Fresh

VOLUME 20 • Monsoon Edition, August 2010

E D I T O R I A L

Dear Reader

Hello "Fresh" readers and customers. We at PerkinElmer India are making efforts to make the newsletter more interesting and informative. All of you are busy in day to day activities and are linked with the science and scientific work in the laboratory or at the site.

Many of the inventions and procedures were devised due to the need or accidentally. The modern technologies are helping us to make these more simpler and with less efforts. For example in ancient India the medical science and surgical methods were well established and are documented by Sushrut. The medical materials used in the modern surgeries are required to be tested for VOCs.

Similarly the First Emperor of China had a mysterious death due to consumption of mercury pills. The mercury in any form in excess is dangerous to human and environmental life. Hence PerkinElmer ICPMS solution for the elemental detection in low level can be performed easily. Look for NexION the revolutionary ICPMS.

The hectic work activities and urban lifestyle made people across many parts of the world to rely on the ready made packaged food. The quality of the multilayer packaging need to be of the highest standard to get the safer food to the consumer. PerkinElmer provide testing solutions for the food and beverages as well as packaging to ensure the safer food for the consumers.

Since ages diamonds are the prestigious gemstone in the world. India and South Africa were the main continents to mine the diamonds. The diamonds and other gemstones are necessarily to be tested for its grade and industrial usage. PerkinElmer UV VIS NIR systems are the best to analyze the gemstones of various sizes and shapes.
The month of August brings the Independence Day for India on 15th. Let us lead the world for the peace and better place for human health and environmental health.

Jai Hind! (Long live independence)

WHAT'S Fresh inside...

Interesting facts of independence days in the month of August

August 1,	1291	Switzerland
August 6,	1825	Bolivia
August 25,	1825	Uruguay
August 19,	1919	Afghanistan
August 15,	1945	Korea, North
August 15,	1945	Korea, South
August 17,	1945	Indonesia
August 14,	1947	Pakistan
August 15,	1947	India
August 8,	1949	Bhutan
August 31,	1957	Malaysia
August 1,	1960	Benin
August 3,	1960	Niger
August 5,	1960	Burkina Faso
August 7,	1960	Cote d'Ivorie
August 11,	1960	Chad
August 13,	1960	Central African Republic
August 15,	1960	Congo, Dem. Rep. of the
August 16,	1960	Cyprus
August 17,	1960	Gabon
August 6,	1962	Jamaica
August 31,	1962	Trinidad and Tobago
August 9,	1965	Singapore
August 15,	1971	Bahrain
August 20,	1991	Estonia
August 21,	1991	Kyrgyzstan
August 24,	1991	Russia
August 25,	1991	Belarus
August 27,	1991	Moldova
August 30,	1991	Azerbaijan

Medical Materials Testing

For any surgery it is essential to have dis-infected surgical apparatus and material used for surgery. Whether it is major surgical procedure or minor the quality of medical material and allied components should be the best. The medical material include the gauze, plasters, bandages, sutures, tubing, syringes (disposable) etc.

Many of these material are essentially free from the volatile organic components (VOCs) present in surgical products, specifically sutures. Some of these VOCs are considered toxic impurities, so they need to be identified at the lowest possible detection levels since they may be absorbed into the human body and introduce the potential for adverse metabolic reactions.

Where do VOCs come from?

VOCs are widely used in household and commercial products. Some cleansers, disinfectants, waxes, glues, cosmetics, dry cleaning products, paints, varnishes and preservatives include VOCs. Gasoline, kerosene and other fuels also contain VOCs. VOCs are also found in cigarette smoke and pesticides.

A number of building and household materials may be sources of VOCs. New carpeting, backing, and adhesives; draperies; wood products that use certain glues, finishes, and waxes in the manufacturing process; and vinyl type flooring and wall coverings may all release VOCs into the air.

What are the health effects?

The ability of VOCs to cause health effects varies greatly. As with other chemicals, the effects of VOC exposure depends on several factors including the type of VOC, the amount of VOC and the length of time a person is exposed. Exposure to elevated levels of VOCs may cause irritation to the eyes, nose, and throat. Headaches, nausea, and nerve problems can also occur. Some people do not appear to have any kind of reaction to fairly “low” amounts of VOCs, while other people are fairly sensitive.

Studies of animals have shown that

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breathing some types of VOCs over a long period of time can increase the risk of getting cancer.

