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Focus on the Dairy Industry

NZIC Conference Programme Page 27

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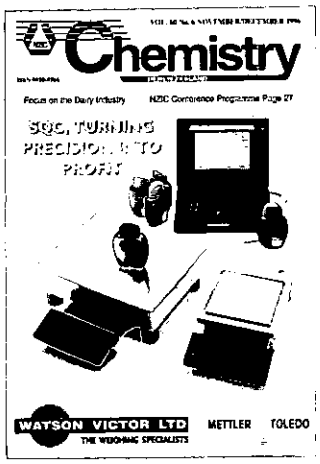
UP FRONT ...



WATSON VICTOR LTD, in partnership with METTLER TOLEDO, are pleased to announce the new SQC product and quality control package, FreeWeigh 9001. Whatever your product (liquid, paste, powder or solid) and whatever your container (bottle, can, box or bag) you'll benefit from FreeWeigh 9001. Regular samples provide you with precise adjustment instructions for your filling installations. So you avoid unnecessary material losses, easily comply with the statutory directions for statistics and keep your customers satisfied.

For further details see the cover story on page 2

NZIC Chemistry IN NEW ZEALAND

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IN THIS ISSUE ...

COMING UP ...

January 1997 - Focus on Environmental Control, Waste Management, Water Analysis

March 1997 - Food and Beverage Manufacturing

Deadline for material:
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COVER STORY

STATISTICAL QUALITY CONTROL (SQC) METTLER TOLEDO FREEWEIGH9001

WHAT IS METTLER TOLEDO FREEWEIGH9001?

METTLER TOLEDO FreeWeigh9001 is an integrated software package. It covers the fields of filling process control, statistical process control and quality control by means of the inspection of attributes. The weight control of prepackages is based on the legal regulations of various countries, the uniformity tests on pharmacopoeia.

The system is primarily used for the statistical weight control of filled products. This is achieved through the acquisition, storage and statistical evaluation of weighing data. The results can be output in graphical form or as lists.

All master data can be acquired at the central MS-DOS/Windows computer located, for instance, in the production manager's office. The current status of the production can be continuously monitored and reports on the evaluation of the data generated. Microsoft Windows is used as the user interface of the application. A relational database is available in the background.

If faults occur in production or if there is a danger that the production lot will be unsuitable, alarms are triggered.

More than 25 workstations decentrally distributed throughout the filling operation can be controlled by the central station.

The program includes a large number of standard functions. These are adapted by appropriate configuration to the customer needs. The modular structure of the basic application allows stepwise expansion. In addition to the acquisition of weighing data, any type of attribute, can be enlisted for quality control should the situation require it.

METTLER TOLEDO SQC; WORLDWIDE SUCCESS

Strongbow and Woodpecker are just two of the well-known brands of cider from a range of over 40 different types produced by HP Bulmer (England) for over 100 years. The company recently installed a Mettler-Toledo FreeWeigh system to monitor production quantity and quality.

Bottles, cans and kegs are filled by weight on lines which can produce over 10,000, 2-litre bottles per hour, 24 hours per day. Checks on fill levels were, until recently, done manually. The time savings made by installation of the FreeWeigh system has enabled the filler operator to spend more time running the machine. This also allows the QC operator more time to spend in an active role on the production line.

To ensure that bottles and cans were filled to the legal requirements, Bulmers were sometimes overfilling by up to 1% on a 2-litre bottle. The FreeWeigh system allows the tolerance to be targeted much more accurately, minimising product wasteage. The standard deviation on each filler head can even be monitored to show which ones are responsible for over/under filling and adjustments can be made to within 1 mL of cider. Conformance to GMP is met with the use of a printer, with automatic print-outs for standard reports.

"At first, operators were worried about using the new system because they thought it would be much more complicated than the old way of recording with paper and pencil. But the more they use the system, the more they realise how user-friendly it is, how easy it is to produce the reports we need and to enter critical values such as tare and density. We can group individual items as required for reports, such as size of container, type of product, batch number, etc. and can easily produce the regular shift, day and monthly reports as well" said Andy Rawcliffe, a Production Supervisor at Bulmers.

Above: Typical set-up of a FreeWeigh central station

COMPOSITIONAL ANALYSIS OF MILK USING NEAR-INFRARED SPECTROSCOPY

Introduction

Compositional analysis for fat, protein and lactose in raw bovine milk submitted by the farmer is normally performed to ensure that the milk meets minimal compositional requirements. Milk composition also forms the basis for payment to the farmer by the processor.

The success of near-infrared spectroscopy (NIRS) over more widely accepted spectroscopic methods of analysis is because of its suitability as a rapid, non-destructive analysis method for samples which are complex in composition, heterogeneous and strongly light scattering. Traditionally, NIR analysis has been performed using diffuse reflectance measurements in the 1100-2500 nm spectral region. Solid matrices containing high constituent concentrations have been the most successful and have therefore received the greatest attention. Greater awareness and acceptance of NIR techniques has led to the development of flexible analysers which also provide for transmittance measurements. In transmittance mode, depending upon wavelength selection, the near-infrared (NIR) radiation can be transmitted through a reasonably thick sample, often a centimetre or more in thickness. Such diffuse transmittance measurements have proven particularly useful in the analysis of liquids, slurries, suspensions and pastes.

The NIR spectrum is composed of a continuum of overtone and combination bands of the fundamental IR vibrational bands. Due to their origin, the intensity of the NIR bands decreases at shorter wavelengths and the bandwidth increases. To achieve precision and accuracy of major constituents in the 700-1100 nm region, long optical pathlengths (1 cm or more) are necessary. For estimation of other constituents, it is advantageous and necessary to utilize the 1100-2500 nm portion of the NIR spectral region. However, shorter optical pathlengths of 0.5 to 10 mm are often required.

Since milk consists of more than 80% water and is strongly light scattering, it is a potential candidate for measurement in both reflectance and transmittance modes, using either the 700-1100 nm or the 1100-2500 nm spectral segments. Opacity differences due to variations in the fat and protein content make diffuse reflectance measurements difficult to perform, particularly at low fat concentrations where light absorption is strong. Secondly, the high water content of milk inhibits the use of analytical wavelengths beyond 1900 nm via reflectance techniques. Hence, diffuse transmittance is the preferred measurement mode.

The choice of pathlength is dictated by the specific application and the desired level of precision and accuracy. To acheive maximum standard error of peformance of 0.05% for fat, protein and lactose in raw bovine milk it is necessary to perform transmittance measurements in the 1100-2500 nm spectral region using a short optical pathlength.

Worthy of note is that for on-line measurements, where short pathlengths are impractical, a 1 cm pathlength is employed and absorbance measurements are obtained in the 700-1100 nm spectral region, producing a slight increase in the standard error. Using a 0.5 mm pathlength, the NIR absorbance data in the 1100-2500 nm region for raw bovine milk calibration standards were compared with reference analytical data for fat, protein and lactose.

Experimental

Fifty-five pasteurised raw bovine milk calibration standards were analysed using NIR. The analytical ranges were 0.05 to 5.47% for fat, 2.96 to 3.86% for protein, and 4.61 to 4.94% for lactose.

Samples were equilibrated in a 40 °C ($\pm$ 0.5 °C) water bath for 30 minutes, withdrawn as needed and shaken vigorously by hand (not homogenised). An aliquot was placed in a 0.5 mm quartz cuvette. The NIR diffuse transmittance spectra were obtained using an NIR Systems, Inc. Model 5000 spectrophotometer from 1100-2500 nm. Sample spectra were generated from 32 co-added sample scans referenced to 32 scans of air. Triplicate analysis was performed for each sample.

A semi-micro Kjeldahl method was used for protein estimation, Mojonnier for fat analysis, and a polarimetric estimation for lactose content.

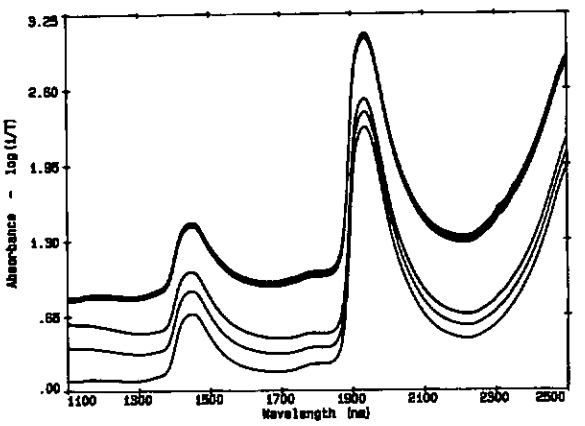

Figure 1. Near-infrared spectra of raw bovine milk samples.

Results and Discussion

The NIR absorbance spectrum of representative bovine milk samples is presented in Figure 1. The spectra increase in absorbance as a function of increasing fat concentration. The prominent absorption bands located at 1450 nm and 1910 nm are the first overtone and combination bands of water. It is difficult to discern spectral differences in the NIR spectra related to analyte variations because of the gross baseline shifts. The large shift in baseline is a function of the scattering properties of the milk samples and can be a major source of error if left uncorrected.

To reduce baseline differences and to enhance spectral resolution the second derivative of the absorbance data is calculated, as illustrated in Figure 2. (Note that an absorbance maximum will correspond to a second-derivative minimum.)

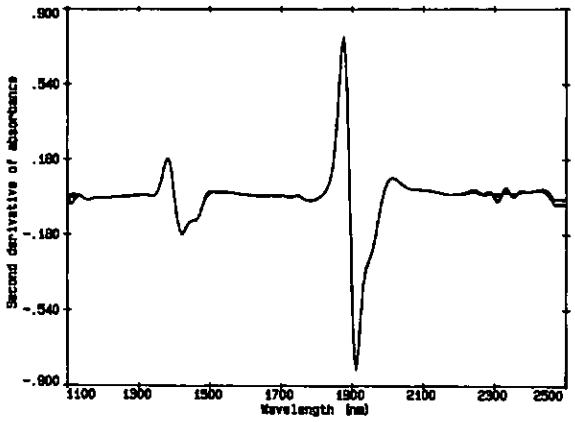

Figure 2. Second-derivative absorbance spectra of raw bovine milk samples.

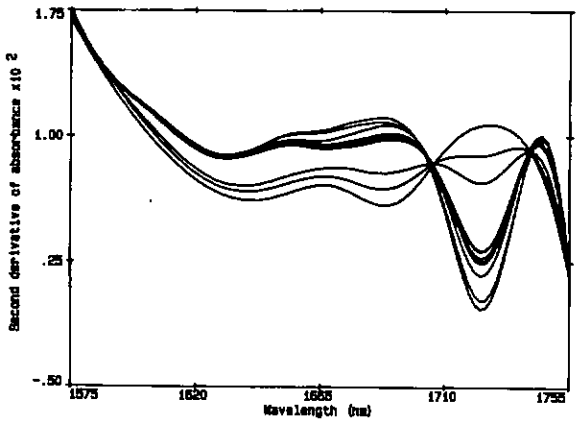

Figure 3. Expanded second-derivative absorbance spectra of raw bovine milk: overtone region.

The overwhelming absorptions due to water still make structural differences related to fat, protein and lactose difficult to isolate. For clarity, the first overtone (Figure 3) and combination band (Figure 4) spectral regions have been expanded. Subtle spectral differences now become apparent in the magnified spectra. For example, changes in fat levels are reflected in the C-H combination band region at 2300 nm and the C-H first overtone region at 1700 nm. Protein variations are identifiable in the N-H combination band region at 2060 nm and 2180 nm regions. Fluctuations at about 2100 nm are attributable to lactose.

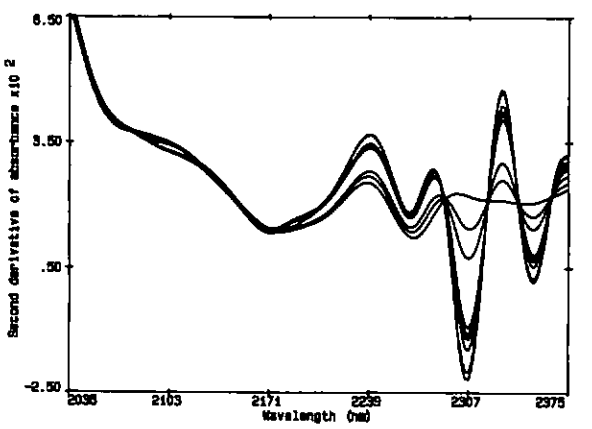

Figure 4. Expanded second-derivative absorbance spectra of raw bovine milk: combination band region.

The NIR second-derivative absorbance spectrum of each milk sample was regressed against the known analyte values for each sample using linear least-squares regression. The regression results are shown in Table 1. K(O) is the y-intercept; K(1) and K(2) are the slope terms associated with the corresponding wavelengths, $\lambda_1 + \lambda_2$ for protein and lactose, and λ_1/λ_2 for fat. The standard error of calibration (SEC) is the standard deviation and multiple-R is the correlation coefficient.

Table 1. Summary of multiple linear least-squares regression results for fat, protein and lactose in raw bovine milk (N = 55).

Analyte	*Constants*	*Wavelength(s)*	*R*	*SEC%*
Fat	K(0)= 5.135 K(1) = -4.149	1724/1610	-1.0	0.037
Protein	K(0) = 23.748 K(1) = -334.296 K(2) = -98.845	2056 1832	0.95	0.078
Lactose	K(0)= 10.288 K(1) = -123.262 K(2) = -108.087	2095 1594	0.86	0.040

In all cases two wavelengths were necessary, one related to a specific analyte absorption band, as indicated by the first wavelength term (or numerator), and a secondary wavelength to correct for interfering absorptions (i.e. linear summation) or matrix effects associated with scattering differences (i.e. denominator).

A linear summation equation has been used to correct for an interference arising from protein in the case of lactose and water in the protein determination. For lactose, it is important to keep in mind that the correlation coefficient is a range dependent parameter. Improvements can be expected if the lactose calibration range is extended. Because NIRS is an indirect method, requiring calibration against a primary reference method, any errors in the reference assay will be incorporated in the NIRS method. Non-protein nitrogen sources present in bovine milk, such as urea, could produce a higher than expected SEC in the protein determination.

For the estimation of fat, a denominator has been used to correct for pathlength variations associated with light scattering differences. In these samples, the scattering differences are the result of variations in the concentration and size of the fat globules. Globule size is related to both fat and protein concentration. Hence, it is appropriate to use 1610 nm as a reference analytical wavelength, as scattering variations at this wavelength are related to both the physical and chemical differences.

The reference analyte amount, and those obtained using the NIRS calibration equation, are compared graphically in Figure 5 for fat, Figure 6 for protein, and Figure 7 for lactose.

Conclusions

These results demonstrate that near-infrared spectroscopy can successfully estimate the nutritive content of milk without the need of additional sophisticated homogenisation equipment.

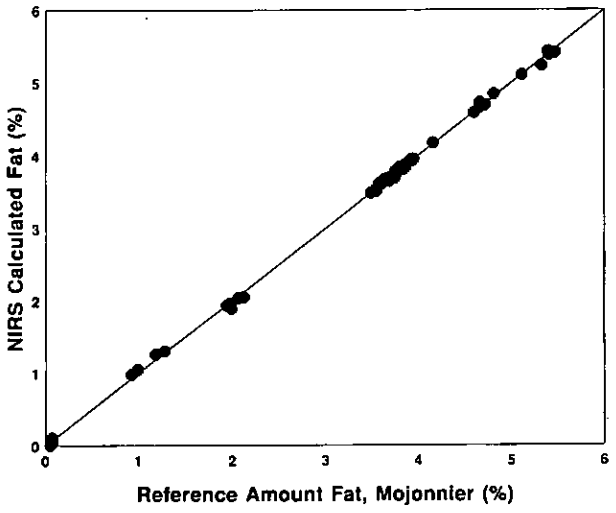

Figure 5. Near-infrared fat determination in raw bovine milk.

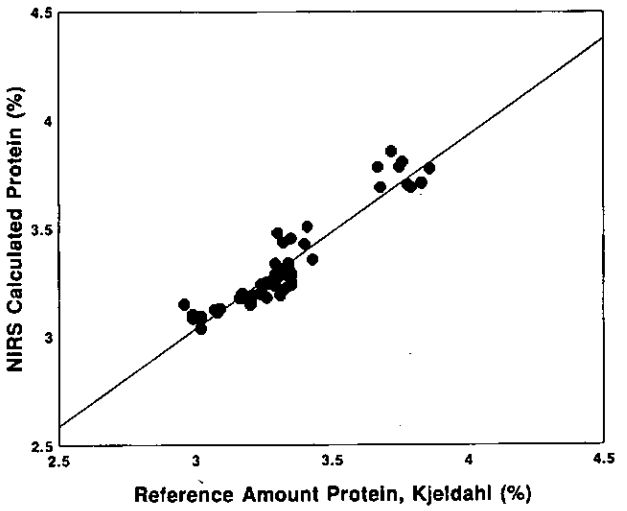

Figure 6. Near-infrared protein determination in raw bovine milk.

