Fresh

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HEALTHY WORLD

**Wishing all our reader's
a very Happy New Year!**

Fresh

WHAT'S Fresh inside...

Dear readers,

We have come to a stage from where the year 2013 will become history. The year will be remembered for many good and bad happenings. Some natural calamities and some man made problems; were experienced in this year.

In spite of all these tough situations PerkinElmer team made a difference in providing the best possible support and services. This year witnessed few new products like DairyGuard analyzer, SNFR olfactory port, New Thermo Mechanical analyzer getting added to PerkinElmer product range.

We are ready to take on the analytical challenges through solutions. Together we work for the safety of food, water and environment to make safer and healthier future.

Wishing you Merry Christmas and very Happy New Year!

Team Marketing
PerkinElmer (India) Pvt. Ltd.

Coffee Characterization by and GCMS-HS Trap with SNFR Olfactory Port

Introduction

Coffee is a very popular drink in most parts of the world and is one of the most traded agricultural commodities on the planet. The drinking of coffee, however, is a fairly recent activity. Although its origin may be attributed to Ethiopia a thousand years ago, its popularity as a beverage really started in the Middle East around the start of the 17th century.

Part of its popularity is due to the stimulating effect of its caffeine content (a cup of coffee may contain as much as 150 mg) and part is due to its rich complex taste. The taste of a cup of coffee depends on many factors – the coffee bean variety and horticulture and the way the beans are stored, roasted,

ground and brewed. Even the water used to make the coffee can have an effect on its flavor.

For such a commercially significant product, it is important that there should be some means to characterize and control its taste at the various stages of production. This may achieved organoleptically (i.e. by smelling and tasting) or by using powerful analytical tools like gas chromatography mass spectrometry (GC/MS) to determine chemical composition.

Aroma plays a very important part in the taste of coffee. This application note presents a system for characterizing finished coffee aroma while simultaneously performing a chemical analysis on a

mass spectrometer. Further data may be acquired using a flame ionization detector (FID) for chemometric processing to provide further insight into the individual character of each coffee sample. The results provide a powerful insight into both the chemical composition and the sensory perception of coffee aroma. Such a system can be used for quality control purposes, process and product development, storage studies, troubleshooting and evaluating competitive products.

Instrumentation

In this analysis, a headspace trap system may be utilized for sample introduction to characterize the flavor of roasted coffee beans. This technique ensures that non-

volatile material in the beans does not enter the analytical system, which can cause interference in the chromatography and potential system contamination. The headspace trap extracts the volatile components from a large sample and focuses them onto an inline adsorbent trap. It also facilitates very easy sample preparation – a weight of ground beans is dispensed into a vial and sealed. The subsequent analysis is then fully automated.

A PerkinElmer TurboMatrix™ Headspace Trap connected to a PerkinElmer Clarus® SQ 8 GC/MS with a flame ionization detector is used for these experiments. The MS provides the ability to identify each separated component and the FID is used to provide the quantitative data used in the chemometrics analysis. A schematic diagram of the GC system is given in Figure 1.

Using a headspace trap instead of the classical headspace technique enables up to 100 times improved detection limits over classical static headspace methods.
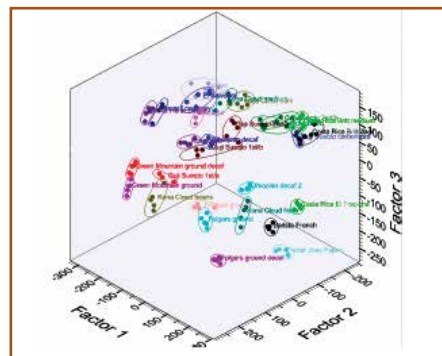
A polar 60 m x 0.25 mm x 1.0 µm Elite Wax column is used. This thick-film column provides sufficient chromatographic retention to separate the early-eluting most volatile components and provided the dynamic range necessary to chromatograph both high level and low level components in the coffee.

The column effluent is split between a PerkinElmer SNFR™ GC olfactory port, the MS detector and the FID. This splitting is performed using an S-Swafer™ in a standard active splitting configuration. Twenty seven varieties of pre-roasted and freshly roasted coffee beans from throughout the world were procured and examined in this work.

