GIBNIK

ANALYTICAL SOLUTIONS

KONIK MULTIDIMENSIONAL

HPLC+GC-MS TRIPLE ANALYZER

THE BEST OF ALL WORLDS!

THE POWER OF HPLC,GC & MS COUPLED IN PERFECT SINERGY!

Opening new dimensions: The KONIK Multidimensional HPLC+GC K2 and HPLC+GC-MS K2Q2® Triple Analyzers:

Small and medium size molecules play a key role in our lives. They are a substantial part of who we are and everything that interacts with us daily including the air we breath, the water we drink, the foods we eat, the drugs we take, etc etc, . **On the other hand the ever-increasing production and use of chemicals augment their occurrence in the environment and more specifically in drinking water and its sources. Monitoring chemicals, using targeted chemical analyses alone, is no longer sufficient. Complementary methods that can detect simultaneously the multitude of chemicals of different MW, volatilities and polarities that interact with humans in our daily lives are required.** Most of the compounds are **unknown** hence we are to refer to them and the new methodologies to be applied as ***"unknown or non-target screening" as oposed to "target" screening.***

The patented KONIK HPLC+GC K2 and HPLC+GC-MS K2Q2 are one step beyond tandem MS-MS, opening advantageously the innovative world of Multidimensional HPLC+GC to the Quali/Quanti analysis of organics both target and unknown, in any matrix, with easy sample handling, as samples can be injected directly into the HPLC.

GIBNIK (KONIK) has been developing and manufacturing GC□s and HPLC□s Systems, with innovative designs and unmat ched performances since 1978. Unique cold septum injectors, high precision ovens, pulse free pumps, multidimension multivalve systems, multimode autosamplers, multifunctional mass spectrometers ... are only a few of its impressive trackrecord of innovation. The new Multidimensional Platforms **KONIK HPLC+GC and KONIK HPLC+GC-MS**, fully conceived, engineered and manufactured by **GIBNIK**, based on **Patent No.: US 6,402,947 B1** and others, are the next natural step. GIBNIK is proud to offer to the world again a technologycal breakthru with unmatched advantages and

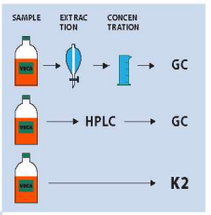
The first KONIK HPLC+GC-MS K2Q12 introduced in 2010

Designed around State-of-the-art new gen

Multidimensional HPLC+GC: A world of proven advantages

Simplify tedious sample preparation. On-line HPLC clean-up or fractionation

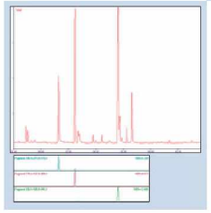
Minimize use of solvents



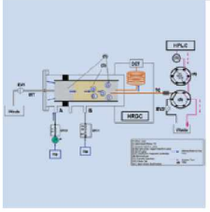
Minimum manipulation guarantees sample integrity

Minimum total analysis time

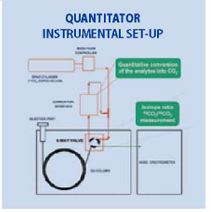
Reduce total cost per analysis



Lower detection limits by concentration of analytes



Extend the limits to polar non-volatiles with the KONIK On-line DERIVATIZER®



Absolute quantitative analysis with the KONIK QUANTITATOR®

eneration of KONIK GC⊠s, HPLC⊠s AND MS⊠s

KONIK K2 HPLC+GC with RoboKrom since 2010

HPLC+GC COUPLING: The challenges to be met

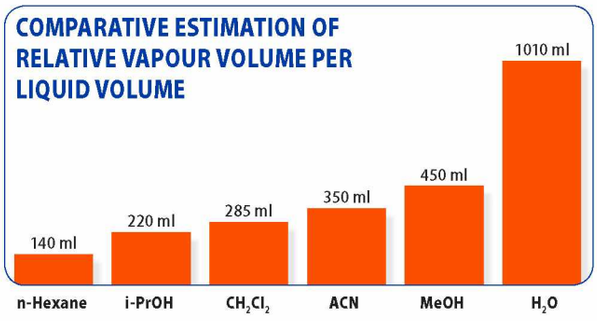
PATENTED

A) Selective elimination of HPLC solvents vs analites of interest

The power of a unique, patented, HPLC+GC interface

The concept of this coupling interface at the heart of this system is not to be missed.
The patented HPLC+GC Adsorption/Desorption interface, is capable of trapping any analyte by the convenient use of any adsorbent of your choice, among other Tenax, following the pioneering work by Albert Zlatkis, et al. Anal. Chem., 1973, 45 (4), pp 763–767 (Profile of volatile metabolites in urine by gas chromatography-mass spectrometry) at the U. of Houston, Texas, where Prof. Dr. Josep M. Gibert, Scientific Director of the KONIK Development Programme since 1978, was at the time working on his PhD under guidance of Professors Zlatkis and Oró. Fortunately at GIBNIK we have followed the track of Tenax, as a unique adsorbent of organics since the initial discovery of its unique properties, later amplified when adapted as the main adsorbent for the EPA Purgeable Organics Official methods and other.

PROBLEMS WITH WATER TRANSFER



- Water does not wet surfaces (uncoated precolumns)
- Has high chemical reactivity
- Has high boiling point
- Produces large volume of vapour per unit volume of liquid

THE KONIK HPLC+GC® INTERFACE OVERCOMES NICELY ALL THESE PROBLEMS

B) Selective elimination of reagents and solvents excess with the On-line Derivatization option

In order to extend the application limits to polar non-volatile substances, of any functionality. Any active hydrogen of any functional group can be derivatized with either selective or universal derivatization reagents. (See page 6)

HPLC+GC KONIK Interface: Operational Principles

The following are the main objectives achieved in this unique, patented, interface after the pioneering work of Prof. Dr. J. Villen et al. in the Journal of Chromatography:

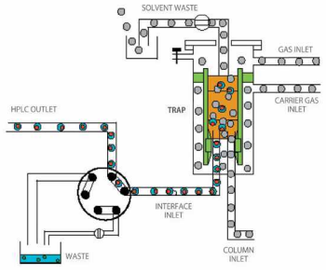
Title: "Automated determination of pesticide residues in olive oil by on-line reversed-phase liquid chromatography–gas chromatography using the through oven transfer adsorption desorption interface with electron-capture and nitrogen–phosphorus detectors operating simultaneously". Authors: Eva M. Díaz-Plaza, Jose M. Cortés, Ana Vázquez, Jesús Villén. Published at: Journal of Chromatography A, 1174 (2007) 145–150

Title: "Large volume injection of water in gas chromatography–mass spectrometry using the Through Oven Transfer Adsorption Desorption interface: Application to multiresidue analysis of pesticides" Authors: Rosa M. Toledano, Jose M. Cortés, Juan C. Andini, Jesús Villén, Ana Vázquez. Published at: Journal of Chromatography A, 1217 (2010) 4738–4742

1. Selectively eliminate any HPLC solvent from any analyte of interest
2. Trap and desorb quantitatively all analytes of interest
3. Use any HPLC solvent in both NP-HPLC and RP-HPLC including water and methanol
4. Use the interface as a high volume "concentrator" of any volatile, semivolatile and non-volatile (apolar, semipolar and polar) substances up to MW∼1.200
5. Use the interface as an "on-line derivatization media" for polar non-thermally desorbable substances
6. Use the interface to selectively eliminate, HPLC solvents, the derivatizating reagents and the solvent used as derivatization media
7. Ability to analyze single or multiple on-line HPLC fractions sequentially.

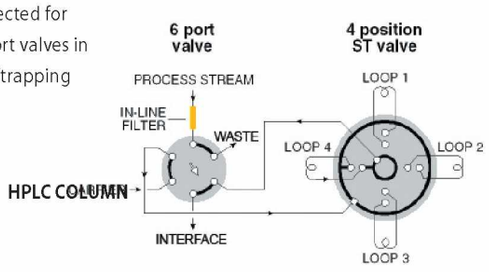
Flow diagram: Fluidodinamics of the KONIK HPLC+GC coupling interface

By commuting Valve 3 (V3 in the figure) the HPLC fraction of interest, as a result of the HPLC method developed, is sent over to the trap where an adjusted flow of Gas is selectively eliminating the HPLC solvent while the analytes of interest are retained in the trap adsorbent. After completing the drying process of the trap valve 3 (V3) is switched over and V1 and V2 closed so the trap can be heated to desorb the analytes retained into the GC (GC-MS).

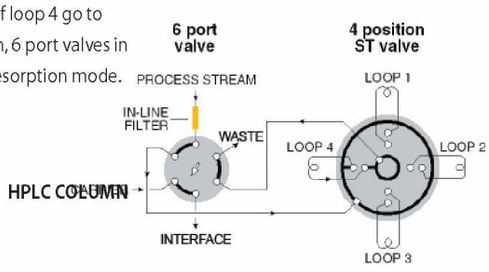


Single or multiple fractions: The system allows to analyze multiple fractions

Loop 4 selected for filling, 6 port valves in collection/trapping mode.



Contents of loop 4 go to the column, 6 port valves in analysis/desorption mode.



By using multiple port valves as per diagrams above, or similar valving arrangements, multiple fractions can be sequentially analysed. GIBNIK will deliver "Turn Key" Engineered Solutions as per the unique sales policies outlined in the bottom of page 19.

How to develop and adjust a method: Looks complex. It is straightforward

1· Select the HPLC Column and conditions best suited for the clean up or fractionation of the analytes of your interest. You have hundreds of columns to choose from, solvent gradients, column flows and temperatures to optimize any HPLC separation as per your defined objectives.

2· Prepare a solution of standards: with only a few compounds related to your interest. Make them to be inclusive of the lowest MW/volatility as well as of the high MW/volatility expected to be found or searched in your sample. Use the HPLC detector of choice (UV-VIS, Fluorescence and RI) in accordance.

3· Define the trapping material of the HPLC+GC interface. GIBNIK offers a wide variety of proprietary packings ranging from preconditioned and pre-treated TENAX-TA, to carboxen, and proprietary organic polymers bound to spherical graphitised carbon and mixes of all of them. The limit is the user experience and imagination!