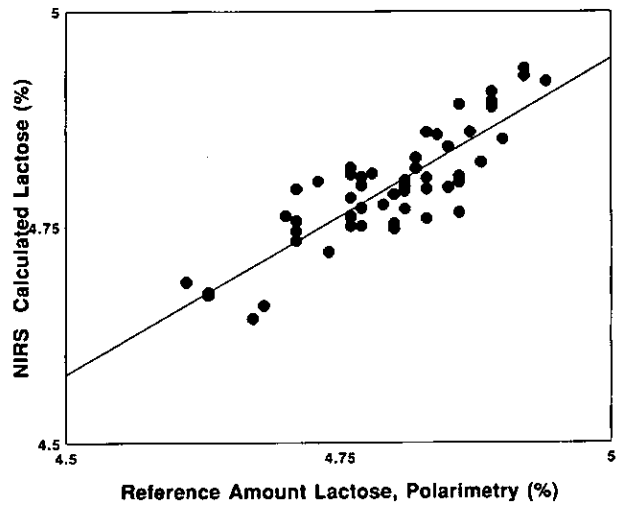

Figure 7. Near-infrared lactose determination in raw bovine milk.

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ALPHA MOS: THE FOX INTELLIGENT ELECTRONIC NOSE

The human senses of sight, hearing, taste, touch and smell allow us to analyse our environment, to sense and react to changes that occur within it. Measurement of light, sound and temperature has been possible for some time. Rapid and accurate electronic analysis of smell and taste – being closely interrelated – has remained elusive until recently.

An extensive programme of research and development has resulted in the world's most advanced system for the measurement and analysis of aromas. The Alpha MOS technology was originally developed at the University of Warwick and the University of South Hampton. Alpha MOS still works closely with these universities to maintain the leading edge in sensing technology with metal oxide sensors, conducting polymer sensors and piezo-electric sensors.

Alpha MOS technology characterises aromas in a digital format, allowing them to be measured, recorded and analysed objectively. The technology is unique, its performance emulates that of the human nose with high levels of discrimination, sensitivity and reproducibility.

Three distinct phases – detection, signal processing and recognition/interpretation of aroma allow the human nose to detect, analyse and react to changes in the smell of its environment.

Detection is carried out by the olfactory epithelium in which approximately 50 million receptors (made up of at least 30 different types) are exposed to the external environment. Olfactory receptors have broad specificity across chemical species. The size, shape and distribution of polar groups determine the odour description and hence the response of the nose. The olfactory region in the nose carries out chemical analysis after which signals pass to the cerebral hemispheres of the brain where odour recognition is combined with other sensory inputs. This data is then used to monitor and evaluate, like or dislike, eat or discard, stay or leave.

The Alpha MOS Fox mimics the three phases of the human olfactory system. Its sensors emulate the olfactory receptors' capacity in its discrimination of stereo-chemical and polar characteristics of volatile chemicals. Additionally, the Alpha MOS Fox uses six, twelve or eighteen sensor arrays to detect a spectrum of compounds similar to that of the 30 receptor families in the human nose. Initial data processing – carried out in the olfactory bulb – is performed in the Fox by the processor which provides aroma characterisation and aroma radar plots. Finally, artifical neural network processing imitates the brain to provide pattern recognition off-line or real-time quality descriptive evaluation of aromas.

The Fox is the most powerful intrument available for the comparison of an unknown aroma against standard profiles. The ability of the user to "switch off" or replace sensors which have low specificity for a particular aroma dramatically increases the versatility and power of the Fox. The Alpha MOS software compresses the multi-dimensional data of the aroma fingerprints into a two-dimensional format. Differences between samples become apparent and quantifiable by measurement of

the Euclidean distance between them. A small Euclidean distance is indicative of similar aromas – the higher the Euclidean distance the greater the difference in the aromas.

The final stage of data processing uses proprietary neural network pattern recognition algorithms in an Artificial Neural Network (ANN) to distinguish between similar or difficult to resolve aromas. The system is self-learning; the more data presented the more discriminating the system becomes.

The Fox compliments human sensory panels and chemical component analysis techniques by providing real-time evaluation of a sample's overall aroma. Routine analytical procedures can be performed by the Fox, freeing sensory evaluation experts to perform higher value analysis and opening up the opportunity for more frequent digital aroma management at critical points in industrial processes.

Alpha MOS technology can be applied to characterise, identify and discriminate between simple and complex aroma components. Accurate, objective quality control can be instituted at points throughout the manufacturing process, in many industries where aroma is a factor. These include a wide range of food, beverage, cosmetics, pharmaceutical and other industrial, environmental and healthcare sectors. It will also assist companies to meet an increasing legislative requirement to monitor and classify aromas.

Alpha MOS Sa. is a worldwide market leader in the design, development and manufacture of aroma sensing and analysis systems. With extensive expertise in aroma sensing technology – from specialists in olfactroscopy, surface scientists, specialists in metal oxides, conducting polymers and piezo electronic gas phase interfaces, to electronic engineers and software specialists – Alpha MOS has the capability to enhance and develop aspects of its technology to suit a wide range of specific customer requirements. The company's core technology is being constantly advanced by leading research into sensor and processing software. For more information on the applications of the Alpha MOS Fox,

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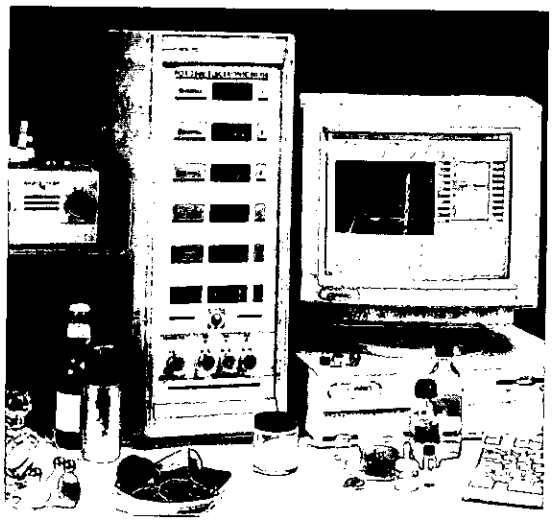

ON-LINE ANALYSIS OF MILK POWDERS IN A FLUID BED DRYER

Introduction

In the manufacturing environment, the time it takes to get pertinent quality control information for the process is critical. The timeliness of the data, the ability to react to the information, and the ability to analyse trends from the data have significant cost-savings and quality implications for all industries. The dairy industry is no exception.

The market for milk powder is a global market. Suppliers providing a milk powder product know quality demands are high and competition keen. Measuring key constituents like moisture and fat in the process stream provide major advantages both in maintaining product quality and in providing manufacturing efficiency. The key information is quickly in the hands of plant personnel for action and available for trend analysis as part of the Statistical Process Control (SPC) function.

Near-infrared spectroscopy (NIRS) is a technology that has developed into an ideal quality and process control technique. By use of fibre optics, near-infrared (NIR) process analysers can be interfaced directly to the process stream thereby providing real-time process information. A moisture determination by NIRS in the process stream is immediate while a laboratory analysis by traditional methods may take several hours.

Milk powder producers who have already implemented on-line analysis of their products by NIRS have keyed upon using the fast answers produced to reduce the tolerances from their moisture and fat specification through trend analysis. By making a more consistent product, they are able to move closer to the target specification with confidence providing cost savings while maintaining product quality. In addition, the amount of rework is minimised saving the producer additional money.

This application note concentrates on the on-line analysis for moisture in milk powders by making the measurement in the cooling stage of the fluid bed dryer. The analysis for fat is also possible in the same manner.

Experimental Data Collection and Analysis

All NIR spectra were collected in reflectance by using an NIRSystems Process Analyser (Model OL-5000) equipped with a one metre anhydroguide fibre optic bundle (Fiberguide Technologies) and 12 inch interactance reflectance probe.

On-line sample spectra were generated by the co-addition of 96 sample and 96 internal reference scans. Total time for spectral data acquisition and moisture prediction (after calibration) is 1.8 minutes. For closed-loop control, a 4-20 mamp card can be implemented.

Calibration samples were collected on-line from two milk powder products, having target moisture levels of 2% and 4%. Reference laboratory results for moisture were based upon weight loss on drying in an oven at 80 °C for 2 hours.

To investigate the possibility of using a single spectroscopic model to determine moisture for several products, spectral data from each of the products was combined for calibration development.

Fibre Optic Probe Interface

The sample probe was mounted directly into the process stream using all chemically-resistant, autoclavable materials. Probes are constructed of 316 stainless steel and pressure fitted for mounting. Optical interface is achieved through sapphire windows at the end of probes. Probes are rated to 200 °C and 1000 psi.

The interactance reflectance probe was mounted using a pressure fitting (Swagelok) welded to the last stage of a four stage dryer. The probe protrudes directly into the fluid bed and contacts the milk powder "cloud" as it exits the final stage of the dryer.

Results and Discussion

The critical part of on-line monitoring of the milk powder moisture in the fluid bed dryer was in interfacing the spectrophotometer to the process via the fibre optic probe.

Initial attempts to monitor the moisture via other optical techniques were unsuccessful but are worthy of discussion. An initial attempt was made to monitor the moisture by transmitting the radiation through a porthole in the last stage of the the dryer. The reflected radiation was collected through the same porthole. This provided a system that was stable during calibration but unreliable because the powder adhered to the porthole window throughout the drying cycle. A second attempt was made by mounting a detector directly into the dryer above the fluid bed. In this instance, the optical window of the detector was coated with sample producing inconsistent results.

To inhibit product buildup and provide accurate moisture determinations, we developed a fibre optic probe that could be mounted directly into the process stream. The abrasive action of the sample passing by the probe tip constantly removed any product buildup on the probe tip. Reproducible and representative spectral results could now be obtained.

The NIR spectra of a few representative milk powder spectra for each of the products with varying moisture levels are presented in Figure 1. Although structure is present in the spectra, it is difficult to isolate features related solely to moisture variations due to the broad, overlapping absorptions and the baseline shifts.

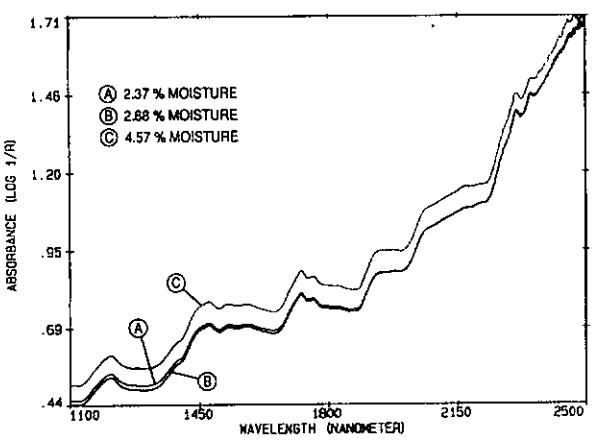

Figure 1. Spectra of Milk Powder

To enhance spectral features and reduce baseline offsets, the second-derivative of the absorbance data was calculated. Figure 2 shows the second-derivative spectra for the same samples. In the second derivative spectra, absorbance maxima are inverted to peak minima. Spectral variations due to moisture are more obvious in the second derivative spectra.

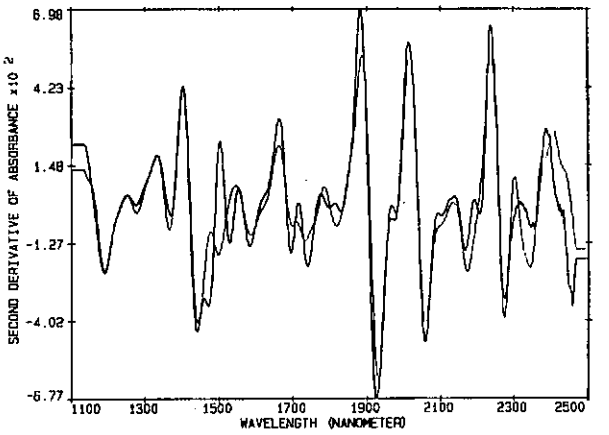

Figure 2. Spectra of Milk Powder (Second Derivative)

The combination absorption band due to the water O-H group is centered at 1928 nm (Figure 3). The water O-H overtone absorption is also present in the spectra and is centered at 1434 nm (Figure 4). Both of the absorption bands due to water are very strong and relatively free of interfering absorptions.

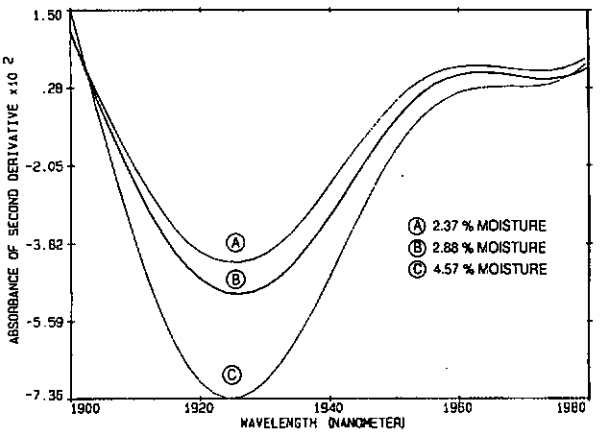

Figure 3. Spectra of Milk Powder (Second Derivative)

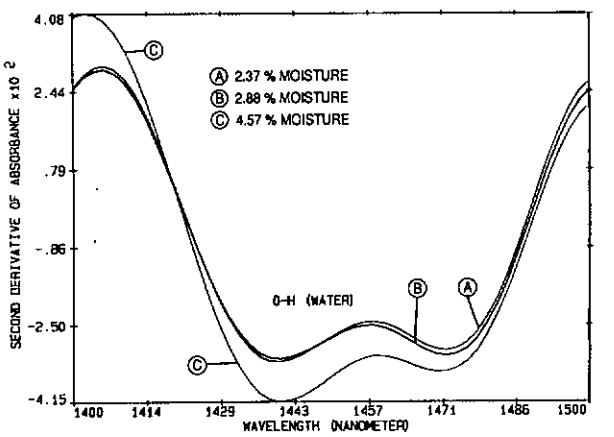

Figure 4. Spectra of Milk Powder (Second Derivative)

A linear least-squares regression analysis was applied between the second-derivative absorbance data and the reference moisture results. The optimal regression equation for the determination of moisture in the two powder products was obtained at 1926 nm.

This equation provided a standard error of calibration, SEC = 0.22% and correlation coefficient, r = -0.96.

The combination of two different products possessing different moisture levels for calibration development in NIRS is only possible because the band intensity and peak position of the strong water absorptions are not significantly affected by matrix variations such as hydrogen bonding. Hence, the water absorption band used for quantitation appears at the same wavelength and has similar absorption strengths for each product.

Summary

On-line quality control of milk powder in a fluid bed dryer can be acheived in real-time using near-infrared spectroscopy. On-line NIRS measurements provide improved quality control because the NIRS results enable faster adjustments to be made to the manufacturing process. Improvements in product quality and consistency were achieved with on-line measurements. Real-time results for moisture were achieved every 3 minutes, while other product parameters like fat are also possible to measure.

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NEW PRODUCTS

FAST INTERACTIVE TRAINING FOR ALL PRODUCTS

Thermo Jarrell Ash Corporation announces FAST (Fully Interactive Atomic Spectroscopy Training) software available on CD ROM for all its spectroscopy products. FAST software allows an operator instant computer access to text and video clips (with sound) explaining step-by-step procedures for routine operation and maintenance of TJA instruments and accessories, as well as instrument theory.

FAST is a new concept in training designed to provide the operator with virtually all of the information normally given during an intense training course. However, FAST allows training at the operator's convenience, and can instantly access specific bits of information pertaining to immediate topics of interest. FAST is normally resident on the instrument's computer and operates in the Windows environment used by TJA instruments. Therefore, immediate visual and spoken help is available for adjustments or optimisation parameters that would normally require an operator's manual and/or a phone call.

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SPECTRAL – AN EXCITING NEW WINDOWS SOFTWARE PACKAGE FOR GBC UV-VISIBLE SPECTROMETERS

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Spectral uses all the features of the Windows environment, and menus are organised by their functionality to make the system easy to use and understand. Spectral's menu system provides a fully customisable user interface to simplify routine analysis.

Spectral is fully compatible with Windows 3.1, Windows 95 and Windows NT operating environments. The software will be provided as standard with the new Cintra range of instruments and is available as an upgrade to existing GBC 916/918/920 users.

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Ph: (09) 3735765, Fax: (09) 3600683, Free Phone/Fax: 0800 428428
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FINN DIGITAL PIPETTES – FULLY AUTOCLAVABLE IN ONE PIECE

For reliable delivery of microvolumes, the Finn range has been extended with the addition of the 0.2–2 µL single channel and a 0.5–10 µL multichannel pipettes. Both are designed with a telescopic piston which boosts the power of the blow-out step. Finntips are also available in fully autoclavable, easy-open, hinged tip racks.

Available in seven single channel and five multichannel models for volumes from 0.2 µL – 10 mL, the Finnpipette Digital range of pipettes is designed with a soft touch tip ejection mechanism and each pipette is provided with a shelf hanger.

Special offer until 31 December 1996 – buy two get one free.

