 18H28-IMT2-1-CC
Customer identification : Helichrysum Italicum Hydrosol - HYDALB0718
Type : Hydrosol
Source : *Helichrysum italicum*
Customer : Immortelle Therapy

Analysis

Method: Extraction with dichloromethane 3 times. Addition of an internal standard of tetradecane to estimate concentrations of individual compounds. Concentration of the organic phase. Analysis with PC-PA-001-17J19, "Analysis of the composition of a liquid essential oil by GC-FID" (in French). Identifications double-checked by GC-MS.
Analyst : Sylvain Mercier, M. Sc., Chimiste
Analysis date : September 05, 2018

Checked and approved by :

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

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CONCLUSION

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

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ANALYSIS SUMMARY

Identification	DB-5 (mg/L) ††	DB-WAX (mg/L) ††	DB-5 (%)	Classe
Butyl acetate	1.1	0.8	0.81	Aliphatic ester
Furfural	1.1	3.0	0.84	Aliphatic alcohol
4-Methyl-3-hexanone	2.6	3.0	2.01	Aliphatic ketone
(3*Z*)-Hexenol	1.4	1.2	1.06	Aliphatic alcohol
(2*E*)-Hexenol	0.2	0.2	0.16	Aliphatic alcohol
Hexanol	0.6	0.7	0.44	Aliphatic alcohol
2-Methylbutyric acid	2.7	11.9*	2.02	Aliphatic acid
Tiglic acid	1.7*	5.5*	1.27	Aliphatic acid
5,5-Dimethyl-2(5H)-furanone	[1.7]*	8.7*	[1.27]	Aliphatic lactone
Unknown	3.3		2.47	Unknown
6-Methyl-5-hepten-2-one	0.2	0.2	0.18	Aliphatic ketone
1,8-Cineole	2.8*	1.5	2.11	Monoterpenic ether
Limonene	[2.8]*	0.3	[2.11]	Monoterpene
Benzyl alcohol	2.6*	1.2	1.90	Simple phenolic
Benzeneacetaldehyde	[2.6]*	0.7	[1.90]	Simple phenolic
Caproic acid	[2.6]*	[18.0]*	[1.90]	Aliphatic acid
cis-Linalool oxide (fur.)	0.3	1.1	0.24	Monoterpenic alcohol
trans-Linalool oxide (fur.)	0.3	0.1	0.20	Monoterpenic alcohol
2,4-Dimethylheptane-3,5-dione	5.6	6.0	4.23	β-Diketone
Linalool	4.3	3.5	3.29	Monoterpenic alcohol
endo-Fenchol	1.0	0.8	0.72	Monoterpenic alcohol
Benzeneacetonitrile	0.2	0.1	0.13	Simple phenolic
Unknown	1.6*		1.18	Unknown
trans-Pinocarveol	[1.6]*	0.9	[1.18]	Monoterpenic alcohol
Borneol	1.9	[11.9]*	1.45	Monoterpenic alcohol
Terpinen-4-ol	3.4	8.2*	2.56	Monoterpenic alcohol
4,6-Dimethyloctane-3,5-dione epimer II	13.6*	[8.2]*	10.27	β-Diketone
4,6-Dimethyloctane-3,5-dione epimer I	[13.6]*	[8.7]*	[10.27]	β-Diketone
α-Terpineol	10.4	[11.9]*	7.86	Monoterpenic alcohol
Myrtenol	0.5	0.5	0.41	Monoterpenic alcohol
Verbenone	0.3	0.4	0.23	Monoterpenic ketone
Unknown	0.8		0.60	Unknown
Unknown	1.2		0.88	Unknown
Nerol	7.2	[5.5]*	5.33	Monoterpenic alcohol
Geraniol	0.4	0.5	0.32	Monoterpenic alcohol
2-Acetyl-para-cresol?	1.2		0.92	Simple phenolic
Neryl acetate	0.3	0.4	0.23	Monoterpenic ester
Italidione I	12.0		9.06	β-Diketone
Italidione II isomer I	2.4	[18.0]*	1.81	β-Diketone
Italidione II isomer II	3.7	18.0	2.77	β-Diketone
Italidione II analog	tr	tr	0.02	β-Diketone
Italidione III isomer I	0.2	0.1	0.13	β-Diketone
Italidione III isomer II	0.2	0.1	0.14	β-Diketone
Italidione III isomer III	0.1		0.04	β-Diketone
Eudesm-5-en-11-ol analog	0.3	0.5	0.22	Sesquiterpenic alcohol