4· Optimize the KONIK HPLC+GC interface fluidodinamics: Set in accordance the flow of drying gas as well as the time needed to eliminate selectively the HPLC solvents being used. Regulate intelligently the vacuum applied to the trap exhaust to shorten the time and hence reduce the consumption of drying gas.

5· Choose the right GC column and conditions. You have hundreds of options. GIBNIK has developed the KONIK "PeakSym" KAP,s, a new class of unmatched stability and inertness GC columns, binding the phases by the use of nanoparticles, that are ideally suited for GC-MS and hence for HPLC+GC-MS.

6· Select the MS ionization mode and scanning mode: In the KONIK MSQ12 you have EI, CI or dual EI/CI as well as full scan, SIR, or MIR with variable scanning speeds. You can do auto tuning or manual tuning optimizing for sensitivity over a particular mass range.

KONIK K2 and K2Q2 turn key engineered solutions: Satisfy your needs without any risk

You can do all the above by yourself or procure your system on a "turn key" bases, totally optimised for your main application(s), including factory training in the beautiful surroundings of Barcelona, where KONIK operates its main R&D and Customer Trainning Center.

MULTIDIMENSIONAL HPLC+GC-MS OPTIONS: Stretching the limits!!!

1. On-line derivatization option: The KONIK Derivatizer®

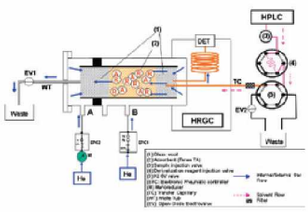
PATENTED

Operational principles and schematics.

With this patented option KONIK extends Multidimensional HPLC+GC to the analysis of polar non-volatile substances that are easily separated by HPLC but that require to be derivatized to be handled by GC. Hence these non-volatile analytes, with any functional groups, that would be normally retained in the KONIK HPLC+GC interface are subject to on-line derivatization by using any of the multiple universal or selective derivatization reagents available. KONIK uses advantageously the decades of scientific information available on the subject when GC and GC-MS where the techniques of choice.

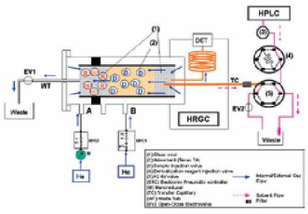
The KONIK Derivatizer®: Flow diagrams

A- DERIVATIZATION STEP



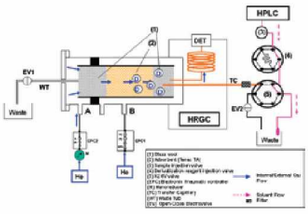
Derivatization:
When an on-line derivatization step is necessary, the derivatization reagent (R) is introduced through injection valve (4). The solvent with the derivatization reagent reaches the liner at 0.1-0.3 ml/min. Helium pushes the solvent through the adsorbent. Derivatization reagent is retained in the packed material and reacts with analytes whereas solvent is vented to waste through the waste tubing (WT).

B- SOLVENT AND REACTION PRODUCTS ELIMINATION STEP



Remaining solvent and reaction products elimination:
LC solvent coming from the pump as well as reaction by-products (BP) are sent to waste whereas derivatives (D) remain in the packed liner. Helium pushes the remaining solvent in the capillary tubing to waste.
These conditions are maintained for several min in order to achieve appropriate elimination of both residues. EV2 is closed.

C- THERMAL DESORPTION STEP



Thermal desorption:
Helium enters only through the external gas inlet (A) to the column. K2 interface is heated for several min and the retained derivatives (D) are desorbed and transferred to the capillary GC column. EV1 and EV2 are closed.

2. On line Sample Multi-fractionation: automatic valving system automation for easy sample fractionation prior to sequentially intoducing each fraction into the GC-MS. A new concept of sample profiling and determination of unknowns

The set up schematics of valve mounting has been already described in page 5 above . By developing the proper HPLC methodology (after proper selection of the column and solvent gradient) it is possible to separate a minimum of three fractions from any complex sample matrix, being the first fraction developed to contain the most volatile and lower molecular weight compounds, the second fraction containing the medium MW and semi-volatiles, and the third fraction the non-volatiles more polar compounds. There is the possibility to generate a fourth fraction and make a balance of materials by reversing the flow of the HPLC for any other compounds retained into the column for longer elution times. Each fraction is to be sent sequentillay to the patented HPLC+GC interface, trapped and sequentially desorbed. The compounds trapped and not desorbed can be derivatized "On Line", so each fraction renders two high resolution GC chromatograms and the corresponding MS scans can be obtained. These paramount numbers of data can be evaluated in many ways, ranging from single compound identification and quantitation to more complex data mining. In fact it can be visualized to compare the complete combined or partial "profiles" obtained, with the billions of data points resulting from time/mass/intensity into a tri-dimensional format, using at will the power of modern computational algorithms and the power of supercomputers. Certainly it is quite obvious that the enormous analytical power of the KONIK Multidimensional HPLC-GC-MS Triple Analyzer can contribute effectively to profiling and fingerprinting any complex sample matrix of interest facilitating the search of unknowns as well as of target compounds. Undoubtly will contribute effectively to early diagnostics of many diseases as well as to better prognosis of the same, in both R&D and routine clinical laboratories, in toxicology and forensics, pharmacological bioequivalence determinations, emerging environmental polutants , petroleum fraction fingerprinting.,

3. On line Universal/Absolute Quantitation System: The KONIK Quantitator® System

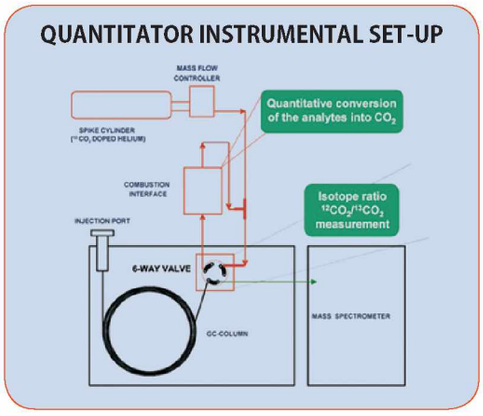
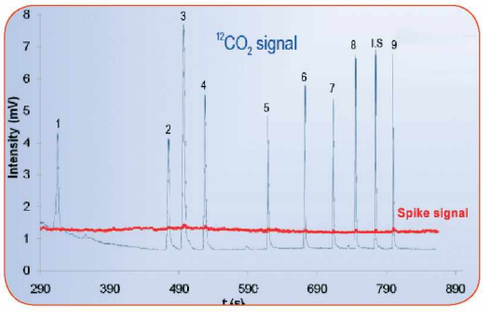


FIG. 1



One of the latest patented developments we have introduced in our programme is an optional Universal Absolute Quantification System, the KONIK QUANTITATOR® that facilitates quantitatation of unknowns without the need to use reference standards.

The KONIK Quantitator uses an small combustion furnace, placed at the end of the GC column in the KONIK 5000C GC. It converts all the organic molecules to CO_2 (m/z 44). An accurately controlled flow of doped Helium 13CO2 (m/z 45) is perfectly mixed before entering the MS source providing a reference signal. The KONIK QUANTITATOR® provides an absolute quantification value for any analyte eliminating the need for individual reference standards as reported in:

> Title: "A Quantitative Universal Detection System for Organic Compounds in Gas Chromatography with Isotopically Enriched 13CO2"
> Authors: Sergio Cueto Díaz, Jorge Ruiz Encinar, Alfredo Sanz-Medel, and J. Ignacio García Alonso
> Published at: Angew. Chem. Int. Ed. 2009, 48, 2561–2564

Figure 1 describes the Quantitator main modules with the relative disposition of the reference cylinder of the 13CO2 with the accurate MFC (Mass Flow Controller) that is producing the red reference signal of the leaked known amount of m/z 45 while the Combustion Furnace is responsible to oxidize all organics to CO2 generating the m/z 44 mass chromatogram.
Fig 2 shows the results obtained with an standard mixture of 10 compounds using only one internal standard used to quantitate the flow of $^{13}CO_2$.

NO MORE CALIBRATION STANDARDS

The Best of Both Worlds?

Janet Kelsey spoke to Dr Josep M. Gibert from Konik-Tech about the development of a new system combining LC and GC technology and what advantages this offers chromatographers.

Can you explain why you developed a system combining LC and GC technology?

We wanted to simplify — even eliminate — tedious and costly sample preparation steps, minimize sample manipulation, lower detection limits and reduce overall costs by reducing the use of solvents and analysis time.

HPLC is a fantastic fractionation and clean-up tool but a combined HPLC and GC interface can trap higher amounts of the target analytes by proper dimensioning.

What advantages does this technology have over the more established LC–MS and GC–MS systems?

The main advantage of the Konik K2Q12 HPLC+GC–MS analytical platform compared with traditional LC–MS and GC–MS systems is that it allows the user to build a customized analytical instrument. The system can work as a combined piece but its components can also be easily used individually (HPLC or GC coupled to universal or selective detectors, such as a mass spectrometer) and even by combining them with other sample preparation/introduction techniques using a multi-modular microchemical station autosampler.

Additionally, an optional LC–MS source can be added to the KONIK MS Q12 and/or a direct insertion probe (DIP)/direct exposure probe (DEP) for direct analysis of pure solid and liquid samples respectively and/or a second LC/microchemical station autosampler to the HPLC for full automation of the LC–GC procedure.

With respect to both GC–MS and LC–MS, the combined LC–GC system allows simplified sample preparation and full automation by direct introduction of complex samples into the HPLC system, which performs clean-up steps without previous pretreatments. This provides sample integrity, less analysis time and less solvent consumption, as well as an increase in sensitivity due to the pre-concentration power of the technique compared with liquid injection GC–MS and the use of more sensitive GC detectors than those used with LC–MS.