Chromatography on the MS

Slow chromatographic times are preferred to enable the analyst to fully elucidate his or her sensory experience as the peaks elute. Faster chromatography is possible but then there is a risk that odors from adjacent peaks may start to overlap. Slower chromatography also gives the user more time to fully narrate and record their sensory perceptions.

Principal component analysis loadings of first three factors for the 27 coffee samples examined.

The GC SNFR system

Photograph of coffee expert monitoring coffee aroma compounds

Olfactory Monitoring

Figure below shows an image of the SNFR system used for the olfactory monitoring. Next figure shows a photograph of Mr. Snow, a coffee expert, using the device to monitor the aroma of individual compounds. While the coffee aroma components are being monitored, the user is able to record.

The combination of chromatographic, mass spectral, chemometric and olfactory data from a single analysis provides a very powerful insight into the aroma and taste of complex samples such as coffee. Users can quickly identify which compounds are largely responsible for the aroma of a given coffee and what are the key differences and similarities between different coffees. The system that produces all this data would be at home in both a development laboratory or in a QC environment.

Author
Andrew Tipler, PerkinElmer, Inc. Shelton, CT

Qualifying Mustard Flavor by Clarus SQ8 GCMS-HS Trap

Author - **Ruben Garnica, Andrew Tipler,** PerkinElmer, Inc. Shelton, CT 06484 USA

Mustard is a common condiment used across many cultures and culinary styles to enhance the dining experience. It is derived from the mustard seed and is used either as a dried spice, spread or paste when the dried spice is mixed with water, vinegar or other liquid. The characteristic sharp taste of mustard arises from the isothiocyanates (ITCs) present as result of enzymatic activity made possible when the ground seed is mixed with liquids. The focus of this application brief is the characterization of these ITCs by headspace trap gas chromatography mass spectrometry (GC/MS) and a qualitative description of their relationship to sharpness in taste across various mustard products.

Method

The experimental conditions for this analysis are given in Tables 1 to 4. The vials used are the standard 22-mL vials with aluminum crimped caps with PTFE lined silicon septa.

Table 1. GC Conditions.

Gas Chromatograph Clarus® 680	
Column	60 m x 0.25 mm x 1.0 µm Elite-5MS
Oven	35^{0}C for 5 min, then 6^{0}C/min to 245^{0}C
Injector	Programmable Split Splitless (PSS), 180^{0}C, Split OFF
Carrier Gas	Helium at 2.0 mL/min (28.6 psig initial pressure), HS Mode ON

Table 2. HS Trap Conditions.

Headspace System	TurboMatrix™ 110 HS Trap
Vial Equilibration	80^{0}C for 20 minutes
Needle	120^{0}C
Transfer Line	140^{0}C, long, 0.25 mm i.d. fused silica
Carrier Gas	Helium at 31 psig
Dry Purge	7 min
Trap	CarboPack C, 25^{0}C to 260^{0}C, hold for 7 min
Extraction Cycles	1 @ 40 PSI

Table 3. MS Conditions.

Mass Spectrometer	Clarus® SQ 8S
Scan Range	35 to 350 Daltons
Scan Time	0.1 s
Interscan Delay	0.06 s
Source Temp	180°C
Inlet Line temp	200°C
Multiplier	1700V

Table 4. Sample Details.

Sample	Weight (g)
Mustard Seed (ground)	0.50
British Mustard Powder (dry)	0.50
British Mustard Powder (reconstituted)*	1.00
British Mustard	1.00
French Mustard	1.00
*reconstituted per manufacturer instructions	

Results

The total ion chromatogram obtained from French and British mustard samples are given in Figure 1. These intensity locked spectra demonstrated the higher level of ITCs present in British mustard as indicated by the larger peaks for allyl isothiocyanate (RT = 21.00 min) and 4-isothiocyanato-1- butene (RT = 24.28 min). This difference is indicative of the sharp verses smooth taste between British and French mustard.