β-Eudesmol	0.1	0.2	0.05	Sesquiterpenic alcohol
Neointermedeol	0.1	0.1	0.08	Sesquiterpenic alcohol
Unknown	0.3	0.2	0.23	Oxygenated sesquiterpene

*: Two or more compounds are coeluting on this column
[xx]: Duplicate percentage due to coelutions, not taken account in the identified total
††: As Tetradecane equivalents

Note: no correction factor was applied

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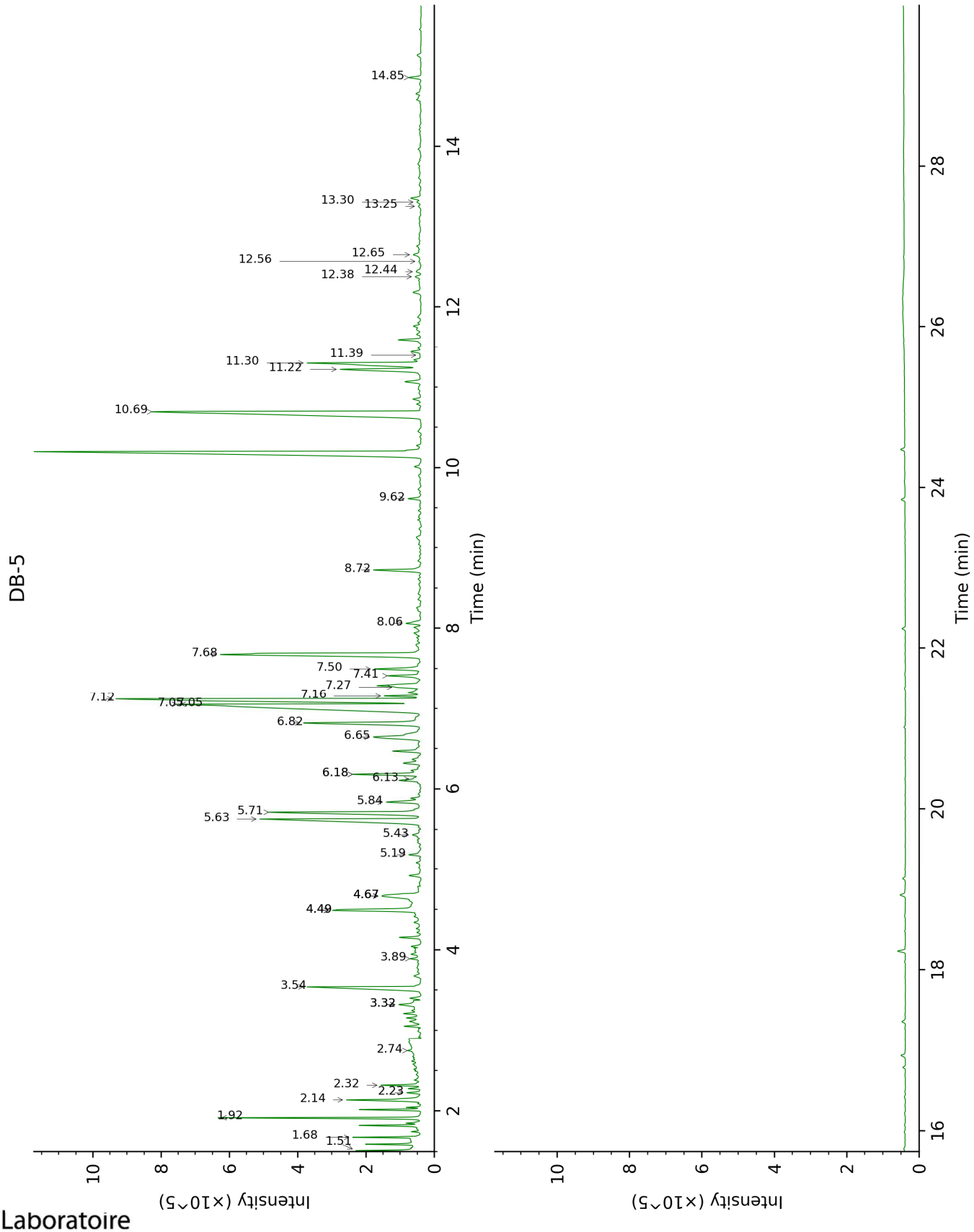