The combined HPLC and GC–MS system is quite universal and can be used for volatiles, semi-volatiles and non-volatiles (through on-line derivatization) allowing the automatic analysis of a much larger range of middle size molecules in one system compared with LC–MS and LC–MS–MS systems that can be more costly and more complex to operate and maintain. Furthermore, data generation and interpretation are more demanding on users because MS–MS does not rely on spectral libraries. As a direct consequence of these drawbacks, HPLC–MS–MS requires far more expertise and specialization whereas HPLC+GC–MS can be operated by GC–MS personnel with some HPLC experience.

This innovative analytical platform can also be combined with a patented universal and absolute quantification system — the Konik Quantitator — which allows the quantification of the compounds by GC–MS without the need for individual standards of the target or unknowns analytes that have been searched or found.

What problems did you have to overcome to couple these two techniques?

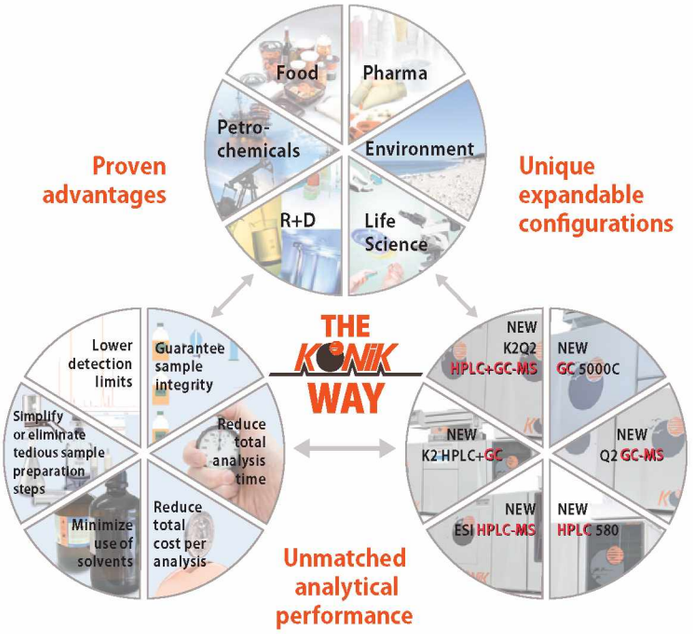
The continuous development of the HPLC+GC–MS platform over the last few years has been covered by seven international patents — the latest granted this year in Europe and the USA. We have developed a robust system where problems commonly associated with coupling have been successfully solved. The very basic problem to overcome in coupling an LC/HPLC to a GC is the selective elimination of any HPLC solvents being used, either non-polar in normal phase (NPLC) or the more difficult polar solvents normally used in reversed phase (RP). These solvents cannot enter the GC column. The through oven transfer adsorption desorption (TOTAD) interface, used to couple HPLC to GC, achieves both objectives simultaneously (retaining the target analytes quantitatively and

Interview with Dr. Josep M. Gibert that appeared in the LC-GC on-line magazine "The Column" on October 2010. You can see more about the interview at:
www.chromatographyonline.com - The Column, Oct 8, 2010
http://digital.findanalytichem.com/nxtbooks/advanstaruk/thecolumn100810/#/20/OnePage

Multidimensional HPLC+GC-MS: Unique solutions in every field

The most powerful, unmatched, analytical platform for virtually universal quali-quanti of target and unknown organics in any sample!!!

CHOOSE THE BEST INITIAL CONFIGURATION AND EXPAND IT LATER



You can build your **HPLC+GC** or **HPLC+GC-MS** platforms from any angle...
Starting from your **KONIK GC 5000C** or **KONIK HPLC** designed to be married to each other, and bring you the paramount number of benefits in the analysis of:

- **Chemicals:** EC REACH directive, toxicology... Improved standard methods
- **Environment:** Target and emerging pollutants in air, water sediments... eg: Naphtenic acids for EPA like and other innovative methods
- **Food and Beverages:** Pesticide residues, contaminants, adulterants, additives, flavourings, nutritional constituents and biomarkers, additives, adulterants, halal, kosher, Mediterranean and Asian diets...
- **Pharma:** Bioequivalence assays, Bioassays, Biomarkers, Pharmacokinetics, Pharmacopeia methods...
- **Life sciences and clinical chemistry:** Metabolomics, molecular medicine, early diagnosis of many diseases...
- **Toxicology, Antidoping and sports medicine:** Antidoping controls, criminal toxicology and forensics, drugs of abuse...
- **Petroleum and derivatives:** ASTM, UOP... Characterization, fingerprinting, catalysis, bio fuels, biomass conversion...
- **R&D:** Determine any target, as well as any unknown analytes, in any sample at lower detection limits, with simplified or no sample preparation at all...

Tandem MS-MS: Limitations

HPLC-MS-MS and GC-MS-MS offer unquestionable selectivity, and eventually simplify sample preparation in routine analysis... but:

1. In many instances analyst still face lengthy and time-consuming sample preparation procedures, including previous mandatory manual and tedious derivatization of critical substances
2. These sample preparation steps generate unwanted interferences, artefact formation, and/or sample degradation
3. Tandem MS MS suffers from those inherent drawbacks to generate the parent /daughter ion formation and selection:

a) Drop of sensitivity, as these are inefficient phenomena

b) In spite of the selectivity imposed the technique is not free of interferences and false positive thus producing eventually questionable and unreliable results.

c) You can only find what you have predetermined to look for. MS-MS falls short to search for unknowns, lower detection limits, provide reliable unequivocal quali/quanti, and handle, in one instrument set up, all analytes (volatile, semmi-volatile and non-volatile)

HPLC+GC-MS: Advantages

In front of the limitations of tandem MS-MS, the best of both worlds!

1. Even more selectivity but with inherently highest sensitivity by a pre-concentration interface
2. Lower detection limits
3. Determine target as well as unknowns, with straight confirmation of spectra in NIST and Wiley libraries
4. Unlimited fractionation, and sample clean up, by the power of HPLC coupled to the GC
5. On-line derivatization at will with added selectivity
6. Unique on-line absolute-universal quantification option eliminating the use of reference standards.

KONIK Multidimensional HPLC+GC-MS gives you all these... and more! It is only the beginning of a beautiful love story among techniques that GIBNIK has married with all the blessings for the life of the international patents covering these innovations.

HPLC+GC-MS with other hybrids systems: Overcoming the limits

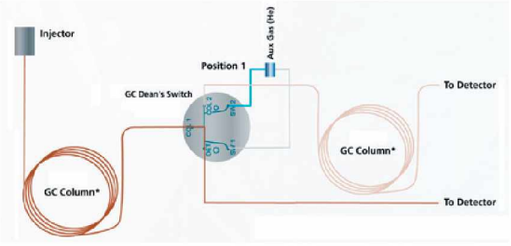
As evidenced at length in this brochure the KONIK Multidimensional HPLC+GC-MS Systems, and patented technologies, are undisputedly innovative and complementary to any other. They are, as well, advanced new powerful tools for analysing complex mixtures advantageously to other. They can be potentially adapted, and/or hyphenated, in many ways, to bring its inherent benefits to other chromatographic and mass spectrometric modalities.
GIBNIK is in the process to developing, and considers developing further, new hybrid platforms and hybrid systems to make available to potential end user **the benefits of :**

1. **Clean up and/or fractionation power of complex mixtures (KONIK HPLC+GC Interface)**
2. **High volume on-line concentration (KONIK Concentrator)**
3. **On-line derivatization (KONIK Derivatizer)**
4. **On-line absolute quantitation (KONIK Quantitator) to any imaginative combination of alternative/complementary analytical techniques.**

On going work at the GIBNIK R&D Centre of Barcelona, in cooperation with different Research Groups worldwide, is centred to couple the above 1, 2, 3, and/or 4 technological breakthroughs to other techniques, **as well as making HPLC+GC the main sample introduction platform to other hybrid systems such as GCXGC, MS-MS, IMS, as well as PTR-MS, each with focus in different application niches**, according their own merits. These are a few examples of on going projects:

A. HPLC+GCXGC-MS

Coelutions in one dimensional chromatography are often observed. One way to overcome the overlapping of peaks is to cut and transfer into a second column the fraction of coeluates not properly resolved. This column is mounted on a second gas chromatograph (GC) or a second satellite oven with independent temperature programming. Both GCs are interconnected in the KONIK model 5000 using the heated transfer line designed for coupling the GC to the MS for GC-MS. In the first dimension a flame ionization detector (FID) is normally used but the sample can be split and sent in parallel, through a deactivated capillary, to the mass spectrometer. This kind of set up has been used by many authors in analysis of chiral compound and optical isomers. The regions of overlap within the first dimensional chromatogram can be transferred, manually or automatically, at will by simple time functions for switching the valves mounted in the Multi-Deans Switch System. GIBNIK offers this arrangement by coupling two KONIK K5000 GCs, for GCxGC, as well as to build the unique hybrid, HPLC+GCxGC-MS.



B. IMS-QMS

Ion Mobility Spectrometry (IMS) is an interesting option for fast separation of isomers, reduction of chemical noise, measurement of ion size, and separation of structurally similar ions and ions of the same charge state into families of ions separated by their mobility along a unique mass-mobility correlation line. On the other hand IMS falls short to identify the separated molecules hence this is achieved when coupling IMS cells to full scanning mass spectrometers.

GIBNIK has a cooperative ongoing project with a University, and one IMS manufacturer that should result on a commercial IMS-ESI-QMS system in the near future. KONIK is also interested to couple IMS to EI/CI-QMS to be used in easy and fast fingerprinting of products, manufacturing processes and quality control, as well as clinical chemistry when coupled as option to the KONIK Metabolic Chamber described in page 18 focussed in early detection of molecular markers and fingerprints of many dysfunctions and diseases.