The large presence of ITCs shown in Figure 1 is contrasted with the total ion chromatogram obtained from ground mustard seed given in Figure 2. In general ground mustard seed lacks volatile flavor compounds because the enzymatic activation with liquid has not been performed. Figure 3 demonstrates this activation with a comparison between dry British mustard powder and a reconstituted sample. In these labeled total ion chromatograms the intensity scales are locked between the spectrum and it is clear that activation with water has drastically increased ITC level in the reconstituted paste. The component identities were established by performing mass spectral library searches with the best match presented here. Peaks labeled with a single asterisk indicate detector overloading while peaks labeled with a double asterisk indicate inconclusive compound identification due to structural similarities.
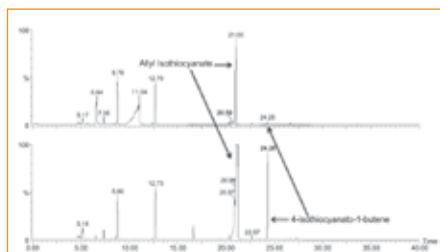

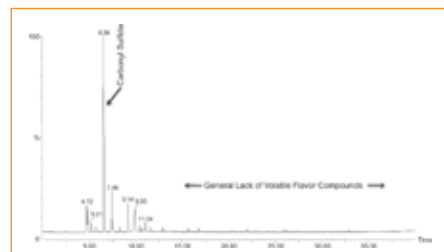Figure 1. Full total ion chromatogram obtained from French (top) and British (bottom) mustards.

Figure 2. Full Total Ion Chromatogram obtained from mustard seed sample.
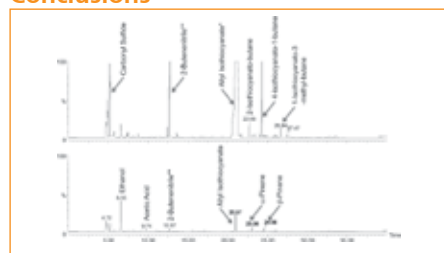
Conclusions

Figure 3. Full total ion chromatogram obtained from British mustard powder (bottom) and reconstituted British mustard powder (top).

This system provides a very simple and convenient way of characterizing the volatile flavor components of mustard based products. A rapid comparison between production samples may be made to monitor the enzymatic activation process and help producers arrive at the correct sharpness in taste. The combination of HS Trap with GC/MS allows for component detection at low-level concentration combined with the mass spectral compound identification.

Hydrogenation of Crude Oil at Elevated Pressure

Pyrolysis-GC/MS (Py-GC/MS) is a simple tool for the characterization of various crude oils. The rapid heating of approximately 0.5 - 1 µL of oil volatilizes it directly to the GC, where it is then analyzed like any other complex mixture. For example the bottom chromatogram in Figure 1 shows Py-GC/MS in helium of a crude oil sample.

The addition of a catalytic reactor, a pressure regulator and a trap to the system permits treating the oil in a reactive atmosphere, such as hydrogen, at higher pressures. The sample is volatilized by the Pyroprobe, and the resulting compounds are then carried by the reactant gas through the reactor to the trap, which is positioned after the back-pressure regulator. The hydrogenated products are collected by the trap, which

is then thermally desorbed to the gas chromatograph. The middle chromatogram in Figure 1 shows the effect of heating the oil at $600^{\circ}C$ in hydrogen at 100 PSI with the flow moving through a reactor with a platinum catalyst at $500^{\circ}C$. Under these conditions, compounds with double bonds are hydrogenated, converting olefins to paraffins.
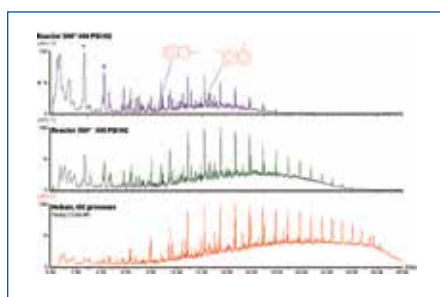
This effect is seen more easily in Figure 2. Here a series of olefins is marked with "O"s in the standard Py-GC/MS run on the bottom. Using a hydrogen carrier at 100 PSI, these olefins are completely hydrogenated, so the peaks are absent in the upper chromatogram.

Figure 1. Py-GC of crude oil (bottom), at 100 PSI Hydrogen (center) and at 400 PSI (top)
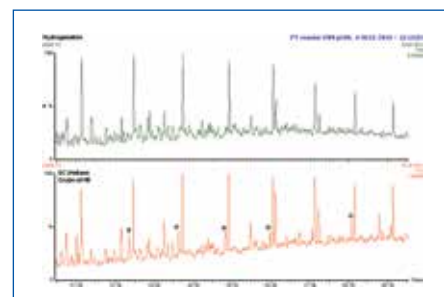

Figure 2. Expanded pyrograms of crude oil in He with olefins marked "O" (bottom), and H2 (top).

