GC-LC Concordance

Imagine…

A Unique Software that Compares Complex Chromatograms, Essential Oils, Fragrances, Aroma etc. in Seconds

The Problem

Today's chromatography instruments are highly efficient but analytical interpretation of results are still based on old **manual and tedious controls.** Therefore, they are **subject to error**.

The Solution

An Intelligent Software based on **neuronal algorithms** solving random Retention Time Shifts

GC–LC Concordance

The Team

Raymond Loyer & Engineer team - 30 years of Experience in Chromatography analysis (Perkin Elmer, Varian and Thermo Fisher).

GC-LC Concordance

David Loyer
david@spectrochrom.com

Typical Industries Using GC-LC Concordance






- **Fragrance Industry**
- **Essential Oils**
- **Food Aroma etc.**
- **Wine Industry**
  (wine's vintage recognition, etc.)
- **Environment**
  (pollution, fire residues, etc.)
- **Oil and Petrol Industry**
- **Pharmaceutical**

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GC-LC Concordance Compatibility

Requires No Modification of Your Current Chromatographic Methods!

PerkinElmer

Waters
THE SCIENCE OF WHAT'S POSSIBLE.™

SHIMADZU

Thermo SCIENTIFIC

Agilent Technologies

VARIAN

...

GC, HPLC, GC-MS ...

GC-LC Concordance

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Some of Our Clients (11 countries)...

ROBERTET GROUPE

YVES ROCHER

sisley PARIS

Red Bull

Givaudan

eurofragance

Parfex Créateur de parfums

IFF

Silesia

SOZIO DEPUIS 1758

MG INTERNATIONAL FRAGRANCE COMPANY

LABORATOIRES ASEPTA MONACO

Metarom

EVER NEURO PHARMA

PEAKEXPERT High-Performance Polymers and Additives Characterization

PyrenEssences Analyses & Productions

SFA SOCIÉTÉ FRANÇAISE D'AROMATIQUES

Instituts thématiques Inserm

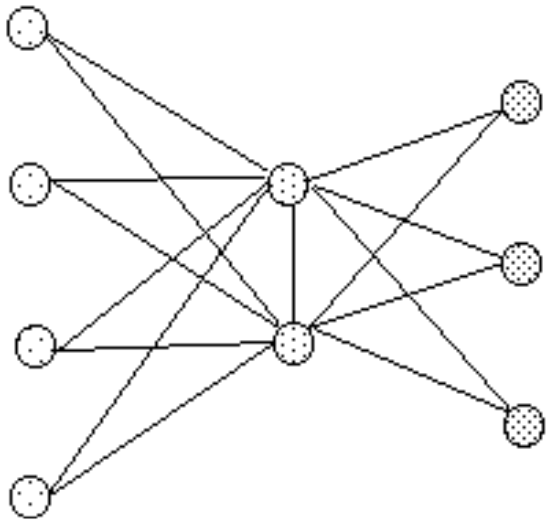
cnrs

CRÉATIONS & PARFUMS

. . .

GC-LC Concordance

The Key of Concordance: a Specific NEURONAL Process Up to 100 Millions Calculations for One Comparison of Two Chromatograms!



Automatic Mode in RT & RI (Kovats) for:

- Quality Control
- Norm
- Fingerprint Database

Or With Settings & RI Databases for:

- Identification
- Quantification
- Research
- Etc.

GC-LC Concordance

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GC-LC Concordance Solves Retention Time Shifts in GC, GC-MS, LC and LC-MS

GC-LC Concordance

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The Reasons for the Random Shifts in GC and HPLC

- Ageing of the Columns
- Injection mode
- Gas Control
- Temperature Control
- Chemistry of the Injected Product
- Reconditioning of the Gas Chromatograph
- Sample Impurities
- Phase Oxidation (O2 in Carrier Gas)
- Quality and Accuracy of HPLC Pumps
- Etc.