C. GC-PTR-MS

Proton-transfer reaction mass spectrometry (PTR-MS) is interesting for its high sensitivity (low ppt range), high time resolution (200 ms), little ionization-induced fragmentation, and ionization efficiency independent of the compound to be analyzed.
Yet, PTR-MS has a shortcoming. It is a one-dimensional technique that characterizes compounds only via their mass, which is not sufficient for positive and unequivocal identification. Combining separation of the compounds of interest by gas chromatography (GC) with simultaneous and parallel detection of the GC effluent by PTR-MS and EI (electron impact) and/or CI (chemical ionization) MS, allows an unambiguous interpretation of complex PTR-MS spectra. A combination of gas chromatography and PTR-MS (GC-PTR-MS) can also be used to confirm identities of chemicals analysed by PTR-MS in a number of areas such as atmospheric VOCs, breath volatiles, "industrial" odours fingerprinting, etc.
GIBNIK is interested to push forward this hybrid systems adapting the PTR protonization ion source and drift tube to the GIBNIK patented designs. This is of special interest likewise in the IMS case as an option to be included in the KONIK Metabolic Chamber being designed as described in page 18.

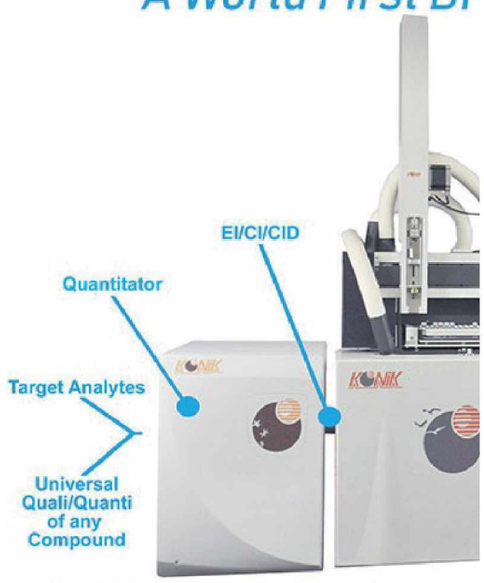
VIRTUAL TOTAL QUALI-QUANTI

ON ANY ANALYTES IN ANY SAMPLE IN FOOD, PHARMA, ENVIRONMENT, PETROCHEMICALS, TOXICOLOGY, METABOLOMICS...

NON POLAR VOLATILES
SEMIPOLAR SEMIVOLATILES
POLAR NON VOLATILES

Multidimensional

A World First Br



KONIK TRIPLE A

Evolution? No. Revolution!

- **HPLC+GC Coupling**
- **On-line Derivatization**
- **. On line Multifractionation**
- **Large volume concentration**
- **Absolute/Universal Quantification**

GIBNIK is leading the way in bidimensional (heart cut) HPLC+GC and Multidimensional HPLC+GC-MS where MS is adding the third dimension in both qualitative and quantitative analysis.
Virtually Total Qualitative and Quantitative Analysis... meaning the KONIK K2 and K2Q2 are capable of determine the presence or absence of any (known) analytes while searching for unknowns at unexpected low detection limits. These are achieved by intelligent use of the combined power of HPLC, HPLC On-line Multifractionation, GC, On-line derivatization (to stretch the limits of GC to naturally non-volatile analytes) and to MS in wonderful synergy among themselves.

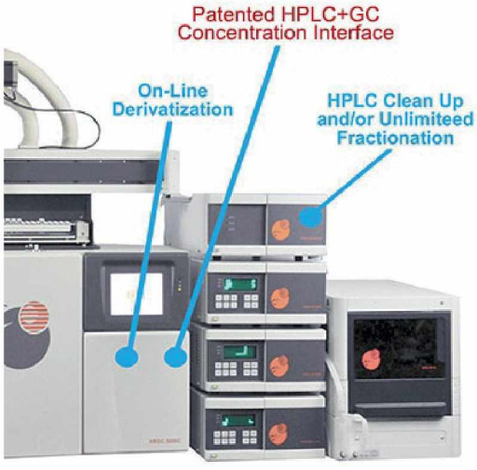
Complementary to tandem MS-MS i

Any analytes on any sample matrix at your fingertips!
You can comply with an official method and take advantage of these GIBNIK technologies to eliminate or simplify the tedious sample preparation steps.
Another possibility is to develop a totally new alternative method, lowering detection limits and reducing total cost per analysis.
You can eliminate alsol the intensive use of calibration standards with the QUANTITATOR® Option.
You can benefit in routine analysis, but there is no more flexible, nor more powerful combination of techniques, complementary to any and all other, for R+D and discovery of new components in any sample.

Analyze volatile, semi-volatiles and non-volatiles of any polarity and functionality capable of being handled by gas chromatography. GC and GC-MS for more than 30 years (1953-1983), before HPLC was developed, were the

HPLC GC MS

Breakthrough



ANALYZER K2Q2

Options:

- Also available HPLC+GC (Without MS) with any GC detectors.
- On-line derivatization for polar
- On-line HPLC Multifractionation
- Generic Universal Quantitation (KONIK Quantitator® Patented).
- On-line High Volume Concentrator (KONIK Concentrator®).

in quasi universal QUALI/QUANTI

techniques of choice. The NIST and WILEY libraries contain plenty of spectra of derivatized compounds that at the time were analyzed by these techniques. This is a definitive advantage compared with MS-MS techniques when searching for unknowns, while the natural advantage of MS-MS selectivity is also enhanced in multidimensional HPLC+GC-MS: The inherent selectivity steps imposed by HPLC fractionation, selective or universal trapping in the coupling KONIKHPLC+GC interface (many adsorbents are available), the on-line derivatization reagents, the GC column, and the multiple MS ionization options (EI/CI/CID) as well as SIR and MIR for single of multiple ion recording, or full spectrum search, all in one, at your choice.

* Internal validation of official methods modified for the preparation steps is easy and straight forward as illustrated in the several examples included in this brochure.

You can:

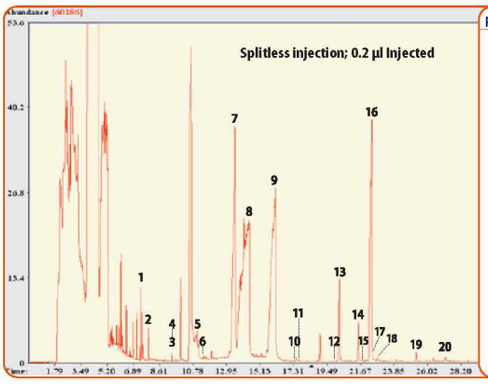
- **Simplify or eliminate sample preparation!**
- **Lower detection limits!!**
- **Minimize analysis time!!!**
- **Lower cost per analysis!!!!**

You can eliminate or simplify the tedious sample preparation steps. You can use the HPLC power to perform a simple sample clean-up, fully automated, or fractionate your sample at will! Single or multiple fractions can be sequentially done, on-line derivatization of the more polar, non-volatile compounds, using any suitable derivatization reagent and solvent media can be automated at will. The formed derivatives are trapped while the excess reagent and solvent are selectively eliminated following the same fluidodinamics of patented interface. Thermal release of the derivatives allows obtaining complementary chemical information of the constituents easy to search in the MS libraries. You can also lower detection limits as you are only limited by the amount of sample that you introduce into the interface and amount of trapping material. You can eliminate the use of calibration standards, lowering cost, also by using the Quantitator.

Toxicology

OFF-LINE vs. ON-LINE DERIVATIZATION-HPLC+GC-MS ANALYSIS OF ILLICIT COCAINE

Official method with several modifications: United Nations Office on Drugs and Crime (UNODC):
Methods for Impurity Profiling of Heroin and Cocaine (2005): Method C1



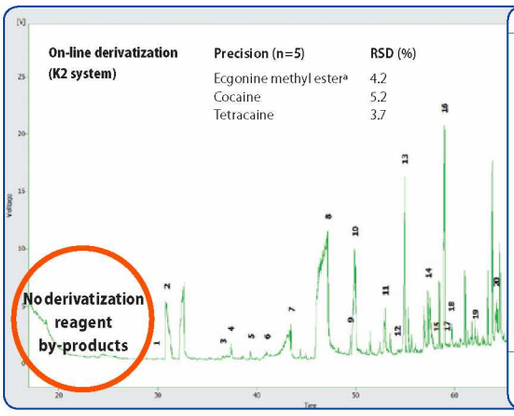
Peak n.	COMPOUND
1	Trimethylsilyl ether of glycerol
2	Benzoic acid[a]
3	Anhydroecgonine methyl ester
4	trans-cinnamic acid[a]
5	Ecgonine methyl ester[a]
6	Ecgonine[b]
7	D-Mannitol-TMS (6 groups)
8	Piracetam
9	Phenacetim
10	Tropacocaine
11	Caffeine
12	Levamisole
13	Procaine
14	Benoxil (Oxybuprocaine)
15	Norcocaine
16	Cocaine
17	Benzoylecgonine[a]
18	Tetracaine
19	cis-cinnamoylcocaine
20	trans-cinnamoylcocaine

Off-line derivatization
Sample: 5.5 mg illicit sample / 200 µl chloroform
Deriv. condit.: 200 µl MSTFA; 80°C (15 min)

GC-MS Conditions
Column: KAP-1701 30 m 0.25 mm 0.25 µm
Injection mode: SPLIT; 5 µl
MS mode: EI+ (70eV)
Full-scan: m/z 40-500; 350 ms

✓ Changing the Split injection mode by Splitless/split allowed the identification of 5 additional alkaloids and cutting agents with pharmacological effects, such as LEVAMISOLE, used as cancer chemotherapy drug.

✗ High peaks were eluting at the front part of the chromatogram corresponding to derivatization reagent by-products and artefacts that can damage and reduce column lifetime.