Clarus series GCMS Head Space systems for VOC determination at low levels

A new sample-introduction product, the PerkinElmer® TurboMatrix™ HS Trap was coupled to a PerkinElmer Clarus®580 GC/MS and used for this investigation. The TurboMatrix HS Trap is a headspace system that incorporates new technology; a trapping process that pre-concentrates and focuses the VOCs before injection into the GC. This provides the ability to identify very-low-level volatile components that may not be detected by traditional static headspace sampling.

The system can identify and confirm the compounds with the help of retention time and library spectra data
The compounds like toluene, tetrachloroethylene, A homologous series of aliphatic aldehydes along with ketones and a phthalate ester (typically from plasticizers) etc. are normally monitored to very low levels.
PerkinElmer Clarus GCMS-HS system is a perfect solution for the medical material manufacture to ensure the quality of the material produces and assures the life of the patients.

The innovative headspace trap technology used in this application provides sensitivity beyond the capability of traditional static headspace. This presents a new level of detection capability for the evaluation of materials used in medical applications, as well as in other types of material testing, including pharmaceutical formulations and food-packaging film.

For many more applications of GCMS-HS please log on www.perkinelmer.com

THE ART OF SURGERY- An ancient Indian medical science

Sushruta's ophthalmic surgery

Medical Science was one area were surprising advances had been made in ancient times in India. Specifically these advances were in the areas of plastic surgery, extraction of cataracts, dental surgery, etc., These are not just tall claims. There is documentary evidence to prove the existence of these practices.
The practice of surgery has been recorded in India around 800 B.C.Surgery is one of the eight branches of the ancient Indian system of medicine. The oldest treatise dealing with surgery is the Shushruta's compendium. Shusruta who lived in Kasi was one of the many Indian medical practitioners.

Shushruta was one of the first to study the human anatomy with the aid of a dead body. Shusruta's forte was rhinoplasty (Plastic surgery) and ophthalmialogy (ejection of cataracts). Shushruta has described surgery under eight heads Chedya (excision), Lekhya (scarification), Vedhya (puncturing), Esya (exploration), Ahrya (extraction), Vsraya (evacuation) and Sivya (Suturing).

OPHTHALMIC SURGERY: Shushruta specialized in ophthalmic surgery (extraction of Cataracts). A typically operation per formed by Shushruta for removing cataracts is desired below. "It was a bright morning. The surgeon sat on a bench which was as high as his knees. The patient sat opposite on the ground so that the doctor was at a comfortable height for doing the operation on the patient's eye. After having taken bath and food, that patient had been tied so that he could not move during the operation."

PLASTIC SURGERY: Perhaps the greatest contribution of Shushruta was the operation of rhinoplasty (restoration of a mutilated nose by plastic surgery). The detailed description of the rhinoplasty operation in the Shushruta Samahita is amazingly meticulous and comprehensive. There is evidence to show that his success in this kind of surgery was very high, which attracted people from all over the country and perhaps even from outside. Cutting off of the nose and ears was one of the common modes of punishment in the early Indian kingdoms.

Shushruta moved by his intense humane approach to life and equipped with superb surgical skills, did the operation of rhinoplasty with remarkable skill, grace and success. The details of the steps of this operation, as recorded in the Shushruta Samahita, are amazingly similar to the steps that are followed even to-day in such advanced plastic surgery.

The death of First Emperor

Mercury is ubiquitous in nature, and the human health consequences of mercury exposure were recognized from prehistory to the present. The first emperor of unified China who came to power in 221 B.C., Qin Shi Huang, reportedly died of ingesting mercury pills that were intended to give him eternal life.

Who Was Qin Shi Huang?

From boyhood, China's first emperor led a truly operatic life. Qin Shi Huang lived during the third century B.C.E., during his country's bloody Warring States Period, when China's Middle Kingdom was made up of an unruly collection of principalities. In 247 B.C.E., he was still Prince Zheng, but that year, the 12-year-old boy inherited the powerful northwestern state of Qin. And at 21, the headstrong and precocious prince eliminated his regent, assumed full power as king, and set about consolidating his realm.
To do so, he quickly established what might today be called a totalitarian state, putting in place a system of rewards (mainly for battlefield valor) and punishments (amputations and executions, for almost any infraction). He abolished aristocratic ranks and hereditary offices, replacing them with a bureaucracy under central control. He built a wall (the first of several ancestral incarnations of the 15th-century Great Wall we visit today) to defend the northern frontier. Able-bodied men not in the army raised grain to support the troops and built vast irrigation works to increase agricultural production. Within a few years the king had created a deadly machine dedicated to military conquest.