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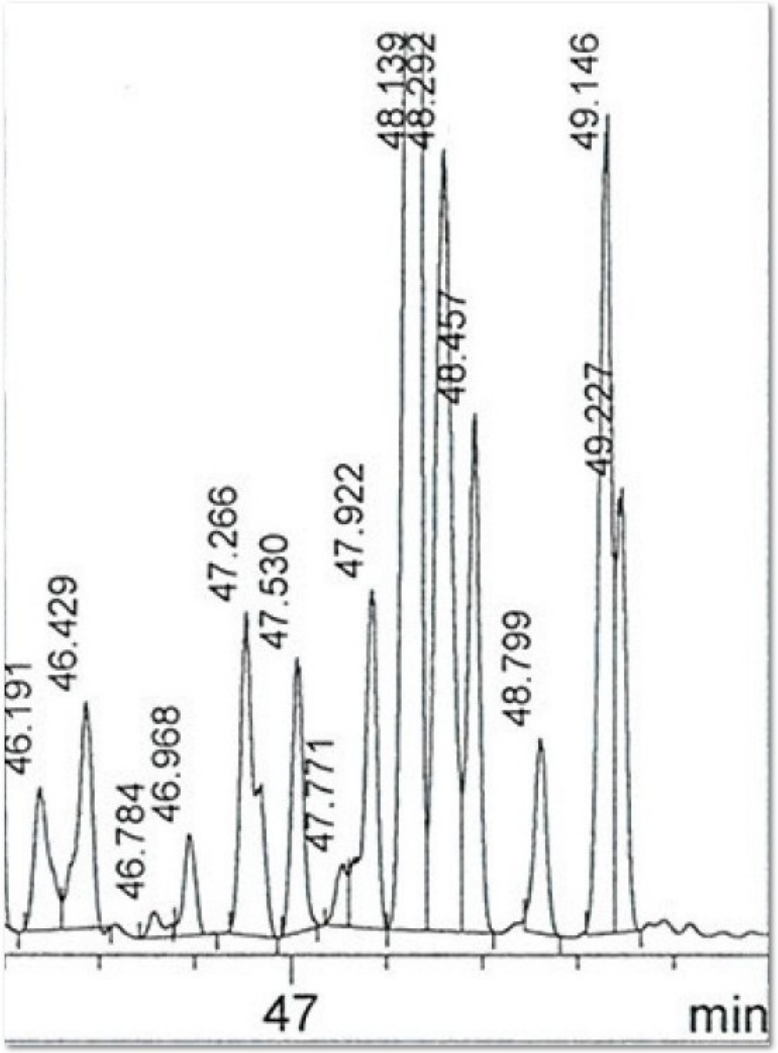
Concordance Works with the Peak's Integration

We use the integration of the peaks and calculate the difference between their areas.

NO NEED TO CHANGE YOUR CURRENT METHODS!



GC·LC Concordance

Examples of Integration Files Formats

PERKIN ELMER – TOTALCHROM - FID

```
1,#essai ,5.039,1935.21,516.48,0.03,0.03,,,BB,0.0019,0.0019
2,#,7.551,2657.94,810.18,0.05,0.05,,,BB,0.0027,0.0027
3,#,9.580,2940.49,863.38,0.05,0.05,,,BB,0.0029,0.0029
4,#,11.924,2495.87,805.97,0.04,0.04,,,BB,0.0025,0.0025
5,#,13.186,163960.46,52378.07,2.92,2.92,,,BB,0.1640,0.1640
6,#,13.698,19262.49,6048.78,0.34,0.34,,,BB,0.0193,0.0193
7,#,14.219,83459.98,30270.36,1.49,1.49,,,BV,0.0835,0.0835
8,#,14.405,3799.23,1163.11,0.07,0.07,,,VB,0.0038,0.0038
9,#,15.082,14126.68,4491.01,0.25,0.25,,,BB,0.0141,0.0141
10,#,16.471,1877.07,564.65,0.03,0.03,,,BB,0.0019,0.0019
11,#,17.560,833.70,349.40,0.01,0.01,,,BB,0.0008,0.0008
12,#,17.774,54793.98,17655.18,0.98,0.98,,,BB,0.0548,0.0548
13,#,18.657,72587.65,26258.21,1.29,1.29,,,BB,0.0726,0.0726
14,#,19.562,147463.98,51542.80,2.63,2.63,,,BB,0.1475,0.1475
15,#,20.962,660771.76,124651.57,11.76,11.76,,,BV,0.6608,0.6608
16,#,21.037,579184.93,181339.56,10.31,10.31,,,VB,0.5792,0.5792
17,#,22.057,717657.62,175360.34,12.78,12.78,,,BV,0.7177,0.7177
18,#,22.257,762619.54,177831.82,13.58,13.58,,,VV,0.7626,0.7626
19,#,22.545,185673.12,59045.52,3.31,3.31,,,VV,0.1857,0.1857
20,#,22.748,45221.52,14863.15,0.81,0.81,,,VB,0.0452,0.0452
21,#,23.683,155291.26,49401.35,2.76,2.76,,,BB,0.1553,0.1553
```