If the pressure is increased further, the effect is to generate aromatics. For the upper chromatogram in Figure 1 the reactor temperature is still 500°C, but the pressure is now 400 PSI. Benzene, toluene, xylenes and heavier aromatics are generated in large quantities, although some of the aliphatics may still be seen. In addition, the chromatogram is now characterized by an increase in early eluters and a considerable reduction in the less volatile compounds present in the original crude oil.

Instrument condition

PerkinElmer Clarus® GC/MS	
Column	30 m x 0.25 mm 5% phenyl
Carrier	Helium, 50:1 split
Program	40°C for 2 minutes, 10°C/min to 300°C

CDS® Pyroprobe 5200 HP-R	
Interface	325°C for 4 minutes
Pyrolysis	600°C for 15 seconds
Reactor	500°C, Platinum
Pressure	100 PSI, 400 PSI
Trap	325°C for 4 minutes

Author
Thomas P. Wampler, Director of Science and Technology, CDS Analytical Oxford, PA USA

Analysis of Wear Metals and Additive Package Elements in New and Used Oil

Introduction

The analysis of new and used oil for concentration trends of wear metals and for formulation or depletion of additive package metals has been around for over 30 years. Wear metals such as copper (Cu) and iron (Fe) may indicate wear in an engine or any oil-wetted compartment. Boron (B), silicon (Si) or sodium (Na) may indicate contamination from dirt or antifreeze leading to a failure. Additive elements such as calcium (Ca), phosphorus (P) and zinc (Zn) are analyzed for depletion which contributes to wear since these elements contribute to certain key lubrication characteristics. A sound maintenance program, which routinely measures metals in the lubricating oils, not only reduces the expense of routinely dismantling the components for visual inspection, but can indicate unexpected wear before component failure.

Figure 1. PerkinElmer Optima 8300 ICP-OES spectrometer

Atomic absorption spectrometers (AAS) were first used for these applications in the early to-mid 1960s. As the number of elements and samples grew over the

Figure 2. Torch-box of an Optima 8300 Flat Plate plasma technology.

years, inductively coupled plasma-optical emission spectrometers (ICP-OES) were used for oil analysis.Today, many oil analysis labs will handle between 500 to 2000 samples per day and analyze from 15 to 24 elements per sample.

Many improvements to ICP technology have taken place over the years with the most recent being the replacement

of the helical load coil used to generate the plasma. The Optima™ 8x00 ICP-OES series utilizes the new Flat Plate™ plasma technology that replaces the traditional helical coil design used since the inception of the inductively coupled plasma. The Flat Plate plasma technology utilizes two flat induction plates. (Figure 2) to produce a plasma that is compact, dense and robust. This plasma utilizes about half the argon required by previous helical coil designs while still delivering exceptional analytical performance. The Flat Plate system produces a flat-bottom plasma that minimizes the escape of sample and vapors around the outside of the plasma, making organic sample analysis easier. Plasma argon flow has been reduced to 10 L/min versus the typical 15-18 L/min used by helical systems for this application which helps to reduce the cost of analysis.

Experimental Conditions

Data were collected using the PerkinElmer® Optima 8300 ICP-OES with a CETAC® ASX-1400 stirring autosampler (CETAC Technologies®, Omaha, NE). The standard sample introduction system is given in application note in detail. With Plasma parameters for the analysis of wear metals and additive package elements in new and used oil using the Optima 8300 ICP-OES. The note will provide complete list of wavelength setting and several important parameters for the oil analysis.

All solutions were prepared with a CE-TAC® APS-1650 Automated Prep Station.

Figure 3. CETAC® APS-1650 Automated Prep Station for use with an Optima 8300 ICP-OES.

