Fresh
VOLUME 17 • May, 2010
Analytical Science | Genetic Screening

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E D I T O R I A L

Dear Reader

We have entered into a new financial year for India business and I'm sure we're all raring to go and make the best of it. Let's just hope whatever bad is brewing over in Greece does not spill over and upset some stomachs! Only time will tell!

We're in the midst of a really tepid summer. And invariably, it usually tends to get hotter and hotter on a Friday night! After a long, tiring day at work, there's nothing like heading over to your favorite watering hole with your friends and colleagues and having an ice cold beer! So you've downed a few, stumbled over your car and say to yourself, "I can drive with ease. I'm perfectly sober"! Long story short, let's just say you're caught by the cops! And now the inevitable and dreaded Blood Alcohol test. While you sit there and hope (& pray) that it's well below the permissible limit, just stop and think for a minute how critical and important these tests really are. They could be of prime importance in court cases when lives have been taken away in a heartbeat because of reckless drunk driving.

Believe it or not, one of the instruments that you usually work with (and cover here in PerkinElmer literature) that can be used for detecting blood alcohol levels, is the Gas Chromatograph with Headspace!

We cover one such article that will amaze you, whether or not you enjoy the occasional peg! We discuss another important business from PerkinElmer, and that's carrying out New Born Screening. And finally, how a simple restructure in your surroundings can improve in curbing energy loss.

If you are in or around Pune later this month, you will not want to miss.

WHAT'S Fresh inside...

Article

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Increasing Blood Alcohol Analysis by Headspace – GC

Testing for the presence and subsequent quantitation of ethanol in blood, breath, and urine are the highest volume tests performed in forensic laboratories. Inaddition to ethanol, the detection of several other significant alcohols and their metabolites is necessary. Gas chromatographic (GC) assays provide the greatest amount of flexibility and specificity in analyzing for these volatile compounds. Direct injection of biological samples into GC columns has been used in the past as the method of sample introduction. This typically leads to column contamination and decreased performance. The incorporation of headspace sampling into the method prevents the buildup of non-volatile contamination at the head of the column and helps to maintain consistent performance and extend column lifetime. Analysis time and resolution are two critical factors when developing a GC assay for ethanol. Analysis time for each sample should be as short as possible, while still maintaining baseline resolution for all analytes. Isothermal operation is the preferred method of analysis because it eliminates the cool-down period between temperature programmed runs. Overall analysis time can be reduced in isothermal analysis by raising the temperature of the analysis or by increasing carrier gas flow rate. However, in attempting to shorten the analysis time either by increasing the flow rate or by raising the temperature, many traditional capillary column stationary phases fail to provide adequate resolution of all of the components commonly tested during blood alcohol analysis. PerkinElmer supplies the Elite BAC-1 and BAC-2, two novel capillary column stationary phases to meet all of these requirements.

The goal of the method developed here was to use headspace sampling and dual column GC analysis to provide blood alcohol confirmation in less than 3 minutes. The instrumentation requirements for this type of analysis can be satisfied by selecting from a wide variety of PerkinElmer products. Any current TurboMatrix™ headspace autosampler (as well as previous models such as the HS40 or HS110) can be used for sample introduction. Similarly, the GC requirements can be fulfilled using the Clarus™ 500 as well as previous models such as the AutoSystem XL or AutoSystem (as long as the system incorporates dual FID detectors). Data acquisition and data processing requirements can easily be addressed using SoftLINK™ and TotalChrom™ software
(or Series 600 link box and TurboChrom® software).

The TurboMatrix headspace products use a balanced pressure sampling procedure to transport the sample to the GC. This type of sampling works better with columns that require higher head pressure, so 0.32 mm ID analytical columns were chosen for this application because of their higher operating pressure. Optimal performance of these columns during headspace analysis depends on GC/headspace system set up. Band broadening can occur if there is excess dead volume in the sample flow path between the sample valve and the head of the column. Low volume inlet liners or interfaces in the injection port should be used to reduce the amount of excess volume at the exit end of the transfer line. A 2 mm ID zero dilution liner was used in this analysis to reduce dead volume and maintain narrow peak widths. High carrier gas flow rates through the transfer line can also be used to maintain narrow sample

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bandwidths and speed up sample transfer to the head of the column. A flow of 40 mL-per-minute was used to optimize the analysis on the headspace autosampler.