And the conquests came swiftly. Qin's armies of chariots, spearmen, and crossbowmen swept aside the armies of state after state, and the king coined a new title — huangdi ("emperor") — to suit his status as China's unifier. He predicted that his dynasty would endure for a thousand generations. Qin Shi Huang built public works, palaces, and his own tomb on a gargantuan scale. He standardized weights and measures, coinage, the writing system, and even the width of roads.The first emperor's power was total, but unrest lurked under the surface.

And then, suddenly, it was over. In 210 B.C.E., the emperor fell ill and died. Some suspected poison; the mystery was never solved. Rebellions broke out, and rival officials slaughtered each other. The second emperor committed suicide, leaving no successor. Qin Shi Huang's empire collapsed.

The severity of mercury's toxic effects depends on the form and concentration of mercury and the route of exposure. Although its potential for toxicity in highly contaminated areas such as Minamata Bay in Japan is well documented, research has shown that mercury can be a threat to the health of people and wildlife in many environments that are not obviously polluted. There is no safe level of mercury for humans. The main toxic effects of mercury are known to negatively affect the neurological, renal, cardiovascular and immunological systems.

Mercury exists in three chemical forms: elemental or metallic, organic or methyl mercury, and inorganic complexes. Mercury has thousands of industrial applications. Some common uses for mercury include conducting electricity, measuring temperature and pressure, acting as a biocide, preservative, and disinfectant, as well as being a catalyst for reactions. Unlike most other pollutants, mercury is highly mobile, non-biodegradable, and bio-accumulative; as a result, it must be closely monitored to ensure its harmful effects on local populations are minimized.1 Thus, measurement of mercury in environmental samples, and in particular wastewater, is of great importance as a major tool to protect the environment from mercury released through emissions from manufacturing, use, or disposal activities. Currently, the prominent methods typically utilized by the environmental community for the determination of mercury generally require detection limits as low as 0.5 ng/L (ppt, parts per-trillion

Traditionally, mercury is analyzed using Cold Vapor Atomic Absorption Spectroscopy (CVAAS) or Cold Vapor Atomic Fluorescence Spectroscopy (CVAFS). Both of these techniques are relatively straightforward to use and can accomplish the analytical requirements of detection limits in the low ppt range. However, they are generally specific for mercury analysis only.In recent years, Inductively Coupled Plasma Mass Spectrometry

(ICP-MS) has become one of the most powerful analytical techniques for trace element analysis because of its high sensitivity, wide linear dynamic range, and simultaneous multi-element detection capability. As a result, ICP-MS has been increasingly adopted in environmental and biomonitoring laboratories for the simultaneous measurement of mercury with other toxic metals since this technique can offer the same analytical performance as CVAAS or CVAFS.

MULTILAYER PACKAGING FOR FOOD

We are witnessing a significant change in food consumption habits. Sales of fresh food over the counter are decreasing as more and more consumers prefer to use cold shelves

where they can find the product prepared and packaged without having to wait. We also observe a ‘snack’ and ‘ready to eat’ phenomenon going on in many parts of the world.

The time people spend cooking is decreasing, which in turn increases demand for prepared food with minimum cooking times. And there is simultaneously a growing demand for products with longer shelf life but the same nutritional value and aromatic properties; and an increasing focus on a healthy lifestyle.

The requirements for packaging

In addition, the growing number of single households and households with elderly people living alone causes an increasing demand for single packs with a high level of convenience and features such as lightweight packaging, and easyto-open, re-closable containers. Production security and traceability of the production process is a prerequisite, including, for example, the implementation of certain quality and hygiene standards to guarantee food safety and consumer security.

The requirements a food package has

to fulfill are thus becoming more and more demanding, and include, among others, the need to protect the packed food against any kind of impact, to ensure high production efficiency, to support environmental sustainability and to provide maximum shelf appeal. In terms of protection, the packaged food must be protected against aromas and odours, gases (e.g. oxygen, nitrogen and carbon dioxide), water vapour, light, fat, temperature, chemical and mechanical impacts. The packaging must ensure that the interaction between the environment and the packaged food is minimal.