AGILENT - HPCHEM - GC/MS

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1,0.8362,0.0049,#ACETALDEHYD!,1494,75,2
2,0.9377,0.0066,#)(\HEXANE,821,110,64
3,1.0518,0.0018,#ACETALDEHYD!,1494,75,4
4,1.2041,0.0005,#ESSIGSAEURESOBRERYLESTER!SOBRERYLACETAT,2633,0,7
5,1.3436,0.0007,#ESSIGSAEURE-1-(3.3-DIME-CYCLOHEXYL)-ETHYLESTER P.2!ROSAMUSK,2820,0,9
6,1.4155,0.0006,#ACETALDEHYD!,1494,75,2
8,1.9483,1.4433,#ETHANOL DBW=921,377,64,78
9,2.2485,0.1027,#DIACETYL,10134,0,64
0,2.5,0.494,#aaa,0,0,0
10,2.7222,0.0037,#PROPANAL-1.2-PROPANDIOLACETAL PEAK 1!DIOXOLAN. 2-ETHYL-4-MET,2500,0,59
11,2.8617,3.2464,#BUTYRATE ETHYLE (4.5 08/03),8,105,96
12,3.0604,4.6156,#METHYL 2 BUTYRATE ETHYLE (* 3.2 01/06 7.2 10/04),1100,7452,90
13,3.2338,2.5259,#ISOVALERATE D'ETHYLE,11774,108,97
14,3.6694,0.0039,#CROTONSAEURE!BUTENSAEURE. 2E-,2423,3724,9
15,3.8935,0.5855,#ACETATE ISOAMYLE (8.9 07/04),2,123,90