Contact: Medica Pacifica Ltd
P O Box 102-062, North Shore Mail Centre, Auckland
Freephone: 0800 106100, Freefax: 0800 688883
circle number 23 on the reader reply card

EXTRACTION OF DRUGS FROM CLINICAL SAMPLES USING SPE

An informative monograph available from Alltech contains methodology for extraction of barbiturates, topical anaesthetics, and lidocaine and its metabolites from serum and urine. Clear step-by-step instructions and recommendations for handling large numbers of samples are provided. Prices for extraction columns and vacuum manifolds are also included. For a free copy,

Contact: Alltech Associates Inc.
P O Box 100-352 North Shore Mail Centre, Auckland
Ph: (09) 4443230, Fax: (09) 4442399, Freephone: 0800 ALLTECH
Email: alltech@alltech.co.nz
circle number 24 on the reader reply card

EQUIPMENT AND TECHNIQUES FOR TCLP AND ZHE

The Toxicity Characteristic Leaching Procedure and Zero Headspace Extraction are USEPA-approved methodologies that are becoming more and more relevant to New Zealand chemists involved in environmental applications. Sci Tech is pleased to announce the availability of a complete range of tumblers, extractors and accessories from ADMC of the USA.

A great deal of confusion has surrounded the correct adherence to EPA procedures in this area: As a small company that has worked closely with the EPA in the development of commercial devices for TCLP, ADMC are unique in offering both equipment and procedural guidelines to help newcomers achieve success. Written guidelines and videos of correct procedures are available from Sci Tech to assist with the correct use of equipment placed in New Zealand, and the applications support available from the manufacturer offers considerable security for environmental laboratories considering embracing these techniques.

TCLP equipment compliments Sci Tech's extensive range of sample preparation and analysis equipment for environmental chemistry, which ranges from solid phase extraction cartridges and glass fibre filters to ion chromatographs and ICP spectrometers.

Contact: Sci Tech
P O Box 9881, Wellington
Ph: (04) 8017220, Fax: (04) 8017221
circle number 25 on the reader reply card

WALLAC VICTOR™ MULTILABEL COUNTER

The new Wallac VICTOR™ multilabel counter measures luminometry, photometry and fluorometry assays. This means that using just one instrument, bioanalytical laboratories now have the facility to process assays based on all of the main non-radioactive label measurement technologies.

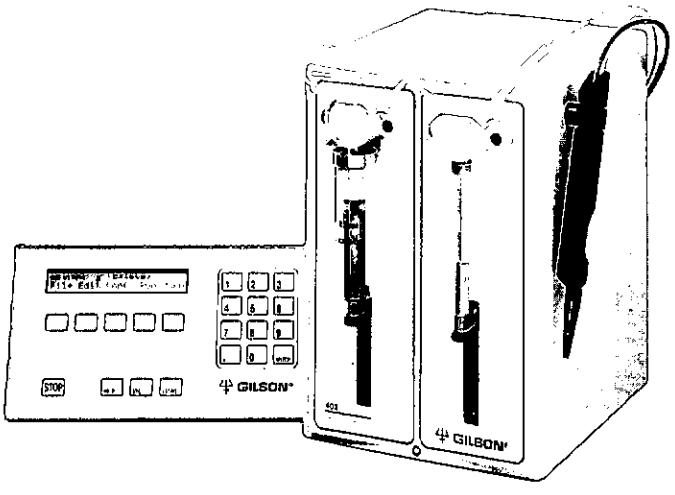
In addition to performing as a conventional fluorometer, VICTOR also processes time-resolved fluorometry assays. In these it counts any of four lanthanide chelate labels, europium, samarium, dysprosium and terbium. Each has a distinct spectrum so the instrument is ideal for multilabel assays which save time and money.

VICTOR is simple to use. It is easy to change excitation filters and no physical adjustments need to be made when switching from one technology to another. Protocols for all measuring technologies are edited in the same straightforward fashion.

Operated using a Windows 95-based program, the instrument provides results ready for direct incorporation into spreadsheet programs. Users may select semi-automatic or fully automatic operation by choosing such options as the automatic ID reader, a 20-plate stacker or a robotic loader interface.

Contact: Sci Tech
P O Box 663, Dunedin
Ph: (03) 4777860, Fax: (03) 4777870
circle number 26 on the reader reply card

THE NEW GILSON MODEL 402 DILUTOR-DISPENSER



John Morris Scientific Ltd are pleased to introduce Gilson's new 402 Dilutor-Dispenser for transfering liquids between vials. Based on user-defined protocols, the 402 Dilutor-Dispenser offers a wide range of combinations for handling liquids.

The 402 Dilutor-Dispenser offers the user the following:

- Flexibility: Thanks to the eight pre-stored tasks which cover most of the liquid transfer operations performed in a laboratory and which can be combined if necessary.
- Easy: As simple as the touch of a probe button, liquid handling is guided by the LED light.
- Fast: The dual syringe model allows high dilution ratios. No refills during the execution of protocols for dispensing or diluting, no need for tedious calculations for dilutions and the possibility to complement fractions to a common final volume.
- Precise: Designed by the manufacturer of Pipetman, the 402 Dilutor-Dispenser allows precise and accurate liquid transfers with the same reliability and performance as other Gilson equipment. And the possibility to adjust the piston stroke according to environmental conditions makes this instrument unique on the market.

Contact: John Morris Scientific Ltd
P O Box 6348 Wellesley Street, Auckland
Ph: (09) 3663999, Fax: (09) 3663060, Freephone: 0800 651700
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REGENERATED CELLULOSE MEMBRANE SYRINGE AND CENTRIFUGE FILTERS FOR MAXIMUM PROTEIN RECOVERY

Regenerated Cellulose (RC) membranes from Alltech are hydrophilic, but solvent-resistant, and low protein-binding. They are ideal for removing particles like cellular debris from samples before application or injection where maximum protein recovery is important. Used with a glass pre-filter in the same housing, these filters are ideal for filtering tissue culture media and for general biological filtration. The pre-filter reduces clogging and improves filtrate without increasing protein absorption. Available in syringe tip filter housings or in Micro-Spin polypropylene centrifugal filters to process samples of up to 750 mL. They are available as non-sterile or sterile and pyrogen-free.

Contact: Alltech Associates Inc.
P O Box 100-352 North Shore Mail Centre, Auckland
Ph: (09) 4443230, Fax: (09) 4442399, Freephone: 0800 ALLTECH
Email: alltech@alltech.co.nz
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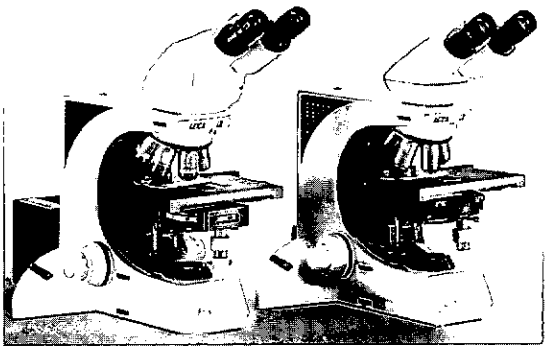
THE NEW DMLB MICROSCOPE FROM LEICA

DAS Mikroskop LEICA DMLB is a new, exceptionally well-equipped laboratory microscope that is destined for success in routine and select research. Unusual for this class of microscope is the DMLB's systematic character, which makes it the all-purpose microscope in any laboratory. For example, only a few hand movements are needed to transform the simple transmitted-light microscope into a proficient fluorescence system with full image documentation facilities.

Superb imaging quality is provided by the Delta optics which have already proven their excellence on other Leica microscopes. The high optical performance is further enhanced by the 25 mm field of view and the choice of 30 or 100 W halogen illumination.



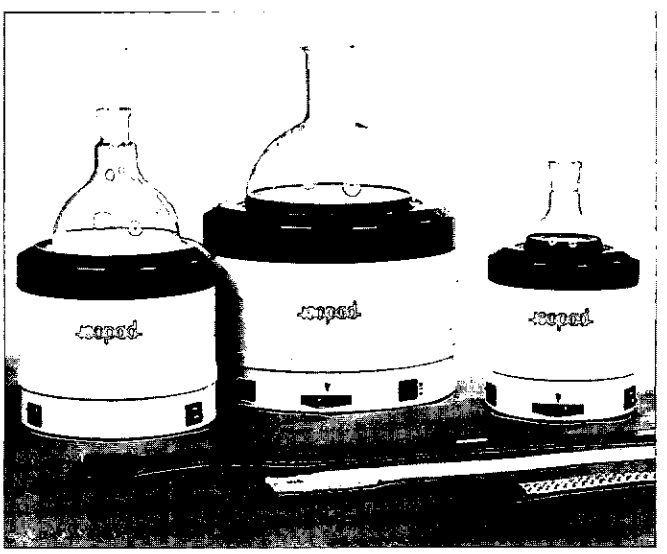
Ergonomic and application-oriented, DAS Mikroskop LEICA DMLB is temptingly practical. You'll also be impressed by standard features such as:

- ceramic stage
- new stage height stop to protect your specimens
- 3-gear focus drive

Contact: Labsupply Pierce (NZ) Ltd
P O Box 34-234 Birkenhead, Auckland
Ph: (09) 4435867, Fax: (09) 4447314, Freephone: 0800 734100
circle number 29 on the reader reply card

PILZ® HEATING MANTLES – THE MANTLE FOR THE LABORATORY

In many areas of research and development and manufacture there is a need for the application of heat to substances. PILZ® heating mantles from Isopad provide heating, whether temperature maintenance or heat-up is required.



ISOPAD heating mantles are asbestos-free, maintenance-free and have a long working life. The mantles are handmade and are manufactured and tested to meet VDE standards. Together with the range of accessories, ISOPAD heating mantles provide an excellent solution to laboratory heating, including testing and analysis. The heater element forms an integral part of the mantle, and prevents any possibility of element separation from the mantle which may cause uneven heating. The way the unit is constructed also prevents heat emission through the outer casing, by the use of high quality thermal insulation.

The ISOPAD product range offers heating mantles to accommodate vessels from 25 mL to 200 L in capacity. Temperatures of up to 900 °C can be achieved. ISOPAD also provide a wide range of heating mantles for hazardous applications. These mantles are designed in accordance with CENELEC and BASEEFA standards. The heating elements have mineral-insulated heating cables which directly terminate in a flameproof junction box.

ISOPAD also have a full range of controls and thermostats for every application. A full catalogue is available on request from the exclusive New Zealand agents.

Contact: Labsupply Pierce (NZ) Ltd
P O Box 34-234 Birkenhead, Auckland
Ph: (09) 4435867, Fax: (09) 4447314, Freephone: 0800 734100
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CAN PIERCING UNITS FROM ALLTECH

Can piercing is the ideal way to sample the head space gases of hermetically-sealed, vacuum and pressurised containers without exposing the contents to the atmosphere. Alltech's unique can piercers take small representative samples from closed containers without significantly disturbing the equilibrium conditions inside the container. Two clamping systems are available for contoured metal containers, such as aerosol cans, or a platform piercing system for sampling from bottle tops or the lids of paint tins.

Contact: Alltech Associates Inc.
P O Box 100-352 North Shore Mail Centre, Auckland
Ph: (09) 4443230, Fax: (09) 4442399, Freephone: 0800 ALLTECH
Email: alltech@alltech.co.nz
circle number 31 on the reader reply card

BIG NEW GAS PURIFIERS FROM ALLTECH

Alltech have added several new gas purifiers to their product line which include the Glass Moisture Indicating Trap, the Big Oxygen, Big Moisture and Hydrocarbon and the Sulfur Purifier.

The Glass Moisture Indicating Trap removes moisture without introducing oxygen or organics into the gas stream like plastic body traps can. On evaluation, a plastic-bodied trap increased oxygen content in a liquid nitrogen source from 0.55 ppm to 1.45 ppm. The glass trap is therefore ideal for MSD, electron capture, electrolytic conductivity and ion trap applications.

The Sulfur Purifier removes sulfur-containing compounds, C_2 and above hydrocarbons and halocarbons from most gas streams. (Not recommended for pure O_2 streams). On evaluation the Alltech Sulfur Purifier removed sulfur compounds and sulfur-containing hydrocarbons to below 10 ppb from a 100 ppm level in a gas stream. To prevent damage to the catalyst bed of a zero

air generator, purify gas streams for sulfur chemiluminescence detectors and catalyst reaction systems, the Alltech Sulfur Purifier is a must.

Our new Universal Mounting Panel allows you to organise up to 5 purifiers of any size for easy monitoring and replacement.

Contact: Alltech Associates Inc.
P O Box 100-352 North Shore Mail Centre, Auckland
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Email: alltech@alltech.co.nz
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NEW APPLICATIONS FOR ALLTECH ELSD

Alltech have published new applications for their model 500 Evaporative Light Scattering Detector. Among the new analyses the ALLTECH ELSD has been used to perform are: amino acid analysis; cholesterol; seed oils; carbohydrates in honey, molasses, corn syrup and fruit juices; triglycerides in olive oil and chapstick; water soluble vitamins; and non-ionic detergent (glucopyranosides). Alltech's Solvent Miser 2.1 mm ID C_{18} column features prominently amongst the new applications. This small diameter column uses 4 times less solvent than conventional 4.6 mm ID columns. ELSD works even better with less solvent to evaporate. Alltech have also introduced a specially designed nebuliser for Super Critical Fluid Chromatography (SFC) further increasing the applications of this truly universal detector.

Contact: Alltech Associates Inc.
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SPOT CHEK DRUG IDENTIFICATION SYSTEM

Alltech's SPOT CHEK drug identification system is fast and accurate for clinical stat toxicology needs:

- *Simple*: It uses one solvent system and one type of TLC plate.
- *Sensitive*: It detects submicrogram quantities of sample.
- *Comprehensive*: It characterises more than 250 drug substances in the database.

Call Alltech now for your free demo disk and request part number 7548.

User-friendly computer software and a variety of visualisation reagents and techniques make this inexpensive system ideal for the busy laboratory that needs "stat" test results. Spot identification is by a search algorithm that identifies or lists drugs by reaction and position on the TLC plate. Alltech also carries a complete line of TLC plates and accessories.

Contact: Alltech Associates Inc.
P O Box 100-352 North Shore Mail Centre, Auckland
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Email: alltech@alltech.co.nz
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NEW CAPILLARY COLUMNS FROM ALLTECH – 0.18 mm ID CAPILLARIES

In response to an increasing demand for narrower bore capillary columns, Alltech have developed a range of 0.18 mm ID Heliflex columns with the most popular phases, lengths and film thicknesses. Compared to 0.25 mm ID capillaries, these have higher efficiencies, lower capacity and require lower flow rates. The 0.18 mm ID columns are often preferred for GC/MS work. Custom 0.18 mm capillaries are also available.

0.53 mm ID capillaries with 1.0 µm films are now also available. The existing 1.2 µm film columns will remain available as standard columns.

Alltech has 10 new 0.45 mm ID x 1.0 µm Econo-Caps available in various lengths and phases, as well as 6 new EC-20 Econo-Caps (20% phenyl silicone) with various lengths, IDs and film thicknesses.

Contact: Alltech Associates Inc.
P O Box 100-352 North Shore Mail Centre, Auckland
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Email: alltech@alltech.co.nz
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CUSTOM MADE ALLTECH HELIFLEX CAPILLARIES

Each ALLTECH Heliflex bonded FSOT capillary is made from the highest quality, polyimide-coated synthetic fused silica. They are supplied mounted on a low thermal mass cage for safe handling and ease of mounting. Every capillary is individually tested and supplied with an instruction booklet, information tag, reusable storage box, computerised test chromatogram, ceramic column cutter and years of experience in capillary production. Your satisfaction is guaranteed.

Now available in custom sizes, 5 IDs of Heliflex column are available, 0.18 mm ID, 0.25 mm ID, 0.32 mm ID, 0.45 mm ID, and 0.53 mm ID. Lengths come in 5 ranges, <5 m, 6-15 m, 16-30 m, 31-60 m, 61-105 m. Be sure to specify phase and film thickness.

Contact: Alltech Associates Inc.
P O Box 100-352 North Shore Mail Centre, Auckland
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Email: alltech@alltech.co.nz
circle number 36 on the reader reply card

ALLTECH ATS METAL CAPILLARY COLUMNS

* Strength of steel, inertness of fused silica.
* Smaller coil diameter (6-1/2")

Alltech ATS capillary columns are made by depositing a sub micron layer of fused silica on the inner pathway of stainless steel tubing. Using various silicone chemistries, the stainless steel tubing is transformed into chromatographically-inert material.

ATS capillary columns are easily cut and connected to existing GCs. Conventional capillary ferrules can be used to install these columns. For further information on the ATS capillary columns, please request ALLTECH bulletin # 344.

Contact: Alltech Associates Inc.
P O Box 100-352 North Shore Mail Centre, Auckland
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Email: alltech@alltech.co.nz
circle number 37 on the reader reply card

TEFLON-COATED SILICONE SEPTA

AUTO-SEP T™ is a high temperature (350 °C) low-contaminant Teflon®-coated silicone septum developed by SGE specifically for high throughput GC autosamplers and manual injection use. Prepared from a soft silicone compound, AUTO-SEP T ensures easy needle penetration, eliminating the need for pre-drilled septa and overcoming re-sealing problems associated with high carrier gas pressures. The soft nature of the septa also demonstrates excellent tear resistance ensuring a long operating lifetime. The Teflon® coating eliminates septa sticking, allowing easy removal even after prolonged use. Pre-conditioned and packaged in glass, AUTO-SEP T™ septa are ready for immediate use.

Contact: Alltech Associates Inc.
P O Box 100-352 North Shore Mail Centre, Auckland
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Email: alltech@alltech.co.nz
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LOWEST BLEED COLUMN AVAILABLE

Excessive column bleed is an issue that all chromatographers understand but hate. Alltech has the lowest bleed column available on the market, made by SGE.