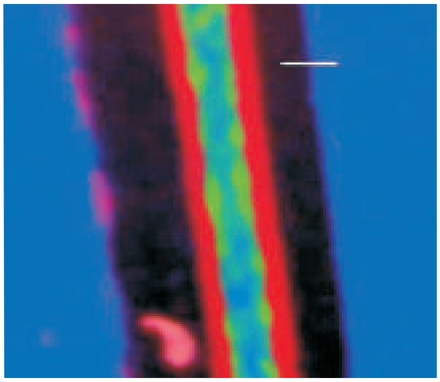
Multilayer films

Such a multitude of requirements can't be fulfilled with packaging films based on a single polymer. While such a polymer might be appropriate in terms of fulfilling one specific requirement it may well possess other properties which are disadvantageous and unsuitable for the production of food packaging. Therefore, the food packaging industry requires multilayer films to combine the advantages of each single polymer into one film and thus balance and compensate for their individual disadvantages. Multilayer films can be produced either by lamination or by co extrusion. In the lamination process, two or more films are bonded together using adhesives to produce a composite film structure. The co-extrusion process combines several layers of individual polymers into one film so that they benefit from their different chemical and mechanical strengths. The combination of the different polymer layers is variable and will be done according to the requirements of the package. An example of an application for multilayer films is the food packaging industry's demand for barrier packaging films.

The barrier property of a multilayer film influenced by the thickness of the polymer layers packaging for fresh meat, often in combination with carbon dioxide and/or nitrogen. The combination of all three helps to preserve the red colour of meat throughout its shelf life. The polymers which have to be combined into a multilayer barrier film are selected once the specific requirements of the food product to be packed have been defined, and the expected shelf life of the package, aspects of environmental. PVC, PET, Nylon, PVdC and EVOH, for example, offer a good barrier to gas transmission. However, their effectiveness as a barrier to water vapour is often not high enough for many food packaging applications.

Analysis of multilayer film using Spotlight IR Microscopy & Imaging system.

Perkin Elmer Spotlight system is a unique and powerful technique optimised for both IR and visual performance. The Spotlight allows an analyser to visually inspect the sample, and to select a small sampling are in order to collect the spectrum. Figure shows a processed high resolution ATR image of a plastic laminate structure containing seven distinct layers made of four chemically distinct materials. The sampling interval was 1.56 microns, which is half the Spotlight FT-IR Imaging System's resolution as measured above. The spectral data in the image have been processed using Principal Components Analysis to reveal the spectral differences between the materials most clearly. The two red bands correspond to distinct, identical



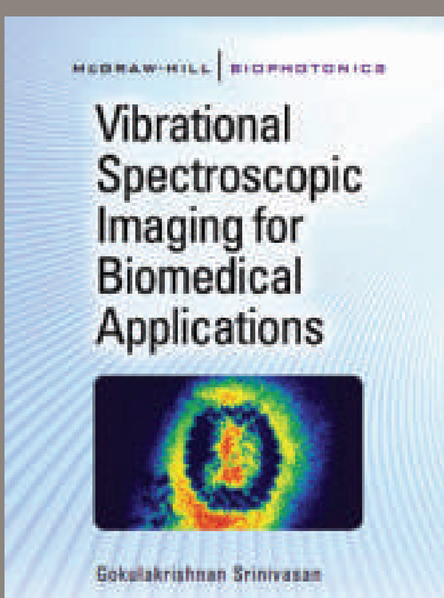
ATR image of a section of a plastic laminate. The image covers 150 microns width by 200 microns height, and has been sampled on a 1.56 micron pitch. The white bar indicates the position where spectra have been extracted.

layers in the laminate which appear to be 5 pixels wide in the raw image, equivalent to a physical width of just under 7.8 microns. "Pure"(unmixed) spectra can be obtained easily from within each layer and there is evidence of still finer spatial structure in the central (bluegreen) layer.The small white line which has been added to Figure 7 indicates a region where there is a spatially sharp transition from one material to another. Spectra were obtained from every other pixel along the white line to show the effects of mixing across the transition

Spotlight Family of FT-IR Microscopy and Imaging Solutions

Whatever Spotlight system you choose, you can be sure of the same high quality microscope and FT-IR optical designfrom the single point-and-shoot 150 through to the multirange Spotlight 400 for MIR and NIR chemical imaging.Choose the Spotlight 150 for single point contamination, laminate or forensics ID applications, or the Spotlight 200for fully automated sample mapping to study spatial distribution of constituents in materials. Both Spotlight 150 and 200 provide transmission, reflection and ATR measurement options and can be equipped with detectors to suit the wavelength and sensitivity requirements. The Spotlight 200 provides additional full-mapping and further sampling automation and can upgraded to large stage options to cover larger materials or accommodate larger capacity multi sampler accessories for unattended operation. The acclaimed Spotlight 400 combines the fully automated IR microscopy of the Spotlight 200 with full imaging capability using advanced dedicated array detectors.