Simulated blood alcohol samples were prepared and analyzed using a modification of a procedure published by Christmore et al.1 n-Propanol was used as the internal standard and was prepared at a concentration of 0.03 g/dL in 1.0 M ammonium sulfate as a diluent. Five milliliters of diluent was added to 1 mL
of sample in a 20 mL headspace vial.
Results

We demonstrated here that a PerkinElmer headspace autosampler coupled with dual-column GC confirmational
analysis provided excellent accuracy and precision in the analysis of blood alcohol. Calibration curves were constructed using concentrations ranging from 0.01% to 0.5% ethanol. Correlation coefficients above 0.999 were easily obtained for all compounds. Response factor repeatability was less than +1% standard deviation while analyzing six samples at a concentration of 0.2% ethanol. Based on our experimentation, a system detection limit of approximately 0.001% ethanol should be achievable while maintaining a minimum signal-to-noise ratio of 10.

Instrument parameters

Dual column analysis using atwo-hile ferrule.
1.0 mL headspace sample of a blood alcohol mix.

Oven temperature:	40 °C isothermal
Inj. temperature:	200 °C
Carrier gas:	He
Sample equilibration temperature:	70 °C
Sample equilibration time:	15 min.
Vial pressure:	30 psi
Vial pressurization time:	0.15 min.
Vial sampling time:	0.01 min.
Transfer line:	0.32 min ID FS Hydroguard™ tubing
Transfer line temperature:	200 °C
Injection port sleeve:	2 mm ID
split flow:	20 mL-per-minute

Product listing

Elite BAC-1 GC Columns

Length (m)	ID (mm)	df (µm)	Part No.
30	0.53	3.0	N9316578
30	0.32	1.8	N9316579

Deactivated Fused Silica Transfer Lines

Length (m)	ID (mm)	OD (um)	Part No.
5	0.18	0.34	N9301354
5	0.25	0.37	N9301356
5	0.32	0.45	N9301357
5	0.53	0.69	N9301358

Dual-Column Analysis Replacement Ferrules-Two-hole

Ferrule i.d. (mm)	Nut Size (in.)	Column i.d. (mm)	Graphite	Graphite/ Vespel®
0.4	1/16	0.18-0.25	N/A	04972392 (1-pk)
0.5	1/16	0.32	N9306001 (10-pk)	N9306000 (10-pk)
0.5	1/8	0.32	09903395	N/A

Elite BAC-2 GC Columns

Length (m)	ID (mm)	df (µm)	Part No.
30	0.53	2.0	N9316576
30	0.32	1.2	N9316577

Splitless Liners

Description	Part No.
Quartz Liner (2mm)	N6121002
Glass Liner (2mm)	N6101372
Deactivatad Liner (2mm, packed with wool)	N6121021

Headspace Autosampler Vials & Seals

Description	Part No.
22mL clear vial, rounded bottom (100-pk)	B0104236
Headspace vial cap w/PTFE/Silicone septe (1000-pk)	B0104242

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A simple step… to protect your precious newborn's future - PerkinElmer Newborn Screening

A mother takes utmost care for 9months when the baby is inside her womb. Nature ensures that baby's needs are met from nutrients and processes within mothers body. But once the baby is born, she is on her own to take care of her developmental needs – of course with the parents help!

While most babies remain healthy, some may have a disorder which may lead to a life threatening situation or cause physical and mental disability – **If not detected early**. These disorders are called **metabolic and other inherited disorders** which are flaws / abnormalities in body chemistry. Metabolic and other inherited disorders are rare, but can be harmful, even deadly, when undetected. For example, metabolic disorders can cause newborns to have difficulty processing food, placing them at risk for serious health complications such as mental retardation, coma, and even death.

Parents who have already had healthy children don't expect any problems and they are almost always right. Since these disorders are not very common, the chances are excellent that your child may NOT have one of these disorders. However, the few children who are born with these problems are generally from healthy families. **Most babies born with these conditions look and act normal and appear healthy at birth. Newborn Screening** determines the risk your baby is at for a metabolic or other inherited disorder. **If your baby is diagnosed with one of these disorders, early medical intervention within the first few days after birth, can play a key role in helping her lead a normal life and save her from physical and mental disability.**

Newborn screening is a vital public health policy and has been made mandatory in most developed countries. Many countries in Asia and several centers in India also suggest newborn screening. PerkinElmer is the global leader in newborn screening. Ask your doctor about PerkinElmer Newborn Screening and gift your newborn baby a bright and healthy future!

Given below are answers to some questions that you may have on newborn screening.

What Is Screening?
Screening is the testing of a group of people to identify those who are at risk for having a specific disease even though they may seem healthy.

What is Newborn Screening?
Newborn Screening is a simple blood screening done in apparently healthy babies soon after birth to identify many life-threatening genetic illnesses. It is a comprehensive test which screens your baby for about 50 different conditions some of which can be treated or modified if detected early in life and thereby preventing potentially disastrous consequences and saving your babies life. For example, 1 in 2000 babies tested has an inability to produce the thyroid hormone which is extremely important for the development of the newborn brain. Such a child can potentially develop mental retardation if not diagnosed and treated in the early newborn period. By screening children for this condition at birth, one can easily avoid this consequence by starting the baby on thyroid hormone replacement. This is only one of the many conditions which are tested for in the newborn screening program.