Calibration standards were made using three V23 (VHG Labs®) blended standards at 500, 100,and 50 ppm. All samples and standards were diluted 1:10 with V-Solv™ (containing cobalt) on a CETAC® APS-1650 Automated Prep Station (Figure 3).The prep station picks up the oil from standard 2-4 oz bottles or 3 mL sample cups, dispenses the oil into an autosampler tube, adds solvent and mixes the sample directly in the autosampler rack. The sample preparation is done on a volume-to-volume basis. Another sample and standard dilution option would be the PerkinElmer OilPrep™ 8 Oil Diluter (Figure 4) To meet the need for increased throughput in wear-metal analysis programs, the OilPrep 8 Oil Diluter is equipped with ultrasonic liquid-level detection (patent pending) and an 8-tip Varispan™ pipetting arm option for rapid "on-the-fly" reformatting and diluting of samples in various sized vessels. The system utilizes multiple syringes along with dispoable tips to increase sample throughput while eliminating carryover between samples and solvent waste (no rinsing is required). The sample preparation is done on a volume-to-volume basis. Ninety-six sample bottles, or any larger numbers of smaller sample containers, can be prepared at a time. Throughput can be as high as 300 samples per hour. All sample information is transferred directly from WinPREP® software into the WinLab32 software, eliminating the need to enter the data twice.

- Analysis time per sample can be as short as 20 seconds (2 replicates per sample) without any degradation in the

Figure 4. PerkinElmer OilPrep 8 Oil Diluter pipettes 8 samples simultaneously

- Analysis precision or long-term stability.
- Less carbon build-up on the torch and / or the injector.
- Stability is increased for a longer period of time, requiring less recalibration and improving QC.

Results

With the stability of the Optima 8300 system, the check standards rarely failed in an 8-10 hour period. If a check standard should fail, the action selected in the software is to recalibrate, rerun the check standard to verify it is within limits, and then rerun all samples since the last acceptable check standard. The % RSDs were as expected – low when analytes were present at typical concentration levels of > 5 ppm and higher when very little analyte was present. Similar results would be seen using the ASXpress™ with sample times of 24 seconds per sample.

Conclusion

The PerkinElmer Optima 8300 ICP-OES handles the diluted oil matrix very easily and increases sample throughput over previous Optima models to 45 seconds per sample with little carryover between samples. The Optima 8300 is the ideal ICP spectrophotometer for oil laboratories with moderate workloads. For laboratories with a heavy workload, an Optima 8300 combined with a CETAC® APS-1650 Automated Prep Station or a PerkinElmer OilPrep 8 Oil Diluter and CETAC® ASXpress™ Rapid Sample Introduction System is suggested.

The Optima 8000 ICP-OES, also equipped with Flat Plate plasma technology, may also be used for this analysis.

Please write to Marekting.India@perkinelmer.com for detail application note or other technical details related to oil and lubricants analysis.

Author
David Hilligoss PerkinElmer, Inc. Shelton, CT USA

Dissolution of Gelatin Monitored by DMA

This application note describes the dissolution process of gelatin obtained from an empty pharmaceutical gelcap using a PerkinElmer® DMA 8000. The experiment was performed by cutting a piece of gelatin from the gelcap and mounting it in the DMA 8000.

The sample was immersed in water and the mechanical properties monitored as a function of time. It will be shown how the temperature greatly influenced dissolution rate. The modulus gives a good indication of the softening of the material over time and the tan gives an indication of the material becoming more viscous over time.

Introduction

Gelatin is commonly used in both foods and pharmaceuticals. Pharmaceutically,

a gelcap is used to encapsulate an active ingredient or therapeutic formulation. The composition of the gelatin can be formulated to give the best dissolution profile with respect to pH, temperature etc. so that the contents are released at the appropriate time after swallowing.

The thickness, overall size, shape and composition of the gelcap can all influence the dissolution properties.

DMA works by applying an oscillating force to the material and the resultant displacement of the sample is measured. From this, the stiffness can be determined and modulus and tan δ can be calculated. Tan δ is the ratio of the loss modulus to the storage modulus. By measuring the phase lag in the displacement compared to the applied force it is possible to determine the damping properties of the material.

Tan δ is plotted against temperature and glass transition is normally observed as a peak since the material will absorb energy as it passes through the glass transition. This application note will

describe some experiments where a sample of gelatin is immersed in water at different temperatures. One advantage of the DMA 8000 is the ability to immerse samples in any geometry. The mechanical properties of the sample as dissolution commences will be discussed and comparison of the different temperature data will be discussed.