16,4.4432,0.3398,#ETHYL CROTONATE,9412,0,91
17,4.7942,0.009,#METHYLE HEXANOATE I(DBW)=1174 CAPROATE METHYLE/ n-CAPROIC AC,2280,106,78
18,5.0521,0.0043,#ESSIGSAEURE-2-ETHYLHEXYLESTER!HEXYLACETAT. 2-ETHYL-,1087,0,10
19,5.2001,0.0025,#HEXANSAEUREHEXYLESTER!HEXYLHEXANOAT,1032,6378,9
20,5.5088,4.8227,#ETHYLE HEXANOATE DBW=1221 apo=973 INNO=1225 ETHYLE CAPROATE,2312,123,97
21,5.9613,0.0105,#MILCHSAEUREISOPROPYLESTER!PROPYLLACTAT. ISO-,2471,0,4
22,6.0755,0.6055,#HEXYL(n)ACETATE,13039,142,90
23,6.2066,0.5554,#methyl-2 butyrate d'isoamyle ICW=1280 IHP1= 10 86,1493,27625,78
24,6.4645,2.4759,#isovalerate d'isoamyle,3807,659,90
25,6.7351,0.9035,#ACETATE CIS 3 HEXENYLE (* 7.2 10/05),628,3681,90
26,7.0311,0.0092,#ETHYL HEPTANOATE,638,106,50
27,7.2722,0.0099,#ALCOHOL C-6,8937,0,72
28,7.4244,0.0483,#TRANS 3 HEXENOL (16.2 05/04),637,0,94
```

THERMO FISHER – FID

RT

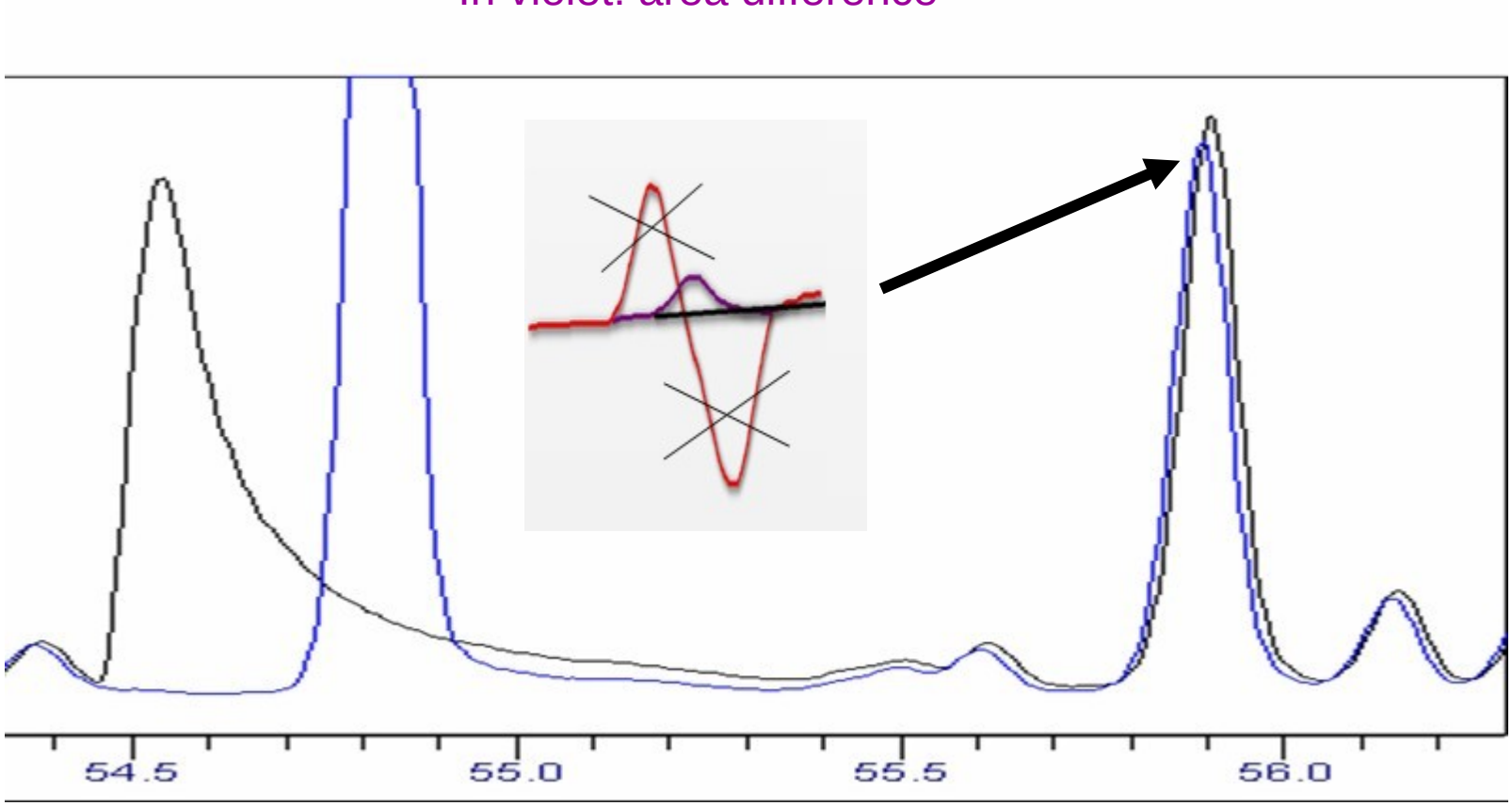
AREA