How is my baby tested?
A healthcare professional will draw a small sample of blood by pricking your baby's heel. The sample is placed on the absorbent filter paper and sent to PerkinElmer Health Sciences Laboratory for analysis carefully.

Is The Test Safe?
Yes, this is a simple and safe test. Over 321 million newborns have had blood collected by heel prick method without any harm to the newborn.

When Should The Test Be Done?
After the baby is born, blood samples should be collected between 24 to 48 hrs of age, as close to 48 hours as possible. However, the test could be done from 12 hours of age but not later than 6 days after birth.

How Can I Get The Results?
The testing will be complete approximately three days after the sample arrives at the PerkinElmer Health Sciences laboratory. Your child's physician will be notified immediately of any abnormal results by telephone. Results are available to your child's physician through the reports sent by us. We do not provide results directly to parents.

What Do I Do If The Baby's Results Are Positive?
If the results are positive, kindly get in touch with your physician he will guide you.

Can I test my baby myself?
No. Your physician must coordinate the entire process. You should not, under any circumstances, attempt to draw and submit the blood sample yourself.

How common are metabolic disorders?
About One in 1,500 babies could be affected by a metabolic disorder. Screening, diagnosis, and intervention within the first days of life are essential. Most of these disorders can be managed if treatment begins early.

Can metabolic disorders be cured?
Metabolic disorders are part of an individual's genetic makeup, so they cannot be "cured." Early identification of a metabolic disorder can allow your physician to start specialized medical

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treatment that may improve the long-term health of your baby.

How many disorders can be screened for?
Screening can identify the presence of more than 50 inherited disorders, including Congenital Hypothyroidism, Cystic Fibrosis, and Congenital Adrenal Hyperplasia as well as many lesser-known disorders.

Can These Diseases Be Treated?
Yes. Effective treatment is available for most of the diseases for which we screen. Treatment may include special diets or drugs. Babies who receive early and ongoing treatment can grow up to enjoy long, productive lives.

If my baby has a metabolic disorder, could my other children have it as well?
This question can best be answered by your physician or a trained genetic counselor. Many familes seek genetic counseling to better understand why their baby has a particular disorder and to learn if any other family could be at risk.

Is newborn screening for metabolic disorders a new procedure?
No. newborns have been screened for inherited disorders in the U.S. since the early 1960s. Many countries in Asia and several centers in India also suggest newborn screening.

Remember, "If your baby's results are normal, the screening will give you peace of mind. Newborns may not show obvious signs that they have an inherited disorder until after health complications have developed. Early identification can allow your physician to start specialized medical treatment that may improve the long-term health of your baby"

References:

http://www.perkinelmergenetics.com/NewBornScreening.htm

http://www.health.wa.gov.au/docreg/Education/Prevention/Genetics/HP009372_newborn_screen_test.pdf

http://www.indiaparenting.com/newborn-care/254_3285/newborn-screening.html

livemint.com
THE WALL STREET JOURNAL
WEDNESDAY, MAY 19, 2010

"Most newborns show no obvious signs of inborn metabolic disorders. A simple test within 24 hours of birth, available in India, aids early detection and treatment"

Till date, screening for newborns in India has focused largely on detection of neonatal congenital hypothyroidism (where the body does not produce sufficient thyroid hormone), which occurs in one out of every 2,600 children, according to a study done by Mumbai's KEM Hospital. The hospital tracked more than 24 million babies born between 1978 and 2004, and also concluded that G6PD**(Glucose-6-phosphate dehydrogenase deficiency)** occurred in one out of every 70 babies born in India.

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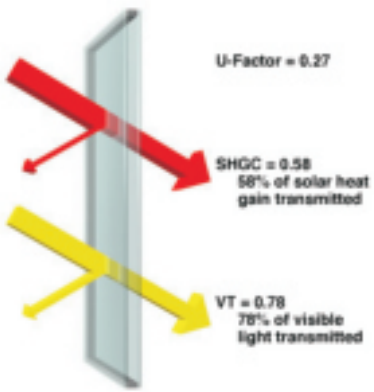
Good façade saves energy loss

Energy efficient façade glasses

Building heat loss means increased energy costs. Much energy wasted occurs in the form of heat escaping through window glazing. Major improvements in the thermal performance of glass have been made in the past three decades.