New release of publication from Gokulakrishnan Srinivasan PhD.



Dr. Gokulakrishnan Srinivasan-

PerkinElmer (India) Pvt. Ltd. congratulate Dr. Gokulakrishnan Srinivasan-Sr. Technical Specialist at PerkinElmer Centre of Excellence; Hyderabad for his book titled "Vibrational Spectroscopic Imaging for Bio-medical applications" published by prestigious McGraw-Hill Publishing house. This book is an outcome of his work in the field of Vibrational spectroscopy and imaging.

Dr. Gokul has worked on various technologies of various makes in India and Germany. During his post doctoral tenure in the Dept. of Bioengineering at the Beckman Institute for Advance Science and Technology at University Illinois, USA he was engaged in applications of IR spectroscopic imaging to diagnosis of human cancers, kinetics of self healing and other biopolymers. He received his doctorate from University of Stuttgart, Germany for his dissertation on Characterization of Chromatographic column materials by solid state NMR and FTIR spectroscopy.

For more details about the technology and applications you may log on to www.perkinelmer.com Or write Marketing.India@perkinelmer.com

Material Characterization Methods for Food and Food Safety

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Food products represent one of the more challenging areas of analysis as the materials are complex and small changes can lead to major differences in product quality and safety.Material characterization techniques like DSC, TGA, DMA, EA, UV, Raman and IR microscopy allow one to gain a greater understanding of the materials. In this paper, we will look at several applications of modern material characterization techniques for food and food safety. In addition, we will look at hyphenated techniques that increase the amount of data we can get from a single sample.

Differential Scanning Calorimetry (DSC) and Thermogravimetric Analysis Techniques

DSC and TGA have been extensively used for food analysis for many years. Applications cover a wide range of materials including milk fats, butter, cocoa and oil concentration as well as estimations of the solid fat index, fingerprinting of essential oils, identifying amounts of water in materials, stability and oxidative degradation tests. One example of a newer application of DSC is the use of fast scanning techniques to remove the water in wheat gluten from overlapping the glass transition.

Humidity and Immersion Effects by Dynamic Mechanical Analysis (DMA)

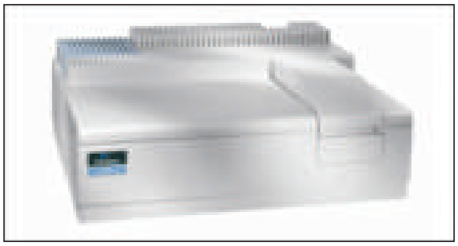
Whether it is the cooking of pasta, the chewing of gum, or the dissolution of gelatin, the physical changes a material undergoes when exposure to water are important to understanding how end products will perform. This exposure can either be evaluated by levels of humidity or by immersion with a DMA. For example, when pasta is immersed in warm water, the water penetrates the material and softens the starch. Similarly, if we look at paper used for wrapping and evaluate humidity by using the DMA 8000 with its humidity generator, we can also see the change in properties as a function of exposure time.

Meat tenderness determination by Raman spectroscopy

Raman spectroscopy has been successfully used to determinate the tenderness of various cooked meat. The use of fiber optic probes permits a unique in-situ spectroscopy analysis of the meat that can be correlated with tenderness and juicy parameters, according with sensory panel evaluations for tenderness.

Raman spectroscopy is ideal for distinguishing the changes in the environment (hydrophobicity) and conformations (α-helix to β-sheet) of the myofibrillar proteins. The presence of additives in meat, such as soy proteins, can be in some cases determinate by Raman spectroscopy.

The PerkinElmer RamanStation™ 400F and RamanFlex™ 400 series can be fitted with external fiber optic probes that can resist high temperature conditions, required for such application.