Peak n.	COMPOUND
1	Trimethylsilyl ether of glycerol
2	Benzoic acid[a]
3	Anhydroecgonine methyl ester
4	Ecgonine methyl ester[a]
5	Ecgonine[b]
6	trans-cinnamic acid[a]
7	Piracetam
8	Phenacetin
9	Tropacocaine
10	Caffeine
11	D-Mannitol-TMS (6 groups)
12	Levamisole
13	Procaine
14	Benoxil (Oxybuprocaine)
15	Norcocaine[c]
16	Cocaine
17	Benzoylecgonine[a]
18	Tetracaine
19	cis-cinnamoylcocaine
20	trans-cinnamoylcocaine

[a]O-TMS derivative
[b]di-O-TMS derivative
[c]N-TMS derivative

On-line K2 derivatization
Sample: 4 mg illicit cocaine / 1.5 ml chloroform (20 µl)
Derivatiz. reagent: BSTFA: pyridine 4:1 (100 µl)
Adsorbent: TENAX TA 80/100 mesh
Adsorp. / desorp. Temp.: 125°C (adsorp.+ derivatiz.)-300°C/min-300°C (5 min)
Transfer vol.: 0.6 ml (for standards) and 0.6 ml (for derivatiz. reagent)
Transfer flow and solvent: 0.3 ml/min ethyl acetate
He internal/external flow: 500 ml/min

GC-MS Conditions
Column: KAP-5MS 30 m 0.25 mm 0.25 µm
Carrier: Helium at 20 psi
Oven: 50°C (15 min); 10°C/min; 310°C (10 min)
MS conditions: as above

KONIK K2 HPLC+GC-MS system has proved to be suitable for the determination of major and minor components in illicit cocaine samples. The method allows the automated analysis of polar/non-volatile components by direct derivatization into the interface, avoiding the time-consuming off-line sample derivatization step. The on-line derivatization HPLC+GC method shows high sensitivity, allowing the identification of alkaloids and adulterants in illicit cocaine selectively eliminating derivatization reagent by-products. So, the K2 system allows determining the compounds with less sample consumption and guaranteeing longer column lifetime.
Additional work is being performed for the automatic determination of drugs of abuse and toxics in biological samples through on-line derivatization into K2 interface after HPLC fractionation of drugs, toxics, and their metabolites in different body fluids and other samples.

HPLC+GC-MS, the ideal technique for ever changing matrices

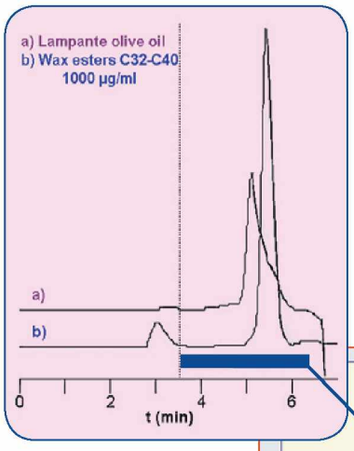
IDENTIFY TARGET AS WELL AS UNKNOWNS

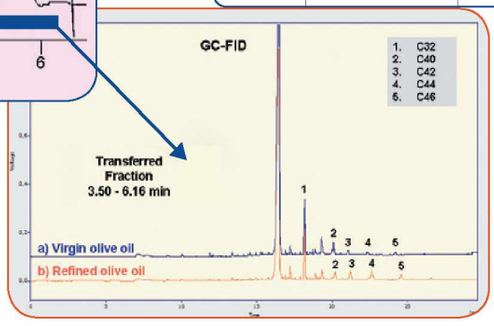
Food and Beverages

ANALYSIS OF WAX ESTERS IN EDIBLE OILS BY AUTOMATED HPLC+GC-FID

Courtesy of Álvaro Aragón, José M. Cortés, Rosa M. Toledano, Jesús Villén, Ana Vázquez
Facultad de Educación, Universidad de Castilla-La Mancha, Plaza Universidad 3, 02071 Albacete, Spain
Escuela Técnica Superior de Ingenieros Agrónomos, Universidad de Castilla-La Mancha, Campus Universitario s/n, 02071 Albacete, Spain

The suitability of HPLC+GC-FID system to analyze wax esters in edible oils has been demonstrated. The method is rapid and straightforward compared to the EU Official Method, minimizing sample preparation steps and allowing practically totally automatization. The wax ester concentration given with the HPLC+GC method were in accordance with those obtained by the EU Official Method. Repeatability was also valid as RSDs for concentrations are less than 5%. The new method could be considered as very useful for routine analysis purposes.





FASTEST ANALYSIS

HPLC S60:	Column:	Lichrospher Si 60 25 cm x 0.46 mm i.d.; 5 µm
	Mobile phase:	0-9 min: n-hexane:ethyl acetate 95:5 (v/v; %) raised to ethyl acetate 100% (20 min)
	Flow rate:	0.5 ml/min (9 min); 2 ml/min (20 min; triglycerides elimination)
	Oven temp.:	25ºC
	Detector:	Refractive Index
	SAMPLE:	0.5 g of pomace refined oil + 0.5 mg of I.S. (C32) diluted in heptane (30 ml) 0.5 g of other oils + 0.1 mg of I.S. diluted in heptane (10 ml). Filtration (0.22 µm filter)
GC 5000C:	Column:	Wax esters mixture C32-C40 (1000 µg/ml) in heptane. KAP-5, 15 m x 0.25 mm x 0.25 µm
	Temperature program:	80ºC (7 min); 20ºC/min; 325ºC (5 min); 20ºC/min; 335ºC (15 min)
	Flow:	He at 2 ml/min
	Injection Mode:	Split/Splitless
	Split ratio:	1:40
	Det. type and Temp. :	FID; 350ºC
Interface:	Detector gases:	H2 38 ml/min; air 220 ml/min; N2: 25 ml/min
	Amplification Gain:	12
	Ads./des./cleaning T:	150ºC(2.66 min)-300ºC/min-185ºC(2.9 min)-300ºC/min-(5 min)
	Adsorbent type:	Tenax TA 80-100 mesh (1 cm)
	Internal and external He:	500 ml/min
	Transfer vol. and speed:	1.33 ml at 0.5 ml/min

Quality control parameters

Relative standard deviation (RSD, %) resulting from the analysis of wax esters of a lampante olive oil (sample VG 238) (n=5).

Compound	RSD (%)		
	Ret. time	Area	Concentration
C32	0.08	5.28	-
C40	0.18	5.70	2.80
C42	0.23	6.42	4.84
C44	0.28	4.96	2.36
C46	0.30	4.66	2.11

ANALYSIS OF OLIVE OIL SAMPLES

Wax ester concentrations (mg/kg) in different oil samples (n=3). The certified values obtained according to the official method appear as EU (1)

Compound	PM 371 (refined pomace olive oil)			VG 238 (lampante olive oil 100%)			RF 429 (refined olive oil 80% palm oil 20%)			BL 597 (extra virgin olive oil 60% sunflower oil 40%)		
	LC+GC	EU	%	LC+GC	EU	%	LC+GC	EU	%	LC+GC	EU	%
C40	706	656	7.6	55	52.1	5.6	69	68	0.9	42	50	16
C42	1126	1146.3	1.8	94	90.4	4.3	70	68	3.5	41	43,5	5.1
C44	831	810	2.6	105	101	3.8	67	66.9	0.8	18	18	0.6
C46	209	194	8.1	31	31	1.3	31	33	7.0	15	16	9.1
Σ conc. (2)	2872 (194)	2800 (150)	2.6	285 (17)	270 (17)	5.8	237 (2)	230 (41)	3.1	116 (5)	118 (30)	2.1

EU: European Union Official Method: EC 2007/702, Off. J. Eur. Union L161 (2007) 11.
The difference between the values obtained by both methods appears as percentage (%).
For total waxes the expanded uncertainty values appear in italics and between parentheses.

Wax ester concentrations and standard deviations (mg/kg) obtained by HPLC+GC method (n=3) (1)

Compound	VOO		ROO		VSO		RSO	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
C40	29.06	0.81	48.09	1.35	16.68	0.47	80.20	2.25
C42	28.49	1.38	72.31	3.50	70.74	3.42	64.21	3.11
C44	20.31	0.48	80.31	1.90	17.05	0.40	35.39	0.84
C46	13.14	0.28	45.24	0.95	n.d.	--	n.d.	--
Σ conc.	91.00	2.95	245.95	7.70	104.47	4.29	179.8	6.19

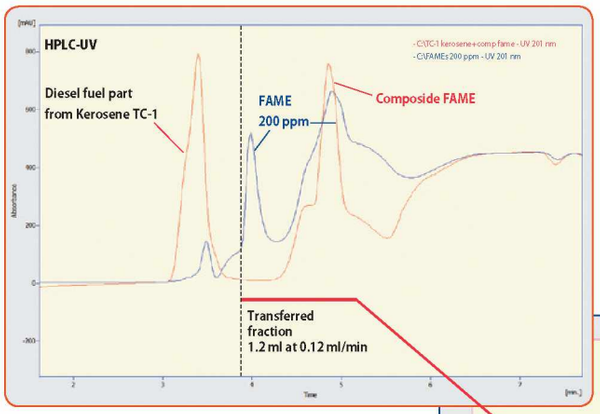
(1) VOO: virgin olive oil; ROO: refined olive oil; VSO: virgin sunflower oil; RSO: Refined sunflower oil.

The Σ conc. wax esters were higher in refined oils than in virgin oils (olive and sunflower). Researchers* suggested that exists a correlation between chemical analysis and sensorial evaluation, being extra virgin olive oils with low concentration of straight chain wax esters evaluated as high quality oils, while some oils with a high content were thought not to be of extra virgin quality.

