

Date : 2024-02-27

CERTIFICATE OF ANALYSIS - GC PROFILING

SAMPLE IDENTIFICATION

Internal code : 24B09-NPA05

Customer Identification : Blood Orange - Italy - NPS00133 - Lot# NP0298

Type : Essential Oil

Source : *Citrus sinensis*

Customer : Nature Packaged

Checked and approved by:



Sylvain Mercier, M. Sc., Chimiste 2014-005

Notes: 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 2024-02-22 to format it for online publication.

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 : Benoit Roger, Ph. D.

Date : 2024-02-22

PHYSICOCHEMICAL DATA

Refractive index : 1.4732 ± 0.0003 (20 °C)

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

Analyst : Cindy Caron B. Sc.

Date : 2024-02-12

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
α -Thujene	0.01	Monoterpene
α -Pinene	0.50	Monoterpene
Camphene	tr	Monoterpene
Sabinene	0.37	Monoterpene
β -Pinene	0.05	Monoterpene
Myrcene	1.85	Monoterpene
α -Phellandrene	0.04	Monoterpene
Octanal	0.28	Aliphatic aldehyde
Δ^3 -Carene	0.18	Monoterpene
Limonene	93.96	Monoterpene
1,8-Cineole	0.26	Monoterpenic ether
(Z)- β -Ocimene	tr	Monoterpene
γ -Terpinene	0.06	Monoterpene
<i>cis</i> -Sabinene hydrate	0.01	Monoterpenic alcohol
Octanol	0.07	Aliphatic alcohol
Terpinolene	0.03	Monoterpene
Linalool	0.48	Monoterpenic alcohol
Nonanal	0.03	Aliphatic aldehyde
<i>trans-para</i> -Mentha-2,8-dien-1-ol	0.01	Monoterpenic alcohol
<i>cis</i> -Limonene oxide	0.01	Monoterpenic ether
<i>trans</i> -Limonene oxide	0.02	Monoterpenic ether
Citronellal	0.01	Monoterpenic aldehyde
α -Terpineol	0.08	Monoterpenic alcohol
Decanal	0.27	Aliphatic aldehyde
Octyl acetate	0.01	Aliphatic ester
<i>trans</i> -Carveol	0.02	Monoterpenic alcohol
Nerol	0.01	Monoterpenic alcohol
Neral	0.04	Monoterpenic aldehyde
Geraniol	0.01	Monoterpenic alcohol
Geranial	0.04	Monoterpenic aldehyde
Perillaldehyde	0.01	Monoterpenic aldehyde
Decanol	0.03	Aliphatic alcohol
Limonen-10-ol	0.01	Monoterpenic alcohol
Undecanal	0.01	Aliphatic aldehyde
α -Copaene	0.03	Sesquiterpene
Geranyl acetate	0.21	Monoterpenic ester
β -Elemene	0.02	Sesquiterpene
Dodecanal	0.03	Aliphatic aldehyde
β -Caryophyllene	0.02	Sesquiterpene
β -Copaene	0.02	Sesquiterpene

α-Humulene	0.01	Sesquiterpene
Germacrene D	0.02	Sesquiterpene
Valencene	0.02	Sesquiterpene
α-Murolene	0.01	Sesquiterpene
γ-Cadinene	0.02	Sesquiterpene
δ-Cadinene	0.04	Sesquiterpene
α-Elemol	0.01	Sesquiterpenic alcohol
Caryophyllene oxide	0.01	Sesquiterpenic ether
β-Sinensal	0.02	Sesquiterpenic aldehyde
α-Sinensal	0.02	Sesquiterpenic aldehyde
Nootkatone	0.01	Sesquiterpenic ketone
Palmitic acid	0.02	Aliphatic acid
Linoleic acid	0.02	Aliphatic acid
Oleic acid	0.02	Aliphatic acid
Stearic acid	0.06	Aliphatic acid
Tangeretin isomer	0.02	Flavonoid
Consolidated total	99.39	