BPX phase technology routinely produces the lowest bleed levels on the market. Witness a comparison by GC/MS of the SGE BPX5 and a competitor's eXtra Low Bleed (XLB) column of identical dimensions (30 m x 0.25 mm, 0.25 µm).

Comparison of Total Column Bleed with Temperature

Phase	150 °C	250 °C	360 °C
BPX5	50,000	50,000	725,000
XLB	60,000	65,000	850,000

Table 1

Chromatographers who use GC/MS are constantly looking for a column which will routinely have the lowest levels of column bleed. The lower the column bleed the greater the sensitivity levels and improved confidence in peak identification.

The BPX5 column is a winner on both counts. The abundance (indicator of background column bleed) for the BPX5 is 20% lower than the XLB at effectively any temperature. Lower background guarantees better detector sensitivity.

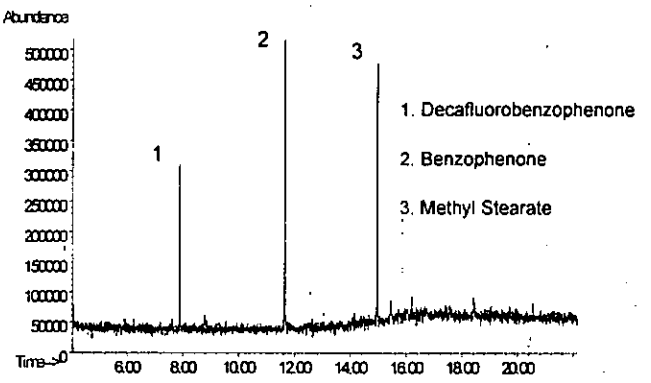
Number of Mass Spectral Ions at 275 °C

Phase	Detectable Ions 275 °C
BPX5	48
XLB	62

Table 2

Peak identification is also improved with the BPX5 column as the lower background bleed levels consist of fewer ions. Fewer ions in the mass spectra (these correspond to the molecules that represent column bleed) improve the confidence of matching the analyte of interest with unknown library standards.

Sensitivity Check (Total Ion) 250pg each component



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GBC OFFERS AN EXCITING NEW RANGE OF ROTATIONAL VISCOMETERS

Rheology International of Shannon, Ireland, is introducing its range of rotational viscometers and acessories into Australia and New Zealand through its new distributor, GBC Scientific.

The RI range is fully compatible with existing low cost viscometers presently on the market, with two unique features:

- A hydraulic lift mechanism allows the user to lift and lower the viscometer head easily, with the weight of the head supported on a gas spring. By simply moving a lever, the viscometer head will rise out of the test sample assisted by the gas spring; similarly, a small downward force allows the viscometer to enter the sample. A fine adjust mechanism allows accurate positioning in the sample.

- A quick fit spindle connector consists of a knurled fitting, requiring a simple quarter turn. The zero lift of the pivot shaft gives total reproducibility/repeatability. Stripped threads and broken spindle couplings are now a thing of the past.

RI *Series 1* viscometer is primarily used for QC – it is very reliable with two rotary switches (speed/spindle selections), and monitors viscosity in cPs and percentage torque. The *Series 2* viscometer is very versatile and ideal for research and development as well, being able to monitor viscosity, shear rate and stress, temperature, percentage torque and absolute torque.

For more information, including a set of Application Notes,

Contact: GBC Scientific (NZ) Ltd
P O Box 68-330 Newton, Auckland
Freephone/Freefax: 0800 428 428
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REPLACE KBr PELLETS AND OIL MULLS

3M Disposable IR Cards are an elegant replacement for KBr pellets or mineral oil mulls in IR spectroscopy. KBr pellets usually show a broad band at 3500 cm^{-1}. Mulls are messy and obsure the 3000-2800 cm^{-1} region. 3M disposable IR cards offer a simple alternative.

Reference: JCE, Vol. **73** No. 7, July 1996.

Contact: Roger C Leslie & Associates
P O Box 1058, Upway, Victoria 3158, Australia
Ph: (+61-3) 97526202, Fax: (+61-2) 97546783
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FOOD TEXTURE ANALYSIS

Texture analysis of foods has become a major factor in the manufacture of food products, particularly in the dairy and confectionery industries. Why is this?

There are several reasons:

Firstly, to enable comparison between new/alternative ingredients and existing ingredients, both to compare qualities to ensure the finished product remains consistent, and also to save money on expensive ingredients. Secondly, new ingredients can offer texture improvements, or improved process times, which results in enormous cost benefits in today's competitive environment. Thirdly, texture analysis enables food processors to measure changes in texture through product shelf life, and to improve flavours by varying texture, and by ensuring that good quality control maintains all the above factors.

The Lloyd Instruments *TA500* Texture Analyser has been introduced as a cost-effective instrument which is capable of routine quality control, as well as advanced flexibility in product research applications. In its basic form the instrument is used with a PC, and a Windows software package with a standard tests library is included in the price. The *TA500* is fitted with a fixed load cell, and has the option of being fitted with additional load cells, thus the one instrument is equally suitable for hard and soft materials. Also available is the advanced Lloyd *R Control* software which gives the user the ability to create customised test setups and reports.

Lloyd Instruments have established a reputation in New Zealand for reliability and ease of use. The *TA500* now gives the food industry a versatile, inexpensive instrument with the backup of an experienced local sales and service organisation.

Contact: GBC Scientific (NZ)
P O Box 68-330, Newton, Auckland
Ph: (09) 3735765, Fax: (09) 3600683
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NEW NIKON ECLIPSE E800: OPTICAL PERFORMANCE AND SYSTEM FLEXIBILITY

Today's research microscopes are not just stand-alone instruments. They are specifically designed to be used with various imaging systems in order to accommodate an increasingly broad range of requirements. These include fluorescence applications such as FISH, Video Enhanced Contrast microscopy and laser confocal systems. Existing optical system frameworks, however, have proven barely adequate to satisfy all of these various applications with a single instrument.

The E800 utilises Nikon's CFI60, a ground-breaking new optical system combining infinity optics with the characteristics of Nikon's renowned CF corrected system. This revolutionary and innovative new "CFI60 Optical System" has achieved a new standard of optical performance to address the most stringent demands of scientific research.

The basic microscope comprises the main unit, an intermediate module, and an eyepiece tube. The intermediate module and eyepiece tube exhibit a high degree of flexibility and can be configured to meet the requirements of individual applications in comfort. The new optical system and the modular structure combine superior optical performance and a high level of system versatility.

Contact: Watson Victor Ltd
P O Box 1180, Wellington
Ph: (04) 3857699, Fax: (04) 3844651
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THE NEW HAAKE VISCOTESTER VT5

HAAKE announce the launching of an innovative new Viscotester, the Viscotester VT5.

The VT5 is 100% ISO2555 compatible and adheres strictly to the Brookfield method described therein. The benefits of purchasing this type of viscometer from a specialist like HAAKE include having full support at a competitive price.

The VT5-L version is designed for low viscosity fluids and the VT5-T model for medium to high viscosity fluids. The unit measures according to international ASTM, ISO, IP, BS and

company standards and last but by no means least, the VT5 features modern digital technology paired with a very solid mechanical design and carries a two year warranty.

Contact: Watson Victor Ltd
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AFFORDABLE BALANCES FOR RESTRICTED BUDGETS IN THE DAIRY INDUSTRY

Analytical laboratories in the milk industry typify large sectors of the food industry as a whole. Even though today strict directives regulate a high percentage of the qualitative requirements, choosing the correct instruments is still the task of the laboratory manager. Daily cost-savings notwithstanding, the laboratory personnel should be able to count on the support of dependable instruments. The laboratory instruments must be simple-to-use, easy-to-clean and rugged. And should it be necessary to perform an experiment directly at the production location, the instruments must also be capable of easy and safe transport. With its modern Basic Level balances, METTLER TOLEDO demonstrates that uncompromising and reliable weighing performances are also available at reasonable prices. Thanks to a very extensive product range (from the analytical balances with 0.1 mg resolution up to 32 kg balances with 1 g resolution), the user has over 25 high-quality models available. In addition to their very simple and logical operation, these balances are especially distinguished by their dependability, their compactness and the exceptional ease with which they can be cleaned. Ruggedness is another feature where no compromises have been made: The selection of high-grade materials and components guarantees a long service life and trouble-free use even under harsh ambient conditions. All balances can be connected via an optional interface to a computer or, if a METTLER TOLEDO LC-P45 Printer is attached, can generate calibration reports conforming to GLP/GMP which fulfil the requirements of a quality audit. And if the balance has to be used at a different workstation, the practical transport case and the power line independence of the external PowerPack are particularly welcome. The Basic Level balances from METTLER TOLEDO – the only compromise is the price.

Contact: Watson Victor Ltd
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STATISTICAL QUALITY CONTROL NOW AVAILABLE WITH BASIC BALANCES

The SQC14 average weight control printer systems can now be connected to the Mettler Toledo Basic balance range, AB/PB/SB. The advantages of this arrangement are twofold. First, it provides an economical solution to producing statistical records of package and tablet weights, and second, it provides an exceptionally compact and portable system.

Even the larger SB scales, up to 32 kg capacity, can be supplied with a case which will carry the scale, the SQC14 programmed printer and battery pack for the scale.

Contact: Watson Victor Ltd
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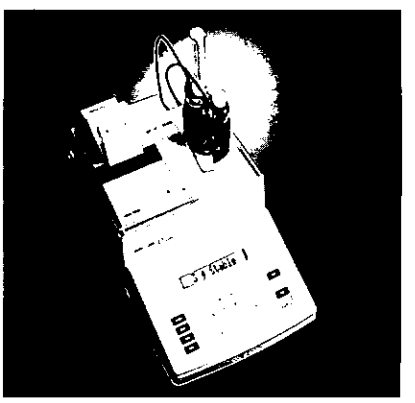
COULOMETRIC KF TITRATIONS IN ROUTINE OPERATION GREATLY SIMPLIFIED



Mettler Toledo has launched a new coulometric Karl Fisher titrator, the DL36. It has been designed for simple routine practice conforming to GLP. The instrument performs the determination with a single method, but one in which new values of the parameters can always be stored. There is a choice of the displayed result unit, the length of the stirring times with or without iodine generation and the abort parameters. The sample weight can be entered before or after the titration or transferred from the attached balance. Two steps are required to operate the DL36; injection of the sample through the septum and pressing the "Run" key. The hermetically-sealed titration cell prevents the ingress of moisture under practically all conditions. Drift is continuously redetermined in the standby mode and displayed to ensure that the latest value is always ready for correction of the results. As three RS232 interfaces allow the attachment of a balance, a printer, a PC or a laboratory information management system, economical processing and documentation of the data is assured. A colour brochure provides detailed information.

Contact: Watson Victor Ltd
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NEWCOMERS TO REPLACE METTLER TOLEDO PM BALANCES

The new PG range takes the best features of the PM, including the easy-to-read, bright green display and a sturdy build, and improves on them, adding new features as well. Efforts have been made to improve resistance to chemical damage and there is a generously-sized weighing area – as big as 204 x 204 mm on a 3100 g capacity PG balance. The whole balance is easy to clean to ensure good hygiene and housekeeping in areas where hazardous materials are present, and the sturdy build of the weigh cell and electronics housed in a metal casing means that this balance will survive in conditions which even the old PM found difficult.

The PG has also been designed with built-in calibration weights, and a special 'VariCal' program ensures maximum compliance with quality assurance and GLP procedures making it simple to check or adjust at various weights. The weighing ranges have been increased by at least 20%, so that direct replacements for the PMs have a higher capacity, e.g. the PG5002DR which replaces the PM4800 has a maximum range of 5 kg instead of 4 kg.

Contact: Watson Victor Ltd
P O Box 1180, Wellington
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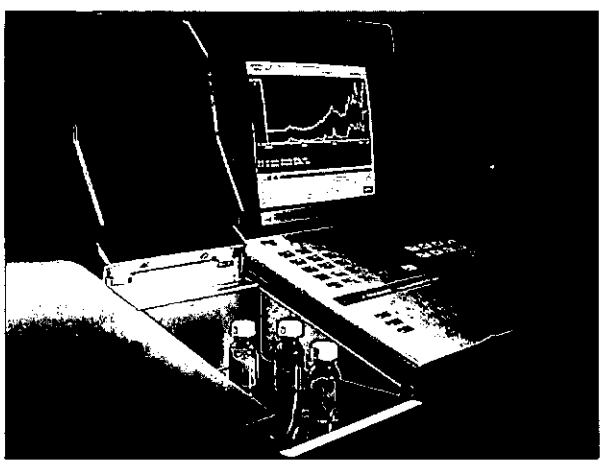
IDENTICHECK FT-NIR SYSTEM OFFERS A NEW, EASIER APPROACH TO MATERIALS CHECKING



Perkin-Elmer, the leading supplier of high-performance FT-IR spectrometers to QA/QC laboratories, has introduced an innovative system for materials checking and assay determination – the new IdentiCheck™ FT-NIR System. The powerful combination of a dependable FT-NIR spectrometer, unique sampling and easy-to-use, validated software provides an optimised system that can be configured to match specific operational requirements.

IdentiCheck FT-NIR Systems provide the ideal combination of simplicity and performance, offering QA/QC analysts a superior alternative to traditional dispersive NIR instruments. In addition to offering superior precision and wavelength accuracy, the IdentiCheck Systems cover the first and second overtone regions. Utilising the full first overtone region, which extends beyond 2,500 nm, provides improved results, the capability for new applications and exciting new sampling opportunities.

Because procedures and preference for materials checking differ widely, Perkin-Elmer offers a choice of two systems, both of which incorporate various key features: unique, on-board and remote sampling; easy-to-use software; fast, simple product checking; reliable, field-proven spectrometer design; built-in diagnostics and Good Laboratory Practices (GLP) features for assistance with validation and regulatory compliance; an extensive suite of data collection, processing and report functions; and the ability to generate turnkey applications through structured and customisable procedures.

The Spectrum IdentiCheck™ FT-NIR System comprises the IdentiCheck FT-NIR Spectrometer and Spectrum IdentiCheck Software for PC-controlled operation on a Windows®-based platform. Ideally suited for QA/QC applications, the Spectrum IdentiCheck System offers a comprehensive, validated and completely customisable solution.

The Paragon IdentiCheck™ FT-NIR System is a unique, fully integrated, simple and intuitive sytem, comprising the IdentiCheck FT-NIR Spectrometer and Paragon IdentiCheck Software. Based on the proven Paragon 1000 FT-IR Spectrometer – used in thousands of QA/QC laboratories worldwide – the Paragon IdentiCheck System is also expandable to be fully controlled from a PC to exploit the benefits of a Windows-based system if desired.

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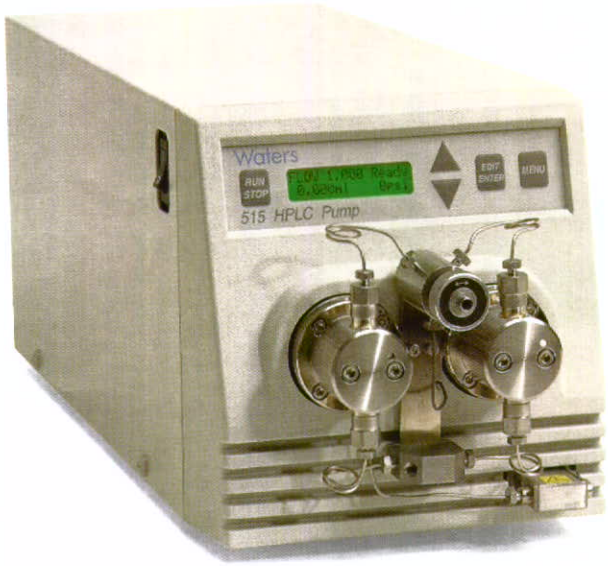

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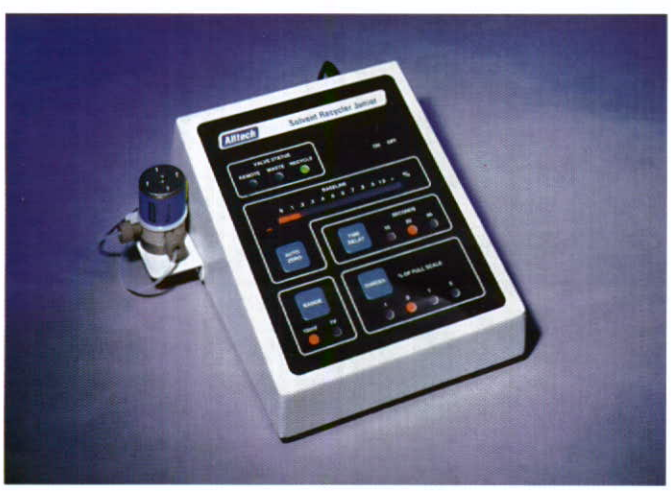

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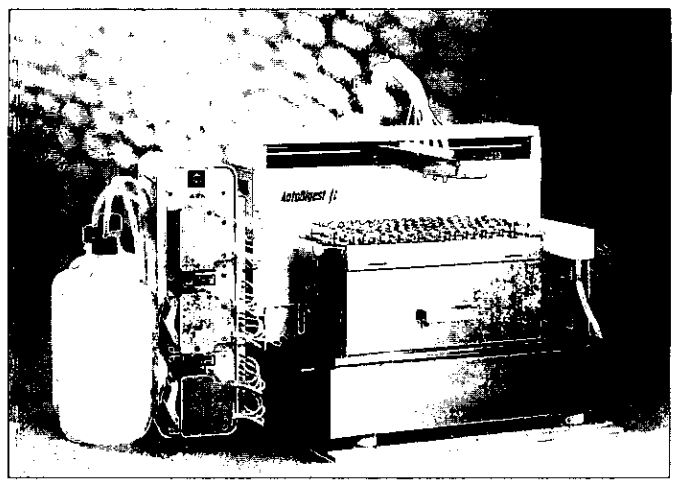
A.i. Scientific announces the release of the AutoDigest, a fully automatic block digestion system (patent pending). The AutoDigest was developed in collaboration with private environmental laboratories in anticipation of proposed legislation. As a consequence the AutoDigest provides high sample throughput and is suitable for a wide range of digestion applications. The AutoDigest does not require any operator intervention during the course of most digests. By utilising the AutoDigest to automate the menial, repetitive and potentially dangerous aspects of a digest, trained staff are available to perform other tasks in the laboratory. The human handling of dangerous acids is reduced to a minimum as acids and other reagents are added to samples, in a controlled manner, by precision pumps and an accurate robotic arm. Every aspect of the digestion process is controlled and monitored by the AutoDigest's Windows-based software. The software is specifically designed to make it easy for laboratory staff to program, save and recall digest processes. Up to 50 samples can be digested in a single batch providing compliance with a number of US EPA digestion methods. AutoDigest is designed and manufactured in Australia by A.i. Scientific in accordance with the ISO9001 quality standard.