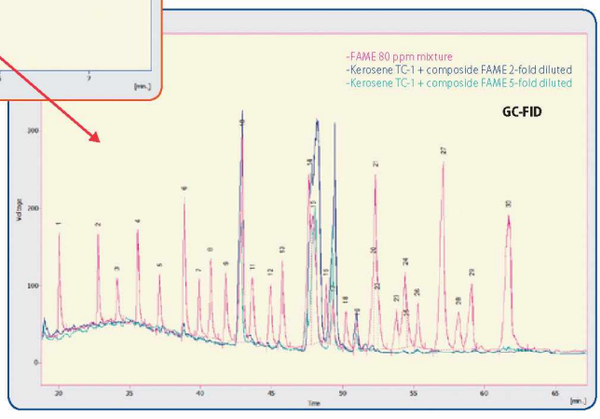
*Biedermann et al., Eur. J. Lipid Sci. Technol. 110 (2008) 1084

Petroleum and derivatives

ANALYSIS OF FAMES IN AVIATION BIOKEROSENE BY HPLC+GC-FID



HRGC:	Column:	KAP-100CN, 60 m x 0.25 mm x 0.25 µm
	Temperature program:	35ºC (17 min); 10ºC/min; 150 ºC; 3ºC/min; 240ºC (12 min)
	Flow:	He at 2 ml/min
	Injection Mode:	Split/Splitless
	Split ratio:	1:40
Interfase:	Adsorp./desorp. T:	60ºC(13.5 min) - 300ºC/min-320ºC (3 min)
	Adsorbent type:	Tenax TA 80-100 mesh (1 cm)
	Internal He (Flow B):	30 ml/min
	External He (Flow A):	300 ml/min
	Transfer volume and speed:	1.2 ml at 0.12 ml/min
	Solvent removing time:	2 min
Detector:	Type:	FID
	Tdet.:	260ºC
	Detector gases:	H2: 38 ml/min; air: 220 ml/min; Make-up (N2): 25 ml/min
	Amplification Gain:	12

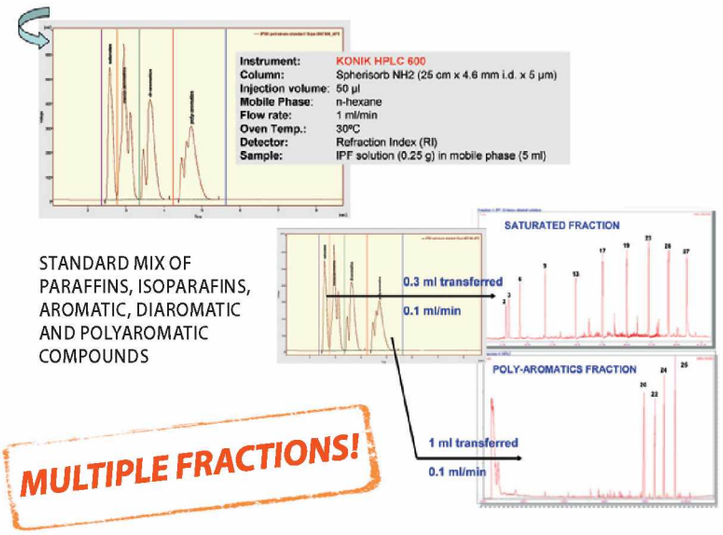


Column	Hypersil silica 25 cm x 0.46 cm, 10 µm
Mobile Phase	0-0.5 min: n-heptane:MTBE 96:4 (v/v; %) 0.5-1min: changed to n-heptane:MTBE 90:10 (v/v; %) 1-10 min: n-heptane:MTBE 90:10 (v/v; %)
Flow rate	1 ml/min
Injection volume	20 µl
Oven Temperature	25ºC
Detector	UV-VIS (λ=201 nm)
SAMPLE: Kerosene of T C -1 mark (5 µl) + composide FAME (standard sample of a plant ethers mix, 5 µl) diluted in mobile phase (5 ml) FAMEs mixture (200 µg/ml) in mobile phase	

EASY HANDLING OF COMPLEX MIXTURES

The potential of KONIK K2 HPLC+GC-FID system to determine FAMEs in aviation kerosene samples is presented. The isolation of the diesel fuel (hydrocarbons) from FAME compounds in aviation kerosene is achieved using NPLC-UV system with a Hypersil Si 25 cm x 0.46 mm, 10 µm column and a heptane: MTBE gradient mobile phase. The HPLC+GC-FID system is applied to the analysis of aviation fuel samples to obtain GC chromatograms for the identification of FAMEs >C8 without the presence of interferences of hydrocarbons from matrix. The HPLC+GC-FID system can also be coupled to KONIK MS Q2 for the unequivocal identification of compounds as a good alternative for the analysis of biodiesel-petrodiesel blends with full automatization of method.

PETROLEUM FINGERPRINTING: MULTIPLE FRACTIONS OF COMPLEX SAMPLES.

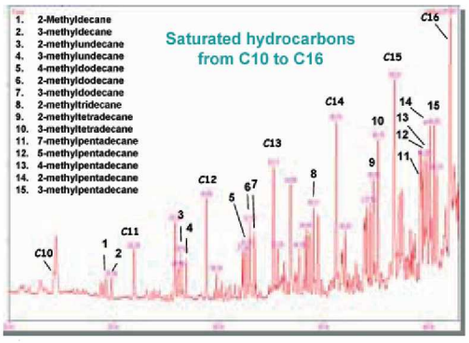


STANDARD MIX OF PARAFFINS, ISOPARAFINS, AROMATIC, DIAROMATIC AND POLYAROMATIC COMPOUNDS

MULTIPLE FRACTIONS!

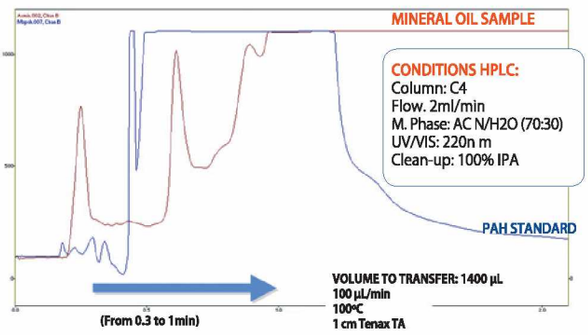
SHORTEST ANALYSIS TIME

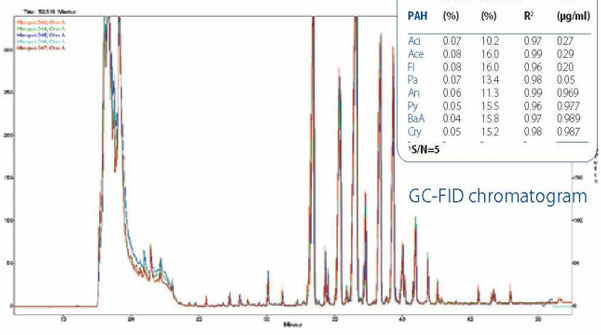
SATURATED FRACTION IN DIESEL OIL DILUTED SAMPLE



Environment

ANALYSIS OF PAHs IN MINERAL OIL BY HPLC+GC-FID



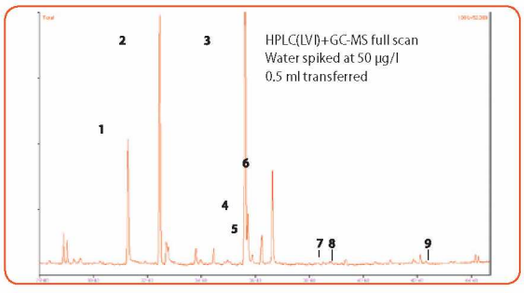


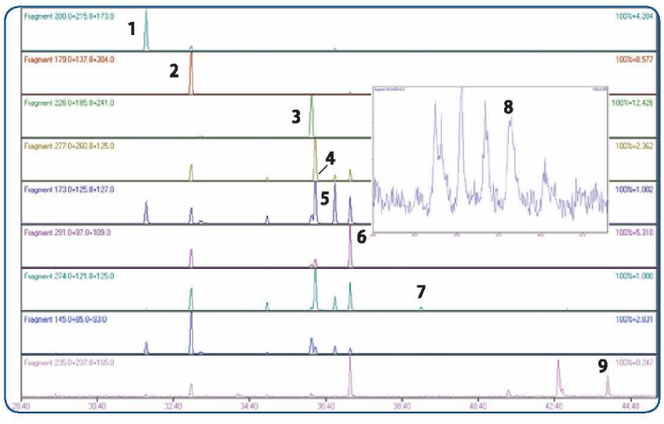
PAH	Precision (n=5) RSD Rt (%)	RSD Area (%)	R^2	LOD[1] (µg/ml)
Acl	0.07	10.2	0.97	027
Ace	0.08	16.0	0.99	029
Fl	0.08	16.0	0.96	020
Pa	0.07	13.4	0.98	0.05
An	0.06	11.3	0.99	0.969
Py	0.05	15.5	0.96	0.977
BaA	0.04	15.8	0.97	0.989
Cry	0.05	15.2	0.98	0.987

[1]S/N=5

HIGH REPRODUCIBILITY

LARGE VOLUME INJECTION (LVI) OF WATER IN GC-MS USING THE HPLC+GC INTERFACE





The potential of KONIK HPLC+GC interface for the large volume injection (LVI) of pesticides in aqueous samples in GC-MS is demonstrated. Water samples, as large as 5 ml, were directly injected into a capillary GC with no sample pre-treatment step. The KONIK HPLC+GC interface allows the introduction of several millilitres of water, while maintaining good chromatographic characteristics. The water is almost entirely eliminated, so that LVI of aqueous samples and an MS detector can be used without problems. Organophosphorus, organochlorine and triazine pesticides were determined in one run. The sensitivity achieved was sufficient for most of the target pesticides but not for all of them. Sensitivity of the analysis can be easily improved by increasing the sample volume or working in SIM mode with the sum of several ions. Good precision was also obtained, considering that they corresponded to the overall analysis.

Courtesy of Rosa M. Toledano[a], Jose M. Cortés[a], Juan C. Andini[b], Jesús Villén[a], Ana Vázquez[c]

[a]Escuela Técnica Superior de Ingenieros Agrónomos, UCLM, Albacete, Spain

[b]CCT CONICET, Santa Fe, Argentina

[c]Escuela Universitaria de Magisterio de Albacete, Departamento de Química-Física, UCLM, Albacete, Spain.