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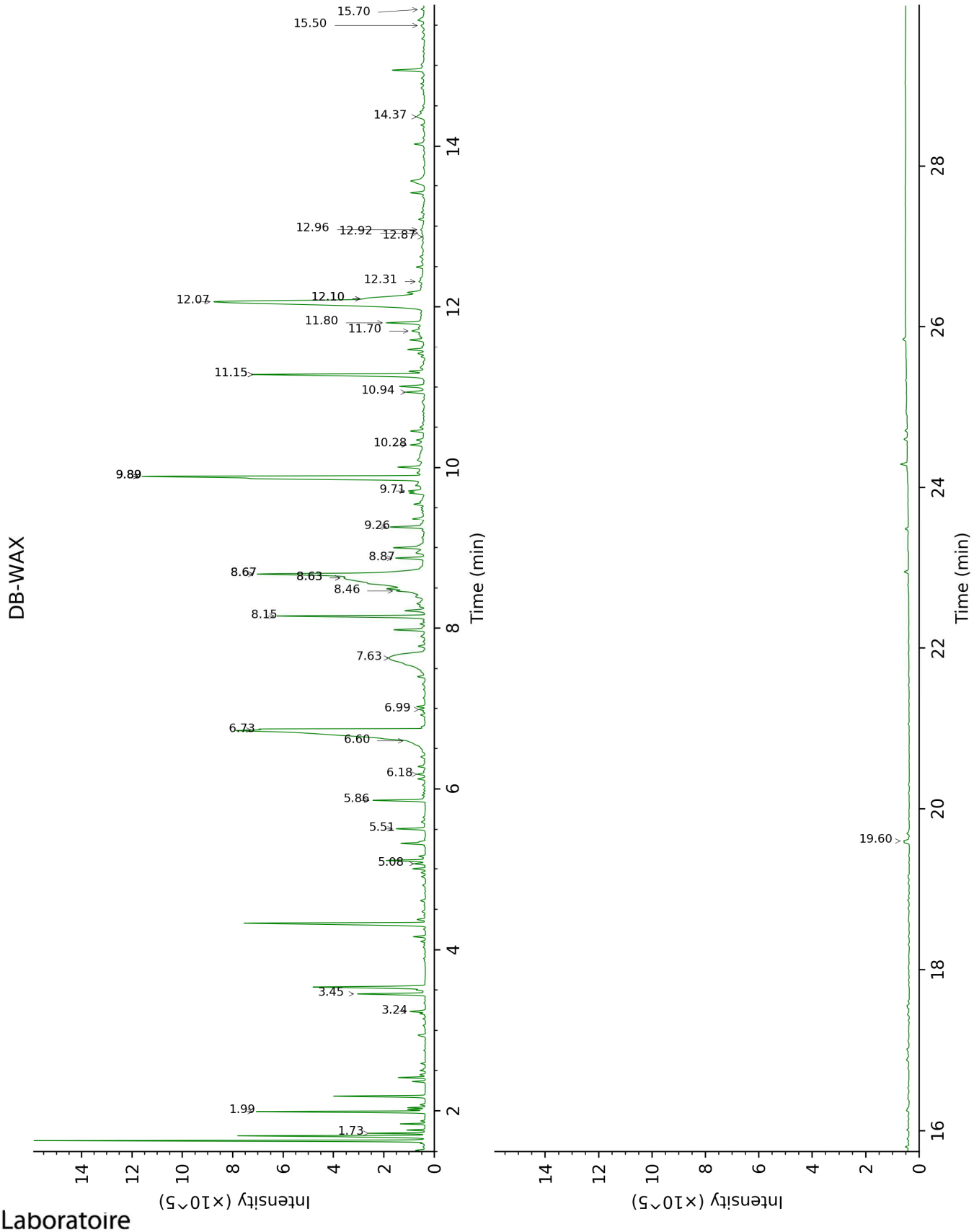