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Patent Proze

by Jane Calvert and Greg Lynch

In this issue of Patent Proze we aim to provide an introduction to the types of inventions which are patentable in New Zealand. We will highlight those areas of particular interest to chemists and biochemists, and also those matters for which patent protection is difficult.

What is patentable in New Zealand?

Subject to certain exceptions, most inventive ideas which result in some product of potential commercial significance, or a new method or process of testing applicable to the improvement or control of manufacture, may be the subject of a patent. For chemical and biochemical advances, this usually boils down to patent protection being available for compounds, compositions containing them, methods of using them and processes for their preparation.

Some areas however require specific comment.

Microorganisms and biological compounds including DNA fragments or sequences, which have been isolated, or cultured to a particular degree of purity, are patentable. However, they are not entitled to patent protection when simply found in their naturally occurring state or environment. The processes for isolating or purifying compounds or DNA sequences from their natural environments are also patentable.

Metabolites from microorganisms, for example new antibiotics from previously unknown microorganisms, are patentable.

Patents seeking protection for methods of treating humans are possible including methods of contraception, methods of diagnosis where there are no surgical steps involved in the invention, and cosmetic methods of treating humans. These methods do not include those where the treatment identified relates to surgery or to the treatment or prevention of disease.

Perhaps surprisingly, a new therapeutic use for a known pharmaceutical is not entitled to patent protection unless the actual pharmaceutical, or a composition containing it, is materially different from those previously known. In 1983 the New Zealand Court of Appeal in the Wellcome decision, held that a process for treating meningeal leukaemia using a substance which had been previously known for treating malaria was not patentable. New Zealand's intellectual property legislation is currently under review. It is possible that a patent protecting a new therapeutic use for known pharmaceuticals or pharmaceutical compositions will be possible in the future. It is also anticipated that methods of medically treating humans will become patentable. We will keep you posted.

Generally, a combination or aggregate of two or more known compounds is not patentable unless a new or synergistic effect results.

Plants and animals *per se* are typically not entitled to patent protection unless the plant or animal has been sufficiently modified or genetically engineered. Protection for plant varieties may be obtained under the Plant Varieties Act. Watch this space for information regarding plant variety rights.

Patent protection is usually not available for information of an intellectual or visual content, for example business systems, book-keeping methods, mathematical formulae and arrangements of words or symbols on a printed sheet. However, copyright protection generally subsists for such works. Computer programmes traditionally fell within this area and hence were not patentable. Recently, a decision from the Commissioner of Patents in May 1995 opened the gateway to the patentability of computer programmes. Computer programmes are patentable provided the programme "involves the production of some commercially useful effect".

It is interesting to note that the Commissioner of Patents has a statutory discretion to refuse a patent application if the invention would be contrary to morality. Along with patentability, novelty of the invention is essential for the grant of a patent. We will discuss the issue of novelty in the next issue of Patent Proze.

We are attending the Dunedin conference in December. Come and visit us at our exhibition stand. A Reminder: if you have any queries regarding patents, or indeed any form of intellectual property, please direct them to:

Patent Proze
Baldwin, Son & Carey
PO Box 852, Wellington
(Email@bscwlg.baldwins.co.nz)

Jane Calvert

Jane Calvert and Greg Lynch are both employed in the patent department of Baldwin, Son & Carey, Patent and Trademark Attorneys, and Solicitors, where they specialise in chemistry patents. Jane joined Baldwins after completing a PhD in chemistry at Canterbury University in 1994. Greg also joined Baldwins in 1994 after three years research at Industrial Research Ltd in Wellington. Following completion of a PhD in chemistry at the University of Otago in 1989, he spent a two year period as a post doctoral researcher at Oxford University.

Greg Lynch

The Chemistry Behind The Polymerase Chain Reaction

Jolon Dyer, Chemistry Department, University of Canterbury, Private Bag 4800, Christchurch

A Mystery Unveiled[1]

The year is 1990, the country the United States of America. A woman is brutally raped and murdered in her own home. Three men are linked to the crime through fraudulent use of the victims credit card the night before her death. Let's call these three men Mr X, Mr Y, and Mr Z. One of these men, Mr X confesses to the rape and murder but, strangely, his confession is inconsistent with the physical evidence of the crime. What is this evidence?

1. A bloody footprint is left at the scene of the crime. This is identified as belonging to Mr Y.

2. A large number of hairs are also found at the scene of the crime.

3. Semen stains on the victim and her clothing.

The conventional way of analysing biological specimens is to type them using protein marker typing. However, in this case such analysis was unable to identify the donors of the samples. Is it possible to sort out the role each of these men played in this heinous crime? Can the source of the hair and the semen be established?

Just five years earlier these questions would have been difficult or impossible to answer. In fact, this case would have remained unsolved or ambiguous had it not been for the advent of a new forensic technique which enables even minute amounts of DNA, deoxyribose nucleic acid, to be typed and identified. This new technique is called the polymerase chain reaction (PCR).

The PCR is a method whereby 'a DNA fragment can be amplified a million-fold or more for unequivocal identification.' One PCR-based genetic marker system is commercially available and validated for forensic casework. This system determines the DQα type of DNA extracted from forensic samples. Simply put, a system such as this one works on the principle that, while everyone's genetic code is unique, the population can be divided up into categories. In this case the category, or type, of each individual is represented by two numbers. Table 1 shows the DQα types of the victim, her boyfriend, and the three suspects, as established by the polymerase chain reaction.

Table 1: DQα types of reference samples from the victim, her boyfriend, and 3 suspects.

Donor	DQα Type
Victim	1.2, 4
Boyfriend	1.1, 1.1
Mr X	1.1, 1.2
Mr Y	2, 3
Mr Z	1.1, 1.1

To analyse the physical evidence, 15 hairs distinguishable from the victim's were selected from those found at the crime scene. DNA was isolated from these hairs and amplified by PCR for DQα typing. 13 of these hairs typed as DQα 2,3 while the remaining 2 gave a non-result. In addition semen samples were differentially extracted from a vaginal swab of the victim and from her clothing. Sperm DNA from both these sources was amplified by PCR and typed as DQα 2,3 also.

What was the result of this PCR-based investigation? Firstly, the man who confessed, Mr X, can be eliminated as the donor of the hair and semen. Mr Z and the victim's boyfriend can also be eliminated. Mr Y, who matched the bloody footprint, cannot be eliminated as the source of the hair and semen. In fact, his particular DNA type occurs in only 3% of the population. The jury for this case convicted Mr Y of rape and murder. Mr X was convicted of the lesser charge of co-conspirator.

This intriguing case demonstrates the remarkable power of the PCR. But, just what is this reaction? How does it work? It is the intention of this review to outline the basics of this remarkable and elegant technique and show that, while on the surface the technique appears to be strictly the domain of biology, its roots are deeply embedded in chemistry. To achieve this, firstly we are going to step back in time and explore some of the vital chemistry which led to the discovery of the PCR (Table 2). Then we will look at the reaction itself and how it works. Finally, we'll look at the diverse array of applications which PCR has already acquired.

Table 2: Vital links in the PCR story

DNA Structure	Watson and Crick	1953
DNA synthesis:	Arthur Kornberg	1955
enzymatic chemical	Gobind Khorana	1956
DNA Sequencing	Fred Sanger	1973
DNA Hybridisation	Michael Smith	1968
Polymerase Chain Reaction	Kary Mullus	1985

The Structure of DNA

In 1953 the complementary double-stranded (duplex) structure of DNA was discovered by Watson and Crick. According to this model, DNA consists of two polynucleotide strands coiled around each other in a double helix, and held together by hydrogen bonds between specific pairs of bases. Part of the immense beauty of Watson and Crick's model was that it explained how DNA could carry information, via a code of four distinct nucleotides.

If we look closer at these nucleotides, it can be seen that they are each made up of three basic components: 1) a phosphate group, 2) a sugar group, and 3) a base. While the phosphate and sugar groups remain the same for all four nucleotides, it is the attached base which is the distinguishing feature of each nucleotide. The structure of these bases is crucial to the DNA as a whole because it is the bases that actually link the two strands of DNA together, via hydrogen bonding.

Pyrimidines (Cytosine, Thymine, Uracil)

Purines (Adenine, Guanine)

Figure 1. Two Kinds of Base

There are two kinds of bases present in DNA (Figure 1), the pyrimidine bases, including cytosine, thymine, and uracil (which replaces thymine in RNA), and the purine bases, which include adenine and guanine. The key difference in these two kinds of bases is best shown when one considers the base pairing in DNA. Each base pair is made up of a pyrimidine and a purine base. Thymine (T) always binds to adenine (A), while cytosine (C) always binds to guanine (G). These two base pairs, AT and CG have a major difference in their binding. The AT base pair is held together by two hydrogen bonds, whereas the CG base pair is held together by three hydrogen bonds, making it a stronger linkage. This is an important feature to keep in mind.

In essence then, DNA could be summarised as two polymer chains, each made up of only four basic building blocks, which are held together by hydrogen bonding. Naturally, once something was known about the structure of DNA, people tried to synthesise DNA themselves, both enzymatically and chemically.

Enzymatic DNA Synthesis

In 1955 the first DNA polymerase enzyme was discovered. DNA polymerases are the biological catalysts responsible for DNA chain growth, and are found in all cells containing DNA. The polymerases are a unique class of enzymes, because their choice of substrate (the chemical(s) acted upon by the enzyme) is determined not only by the enzyme itself but also by a template. Hence the building blocks of DNA, the A, T, C, and G, are added to the growing DNA chain in an ordered manner. A 'T' will only be added when there is an 'A' in the template, a 'C' when there is a 'G' in the template, and so on.

A feature of many polymerases is their proofreading function – that is, they can check to make sure that the correct building block has been added and if not remove it and replace it with the correct one. Researchers such as Arthur Kornberg were able to exploit the function of DNA polymerase as a means of synthesising DNA *in vitro*.

Chemical DNA Synthesis

In 1956 Gobind Khorana made the somewhat accidental discovery of a method for chemical synthesis of deoxyribooligonucleotides (small pieces of DNA). This became known as the phosphodiester method. Full exploitation of this synthetic approach led to elucidation of the genetic code and the first total synthesis of a gene.

Since then reliable automated chemistry for the synthesis of small DNA molecules has been developed. So although until a few years ago the construction of a single small piece of DNA (oligonucleotide) was a substantial task that could only be performed by a skilled organic chemist, now it is possible to purchase an oligonucleotide synthesiser machine. This development of automated chemistry has been described as 'one of the least appreciated contributions to the widespread use of PCR'.[3] Now workers with little or no knowledge of chemistry can synthesise oligonucleotides of their choice rapidly and efficiently.

DNA Sequencing

As a natural progression, once you can synthesise DNA, you would now want to be able to take a piece of DNA with unknown composition and sequence it – that is, sort out the A, T, C, and G order. In 1973 Sanger and co-workers developed what has become known as the 'dideoxy method' for sequencing DNA. Since then DNA sequencing has improved vastly both in speed and efficiency.

DNA Hybridisation

In 1968, Michael Smith began model studies on DNA hybridisation.[4] Hybridisation takes advantage of the ability of a single strand of DNA to find its complementary strand of DNA, even in the presence of large amounts of unrelated DNA. It is based on the very simple yet intriguing chemistry of DNA melting and re-annealing.

DNA Melting and Re-annealing

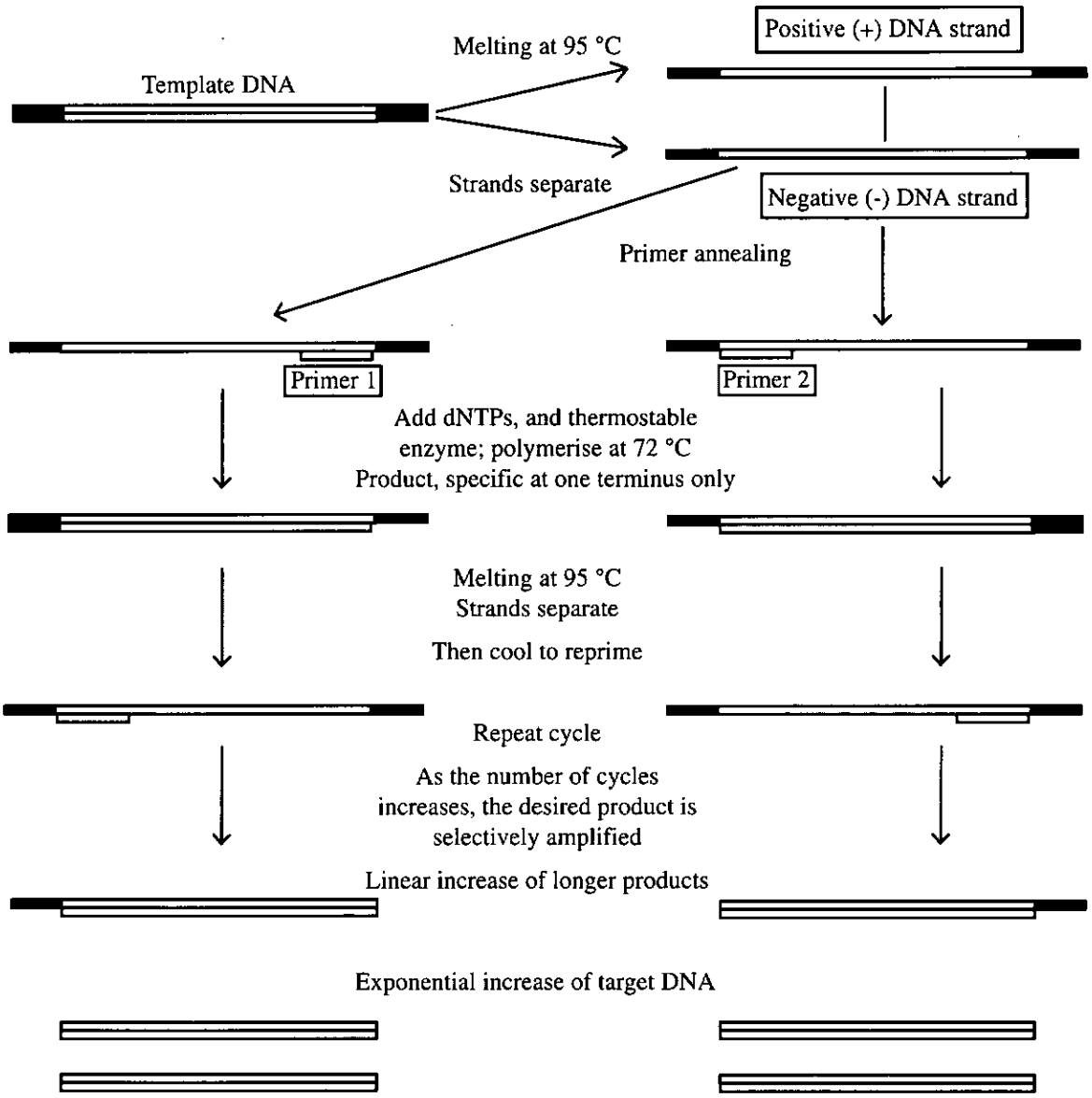
When the hydrogen bonds between the bases of a DNA duplex are broken, the chains come apart. Thus two complementary single strands of DNA are formed. In solution this can be achieved by increasing the temperature. Now, as we saw earlier, GC base pairs are triply hydrogen bonded while AT base pairs are doubly hydrogen bonded. So, as a direct consequence, unwinding of the DNA duplex begins in regions low in GC content. DNA duplex stability, and therefore the temperature at which the strand will come apart (melt) is a direct function of the percentage of GC base pairs (%GC). So when a DNA strand is incubated at a temperature above the melting temperature, the individual strands will separate. Conversely, when complementary chains are incubated at a temperature below the melting temperature they begin to reassociate (re-anneal) and eventually form a double stranded helix. For a long piece of perfectly matched DNA this dependence of melting temperature (T_m) on structure can be expressed by the following equation:

$$T_m = 0.41(\%GC) + 69.3$$

For shorter lengths of DNA, the melting temperature is lowered. So, for example, if we have a piece of DNA with 50 base pairs, 50% of which are GC base pairs, then the melting temperature would be 79.8 °C, whereas if we had a similar piece with only 10 base pairs the melting temperature would be 38.8 °C.