Compound	m/z	Precision (n=5)a RSD tR (%)	RSD area (%)	LOD (µg/l)b
1. Atrazine	200; 215; 173	0.04	8.6	0.05
2. Diazinon	179; 137; 304	0.04	5.7	0.02
3. Terbutryne	226; 185; 241	0.05	4.7	0.02
4. Fenitrothion	277; 260; 125	0.05	10.0	0.08
5. Malathion	173; 125; 127	0.05	16.3	0.07
6. Parathion	291; 97; 109	0.05	9.3	0.12
7. Phenthoate	274; 121; 125	0.06	19.0	0.73
8. Methidathion	145; 85; 93	0.07	18.3	0.04
9. DDT	235; 237; 165	0.05	10.8	0.77

a. 0.5 ml spiked water (50 µg/l); Linearity (r2) 25 - 500 µg/l: 0.96-0.99
b. LOD (S/N=5): calculated from 5 ml of spiked water (50 µg/l)

FIND TARGETS AND UNKNOWNS

HANDLING MOST COMPLEX SAMPLES: EMERGING POLLUTANTS

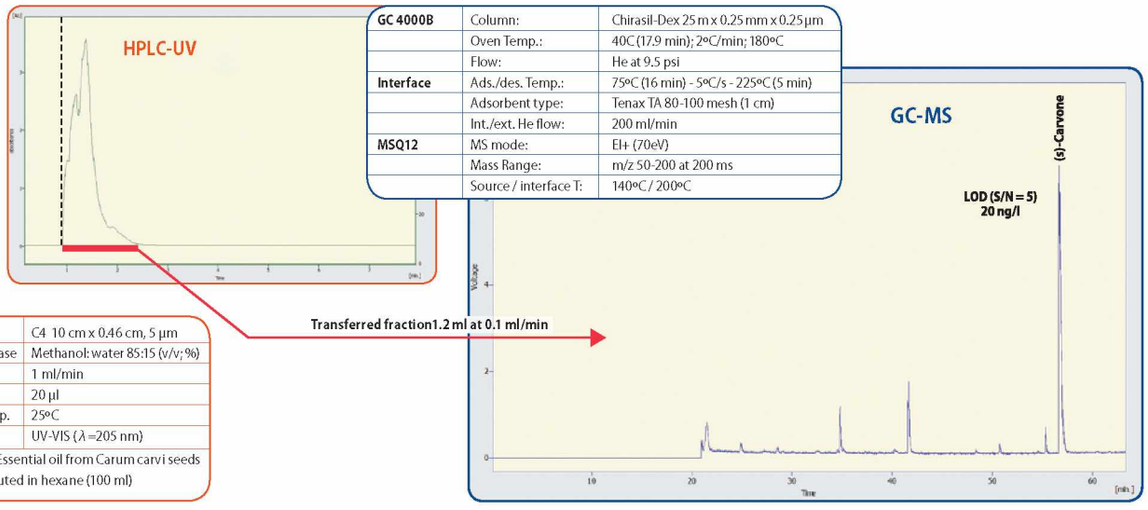
Naphthenic acids in oil sands, due to their inherent solubility, are severaly contaminating valuable water resources, causing environmental health hazards. Multidimensional HPLC+GC-MS as ideally suited for easy clean-up and optimal fractionation by HPLC, while on-line derivatization might be ideal to impose added selectivity.

Drugs, Pharma, Natural Products & Cosmetics

DETERMINATION OF (S)-CARVONE BY HPLC+GC-MS IN ESSENTIAL OIL OF CARUM CARVI (CARAWAY) SEEDS

Courtesy of Rosa M. Martínez and Marta Herraiz. Instituto de Fermentaciones Industriales, CSIC, Madrid, Spain

A method is developed based on the KONIK HPLC+GC interface in the on-line coupling between RPLC+GC-MS for the determination of chiral volatile compounds.
In the research of alternative natural sources for chiral components from essential oils, such as carvone, the multidimensional technique GCxGC is often employed due to the overlapping of the chiral analyte with other matrix components. However, HPLC+GC can be a good alternative for their analysis, even working in reverse phase, allowing the acquisition of chromatograms with user-friendly software for the identification of these compounds.

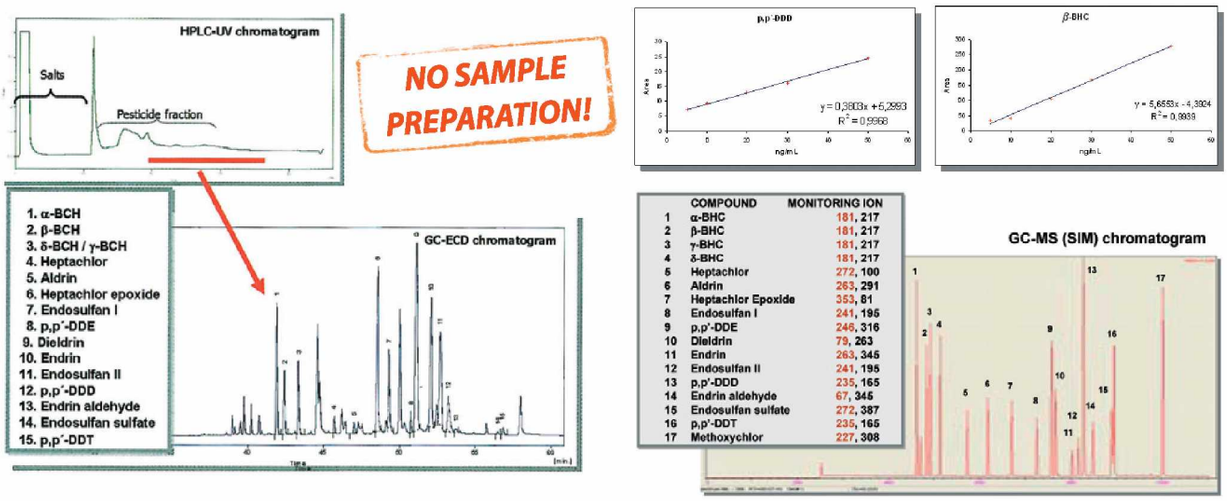


Column	C4 10 cm x 0.46 cm, 5 µm
Mobile Phase	Methanol: water 85:15 (v/v; %)
Flow rate	1 ml/min
Inj. vol.	20 µl
Oven Temp.	25ºC
Detector	UV-VIS (λ =205 nm)
SAMPLE: Essential oil from Carum carvi seeds (2.5 µl) diluted in hexane (100 ml)	

GC 4000B	Column:	Chirasil-Dex 25 m x 0.25 mm x 0.25 µm
	Oven Temp.:	40C (17.9 min); 2ºC/min; 180ºC
	Flow:	He at 9.5 psi
Interface	Ads./des. Temp.:	75ºC (16 min) - 5ºC/s - 225ºC (5 min)
	Adsorbent type:	Tenax TA 80-100 mesh (1 cm)
	Int./ext. He flow:	200 ml/min
MSQ12	MS mode:	EI+ (70eV)
	Mass Range:	m/z 50-200 at 200 ms
	Source / interface T:	140ºC / 200ºC

METABOLIC DISRUPTORS ANALYSIS BY DIRECT URINE INJECTION

HIGH LINEARITY

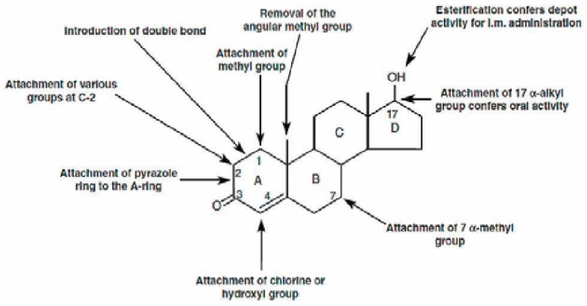


	COMPOUND	MONITORING ION
1	α-BHC	181, 217
2	β-BHC	181, 217
3	γ-BHC	181, 217
4	δ-BHC	181, 217
5	Heptachlor	272, 100
6	Aldrin	263, 291
7	Heptachlor Epoxide	353, 81
8	Endosulfan I	241, 195
9	p,p'-DDE	246, 316
10	Dieldrin	79, 263
11	Endrin	263, 345
12	Endosulfan II	241, 195
13	p,p'-DDD	235, 165
14	Endrin aldehyde	67, 345
15	Endosulfan sulfate	272, 387
16	p,p'-DDT	235, 165
17	Methoxychlor	227, 308

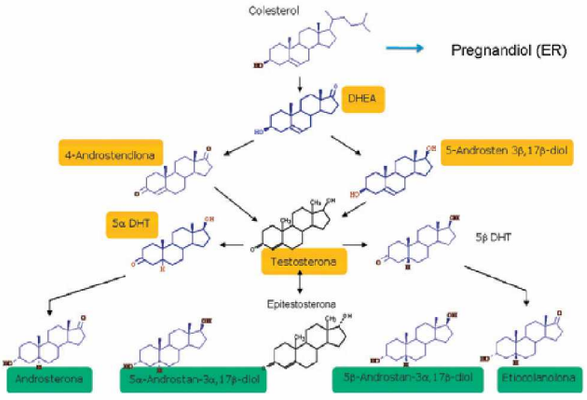
Antidoping control and sports medicine

HPLC+GC-SIRMS: Multidimensional HPLC+GC-Stable Isotope Ratio MS

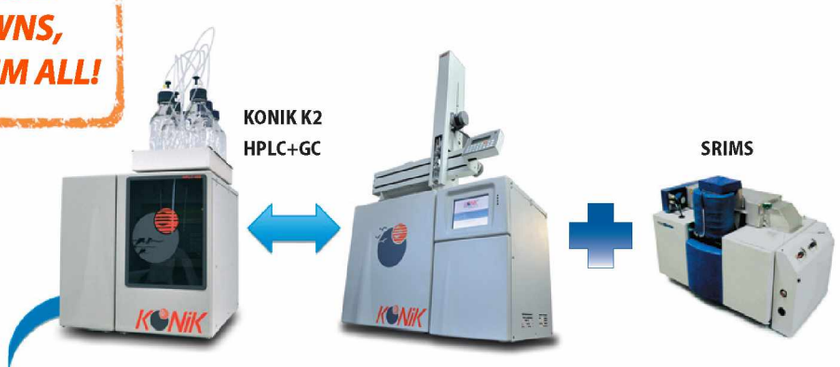
Metabolism of steroids

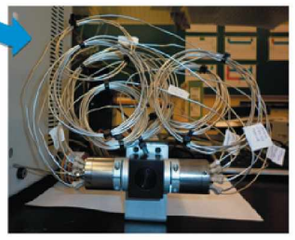


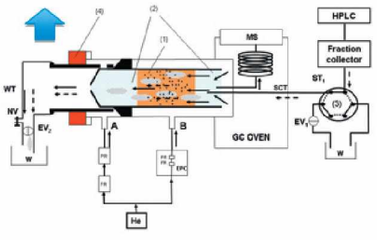
Anabolic Steroids



TARGET AND UNKNOWNS, CATCH THEM ALL!