Results and conclusion

Figure 1 shows the response from the DMA as a function of time. The time data is adjusted so the point of immersion is shown as 30 seconds after the start of the experiment. In both samples, the modulus decreases with time after immersion reflecting the sample getting less stiff as it dissolves. Eventually, the sample disintegrates so much that data is meaningless and this is the point where the data collection was ceased. The sharp decrease in modulus indicates this point. It is worth noting that the rate of softening and the time taken to destroy the sample were both faster at 38^0 C than 25^0C. Also, the initial ingress of water into the gelatin to start the dissolution process was much faster at 38^0C as shown by the short time between immer-

sion and modulus decrease starting. The tan δ data is often referred to as the damping factor and can indicate the sample becoming less elastic and more viscous if tan δ increases. The end point of both experiments show this behavior as expected. The sample is no longer a self supporting solid but rather a viscous semi-solid which would display more viscous characteristics. The 38^0C data, and to a lesser extent the 25^0C data, shows a broad peak which might indicate a swelling of the material as a prelude to dissolution.

It has been demonstrated how the DMA 8000 can investigate dissolution and swelling behavior of materials by utilizing the immersion function of the fluid
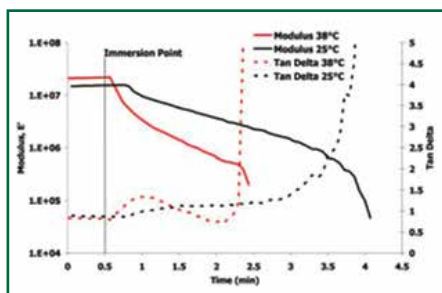

Figure 1. DMA data from immersed gelcap.

bath. Valuable mechanical information was generated from gelatin using this approach. Testing in solution will often give information not available from running samples in air.

Equipment Experimental Conditions

DMA 8000 Fluid
Bath Circulator Sample: Empty Gelcap
Geometry: Single Cantilever Bending
Dimensions: 3.2 (l) x 5.0 (w) x 0.7 (t) mm
Temperature: 25^0 C and 38^0 C isothermally
Frequency: 1.0 Hz

Experimental

Isothermal immersion study of gelatin
An empty gelcap was cut up to provide small strips of gelatin which were mounted in the DMA 8000. The samples were immersed in water and the tan δ and modulus were monitored as a function of time. The experiment was repeated at a second temperature.
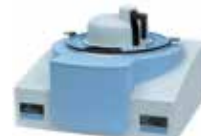
Rapid Screening and Confirmation of Illicit Street Drugs using DSA/TOF

Introduction

Screening methods for drugs of abuse currently require long chromatographic methods and sample preparation or immunoassay techniques (EMIT) with confirmation by GC/MS or LC/MS/MS. These methods can be time-consuming and laborious. The majority of urine screening methods cover only a limited number of metabolites, since reference standards are poorly available, making it difficult to keep up with the changing illicit drug scene. Due to the variety of the illicit and abused drugs available, it is important to monitor the entire spectral range, which is easily performed using a time-of-flight-mass spectrometer (TOF MS). The ability to analyze samples rapidly is desirable, as drug seizures

Figure 1: AxION DSA System

and patient screening may result in thousands of samples. A method was developed using the AxION® 2 TOF MS integrated with the AxION Direct Sample Analysis™ (DSA™) system (Figure 1) for screening various classes of street seized, illicit designer drugs, drugs of abuse and abused human growth hormones

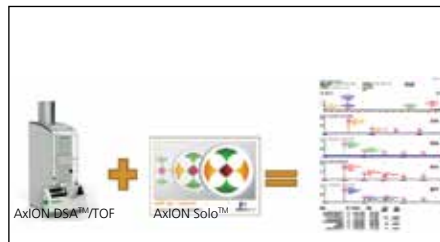in solid, liquids as well as metabolites in urine of possible illicit drug offenders.

This method enables fast screening and confirmation with minimal or no sample preparation using the AxION DSA system. We present a real life case study for the analysis of 369 unknown drugs from seized pills, vials, powders and urine samples (Figure 2). The study shows the suitability of this method and instrumentation and also the ease of use and quick implementation possible of this solution into a laboratory due to the simple user interface, holistic design and visual reporting (Figure 3). At the end of the first day of installation of the instrument, sample results were being reported. Rich spectral information for

screening and confirming illicit drugs takes only 20 seconds, without the need for classical mass spec training. The presence of the target analytes was confirmed using AxION Solo™ software by exact monoisotopic masses of precursor ion and fragment ions. Identification was performed by reverse automatic database search with set criteria for mass accuracy, isotopic pattern and abundance. A database containing all schedule 1-5 drugs as well as other substances to contain more than 1,000 compounds of illicit and commonly abused drugs and pharmaceuticals was used. Additional databases added in minutes. Samples were confirmed using an orthogonal confirmation methodology to validate the accuracy of this method against current industry standards.