Why is the melting temperature so important? As we will see shortly, the melting temperature structure dependence of DNA strands is a key feature of the polymerase chain reaction. So let's now take a look at how PCR works.

Figure 2. PCR Schematic



The Polymerase Chain Reaction (PCR)

The PCR is a technique used to amplify a segment of DNA that lies between two regions of known sequence.[5]

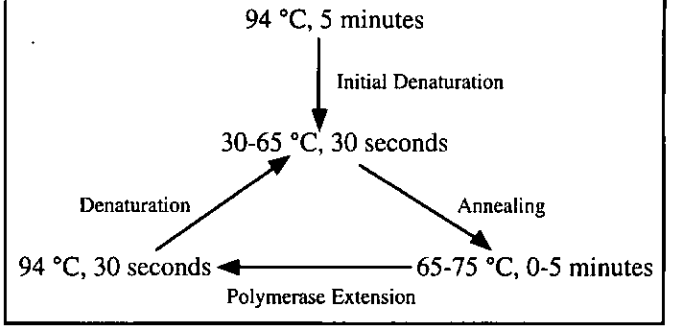
As shown in the PCR schematic[5] (Figure 2), two oligonucleotides are used as primers (starting sequences) for a series of synthetic reactions. These reactions are catalysed by DNA polymerase (usually *Taq* DNA polymerase). The primers used are complementary to opposite strands of the DNA and flank the region to be amplified. The reaction proceeds as follows:

1. Firstly the template DNA is denatured (i.e. the strands are separated) by heat, and then it is cooled to a temperature at which a large molar excess of the primers anneal specifically to their target sequences.
2. Next, these primers, now attached to the template DNA, are extended by DNA polymerase, using deoxynucleotide triphosphates (dNTP) as the building blocks.
3. Repetition of this cycle leads to an *exponential increase in the desired fragment*. This is because the products of each cycle serve as templates for the next cycle.

The major product of a PCR reaction is therefore a segment of double-stranded DNA whose ends (5' termini are defined by those of the primers, and whose length is determined by the distance between them.

In addition, minor side products accumulate at a linear rate, but these are soon swamped by the exponential increase of the desired product. So the whole reaction is carried out simply by cycling the reaction temperature! Figure 3 shows a typical thermocycling profile for a PCR reaction.

Figure 3. Typical Thermocyclic Profile for PCR



Variables of the PCR

A PCR contains many variables, which can be varied so as to optimise the desired amplification. The major variables involved are:

1. *Temperature cycling parameters* – By varying the temperature at which the melting process occurs, the specificity of the reaction can be altered. In addition the total number of cycles performed should be kept as low as possible so as to avoid spurious amplifications.

2. *Nature and concentration of template DNA* – Extensive DNA purification has been found to be advantageous for only the least efficient PCR reactions, so usually the template DNA requires little purification.

3. *Nature and concentration of the primers* – The primers for each PCR reaction are designed specifically to optimise the reaction. In fact a whole set of rules is usually followed in the design of primers.

4. *Buffer conditions* – in practice standard buffer conditions vary little, but the concentration of Mg^{2+} has been found to be important.

5. *dNTP concentrations* – if the concentration of these is too high, then the frequency of the incorrect building block attaching itself increases.

6. *Enzyme considerations* – The enzyme used for most PCR reactions is *Taq* DNA polymerase as this is stable at high temperatures. However this enzyme does not possess a proofreading function.

Pros and Cons of the PCR

Table 3 summarises some of the merits and drawbacks of the PCR reaction.

Table 3: Pros and Cons of PCR

Pros	Cons
Extremely sensitive	Contamination
Specificity	*Taq* Polymerase lacks a proofreading function
Abundance	Plateau effect
Modifications possible	
Automation friendly	
Speed	
Not too fussy	

So just what are the advantages and merits of PCR. Probably most importantly, the reaction is **extremely sensitive.** In fact PCR has been used to amplify gene products from merely a single cell!

Then there is its **specificity.** As we have just seen parameters can be optimised to achieve excellent specificity. As a rule, the more specific the binding of the primers, the more specific the products.

The problem of **abundance** is solved too with PCR. Typically 10^{-12} of starting template, in which there is only a single copy of the desired product in each DNA piece, can be amplified in a 30 cycle PCR reaction to between 0.05 and 1.0 μg, which in this area of science is plenty for most purposes.

PCR is also **automation friendly**, that is, the whole process lends itself to automation. All that is required is a device which can cycle the reaction through a range of temperatures. This in turn means that the **speed** of a PCR reaction is very much faster than any related techniques, such as cloning.

In addition, we have seen that PCR is **not too fussy.** The starting DNA does not have to be totally pure or intact, as long as it does not contain any other contaminating DNA. This feature is extremely important in areas such as forensic work, where the sample DNA may have been exposed to the elements for long periods of time and be fairly broken down or contaminated with dirt.

And finally, yet another very useful feature of PCR is that **modification** of the DNA can be made. These modifications are able to be introduced into the target DNA piece via the use of primers. The primers may have deliberate mismatches incorporated into them, or they may have additional segments of DNA attached to them (containing, for example, restriction sites).

As with any process however, the polymerase chain reaction has its limitations.

The first has to do with **contamination.** Because PCR is such an ultra-sensitive technique, any contaminating genetic material can seriously affect the outcome.

For example, in the criminal case outlined at the start of this paper, if any DNA from another person had contaminated the samples then the results could have been completely different. As a consequence, strict controls must always be performed in conjunction with any PCR reaction, and the reactions repeated where possible. Also, elaborate isolation procedures are standard, so as to minimise the risk of contamination.

Another limitation is that the enzyme most commonly used for PCR reactions, ***Taq* polymerase, lacks a proofreading function**. It is estimated that this results in a 0.25% error, or misincorporation, rate. In the majority of cases however, this is not a problem. The problem itself will be totally eliminated when a heat-stable polymerase with an efficient proofreading function becomes commercially available.

Finally, what is known as the **'plateau effect'** must be taken into consideration. In a PCR experiment the amplification is not infinite. Rather, after a certain number of cycles the desired fragment gradually stops accumulating exponentially and enters a linear, or stationary, phase. This is a limiting factor in all PCR experiments.

Overall though, there can be no doubt that the incredible power, and sheer usefulness, of PCR vastly outweighs any limitations. The elegant simplicity and efficiency of this reaction has really revolutionised many areas of science, with further applications coming to light all the time.

Applications of PCR

Let's take a look now at some of the large array of PCR applications in summary form. These are outlined in Table 4 and have been summarised into three main areas. The power of PCR in the field of forensics has already been illustrated (see ref. 6). The applications of PCR in the medical field are vast and continuing to expand, and some of these have been outlined. In addition, PCR is being applied to historical research. For example, DNA is being extracted from ancient Egyptian mummies in order to trace family trees and ancestries. Chemist John Dalton's colour blindness has been diagnosed, even though he died in 1844, by removing DNA from his preserved eyes.[7] And PCR is even being used to furnish strong evidence for the "Eve Hypothesis", which is an attempt to trace all human beings back to one common ancestor. Finally, the PCR is proving a powerful tool in taxonomical research. The relationship between Southern Hemisphere ratites for example, has been investigated using the PCR to amplify DNA sequences from each species for comparison. Such studies have shown for instance, that moas are not as closely related to kiwis as once thought, but are more closely related to emus and cassowaries.[8] Similarly, the relationship between giant pandas and red pandas has been investigated, indicating that the two are related in name only.

However, to gain a better appreciation of the remarkable power and versatility of PCR, let's take a more in-depth look at one of these applications – the diagnosis of HIV infection by PCR.

Diagnosis of HIV Infection by PCR: Nested PCR[9]

Table 4: Applications [3,9]

FORENSIC:	e.g. murder cases
MEDICAL:	**Diagnosis of Viral Diseases:** e.g. HIV, hepatitis, leukemia, herpes, pre-natal rubella, etc.
	Diagnosis and Characterisation of Genetic Diseases: e.g. muscular dystrophy, haemophilia, etc.
	Diagnosis and Characterisation of Neoplasia
HISTORICAL:	**Examples:** Amplification of DNA from a 7000 year old brain "Eve" Hypothesis Egyptology Diagnosis of John Dalton's colour blindness
TAXONOMICAL:	**Examples:** Investigation of the relationship between Southern Hemisphere ratites Giant panda versus red panda

Early on in an HIV infection very few peripheral blood cells are actually infected and so very few contain proviral DNA. This means that in order to detect HIV infection, an extremely sensitive technique is required. The HIV virus itself has a high degree of genetic variation, with each individual virus being unique. This presented an initial problem for the use of PCR, as only invariant regions of the viral genome can be usefully targeted for amplification; those regions that change very little between individual viruses.

However such highly conserved sequences have been identifed. Also, primers and probes for these regions have been designed. Even so, standard PCR experiments lack the extreme sensitivity required. So a super-sensitive variation of PCR has been developed, and this is called 'Nested PCR'.

Nested PCR is performed in a two-step sequence. The first PCR reaction is performed with a pair of outer primers and the second with a pair of inner, or 'nested', primers (Figure 4). A typical protocol for such an experiment is that after 24 cycles of the first PCR, one-tenth of the resulting product is amplified for a further 30 cycles with the corresponding inner primers.

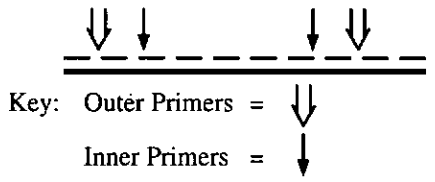


Figure 4. Nested PCR[3]

In practice, for HIV diagnosis several such primer sets are used simultaneously, and the results are excellent! This detection method has indeed proved extraordinarily sensitive and effective in diagnosing HIV infection.

Yet PCR offers even further benefits over other detection techniques, for example in the detection of mother-to-child HIV transmission. Traditionally, HIV infection has been diagnosed by detection of HIV antibodies in the bloodstream. An individual possessing such antibodies is termed 'seropositive'. However, in a newborn child, maternal HIV antibodies may circulate for up to 15 months after birth, making the child seropositive. The important question is whether the child is HIV infected or not, and this is where PCR comes in.

By using PCR the HIV virus can be detected directly. In fact nested PCR is able to detect one copy of HIV proviral DNA against a background of 10^5 peripheral blood cells. Hence HIV infection can be detected in children 4-9 weeks old, where previously no such detection would be possible until the child was much older. Such PCR based studies have recently shown that somewhere between 20-60% of children born from seropositive mothers are infected by the HIV virus.

Not only is sensitive detection available using PCR but also quantitation of the HIV virus is also possible. PCR can be used to quantitate proviral DNA, that is, determine the number of infected cells in HIV-positive individuals. In people classed as seropositive, about 1 in 10^4 T-cells contain proviral DNA. In people with full-blown AIDS on the other hand, about 1 in 10^2 T-cells contain proviral DNA. So PCR-based methods can be used to detemmine the extent of infection. As a consequence, PCR is currently being used as a tool to monitor the effects of potential anti-HIV drugs. One example of this is with the drug

2',3'-dideoxyinosine, where in one case a patient's proviral DNA was found, using PCR methods, to have decreased by about 75% over a 15 week treatment. Obviously PCR has proved, and will continue to prove itself, a mighty tool in the study of infectious diseases such as HIV.

The Future

What of the future? Further applications are being developed for PCR all the time and no doubt these will lead to many new and exciting developments. Already, movies such as 'Jurassic Park' are speculating as to where such developments will lead. A more realistic goal is the proposed use of PCR in the mapping of the human genome, a mammoth task which will need all the help it can get.

Truly the polymerase chain reaction has proved itself, and will continue to prove itself, a powerful technique in all fields of biological science. Yet it is a technique that has its roots firmly embedded in chemistry.

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1. Reynolds, R; Sensabaugh, G; Blake, E, (1991), *Analytical Chemistry* **63**: 2-15.

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Molecules for the Future

NATIONAL CONFERENCE OF THE NEW ZEALAND INSTITUTE OF CHEMISTRY AND THE NEW ZEALAND SOCIETY FOR BIOCHEMISTRY AND MOLECULAR BIOLOGY

University of Otago, Dunedin, New Zealand

From the Conference Committee ...

A warm welcome is extended to all participants in this Conference jointly sponsored by the New Zealand Institute of Chemistry and the New Zealand Society for Biochemistry and Molecular Biology. To date 294 registrations have been received from New Zealand, Australia and Japan, and particularly pleasing are the 120 student registrations. This augurs well for the future of molecular chemistry and biochemistry in this country. Equally pleasing is the spread of scientists from the Universities, CRIs and Industry.

The scientific programme, a blend of fundamental and applied molecular science, will provide a platform for colleagues to share their latest results, to discuss the future directions of molecular science in this country and to learn of recent advances in areas outside their expertise. Our five Plenary Speakers are experts in their fields with high international reputations. Section lecturers have been invited from Australia and Canada, as well as New Zealand, and their expertise covers a wide range of topics in modern Chemistry and Biochemistry. Professor Emsley's presence will reinforce the message that we need to transmit the excitement of our subject to the general public and this theme is continued in the mini-symposium on Chemical and Biological Hazards on the Friday. The Committee wishes to acknowledge the generosity of the following sponsors: British Council, ECNZ, Macraes Mining, Corbett Fund, Campbell Fund, Division of Sciences University of Otago, Allied Press, Ministry of Civil Defence, MoRST and Trust Bank Otago.

The following companies will have their products at the Trade Display: Alltech Associates, Alphatech Systems, BDH Chemicals, Biolab Scientific, Bio-Rad Laboratories, BOC Gases, Boehringer Mannheim NZ, Dynavac NZ, GBC Scientific, Hoare Research Software, Medic Corporation, Perkin-Elmer, Sci Tech, Scientific Supplies, Shimadzu NZ, Watson Victor, Life Technologies, Labsupply Pierce, Amrad Pharmacia, NZ Medical and Scientific, ISL, Life Sciences NZ, Christchurch Valve and Fitting, John Morris Scientific, Baldwin, Son and Carey Patent Attornies, Medtec Products.

We look forward to seeing you all in Dunedin and hope that you will take the opportunity to see something of the city as well as enjoying what we expect to be an excellent scientific meeting.

Programme

The Conference Programme will be on the WWW and please check this site for any updates or changes.
The site address is: http://gandalf.otago.ac.nz:800/rweavers/events/Nzic/prog.htm

Registration Desk

The Registration Desk will be manned as follows:

Monday 2 December
2:00 pm - 8:00 pm University College

Tuesday 3 - Friday 6 December
8:00 am - 8:00 pm Castle Lecture Theatre Complex

Note that vouchers which will be in the satchels will be required for the social functions and Trade Display lunches.

Contact phone, fax and email numbers during the Conference are:

Phone:(021) 678997
Fax: (03) 4797906
Email: nzicconf@alkali.otago.ac.nz

Above: The Conference Committee, from left to right: Back Row: Nigel Perry, Diana Evans, Brian Robinson, Jim McQuillan, Ross Grimmett, Melville Carr, Wayne Temple. Front Row: Cathy Bennett, Dave Larsen, Keith Hunter, Jim Simpson, Kevin Farnden.