To calculate building heat loss, the designer needs to know the U-value of different building elements. A low U value means a low loss of heat from the interior to the exterior of the building. In the last 30 years the glass industry has made enormous progress in the development of thermal resistance of glass. A better understanding of glass properties and this natural phenomenon has lead to a creation of special kinds of glasses, systems and coatings that minimise energy consumption and use alternative natural resources such as sun. Most utilise a low-e coating which is becoming the standard in insulating glass units. Other lesser-known systems include warm-edge spacers, double skin façades, electrochromic glass and technologies that have given a new meaning to energy conservation. By using these system you contribute to preserving the environment and reduce your financial costs.



Typical glass behavior

A dynamic thermal modelling study to show estimated energy savings and projected payback periods for various double façade construction systems in different climates and orientations. It concludes that although the economic case for a double façade based purely on energy cost savings may be marginal, many other factors must be considered. Climate, construction type, construction cost, and energy cost significantly contribute to the feasibility of each unique case and must be assessed for each building.

Double facades are an effective means of buffering and controlling heat, light, air and noise through a building envelope. They do, however, have a premium cost associated with them compared to conventional facade systems. Justification of their inclusion in a building design, therefore is typically on the basis of energy efficiency and associated cost savings. Qualitative benefits of solar control, moderated surface temperatures, noise reduction, reduced glare, reduced heating/cooling demand, moderated access to fresh air, aesthetic purity and increased daylighting are generally seen only as intangible 'bonus' benefits.

The principle of a double skin façade is an additional layer of glass offset from the conventional curtain wall forming an interstitial space that acts as a thermal buffer. Blinds are typically incorporated into the void space to prevent solar heat gains from entering the occupied space. Blinds may be automatically or manually operated. On the outer surface of glazing, operable vents are located top and bottom to prevent the void from overheating in the summer.

Other Important Influences on Cost Payback

Very important influences on total life-cycle payback of double facades cannot be fully elaborated on, but are listed below and expanded on in many references on double facades. Many are soft issues which improve worker productivity, by far the largest portion of an office building's life-cycle cost. Little quantifiable research has been done on these topics and this is an area in great need for future research.

- Reduced Mechanical Plant Capital Costs – peak load reductions allow smaller chillers, boilers, air handlers, ducts, or even different HVAC systems altogether.
- Glare Control – operable blinds block direct solar glare and accept diffuse light
- Moderated Glass Surface Temperatures – blinds block direct solar rays from striking the inner glass preventing it from heating to upwards of 60°C (140°F). In the winter, the warm void heats the inner glass reducing drafts and cold radiant exchange.
- Operable Windows in High-Rise Buildings –the void buffers wind pressures which otherwise make operable windows very gusty and disruptive in tall buildings.

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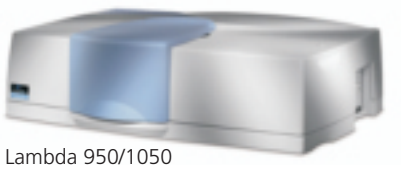
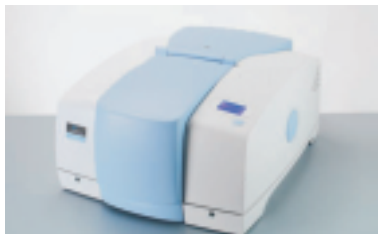
- Acoustical Buffering – the vents and void dampen noise improving acoustics near noisy roads, airports, factories or rail lines.
- Increased Daylighting – operable blinds actively bounce light deeper into occupied space. Improved U-value allows larger windows.
- Reduced Emissions – greenhouse gases, SOx, NOx and other particulates are reduced as energy consumption is reduced.
- Aesthetic Purity – the exterior rain-screen requires no thermal breaks, structural mullions or spandrel glass providing a visually simple façade. Blocked UV, wind and rain allow a wood framed interior curtain wall. External blinds provide shading, so clear glass is acceptable. '

Conclusions

An extensive analytical investigation has been carried out into the cost versus payback benefits of facades with respect to their energy saving



Lambda 950/1050



Spectrum Optica

PerkinElmer provide the technologies to check the performance and quality of glass used to make facades. The Spectrum Optica and Lambda 950/1050 with accessories are the gold standards for the glass industries in the world.

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Knowledge Seminar in Pune on:

- Technology for the regulatory environments in industries
- New solutions for sustainable energy
- Hyphenation techniques for industrial research

Date: 28th May 2010, Friday
Venue:Hotel Sun-N-Sand
Bund Garden Road, Sangamvadi, Pune, Maharashtra

Timing:6:30 pm - 8:30 pm, followed by dinner

Register your participation with
Mrs. Neha Deodhar
Tel.: 020-25447183
Email: Neha.Deodhar@perkinelmer.com

(Registration and confirmation is essential to make necessary arrangements)

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