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

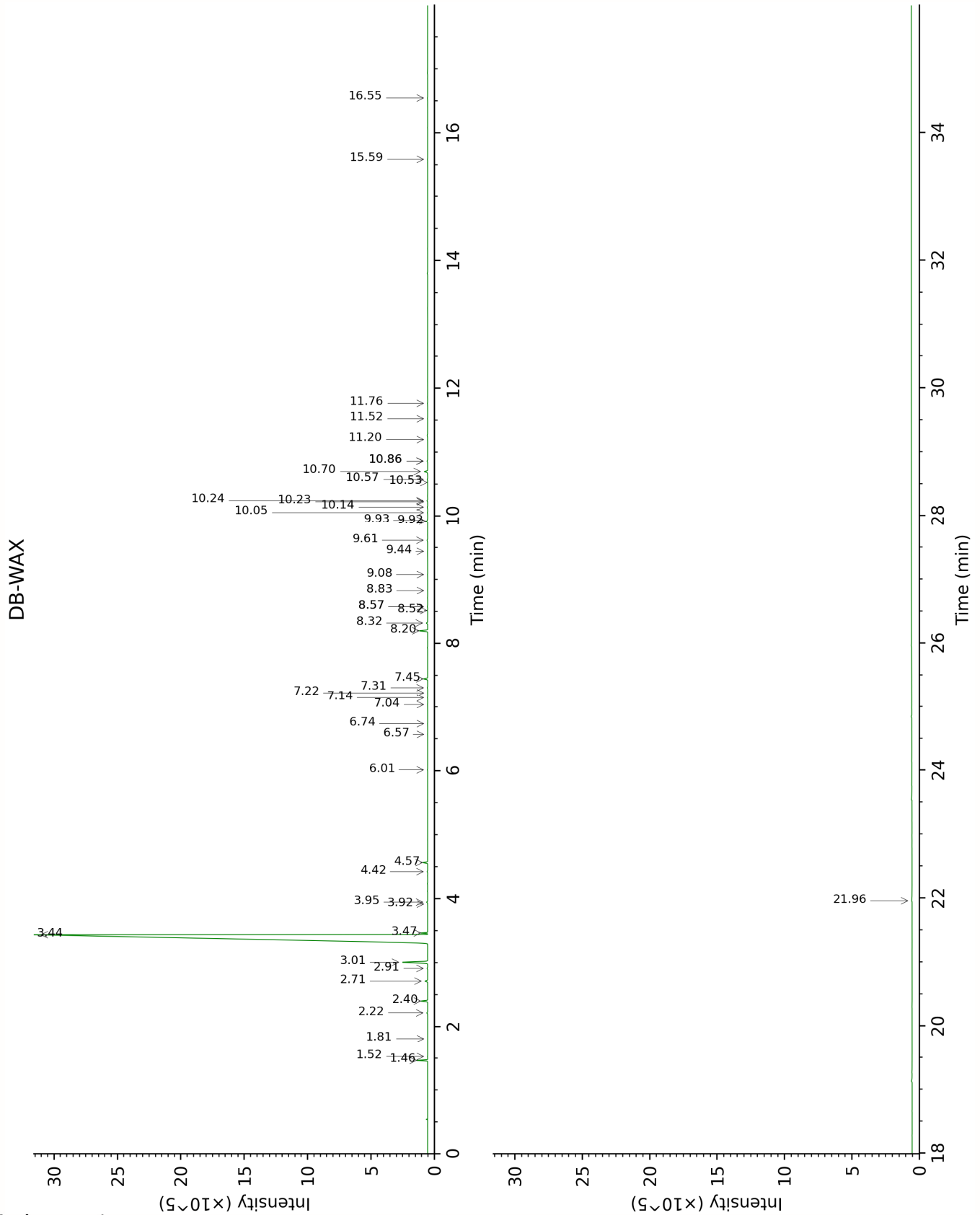
Note: no correction factor was applied

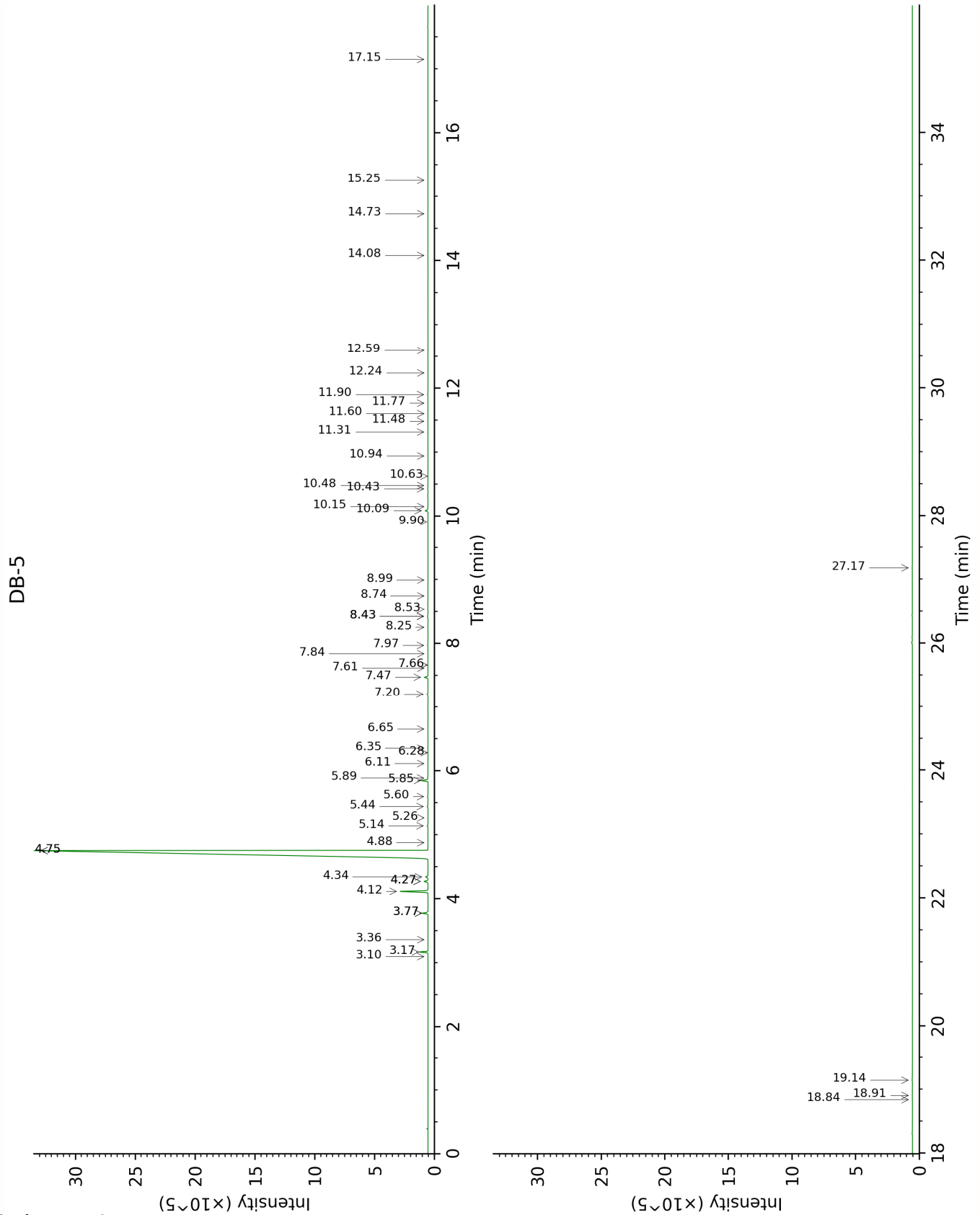
About "consolidated" data: The table above presents the breakdown of the sample volatile constituents after applying an algorithm to collapse data acquired from the multi-columns system of PhytoChemia into a single set of consolidated contents. In case of discrepancies between columns, the algorithm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