Tuesday December 3

8.45 am	**Opening** - ***Professor Sir Neil Waters***				
9.00 am	**British Council Lecturer** - ***Dr John Emsley (P1)***				
	Session 1 *Molecular Pathology*	Session 2 *Microbial Eukaryotic Interactions*	Session 3 *Organic Synthesis I*	Session 4 *Spectroscopy I*	Session 5 *Analytical I*
10.00 am	Faull (S1)	Jenkinson (S2)	Sherburn (S3)	*British Council Lecturer* Hester (S4)	*Campbell Lecturer* Bond (S5)
10.30 am	**Morning Tea**				
11.00 am	Murphy (L1)	Ronson (L5)	Tan (L9)	Gordon (L13)	Lancaster (L17)
11.20 am	Palmer (L2)	Clarke (L6)	Moore (L10)	Williamson (L14)	Keast (L18)
11.40 am	Pel (L3)	Crowhurst (L7)	Lilly (L11)	Cartner (L15)	Birch (L19)
12.00 pm	Tebbutt (L4)	Wilson (L8)	Halton (L12)	Scott (L16)	Rowan (L20)
12.30 pm	**Lunch**				
2.00 pm	**Corbett Lecturer** - ***Professor Raymond Brouillard (P2)***				
	Session 6 *Cancer and Development*	Session 7 *Plant Pigments*	Session 8 *Organic Synthesis II*	Session 9 *Spectroscopy II*	Session 10 *Analytical II*
3.00 pm	Kennedy (S6)	Holton (S7)	Ferrier (S8)	Russell (S9)	O'Sullivan (S10)
3.30 pm	**Afternoon Tea**				
3.50 pm	McConnell (L21)	Davies (L23)	McKeown (L25)	McEwan (L27)	McIndoe (L29)
4.10 pm	Guilford (L22)	Bloor (L24)	Haghbeen (L26)	Kjaergaard (L28)	Woodgate (L30)
4.30 pm	**Watson Victor Lecturer** - ***Dr Paul Reynolds***				
5.30 pm	*NZIC Annual General Meeting*				
7.00 - 9.00 pm	**Poster Session 1** ***(PA)***				
	Plant Pigments/ Organic Synthesis/ Spectroscopy/ Theoretical/Inorganic *Molecular Pathology/ Microbial Eukaryotic Interactions/ Cancer*				

Wednesday December 4

9.00 am	**ECNZ Lecturer** - ***Professor Peter Liss (P3)***				
	Session 11 *Protein Structure and Function I*	Session 12 *Regulation of Gene Expression I*	Session 13 *Organic Synthesis III*	Session 14 *Energy*	Session 15 *Chemistry and Climate Change*
10.00 am	Simpson (S11)	Tate (S12)	Cambie (S13)	Sammes (S14)	Manning (S15)
10.30 am	**Morning Tea**				
11.00 am	Baker (L31)	Poole (L34)	Weavers (L37)	Duffy (L40)	Devine (L43)
11.20 am	Metcalf (L32)	Moyle (L35)	Fielder (L38)	Officer (L41)	Phillips (L44)
11.40 am	Hubbard (L33)	Johnson (L36)	Belcher (L39)	Puschmann (L42)	
12.00 pm	**NZSBMB Lecturer** - ***Dr Jenny Martin (P4)***				
1.00 pm	**Lunch**				
Afternoon	**TOURS**				
7.00 - 9.00 pm	**Poster Session 2** ***(PB)***				
	Proteins/Cell Walls/Colloids/Environment/Organic *Gene: structure, function, regulation, expression/light and molecules*				

Thursday December 5

9.00 am	**NZIC Lecturer** - ***Professor Nicholas Carpita (P5)***				
	Session 16 *Cell Walls*	Session 17 *Regulation of Gene Expression II*	Session 18 *Protein Structure and Function II*	Session 19 *Colloids and Surfaces*	Session 20 *Environmental Chemistry I*
10.00 am	Redgwell (S16)	Brown (S17)		Stanley (S19)	Macalady (S20)
10.30 am	**Morning Tea**				
11.00 am	Koh (L45)	McCormick (L49)	Norris (L53)	Euston (L57)	Kim (L61)
11.20 am	Ratnayake (L46)	Stowell (L50)	Shieffelbien (L54)	Henderson (L58)	Halliwell (L62)
11.40 am	Riddell (L47)		Clark (L55)	McQuillan (L59)	Peake (L63)
12.00 pm	Miller (L48)	Gieseg (L52)	Muir (L56)	McLaughlin (L60)	Downard (L64)
12.30 pm	**Lunch**				
2.00 pm	**Macraes Lecturer** - ***Professor Roger Horn (P6)***				
	Session 21 *Gene Structure and Function*	Session 22 *Light and Molecules*	Session 23 *Bioorganic*	Session 24 *Surfactants*	Session 25 *Environmental Chemistry II*
3.00 pm	Tweedie (S21)	Jordan (S22)	Copp (S23)	Ducker (S24)	Cullen (S25)
3.30 pm	**Afternoon Tea**				
3.50 pm	Trotman (L65)	Smith (L67)	Pratt (L69)	Davey (L71)	Frew (L73)
4.10 pm	Ginger (L66)	Eaton-Rye (L68)	Taylor (L70)	Wanless (L72)	Halstead (L74)
4.30 pm	**Easterfield Lecturer** - ***Dr Andrew Abell***				
5.30 pm	*NZSBMB Annual General Meeting*				
7.00 for 7.30 pm	**Conference Dinner**				

Friday December 6
Chemical and Biological Hazards Symposium

8.55 am	*Opening - Professor D McGregor* Ministry of Research, Science and Technology, Wellington
9.00 am	*Hazardous Substances and New Organisms Legislation - Aspects of Hazardous Substances* Dr S Vaughan, Ministry for the Environment, Wellington
9.30 am	*Volatile Metal Species - From Gosio Gas to Cot Death* Professor W R Cullen, University of British Columbia, Canada
10.00am	*Resource Management Consent - Monitoring Airborne Releases of Chemicals* Dr B Graham, Works Corporation, Auckland
10.30 am	**Morning Tea**
11.00 am	*Genetic Engineering - Laboratory-Based Containment* Professor G Petersen, Biochemistry Department, University of Otago
11.30 am	*Rabbit Calici Virus* Associate Professor F Griffin, Microbiology Dept, University of Otago
12.00 noon	**Lunch**
1.00 pm	*Field Release of Genetically Engineered Organisms* Professor B Scott, Molecular Genetics, Massey University
1.30 pm	*Cut Out Chlorine and Count the Cost* Professor J Emsley, Imperial College, London
2.00 pm	*Hazardous Waste Technology - Microbiological and Chemical* Dr J Thiele, Waste Solutions Ltd, Dunedin
2.30 pm	*Chemical Weapon Destruction* Dr J Fountain, National Toxicology Group, Dunedin School of Medicine
3.00 pm	**Afternoon Tea**

Conference Programme

Tuesday December 3rd 1996

P1 **British Council Plenary Lecture**

9.00 am Dr John Emsley Imperial College London
On Being a Bit Less Green

S1 **Molecular Pathology**

10.00 am Professor Richard Faull University of Auckland
The Molecular Pathology and Genetics of Huntington's Disease

10.30 am *Morning Tea*

11.00 am Dr Michael Murphy University of Otago
The Molecular Pathology of Mitochondrial Oxidative Stress

11.20 am Dr Dave Palmer Lincoln University
Different Patterns of Hydrophobic Protein Storage and Different Gene Loci in Different Forms of Batten Disease

11.40 am Dr Herman Pel University of Otago
From Yeast to Man: A Yeast Model System for the Study of Human Aminoglycoside Induced Deafness

12.00 pm Dr Scott Tebbutt
Development of a Sheep Model for Cystic Fibrosis

S2 **Microbial Eukaryotic Interactions**

10.00 am Professor Howard Jenkinson University of Otago
Bacterial Interactions with Epithelial Cells

10.30 am *Morning Tea*

11.00 am Dr Clive Ronson University of Otago
Vitamin Biosynthetic Loci are Clustered With Symiotic Genes on the Transferable Symbiotic Element of a *Lotus Rhizobium* Strain

11.20 am Mr Sean Clarke University of Otago
The Interactions between Jasmonic Acid and White Clover Mosaic Virus Infection of *Phaseolus vulgaris* L.

11.40 am Ross Crowhurst HortResearch, Auckland
Effect of Disruption of a Cutinase Gene (*CutA*) on Virulence and Tissue Specificity of *Fusarium solani* f.sp. *cucurbitae* race 2 on Cucurbits

12.00 pm Ms Megan Wilson University of Otago
Manipulation of Expression of the *pvdS* Gene of *Pseudomonas aeruginosa* in Order to Study the Functions of the Protein

S3 **Organic Synthesis I**

10.00 am Dr Michael Sherburn Massey University
Serial Reactions for the Synthesis of Biologically Important Molecules

10.30 am *Morning Tea*

11.00 am Dr Eng Tan University of Otago
Controlling Selectivity of Radical Reactions in α-Substituted Carboxylic Acid Derivatives

11.20 am Mr Michael Moore University of Canterbury
Substituted N-[(Alkylsulfonyl and Acyl)Oxy]imides as Mechanism-Based Inhibitors of Serine Proteases

11.40 am Mr Michael Lilly Massey University
Remote Stereocontrol of Intramolecular Diels-Alder Reactions

12.00 pm Professor Brian Halton Victoria University
Polar Cyclopropanes: Novel Hydrocarbons - Unusual Properties

S4 **Spectroscopy I**

10.00 am Professor Ron Hester University of York – **British Council Lecturer**
Ultrafast Vibrational Spectroscopy of Reactive Intermediates in Solution

10.30 am *Morning Tea*

11.00 am Dr Keith Gordon University of Otago
Spectroelectrochemical Studies of Copper(I) Complexes with Binaphthyridine and Biquinoline Ligands

11.20 am Dr Bryce Williamson University of Canterbury
Magnetic Circular Dichroism of the Hydroxyl Radical in an Argon Matrix

11.40 am Dr Tony Cartner Waikato University
Resonance Raman Spectroscopy of a Potential Latent Fingerprint Reagent $SnTPP(OH)_2$

12.00 pm Mr Graham Scott University of Canterbury ***NZIC Student Paper***
The Interstellar Haber-Bosch Process

S5 Analytical I

10.00 am Professor Alan Bond Monash University – **Campbell Lecturer**
Modern Voltammetric Methods in Analytical Chemistry
10.30 am *Morning Tea*
11.00 am Dr Jane Lancaster Crop & Food Research, Christchurch
Influence of Pigment Composition on Skin Colour in a Wide Range of Fruit and Vegetables
11.20 am Mr Russell Keast University of Otago
Analysis of Alcoholic Beverage Flavour Volatiles using Solid Phase Micro-Extraction
11.40 am Dr John Birch University of Otago
Analysis of Long Chain Fatty Acids (LCFA) in High Lipid Waste
12.00 pm Dr Daryl Rowan Hort Research, Palmerston North
Solid Phase Micro-Extraction (SPME) for Quantitation of Apple Headspace Volatiles

P2 Corbett Plenary Lecture

2.00 pm Professor Raymond Brouillard Université Louis Pasteur
Mechanisms Involved in the Variation and Stabilisation of Flower and Fruit Colours

S6 Cancer and Development

3.00 pm Dr Martin Kennedy Christchurch School of Medicine
Homeobox Genes in Development and Cancer
3.30 pm *Afternoon Tea*
3.50 pm Ms Melanie McConnell University of Otago ***NZSBMB Student Paper***
Differential Regulation of the WT-1 Promoter by Two Isoforms of PAX2
4.10 pm Dr Parry Guilford University of Otago
Inherited Susceptibility to Stomach Cancer

S7 Plant Pigments

3.00 pm Dr Tim Holton Florigene Pty Ltd
Genetic Engineering of Floral Pigments
3.30 pm *Afternoon Tea*
3.50 pm Dr Kevin Davies Crop & Food Research, Levin
Modification of Chalcone Biosynthesis in *Petunia hybrida*
4.10 pm Dr Stephen Bloor Industrial Research Ltd
In Vitro Simulation of Flower Colour

S8 Organic Synthesis II

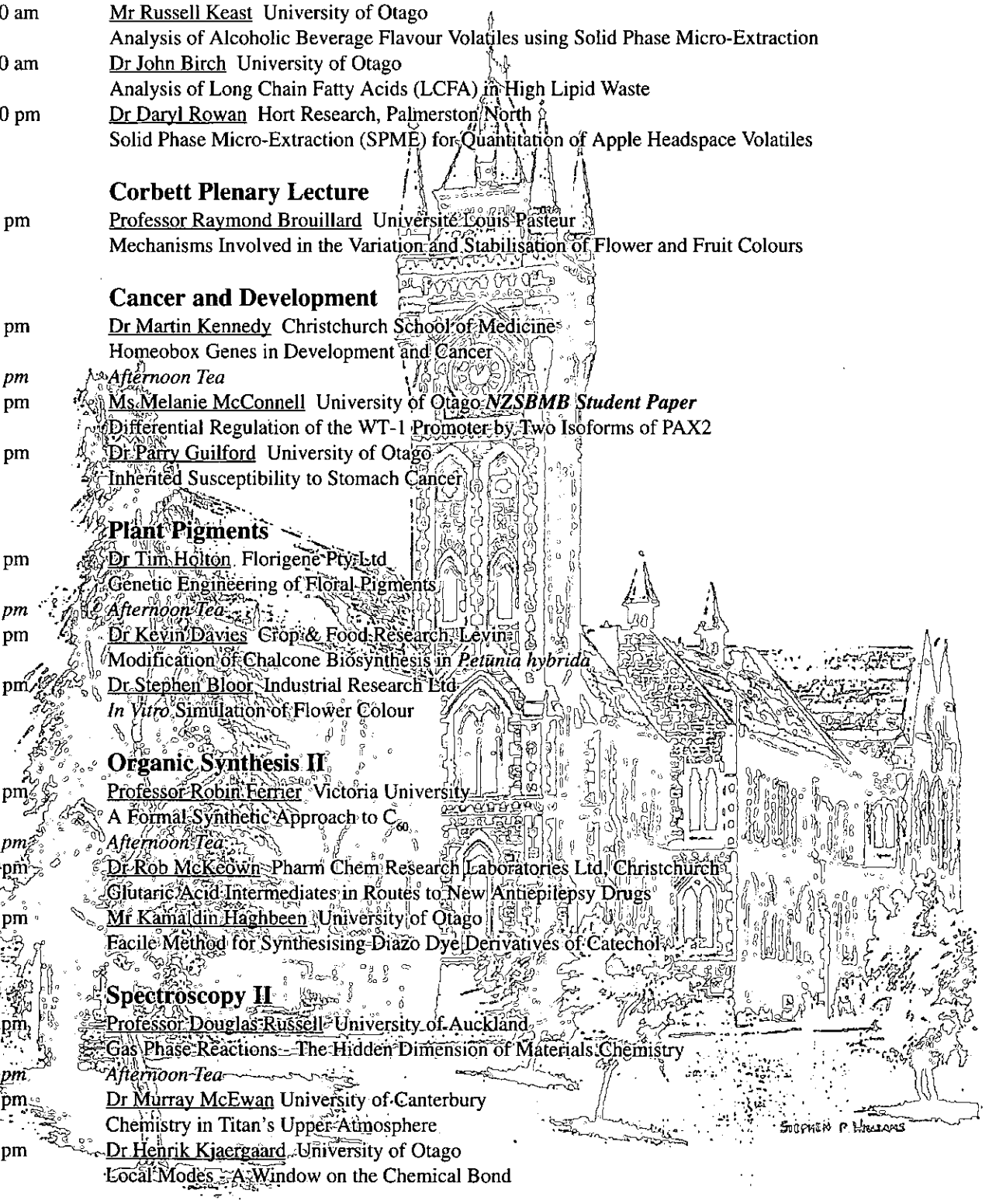
3.00 pm Professor Robin Ferrier Victoria University
A Formal Synthetic Approach to C_{60}
3.30 pm *Afternoon Tea*
3.50 pm Dr Rob McKeown Pharm Chem Research Laboratories Ltd, Christchurch
Glutaric Acid Intermediates in Routes to New Antiepilepsy Drugs
4.10 pm Mr Kamaldin Haghbeen University of Otago
Facile Method for Synthesising Diazo Dye Derivatives of Catechol

S9 Spectroscopy II

3.00 pm Professor Douglas Russell University of Auckland
Gas Phase Reactions – The Hidden Dimension of Materials Chemistry
3.30 pm *Afternoon Tea*
3.50 pm Dr Murray McEwan University of Canterbury
Chemistry in Titan's Upper Atmosphere
4.10 pm Dr Henrik Kjaergaard University of Otago
Local Modes – A Window on the Chemical Bond

S10 Analytical II

3.00 pm Mr Brendon O'Sullivan University of Canterbury
Science Meets Art: The Use of Screen Printing in Analytical Chemistry
3.50 pm Mr Scott McIndoe University of Waikato
Electrospray Mass Spectrometry: A New Technique for Characterising Organometallic Compounds



4.10 pm Mr Scott Woodgate University of Auckland
Carbyne Complexes of Osmium and Their Derivatives ***NZIC Student Paper***

Wat Vic **The Watson Victor Award Lecture 1996**
4.30 pm Dr Paul Reynolds Hort Research, Palmerston North
Developmental Regulation of Gene Expression in the Rhizobium-Legume Symbiosis

Wednesday December 4th 1996

P3 **ECNZ Plenary Lecture**
9.00 am Professor Peter Liss University of East Anglia
Fertilising the Oceans with Iron and its Possible Climatic Significance

S11 **Protein Structure and Function I**
10.00 am Dr Richard Simpson Ludwig Institute of Cancer Research, Melbourne
Interleukin-6: Structure-Function Relationships
10.30 am *Morning Tea*
11.00 am Professor Ted Baker Massey University
Three-Dimensional Structure of a Bacterial Superantigen with Novel Dimerisation and Zinc-Binding Properties
11.20 am Ms Victoria Metcalf Canterbury Health Laboratories ***NZSBMB Student Paper***
Identification and Characterisation of Polymorphic Serum Albumin Proteins in Endemic New Zealand Fauna: Challenging Definitions and Evolution of an Ancient Protein
11.40 am Dr Mike Hubbard University of Otago
ERp29, A Novel and Widely Expressed Resident of the Endoplasmic Reticulum

S12 **Regulation of Gene Expression I**
10.00 am Professor Warren Tate University of Otago
Genetic Code Revisited:Translational Stop Signals Are More Than Just Triplets
10.30 am *Morning Tea*
11.00 am Dr Elizabeth Poole University of Otago
Translational Termination: The Release Factor Contacts the Base Following the Stop Codon
11.20 am Mr Richard Moyle Crop & Food Research, Levin
Isolation and Promoter Analysis of a Sugar Regulated Asparagine Synthetase Gene from Asparagus
11.40 am Mr Daniel Johnson Massey University ***NZSBMB Student Paper***
The Bovine Lactoferrin Promoter