Wine analysis by UV spectroscopy

One indicator of wine quality is its color. In previous times, this would have been done by eye, but this is semi-quantitative at best. It is useful to be able to assign numbers to wine color using instrumentation. Although color is mainly a quality consideration, it does also help with safety issues as a change in color may indicate a fault in the brewing process or indicate bacterial growth or other contamination.

One very accurate approach is to utilize the entire visible region of a UV spectrometer from 380 to 780nm and apply standard color methodology as developed by CIE (Commission Internationale D'Eclairage based in Vienna.) This is an international body responsible for the whole are of representing colors numerically. Their first specification was issued in 1931 and has been developed steadily over the years. The color calculation is a weighted transmittance value that takes into account the illumination conditions and the spectral responses of the eye to the three primary colors of light – red, green and blue. It also takes into account the two types of receptors in the retina: rods for monochromatic vision in low light conditions and cones which are color receptors that work in relatively well illuminated conditions.

Hyphenated Techniques

One of the strengths of hyphenated techniques, the coupling of two different instruments allowing simultaneous measurements on the same sample, is the increased information available from the sample. Evolved gas analysis normally takes place when a TGA is coupled to another instrument. For example, the PerkinElmer Pyris™ 1 TGA can be coupled to a Spectrum™ 100 or 400 FT-IR or to a Clarus® 600 GC/MS depending on the type of sample, the level of material of interest or the type of evolved gas expected. In these cases, confirmation that an evolved gas was ethanol or water is possible. Similarly, a DSC 8500 can be coupled to a RamanStation 400 allowing the study of more precise changes in crystallinity of materials used for packaging, the crystallization of fats, or other changes.

Near-IR imaging and microscopy

Near-IR spectroscopy is widely used in the food industry as a quick and convenient analytical method for the quantification of many organic components such as protein, fat and sugars, in addition to the water, mineral and ash content of foods. A more unusual application of near-IR spectroscopy is the microscopic analysis of animal feedstock as a safety requirement following the BSE crisis of the late 1980s-1990s.

Conclusions

The modern food scientist has an extensive choice of material characterization tools available for precisely monitoring food quality and safety. To begin with, thermal analysis methods allow one to characterize the transitions in materials. Further, DMA can even study materials in situations mimicking real-world scenarios. Elemental analysis can be used to measure protein levels, while UV spectroscopy can be used to measure quality in products such as wine or olive oil. Raman spectroscopy can also reveal other product quality characteristics such as the tenderness in meat. Further, NIR imaging techniques can be used to identify the presence of unwanted materials as shown in the example of banned bone meal in foods. For advanced analysis, hyphenated techniques are available allowing for a greater understanding into the properties of a material than any individual techniques alone could produce.

Training Course calendar for September to December 2010

Course Name	Code	Days	Sep	Oct	Nov	Dec
Flame Atomic AA with AA Win Lab Software	AA-C001	3				15, 16, 17
Hyphenation Techniques : TG-IR / TG-GCMS	TA-C001	1				
Graphite Furnace AA with Winlab Software	AA-C002	2				
Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES)	ICP-C001	3				1, 2, 3
Raman Spectroscopy	FTIR-C001	1			16	
Fourier Transform Infrared Spectroscopy (FTIR) / FTNIR / Microscopy	FTIR-C002	3			17, 18, 19	
Fundamentals of Gas Chromatography (GS)	GC-C001	2	9, 10			
High Performance Liquid Chromatography (Basic) + UPLC + Chromera	LC-C001	3				22, 23, 24
Gas Chromatography and Headspace Technologies	GC-C002	2		28, 29		
Fundamentals of Gas Chromatography and Mass Spectrometry	GC-003	3		6, 7, 8		
Differential Scanning calorimeter (DSC) TGA	TA-C002	3			3, 4, 5	

Diamonds are forever......!!

The name diamond comes from the greek word (adamas) which means invincible.The fact that it's not affected by acids and alkali, refers to the hardness of the mineral. In fact, by boiling them in concentrated hydrochloric acid, diamonds can be cleaned. People have fought over diamonds, have been injured and killed for diamonds. Royalties have used them as a symbol of power. To us as people, diamonds are a symbol of wealth and beauty. A diamond is one of the crystaline allotrophic forms of pure carbon, through the element occurs naturally it's amorphous state.

South Africa has been a major contributor to the world diamond production since 1869 when the first diamond rush occurred on the Vaal River alluvial deposits. Indeed, between 1872 and 1908 (when Namibian diamond production began), the country produced more than 97% world's diamonds..Today, South Africa ranks fifth in the world diamond production by volume. By value only Botswana and Russia exceed South Africa's contribution.