In addition to the previous advantages described, we can now perform rapid screening of samples with automated sample analysis for many different sample types including solid, liquid and gas. Samples are introduced via disposable mesh and glass capillaries. The system is fully enclosed, providing decreased noise for excellent signal to noise, and is holistically designed with simple control and dedicated target and unknown analysis software. Sources are easily interchangeable to enable switching from DSA/ TOF to LC/TOF in minutes to allow for a flexible laboratory workflow. Screening and confirmation is performed in a single sample analysis of targeted substances using accurate mass and isotope ratio supported by the AxION Solo software

as well as confirmation of targeted unknowns, with the AxION EC ID software. AxION Solo uses accurate mass, isotope ratio and collision induced dissociation (CID) accurate mass fragments enabling confirmation by:
• Monoisotopic mass of the precursor ion
• Isotope ratios of the precursor ion
• Accurate mass of multiple fragments

AxION DSA and AxION Solo: a holistic design that enables true one-click automated sample analysis.

Results

369 unknown samples were screened and confirmed for drugs of abuse using the AxION DSA/TOF and AxION Solo. Due to the simple nature of the control software the samples can be easily analyzed without complicated parameter setup and targets screened automatically. 53 unique substances were detected in this study, Each sample took less than 25 seconds. This is a total of 154 minutes or approximately 2.5 hours run and post data analysis time. No sample prep was required for many of the samples, but some crushing and MeOH extractions/ dilutions were performed totaling less than 4 hours for analysis of all samples. All samples were analyzed, confirmed and reported in a single morning using the AxION Solo Drugs of Abuse library and post-acquisition data processing software. It provides annotated mass spectra for all substances detected in the sample that was run, including mass accuracy in ppm against theoretical. Isotopic ratio matching for further confirmation and a stop-light visual summary of substances found / not found against the library, provide a quick review and confirmation of the drugs detected.

For detail method parameters log on www.perkinelmer.com or write to Marketing.India@perkinelmer.com

Author
Sean Daugherty, Hayley Crowe, PerkinElmer, Inc. Seer Green, Beaconsfield, HP9 2FX United Kingdom

Events & Updates

PerkinElmer impact in Sri Lanka

PerkinElmer India along with our Channel Partner Techno Solutions –Colombo- SriLanka organized a knowledge seminar on 27th September 2013. Roshan Rupasinghe, Director, Techno Solutions presented success story of the company over 14 Years. Srinivas Addepalli explained the trust owned by PE worldwide and future plans for SriLanka operation by PerkinElmer. Dr. Gokul and Dr. Jain dazzled the evening by presenting the latest technological knowledge for Material characterization and Inorganic Product line respectively. The Seminar was attended many eminent personalities from the Sri Lankan industry.

DairyGuard Launch in India

PerkinElmer introduced a new NIR based DairyGuard analyzer for the analysis of contaminants in milk powder and dairy products. The launch took place on 12th November 2013 at Thane. The new system was demonstrated and presented by Sharon Palmer, Director, F&B global for PerkinElmer; and Gerlinde Wita –EU segment leader. Many participants from Dairy and allied industry had attended the spectacular launch.

At PMEC 2013 Mumbai

On 3rd November 2013 all the roads from western express way were getting jammed to witness one of the mega show of the year 2013 in India. The Bombay Exhibition and Convention Centre was having hectic activities to stage three exhibitions PMEC, CPhI and BioPharm 2013. PerkinElmer stall was neatly decorated and illuminated with display of instruments and prominent back drop. PerkinElmer had focused on "Better detection Better Compliance" theme. Solutions to new regulations implemented were widely talked. Visitors had shown interest in solutions and services. The Western regional sales team, Product managers and leaders were receiving the customers to explain the GCMSHS, FTIR, DSC, Services and consumables. The trade show was very successful for organizers and exhibitors.