LOWEST DETECTION LIMITS

STEROIDS

Steroids are widely used as doping agents. Coupling the patented KONIK HPLC+GC System with the enrichment KONIK HPLC+GC trapping interface we are able to improve accuracy and lower detection limit for unequivocal determination of anabolic steroids used as doping agents. In the picture above the KONIK K2 HPLC+GC is coupled to a third party manufactured SIRMS.

(This work is partially supported by a grant of WADA, the World Antidoping Agency).

The same configuration can be used to control food adulteration.

Specially engineered systems

Metabolomics, Life Sciences and Clinical chemistry

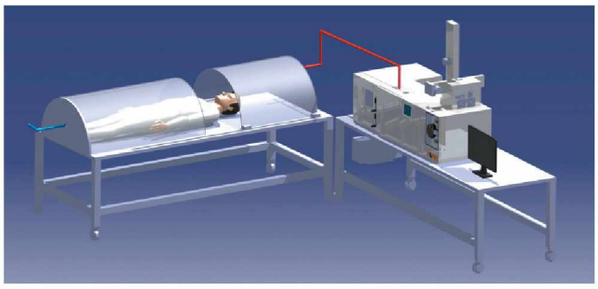
Metabolomics, deeply rooted in genomics and epigenomics, is a growing area in modern molecular medicine for the clinical diagnosis of many diseases. Organic compounds produced by the human body are the scent of health or disease. The end result of cell metabolism of the different specialised organs of the body yields thousands of organic metabolites, many of them volatile, many semi-volatiles and other more polar non-volatile that are related, hence can be tracked to many disorders and diseases.

Multidimensional HPLC+GC-MS with "On Line" HPLC Multi-fractionation and "On Line" derivatization is a new tool encompassing in synergy the individual power of HPLC with GC-MS and the widely proven power of derivatization to increase volatility, selectivity while being able to lowering detection limits.

The KONIK Metabolyzer is being designed with the abilities to be looking at any molecules present in "body exudates" such as breath, sweat as well as body fluids (urine, plasma, saliva, csf...) to detect traces of pathognomonic metabolites, ratios, clusters, and profiles of the same to contribute to early diagnostic of many diseases.

Diagnosis of pathological and certain physiological conditions from the odours of the body, sweat and breath mainly, based on the sense of smell can be traced to the origins of Medicine thousands of years ago. Modern molecular, non-invasive diagnosis follows the development of sensitive and versatile gas-chromatographic and mass-spectrometric instruments, in parallel to other biological and chemical sensors for metabolic pathognomonic tracers. Measuring VOCs in exhaled breath allows for screening of disease markers, studying the uptake and effect of medication (pharmacokinetics) or monitoring physiological processes. (Herbig et al 2009 J. Breath Res. 3 027004).

The "smell" of human breath in particular arises through a combination of volatile organic compounds (VOCs) of which several hundred have been identified to date. Most of these volatiles are systemic and are released in the gas exchange between blood and air in the lungs alveoli. It is clear that the concentration of these compounds in the blood therefore also in urine, as well as along with many other metabolites in other biological fluids and exudates mediating in cell metabolism.



Project of the KONIK Metabolic Chamber: for total analysis and profiling of body fluids and exudates for early diagnostic of disease

In each of these samples the patented KONIK Multidimensional HPLC+GC-MS is able to "squeeze" a phenomenal amount of chemical information of the constituents present at unexpectedly low detection limits. The KONIK Metabolizer® is in the way to become the first full body molecular scanner being developed to qualitatively and quantitatively single out any molecules "produced" by the body.

Some options are planning to be included in this innovative KONIK Metabolic Chamber to the HPLC+GC-MS platform equipped with a multiple switching port MS for special handling of volatiles.
The KONIK Metabolyzer® is a multimilion Euro complex project. It will be available some time in the future after GIBNIK completes agreements with interested parties to get complementary funding.

Note: GIBNIK is seeking interested Organizations Worldwide to team up to complete research and development of this innovative new tool with the indicated objective: to facilitate earlier diagnostics and better prognosis of many affections. If you are interested please contact corporate.development@gibnik.com

EARLY DIAGNOSIS

Passion for innovation

SAVING LIFES

Other specially engineered systems

Based on the same, patented, Multidimensional Analytical Platform the KONIK ENGINEERING DIVISION is capable of designing and implementing specially engineered chambers on a "turn key" bases upon customer request.
Some examples of ongoing projects are:

1 · Petroleum Exploitation: Primary, secondary and tertiary wells recovery simulator.
With the declining reserves and the increasing petroleum prices it becomes necessary to carry continuous R&D of oil and gas recovery in dependence of the real status and situation of individual wells. KONIK is engineering turn key systems capable to simulate and evaluate conveniently the efficiency of different procedures to improve recovery of gas, heavy hydrocarbons, asphaltenes, water, etc in different types of wells by proper simulation of conditions. Quotations will be produced in full confidence and systems will be commissioned after full users training at our Barcelona R&D Centre.

2 · Food Quality: Mediterranean, Halal, Kosher, Asian and other diets.
The presence and fate of antioxidants in original and processed foods, recognized by their positive health effects, along with many other compounds is of increasing interest. Certification of Compliance to procedures intended to protect food integrity is another growing field. Searching for new "markers" of compliance to critical processes such as Halal Slaughtering is a new topic.
Certain compound such as catecholamine and biogenic amine metabolites are produced when animals are under stressed conditions or slaughtered under not strictly Halal (e.g. electric shock). This is to be prevented with the slaughtering processes of Halal. Special chambers are being developed to search for traditional and new "Halal markers" as well as to asses the presence and/or absence of critical compounds to properly evaluate Halal and/or Haram in view of the corresponding certificates of compliance.

3 · Environmental Protection: The fate of environmental pollutants simulator.
Thousands of tons of pesticides, pharmaceutical products, hydrocarbons, and nearly hundred thousand non-natural (synthetic) industrial organics are thrown into the environment every year. The fate of most of them is virtually known. The KONIK Envirolyzer® Multidimensional HPLC+GC-MS Environmental Analyzer System, is being customized with purposely designed chambers to study the fate of thousands of contaminants of our planet Earth. The K2 HPLC+GC and the K2Q2 HPLC+GC-MS can be easily hyphenated to other spectroscopy systems as well.

GIBNIK GUARANTEES YOUR TOTAL SATISFACTION: The KONIK K2 and K2Q2 "turn key" unique sales, training, commissioning and service policies.

Introducing a powerful new technology in competition with other well established technologies (GC-MS, HPLC-MS, Tandem HPLC-MS-MS and GC-MS-MS), primarily promoted by all main manufacturers, it is not something that can be taken lightly. Hence GIBNIK does not. Neither wishes to run the risk of overselling the power of its Patented Multidimensional Techniques nor creating false expectations. Therefore:

Policy 1: We need that you kindly define your needs, objectives and focus on your main problem. If we know where to go we will reach there! All KONIK K2 and K2Q2 are to be quoted as Integrated, Turn-Key Solutions Packages focusing on a particular application to be defined by the end user utilizing the GIBNIK K2Q2 Systems Questionnaire.
Policy 2: Is it a prior feasibility study necessary? If so what is the cost?...Time frames??...Way to go???: If GIBNIK is not 100% sure that the system can be supplied according the requests of the K2Q2 Systems Questionnaire we will submit a quote for a prior feasibility study. We will in confidence deduct 50% of this feasibility studies from the final sales price of the system finally purchased. In the unlikely case that the results obtained were not totally satisfactory, GIBNIK likewise will provide a 50% voucher to be applied towards any other KONIK equipment purchase (GC, HPLC, GC-MS...), accessories, or consumables. The cost of this feasibility studies and time to perform them will be quoted upon request.
Policy 3: The final quotation submitted will be "all inclusive" and the System will be delivered on a "turn-key" base as a comprehensive solution package.
Policy 4: End users (maximum of 3) will be trained with their own system prior to delivery in our modern Barcelona R&D and Training Centre. Your local distributor/support will be trained as well along with you, so they know, as well, your application and gain experience in every niche. This is their commitment to you as GIBNIK Authorised Official Distributors
Policy 5: Final commissioning of the Systems after installation by our Authorised Official Distributors will be supervised by a Senior Factory Trained Service Engineer. In certain countries GIBNIK will take full responsibility for 4 and 5.
Policy 6: Unlimited remote support. After you are trained in Barcelona you get to know our staff so you are invited to join and belong to our "neural network of knowledge". We not only value you as a customer, but also as an expert in your field. We feel we need you as much as you need us. Hence we attempt to establish a permanent communication channel with all customers, inclusive, and not limited, of the innovative and comprehensive advanced remote control capabilities of our KONIK Equipment. All KONIK GC,s MS,s, and GC-MS,s are 100% digital and hence offer unlimited remote control diagnostics, downloading of methods, spectra, etc. This also facilitates interactive training by videoconference with our application chemist. We welcome all new users to join in, specially those active in reputed Universities and R&D Centres of excellence world wide, so we can continuously expand the GIBNIK Social Network of Expertise and Knowledge in this exciting new technologies.

GIBNIK

ANALYTICAL SOLUTIONS... AIMING TO MAKE THE WORLD A BETTER PLACE FOR ALL!

Headquarters

EUROPE, Barcelona
Tlf.: +34 93 729 09 85
Fax: +34 93 729 09 85

Passatge Arrahona, 33 – local 3
P.I. Santiga Industrial Zone
08210 Barberà del Vallès, **Barcelona**

GIBNIK meets most quality standards

Design, manufacturing and commercialization of analytical instruments, laboratory equipment, consumables and accessories.

Local Distributor

For more information on our products and services, please visit our website at:
www.gibnik.com or contact: **sales@gibnik.com**

SOME CUSTOMER REFERENCES

BASF · L'ORÉAL · Repsol YPF · Rottapharm · Bayer · Monsanto · Pfizer · Esso · sanofi aventis · Roche