Diamond is an isometric mineral , the hardest known natural substance (10 on Mohs scale) and it has a perfect cleavage parallel to octahedral faces, along which it can be sawn or broken . Diamonds crystals can be cut only by diamond dust on a lap or rapidly rotating horizontal plate. In the random , distribution of diamonds dust on a lap,some particles will present their hardest direction to the diamond that is being cut. Diamonds slowly burns to carbon dioxide in oxygen at a temperature as low as 900 degrees celsius and slowly inverts to graphite at temperature as low as thousand degrees celsius. The rate of graphization is greatly accelerated when the diamonds are in contact with any of the group 8 elements or with alloys such as iron nickel and cobalt. Diamonds have the most conductivity of any known substance. The points of diamonds used as cutting tools do not become hot owing to this very high thermal conductivity. All except a few diamonds are non conductors of electricity, but all are excellent heat conductors, superior to iron and steel .Under intense radiative bombardment, diamonds first become green , then brown and finally black. If not carried to far , the process may be reversed by heating to a white heat.

The small stone that makes up the small four tons are industrial diamond. Diamonds are an ideal of mechanical parts that must resist wear and undergo a sudden temperature changes and that must not change size, create friction or rust.

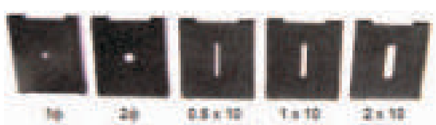
Diamond cutting tools cut much faster and accurately than other tools. Metals can be sliced thinner than human hair by the diamond blade. Some saws have diamond-studded edges that can cut hard material like rocks, concrete and some metals. Diamonds are used to manufacture fine wire, such as the wire used in electric toaster.

The quality of diamonds can be determined in the laboratory by various techniques like UV VIS NIR spectrometers and FTIR spectrometers. The major challenge in analyzing the diamond is the shape and size. Also diamonds are having many faces to reflect and absorb. The PerkinElmer Lambda 950 or 1050 UV VIS NIR spectrometers are capable of providing the analytical tools for the diamonds and gemstone analysis.

Integrating spheres, on the other hand, are detectors designed to measure light at a broad angle. The measurement of very small samples in transmission mode often poses problems. Large-scale losses of energy, scattered light and high backgrounds all impose severe performance requirements on UV/Vis and UV/Vis/NIR instruments. Using small beam apertures can lead to high background absorbance levels, often well over 2A. The LAMBDA 850 and 950 spectrophotometers have a specified dynamic range to +/-8A. Many small solids have nonuniform, non-parallel surfaces. which can cause severe deviation and/or scatter of the transmitted beam. This kind of sample cannot be accurately measured with a normal instrument transmission detector. Also, measurement of small samples requires that the instrument light beam is restricted to the size of the sample to ensure representative measurement. This is typically accomplished by adding either a beam aperture, which is easy to fix to the transmission port of the integrating sphere, or by adding a beam condenser accessory, which is installed in front of the sample.

There are two common ways to reduce the beam size for measurement of small samples: beam apertures and beam condensers

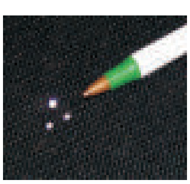
These are small black anodized metal plates with small holes or slits cut into them. The size of the holes or slits can range from 1 mm to 5x5 mm in diameter. The apertures can either be purchased or custom made.



PerkinElmer offers five apertures.

Another way to reduce the beam size in the measurement of small samples is to use a beam condenser. This accessory reduces the normal beam size to a sharply focused point of light. Beam condensers can have different focal lengths producing different spot sizes on the sample. The beam condenser is positioned in front of the sample and focused to optimize the spot size of the light beam to 1 mm or less. The advantage of a using a beam condenser rather than a beam aperture is that the full energy of the original beam is retained and focused through the sample, often without the need for any further masking. The signal-to-noise ratio of data obtained with a beam condenser will therefore be much higher than that obtained with a beam aperture. Small gemstones present a challenge for accurate transmission measurement. In addition to their small size (1 mm to 2 mm), gemstones have multi-faceted surfaces and a high refractive index. A number of natural white diamonds, a natural yellow diamond, and a synthetic blue sapphire were obtained for testing. Figure shows the relative size of the stones compared to a pen point.