α-Thujene	Column DB-WAX			Column DB-5		
	1.52	1001.5	0.01	3.10	926.4	0.01
α -Pinene	1.46	992.4	0.51	3.17	931.2	0.50
Camphene	1.81	1028.9	tr	3.36	943.9	tr
Sabinene	2.40	1084.9	0.37	3.77*	971.1	[0.41]
β -Pinene	2.22	1067.3	0.05	3.77*	971.1	[0.41]
Myrcene	3.01	1134.5	1.86	4.12	993.5	1.85
α -Phellandrene	2.91	1127.1	0.04	4.27*	1003.8	[0.31]
Octanal	4.57	1250.3	0.28	4.27*	1003.8	[0.31]
Δ^3 -Carene	2.71	1112.0	0.17	4.34	1008.3	0.18
Limonene	3.44	1167.2	93.96	4.75*	1033.9	[94.27]
1,8-Cineole	3.47	1169.4	0.26	4.75*	1033.9	[94.27]
(Z)- β -Ocimene	3.92	1203.8	0.01	4.88	1041.7	tr
γ -Terpinene	3.95	1206.0	0.06	5.14	1058.1	0.06
<i>cis</i> -Sabinene hydrate	7.04	1427.7	0.01	5.26	1066.0	0.01
Octanol	8.32	1524.3	0.08	5.44	1077.0	0.07
Terpinolene	4.42	1240.1	0.03	5.60	1086.7	0.03
Linalool	8.20	1514.9	0.51	5.85	1102.5	0.48
Nonanal	6.01	1353.1	0.02	5.89	1104.9	0.03
<i>trans-para</i> -Mentha-2,8-dien-1-ol	9.08	1583.1	0.01	6.11	1119.2	0.01
<i>cis</i> -Limonene oxide	6.57	1393.1	0.01	6.28	1130.1	0.01
<i>trans</i> -Limonene oxide	6.74	1405.3	0.01	6.35	1134.6	0.02
Citronellal	7.14	1435.8	0.02	6.65	1153.6	0.01
α -Terpineol	9.92	1650.6	0.08	7.20	1188.8	0.08
Decanal	7.45	1458.3	0.26	7.47	1206.0	0.27
Octyl acetate	7.22	1441.8	0.01	7.61	1215.4	0.01
<i>trans</i> -Carveol	11.52	1784.7	0.01	7.66	1218.8	0.02
Nerol	11.20	1757.1	0.01	7.84	1230.6	0.01
Neral	9.61	1626.0	0.05	7.97	1239.3	0.04
Geraniol	11.76	1805.3	0.01	8.25	1258.2	0.01
Geranial	10.24	1677.0	0.04	8.42*	1269.7	[0.06]
Perillaldehyde	10.86*	1728.5	[0.04]	8.42*	1269.7	[0.06]
Decanol	10.86*	1728.5	[0.04]	8.53	1277.0	0.03
Limonen-10-ol				8.74	1290.9	0.01
Undecanal	8.83	1563.7	0.01	8.99	1307.6	0.01
α -Copaene	7.31	1447.9	0.03	9.90	1372.1	0.03
Geranyl acetate	10.70	1714.7	0.23	10.09	1384.8	0.21
β -Elemene	8.57*	1544.0	[0.03]	10.15	1389.3	0.02
Dodecanal	10.14	1668.9	0.04	10.43	1409.1	0.03

β-Caryophyllene	8.57*	1544.0	[0.03]	10.48	1412.9	0.02
β-Copaene	8.52	1539.6	0.02	10.63	1423.8	0.02
α-Humulene	9.44	1611.8	0.01	10.94	1447.3	0.01
Germacrene D	9.93	1651.9	0.02	11.32	1475.1	0.02
Valencene	10.06	1661.8	0.02	11.48	1487.6	0.02
α-Muurolene	10.23	1675.7	0.01	11.60	1496.5	0.01
γ-Cadinene	10.53	1700.2	0.01	11.77	1508.9	0.02
δ-Cadinene	10.58	1704.2	0.03	11.90	1519.4	0.04
α-Elemol				12.24	1545.9	0.01
Caryophyllene oxide				12.59	1573.7	0.01
β-Sinensal	15.59	2163.6	0.01	14.08	1694.6	0.02
α-Sinensal	16.55	2261.8	0.02	14.73	1750.4	0.02
Nootkatone				15.25	1795.6	0.01
Palmitic acid	21.96	2890.9	0.05	17.15	1970.6	0.02
Linoleic acid				18.84	2138.1	0.02
Oleic acid				18.90	2144.9	0.02
Stearic acid				19.14	2169.7	0.06
Tangeretin isomer				27.17	3140.3	0.02
Total reported		99.33%			99.43%	

*: 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