```
1  , 4.57176923751831 , 757.99  , 0.027055334299802 , 3.73185205459595 , 2.02925157546997 ,#(kov)
2  , 7.99165391921997 , 926.94  , 0.0303809009492397 , 27.9064025878906 , 14.5469875335693 ,#
3  , 8.28804492950439 , 936.66  , 0.0310654919594526 , 168.048797607422 , 85.0001068115234 ,#>> 939.00  a-pinene   >    alpha-pinene
4  , 8.73407745361328 , 951.28  , 0.0326740778982639 , 19.0451183319092 , 9.30687427520752 ,#
5  , 9.33362483978272 , 970.94  , 0.0322244539856911 , 76.5767822265625 , 36.8799133300781 ,#
6  , 9.57537174224854 , 978.86  , 0.0338628515601158 , 326.947021484375 , 152.192642211914 ,#  Beta-pinene
7  , 9.68675899505615 , 982.52  , 0.0349751561880112 , 191.222137451172 , 85.2306289672852 ,#
8  , 10.3569860458374 , 1003.52 , 0.0384303741157055 , 3.06267189979553 , 1.23935866355896 ,#
9  , 10.6651401519775 , 1011.45 , 0.0352791547775269 , 6.14358425140381 , 2.70685195922852 ,#
10 , 10.7818384170532 , 1014.45 , 0.0368611551821232 , 11.8893871307373 , 5.08817481994629 ,#
11 , 10.8776426315308 , 1016.92 , 0.0385446175932884 , 52.4783020019531 , 21.7536029815674 ,#
12 , 11.3234519958496 , 1028.39 , 0.0548498257994652 , 7671.587890625 , 2013.54809570312 ,#  LIMONENE --)    >
13 , 11.6809883117676 , 1037.59 , 0.0347108729183674 , 6.68874931335449 , 3.01168608665466 ,#
14 , 12.274715423584  , 1052.86 , 0.0372447669506073 , 622.413452148438 , 255.283874511719 ,#   DHM       gamma- terpinène
15 , 12.4697504043579 , 1057.88 , 0.051121711730957 , 3004.03759765625 , 797.944885253906 ,#>> 1059  DHM  <-§  DHM       dihydromyrcenol
16 , 13.5460376739502 , 1085.57 , 0.0431506894528866 , 382.366760253906 , 136.209197998047 ,#
17 , 13.6705341339111 , 1088.77 , 0.0410433001816273 , 75.3718490600586 , 27.2719669342041 ,#