Beam condenser fitted in the cradle holder.



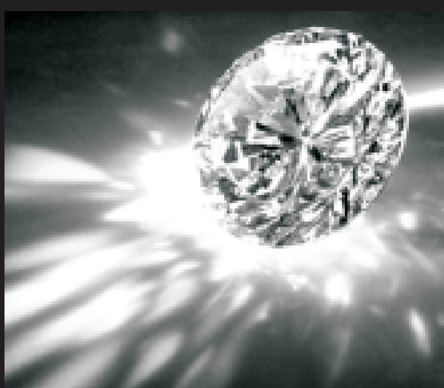
Small diamonds (appx 1- 2 mm diameter).

The PerkinElmer LAMBDA 950/1050 and 850 spectrophotometers, fitted with either beam apertures or beam condensers, are ideal instruments for analyzing these difficult samples, because of their large dynamic range and built-in reference beam attenuation systems. The 150mm integrating sphere accessory is adaptable for the measurement of small samples, either using an aperture mask or a beam condenser lens.

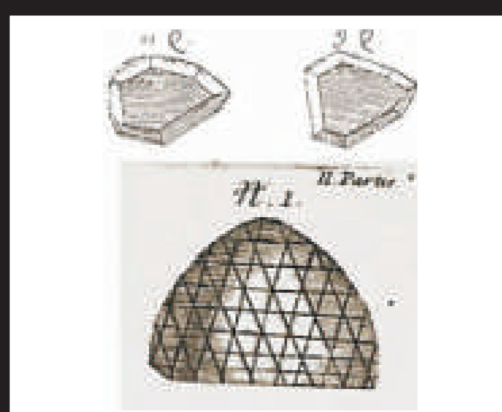
For more information log on www.perkinelmer.com or call +91 22 67601700

Interesting facts about diamonds-

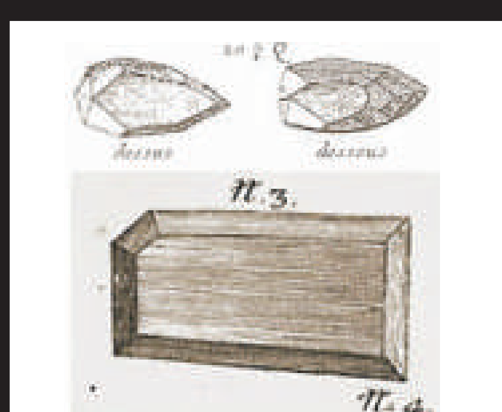
Diamonds were discovered in India during the 4th century B.C India was one of the first countries to mine the gem



India's most prized diamonds are known as the "diamonds of Golconda," and the most famous Golconda stones include the Hope Diamond, Koh-i-Noor Diamond, Orlov Diamond, and Sanc Diamond. The Darya-i-Nur (Sea of Light) was a rare blue-diamond weighed 186 carats, which was owned by the Nadir Shah of Persia after it was plundered from the last 'Great Mughal Emperor,' Aurangzeb's heirs in the 'sack of Delhi' in 1739.



Along India's Malabar Coast, the state of 'Goa' grew into a Portuguese trading center, and a diamond-trading route was established from Goa to Lisbon, Portugal and on to Antwerp. Jean Baptiste written in 1679 documented his extensive travels throughout India and the Far-East, in order to to expand the trade in gems, jewellery, and other valuable commodities. In 'The Six Voyages', Tavernier meticulously illustrated many notable Indian diamond cuts. Diamond #1 (above, right) is the "Great Mogul Diamond" and Diamond #3 is the "Great Table Diamond".



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Velocity-Wax	30 M x 0.32 mm x 0.50 µm	N9306317
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Velocity-1	30 M x 0.25 mm x 0.25 µm	N9306312
Velocity-1	30 M x 0.25 mm x 1.00 µm	N9306323
Velocity-1	30 M x 0.32 mm x 0.25 µm	N9306318
Velocity-1	30 M x 0.32 mm x 1.00 µm	N9306321
Velocity-1	30 M x 0.32 mm x 3.00 µm	N9306329
Velocity-1	60 M x 0.25 mm x 0.25 µm	N9306320
Velocity-1	60 M x 0.25 mm x 1.00 µm	N9306328
Velocity-1	60 M x 0.32 mm x 1.00 µm	N9306324

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