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FULL ANALYSIS DATA

Identification	Column DB-5			Column DB-WAX		
	R.T	R.I	mg/L ††	R.T	R.I	mg/L ††
Butyl acetate	1.51	810	1.1	1.73	1027	0.8
Furfural	1.68	824	1.1	6.73	1413	3.0
4-Methyl-3-hexanone	1.92	844	2.6	1.99	1053	3.0
(3*Z*)-Hexenol	2.14	863	1.4	5.86	1350	1.2
(2*E*)-Hexenol	2.22	870	0.2	6.18	1373	0.2
Hexanol	2.32	878	0.6	5.51	1325	0.7
2-Methylbutyric acid	2.74	912	2.7	9.89*†	1656	11.9
Tiglic acid	3.32*	951	1.7	11.15*†	1760	5.5
5,5-Dimethyl-2(5H)-furanone	3.32*	951	[1.7]	8.63*	1555	8.7
Unknown [m/z 57, 43 (84), 72 (34), 86 (9), 99 (7), 100 (7)...]	3.54	966	3.3			
6-Methyl-5-hepten-2-one	3.89	989	0.2	5.08	1294	0.2
1,8-Cineole	4.49*	1028	2.8	3.45	1177	1.5
Limonene	4.49*	1028	[2.8]	3.24	1160	0.3
Benzyl alcohol	4.67*†	1039	2.6	11.80	1816	1.2
Benzeneacetaldehyde	4.67*†	1039	[2.6]	8.87	1574	0.7
Caproic acid	4.67*†	1039	[2.6]	12.10*†	1843	[18.0]
cis-Linalool oxide (fur.)	5.19	1072	0.3	6.60	1403	1.1
trans-Linalool oxide (fur.)	5.43	1087	0.3	6.99	1432	0.1
2,4-Dimethylheptane-3,5-dione	5.63	1100	5.6	7.63	1479	6.0
Linalool	5.71	1105	4.3	8.15	1518	3.5
endo-Fenchol	5.84	1113	1.0	8.46	1542	0.8
Benzeneacetonitrile	6.13	1131	0.2	12.31	1862	0.1
Unknown [m/z 43, 67 (95), 154 (52), 110 (24), 139 (20), 41 (18), 111 (15)...]	6.18*	1135	1.6			
trans-Pinocarveol	6.18*	1135	[1.6]	9.26	1604	0.9
Borneol	6.65	1165	1.9	9.89*†	1656	[11.9]
Terpinen-4-ol	6.82	1176	3.4	8.67*	1559	8.2
4,6-Dimethyloctane-3,5-dione epimer II	7.05*	1191	13.6	8.67*	1559	[8.2]
4,6-Dimethyloctane-3,5-dione epimer I	7.05*	1191	[13.6]	8.63*	1555	[8.7]
α-Terpineol	7.12	1195	10.4	9.89*†	1656	[11.9]
Myrtenol	7.16	1197	0.5	10.94	1742	0.5
Verbenone	7.27	1205	0.3	9.71	1641	0.4
Unknown [m/z 81, 57 (91), 168 (73), 67 (52), 140 (45), 41 (36), 113 (27)...]	7.41	1214	0.8			
Unknown [m/z 81,	7.50	1220	1.2			

109 (85), 168 (72), 57 (69), 67 (58), 41 (49), 140 (45)...]						
Nerol	7.68	1232	7.2	11.15*†	1760	[5.5]
Geraniol	8.06	1258	0.4	11.70	1807	0.5
2-Acetyl-para-cresol?	8.72	1302	1.2			
Neryl acetate	9.62	1365	0.3	10.28	1687	0.4
Italidione I	10.69	1444	12.0			
Italidione II isomer I	11.22	1483	2.4	12.10*†	1843	[18.0]
Italidione II isomer II	11.30	1489	3.7	12.07†	1839	18.0
Italidione II analog	11.40	1496	tr	12.87	1911	tr
Italidione III isomer I	12.38	1572	0.2	12.96	1920	0.1
Italidione III isomer II	12.44	1577	0.2	12.92	1916	0.1
Italidione III isomer III	12.56	1587	0.1			
Eudesm-5-en-11-ol analog	12.65	1594	0.3	14.37	2052	0.5
β-Eudesmol	13.25	1643	0.1	15.50	2163	0.2
Neointermedeol	13.30	1647	0.1	15.70	2184	0.1
Unknown [m/z 98, 82 (77), 83 (42), 137 (37), 41 (28)... 238 (1)]	14.85	1779	0.3	19.60	2613	0.2

*: 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
††: As Tetradecane equivalents

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