18 , 13.8595991134644 , 1093.64 , 0.039554875344038 , 80.2407608032227 , 32.1092872619629 ,#
```

GC·LC Concordance

GC-LC Concordance Compensates Small RT Shifts…

In red: random envelop difference (first derivative)
In violet: area difference



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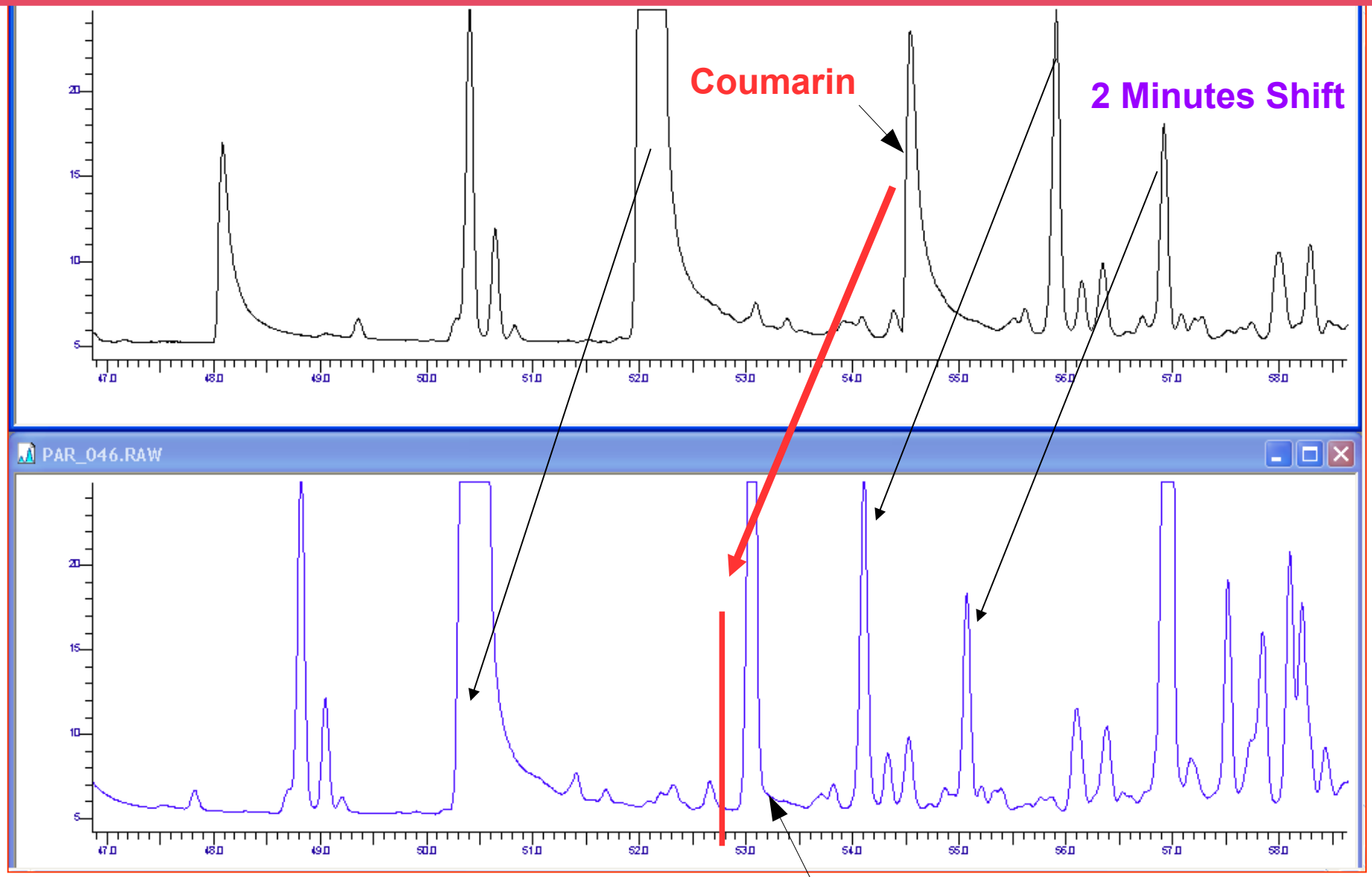
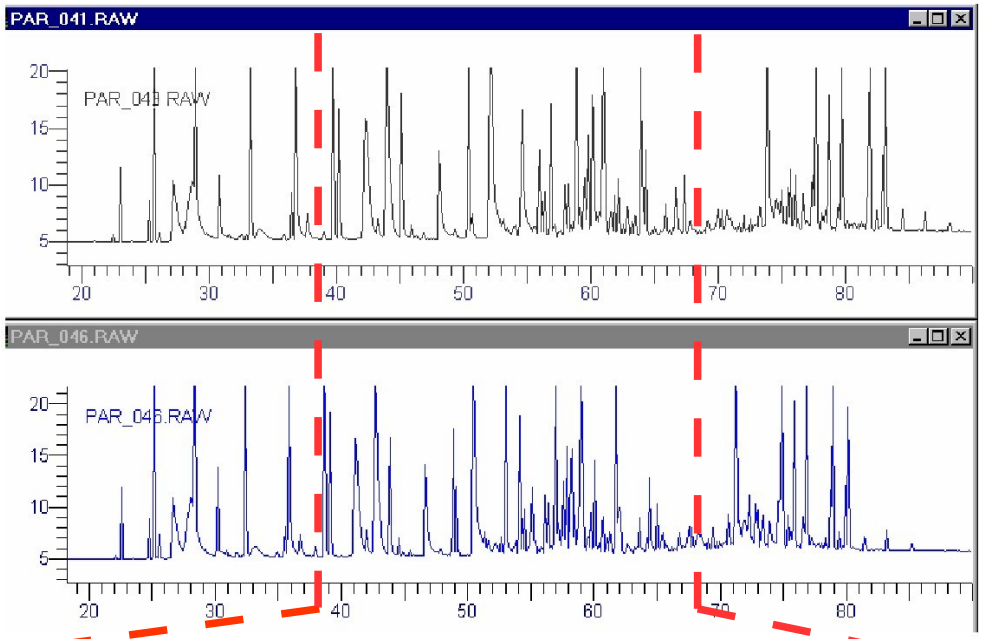
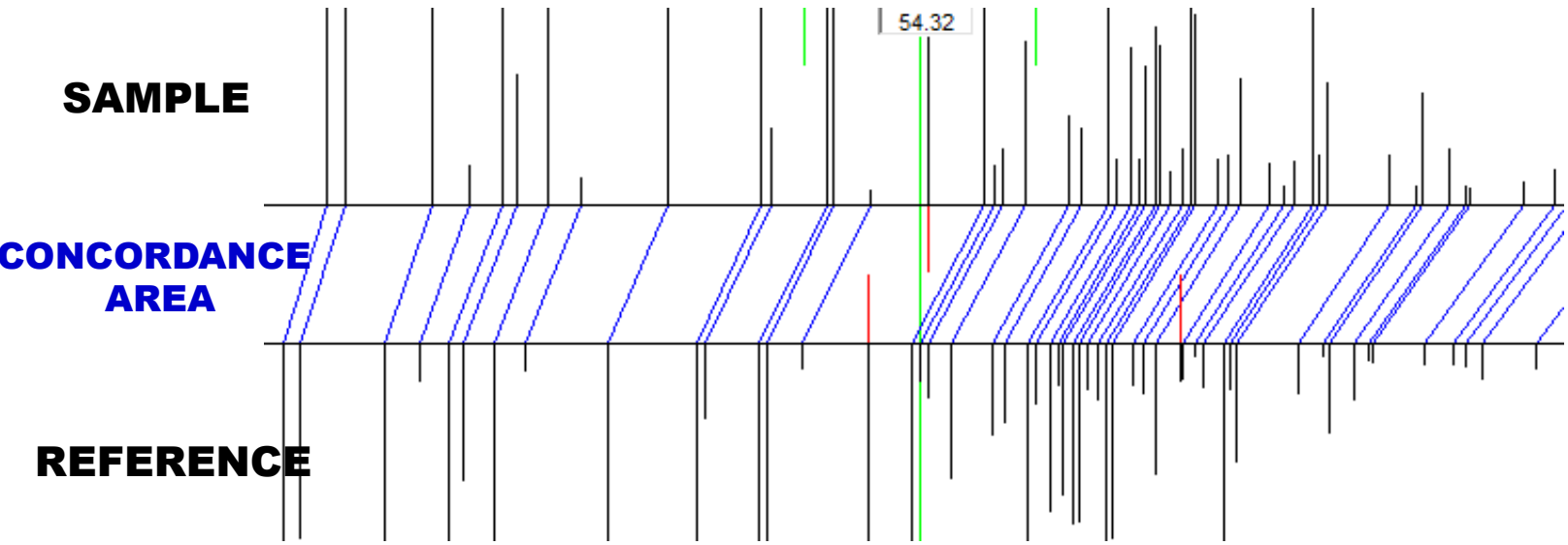
… And Big RT Shifts Due To the Ageing of HPLC/GC Columns



GC-LC Concordance

Representation of Chromatograms (Sample/Ref) in GC-LC Concordance





GC·LC Concordance

1

Improving the Quality Control

Of Flavours, Fragrances and Aromas in Gas/Liquid Chromatography

Improving Productivity and Accuracy (LIVE)

GC-LC Concordance

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2

Controlling the Composition of a Sample

Following the Norms and Specifications Imposed by your Clients

LIVE

GC-LC Concordance

David Loyer

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3

Automatic Comparison of a Complex Chromatogram Fingerprint

to Thousands of them within a few seconds
(Electronic Nose, Origin of a Product, Counterfeiting…)

LIVE

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Some Other Applications of GC-LC Concordance

1. Quality Control in RI (Kovats index) after RT to RI Conversion

2. Molecular Identification in RI (Kovats index) with personal database of RI

3. Raw Material Identification in a Mixture in RI

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Benefits of GC-LC Concordance for Your Laboratory

1. Improve and simplify the interpretation of complex products
2. Remove the arduous nature of manual work
3. Increase the acuracy of your quality control
4. Increase the speed of your quality control (x100)
5. Save your standards samples for months

Reduce dramatically the cost of your Quality Control!

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Some Testimonials...

GROUPE YVES ROCHER - Caroline De-Saint-Orens – France / Ireland

*'We are using GC-LC Concordance and **we could not work without it anymore**. Indeed, your software is saving us a lot of time in analyzing our quality control of concentrates. We will shortly use it with the norm methods and with retention indices.'*

FRAGRANCE RESOURCES - Laurent Viennet - France

*'Concordance is a **powerful** but simple GC complementary operating tool, having the advantage of flexibility, **with a very good support!'***

EVER NEURO PHARMA - Anna-Sophie Fischer – Austria / China / Vietnam

*'We use GC-LC Concordance to evaluate very complex chromatograms in one method of our quality control testing. We needed an objective method to evaluate the consistency of our product. **With GC-LC Concordance we found the solution!** We are very pleased we found a company that's easy to work with and has a great support!'*

Price of GC-LC Concordance (2021)

- GC-LC Concordance Software in RT
  €5,700
- Installation, Training, Support (5 hours)
  €800
- One Year of Free Updates
- Retention Index Option
  €2,600

Contact Us

International

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  david@spectrochrom.com

French speaking countries

- **Raymond LOYER (France)**
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Visit our websites:
www.chromatography-gc.com (English)
www.spectrochrom.com (French)

GC-LC Concordance