S13 **Organic Synthesis III**
10.00 am Professor Con Cambie University of Auckland
A Novel Acid-Promoted Fries Rearrangement of a Diterpene Lactone: Application to Triptoquinone Synthesis
10:30 am *Morning Tea*
11:00 am Dr Rex Weavers University of Otago
Laurenene – A Short Tour via Netscape
11.20 am Mr Simon Fielder Massey University ***NZIC Student Paper***
Synthesis of α-Farnesene Peroxides
11.40 am Dr Warwick Belcher Massey University
A Dendrimeric Approach to Porphyrin Arrays

S14 **Energy**
10.00 am Professor Nigel Sammes Waikato University
Combined Heat and Power Production using Fuel Cell Systems
10.30 am *Morning Tea*
11.00 am Dr Noel Duffy University of Otago
Liquid Solar Cells: Infrared Spectra of Surface Coordinated Dyes on TiO_2
11.20 am Dr David Officer Massey University
Synthesis of Porphyrin Arrays for Light Harvesting
11.40 am Mr Horst Puschmann Victoria University ***NZIC Student Paper***
Trinuclear Frustration

S15 **Chemistry and Climate Change**
10.00 am Dr Martin Manning NIWA, Wellington
Title to be announced

10.30 am *Morning Tea*

11.00 am Mr Kieran Devine ECNZ, Wellington
Title to be announced

11.30 am Professor Leon Phillips University of Canterbury
Taking a Closer Look at the Air-Sea Interface

P4 **NZSBMB Plenary Lecture**

12.00 pm Dr Jenny Martin University of Queensland
Protein Crystallography and its Application to Structure-Based Drug Design: Past Successes, Current Research and Future Potential

Thursday December 5th 1996

P5 **NZIC Plenary Lecture**

9.00 am Professor Nick Carpita Purdue University
Molecular Biology of the Plant Cell Wall

S16 **Cell Walls**

10.00 am Dr Robert Redgwell HortResearch, Auckland
The Plant Cell Wall: The Missing Link

10.30 am *Morning Tea*

11.00 am Mr Eric Koh University of Otago
Changes in the Cell Walls of Strawberry Cortical and Pith Tissues During Ripening

11.20 am Mr Sunil Ratnayake University of Otago
Texture and Analysis of Cell Wall Polysaccharides of Buttercup Squash (*Cucurbita maxima*)

11.40 am Ms Lynn Riddell University of Otago
The Analysis of Dietary Fibre and Carotenoids in a Selection of New Zealand Vegetables

12.00 pm Dr Ian Miller Carina Chemical Laboratories, Lower Hutt
Chemotaxonomy and the Galactans of the Red Algae

S17 **Regulation of Gene Expression II**

10.00 am Dr Chris Brown University of Otago
Translational Control of Gene Expression in Infected Plant Cells

10.30 am *Morning Tea*

11.00 am Dr Sally McCormick University of Otago
Expression of Truncated Human Apolipoprotein B Mutants in Transgenic Mice: Evidence that the Region Between Amino Acids 4330 and 4397 is Required for the Efficient Formation of Lp(a)

11.20 am Dr Kathryn Stowell Massey University
The Genetic Basis of Malignant Hyperthermia in New Zealand Families

11.40 am *To be advised*

S22 **Light and Molecules**

3.00 pm Dr Brian Jordan Crop and Food Research
Plant Defence Mechanisms Against Ultraviolet B Radiation

3.30 pm *Afternoon Tea*

3.50 pm Ms Jenny Smith University of Otago
The Influence of UV-B Light on Frost Tolerance and Antioxidant Enzymes of *Phaseolus vulgaris* L.

4.10 pm Dr Julian Eaton-Rye University of Otago
The Importance of Cp47 in Photosystem II as Studied by Deletion Mutagenesis

S23 **Bioorganic**

3.00 pm Dr Brent Copp University of Auckland
Marine Pyridoacridone Alkaloids: Antitumour Agents and Molecular Probes of Human Topoisomerase IIα Enzyme

3.30 pm *Afternoon Tea*

3.50 pm Dr Andy Pratt University of Canterbury
Phosphoryl Transfer: From Curing Cancer to the Origin of Life

4.10 pm Dr Carol Taylor University of Auckland
α-Aminophosphonates as Peptide Mimics

S24 **Surfactants**

3.00 pm Dr William Ducker University of Otago
The Organised Structure of Adsorbed Surfactants

3.30 pm *Afternoon Tea*

3.50 pm Mr Tim Davey University of Otago ***NZIC Student Paper***
Synthesis and Characterisation of Some Bolaform Surfactants

4.10 pm Dr Erica Wanless University of Otago
Surface Aggregation of Surfactants with Added Electrolyte

S25 **Environmental Chemistry II**

3.00 pm Professor Bill Cullen University of British Columbia
Metabolism of Pyrene in the Soft-Shelled Clam

3.30 pm *Afternoon Tea*

3.50 pm Dr Russell Frew University of Otago
Trace Metal Geochemistry in the South-West Indian Ocean

4.10 pm Mr Michael Halstead University of Otago
Deposition of Atmospheric Trace Metals in Fiordland, New Zealand

Easterfield **The1996 Easterfield Lecture**

4.30 pm Dr Andrew Abell University of Canterbury
The Design of Enzyme Inhibitors Based on Enzyme-Substrate Interactions

Friday December 6th 1996

Chemical and Biological Hazards Symposium

8.55 am Professor D McGregor Ministry of Research, Science and Technology, Wellington
Opening Remarks

9.00 am Dr S Vaughan Ministry for the Environment, Wellington
Hazardous Substances and New Organisms Legislation – Aspects of Hazardous Substances

9.30 am Professor W R Cullen University of British Columbia, Canada
Volatile Metal Species – From Gosio Gas to Cot Death

10.00 am Dr B Graham Works Corporation, Auckland
Resource Management Consent – Monitoring Airborne Releases of Chemicals

10.30 am *Morning Tea*

11.00 am Professor G Petersen Biochemistry Department, University of Otago
Genetic Engineering – Laboratory-Based Containment

11.30 am Associate Professor F Griffin Microbiology Department, University of Otago
Rabbit Calici Virus

12.00 pm *Lunch*

1.00 pm Professor B Scott Molecular Genetics, Massey University
Field Release of Genetically Engineered Organisms

1.30 pm Professor J Emsley Imperial College, London
Cut Out Chlorine and Count The Cost

2.00 pm Dr J Thiele Waste Solutions Ltd, Dunedin
Hazardous Waste Technology – Microbiological and Chemical

2.30 pm Dr J Fountain National Toxicology Group, Dunedin
Chemical Weapon Destruction

3.00 pm *Afternoon Tea*

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... A Column of Help For Chromatographers *From Alltech*

AUTOSAMPLER HINTS

How to improve reproducibility and peak shape when using an autosampler.

Q: I experience bad peak tailing and poor reproducibility when using a 0.5 µL microvolume syringe with a high speed autosampler and split injection. What is wrong with my system?

A: This is a common problem which is consistent with slow volatilisation of the sample and/or slow transfer of all the sample into the column. It occurs with microvolume syringes when the minute sample being delivered from the syringe forms droplets which wet the syringe needle rather than forming a jet from the needle tip.

The problem is solved by effectively wiping the sample from the needle tip during the injection. High speed autosamplers commonly use quartz wool as the liner packing. The position of the quartz wool should be adjusted to achieve effective wiping of the needle. Theoretically the quartz wool should be placed in the hottest part of the injector, normally the centre (Figure 1). In this position, the quartz wool offers no wiping of the needle tip. Figure 1a shows the resultant chromatogram of a 0.3 mL injection from an SGE 0.5BR-HP-0.63 syringe into such an injection port. Unacceptable solvent peak tailing and a poor reproducibility (see Table 1) results.

Table 1	
Centrally packed liner (See Figure 1) 15 Injections C_{10} @ 0.3 µL	Liner packed to wipe syringe needle (See Figure 2) 15 Injections C_{10} @ 0.3 µL
RSD = 12.73%	RSD = 0.57%

By adjusting the position of the quartz wool so that the needle penetrates approximately one-third the way into the quartz wool on injection (Figure 2), the resultant chromatograms show excellent peak shape (Figure 2a) and reproducibility (Table 1) the adjustment of the packing position does not alter the boiling point discrimination characteristics of the injection system.

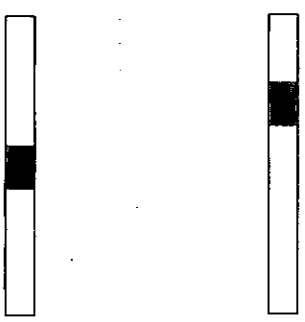

Figure 1 *Figure 2*
Position of quartz wool in the injection liner

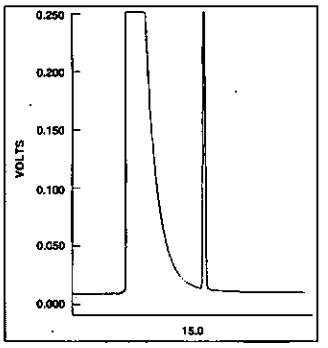

Figure 1a.
Liner centrally packed

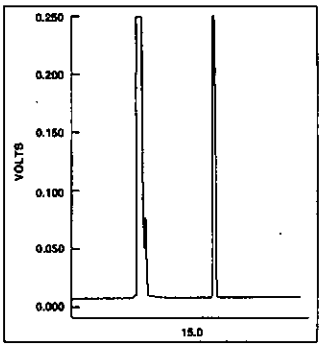

Figure 2a.
Liner packed to wipe needle

Additional hint, do not over-tighten the septum cap when using a high speed autosampler. Deformation of the septum may cause leakage during the rapid injection stroke.

HINTS FOR SELECTING AUTOSAMPLER SYRINGES

What capacity syringe should I use?
Whenever possible choose the smallest suitable capacity syringe to improve accuracy and reproducibility. Your smallest injection volume should be no less than 20% of the syringe capacity.

Which type of syringe do I need?
Choose a microvolume plunger in needle syringe for low injection volumes below 5 mL for capillary split, splitless and on-column injection. Choose a gas-tight teflon plunger tip syringe for very high injection speeds or "dirty" samples, to prevent plunger binding. Standard metal plunger syringes should be used for routine analysis of volumes above 5 mL. Special sample types or injection techniques can be accommodated with a wide range of special syringe designs. Contact Alltech's Chromatography Help Desk for assistance.

What type of needle do I need?
Choose a specific autosampler syringe by manufacturer and model number of GC to get the needle length optimised for correct needle penetration into your injector. Use the manufacturers recommended tip style. A 0.63 mm OD needle is used for all routine analysis except on-column injection. Use a 0.47 mm OD needle for on-column injection into 0.53 mm ID capillary columns. Fused silica needles are available for other smaller diameter capillaries. Ask the ALLTECH Chromatography Help Desk for advice. A removable needle syringe is the most cost effective solution for autosampler use since a bent needle can be replaced.

For expert help in choosing the right syringe at the right price for your application,

Contact: Alltech Associates Inc.
P O Box 100-352 North Shore Mail Centre, Auckland
Ph: (09) 4443230, Fax: (09) 4442399, Freephone: 0800 ALLTECH
Email: alltech@alltech.co.nz

NEW ZEALAND INSTITUTE OF CHEMISTRY

President's Report

Nath Pritchard

As you read these notes I will be in the process of handing over the mantle of office to Dr Rob Whitney the incoming President. The physical act will take place at the Annual General Meeting in Dunedin during Conference.

It is my pleasure to present my report to you on the year's activities of the Institute. It is a time to reflect. What were my hopes on taking up office? What was my agenda? A time to consider one's achievements, if indeed there have been any. A time to consider what objectives were not reached.

As the incoming President I had been left a powerful legacy by my predecessor Bill Denny. The Strategic Review Committee's findings, in what became euphemistically known as 'The Denny Report'. The thrust of the findings was a clarion cry from the Membership for the need for change. It became my responsibility to drive that change. There have been many small changes to the way we operate. The most significant area worked on during the year was that of the membership criteria. 2nd Vice President Alastair MacGibbon is to be congratulated on the work he has done in this area. It has been well debated in Council. Changes requiring Members' ratification have been proposed. My deep regret is that this matter has not been resolved in my term of office. It will become my legacy to Rob Whitney!

My personal agenda on assuming office was the streamlining of the Secretariat; an area of real concern to Members. An audit undertaken by Deloitte Touche Tomadsu of the functions of the Secretariat identified the need for rationalisation of our approach to servicing the members. Incoming President Rob Whitney deserves a great deal of credit for producing an excellent Business Plan for the Institute. It is my hope that he can push this through in his term of office.

The key issues of membership and business planning have left me in no doubt that a single year in office is insufficient period to allow an incumbent the time for such significant objectives. I have been in office some sixteen months and would strongly urge Rob Whitney to consider a two year term now.

The total membership stands at 1425 and comprises:

Honorary Fellow	32
Fellow	329
Member	697
Associates	162
Students	199
Local	6

The split between the Branches is:-

Auckland	378
Waikato	168
Manawatu	163
Wellington	249
Canterbury	194
Otago	133
Overseas	140

During the year both the Hon. Simon Upton and Dr Don McGreggor emphasised the need for good communications, preferably electronic, in our modern society. Improved communications was seen as a key element in modernising the Institute. Positive steps have been taken in this area. I have circulated Branches and the Executive by e-mail, including the Secretariat. Through the enthusiasm and initiative of Grant Boston of the Manawatu Branch, the NZIC appeared on the Internet. We cannot stop now. There is much left do be done in the Secretariat to assist the Executive Officer in his duties.

I have been pleased with the quality of the NZIC journal, *Chemistry in New Zealand*. Robert Lyon and his editorial team have done well. It has become a document worth reading. I would applaud Manawatu and Waikato Branches for their regular contributions. It is only as good as its support from the members. I also enjoy the unsung journal, *ChemNZ*. I always enjoy reading it. I continue to be amazed at the quality of the document that Dennis Hogan and his team turn out.

The need for good communication can not be overstressed. The Conference is one excellent vehicle for communication. I must extend my personal gratitude to the dedicated group of people at Otago who have given of their time and put our conference together this year. I will not name individuals in case I offend anyone left off the list. Rather I will chance offending all by thanking "The Team" for its collective effort.

I would congratulate the NZIC Council on its performance during the year. It has performed well as a group. Issues were debated. Decisions taken. We certainly did not always see eye to eye. And that is how it should be. To the Executive Officer, thank you for all your assistance to myself and to the Council.

It has been my privilege to be your President. I step down firm in the belief that the Institute will prosper under Dr Rob Whitney and I wish him well.

Nath Pritchard
Huntly

CHANGES TO NZIC MEMBERSHIP

Summary

Council proposes dramatic changes to the NZIC membership to reflect the changing role of chemistry and the NZIC. The NZIC is seen primarily as a learned society encouraging the promotion of chemistry and the interaction of those with an interest in chemistry, rather than as a professional accreditation organization. To this end anyone with a genuine interest in chemistry or chemical education will be welcome to become a member. This will also mean that the grades of student, associate and member will be amalgamated.

However these changes are dependent on the agreement of the membership and as such there will be a postal ballot of all corporate members. The aim of this notice is simply to provide background for the ballot.

Background

Last year the NZIC Strategic Review Committee, under then President Bill Denny, sought the views of the NZIC members as to the future options of the NZIC. After canvassing and discussions with all branches and specialist groups they issued a report which was published in *Chemistry in New Zealand* (Vol. **59** No.5 (Sept. 1995), 45-47), on the NZIC world wide web page and circulated to all the branches.

One of the recommendations was the simplification of the grades of membership. While there were arguments with regard to professional standing to maintain the status quo, it was considered that on balance the current strength of the NZIC was not as an accreditation body. Therefore it was suggested that the rules for admission as Member should be revised to remove any age limit, and to accept any person with a genuine interest in chemistry and the NZIC. The requirement for a recognised tertiary qualification in chemistry and the practise of a chemistry related employment for a period would be abolished (but would be retained as a requirement, amongst others, for later admission to the Fellowship). These changes would allow the current non-qualified members of the Specialist Groups to become full members of the NZIC.

The Fellowship would become the sole means of peer recognition by the NZIC, and the entry to this grade may need to be broadened to give greater weight to commercial and management functions. However Fellows would have a larger obligation to the NZIC.

It should be noted that, as in the past, any reference to chemistry is in its broadest sense and includes all aspects of the chemical sciences. This should not be confused with the academic distinctions of, for instance, chemistry and biochemistry.

Environment

Chemists are no longer working in chemistry as a pure discipline. Chemists are using their knowledge in agriculture, medicine, horticulture, processing, analysis and a wide range of other areas. This means that they have multiple commitments, loyalties and contacts. An example of this change is the development of multidisciplinary Crown Research Institutes. In this environment NZIC needs to be able to act as a point of interaction for chemists in the form of a learned society, rather than as a professional organisation.

In addition there are a wide variety of people with an interest in chemistry that often do not have the qualifications to be a full member, e.g. some specialist group members, and some teachers who have the responsibility of providing the initial grounding of young students in chemistry. By increasing the breadth of members we shall increase the interactions, and by having a stronger organisation we should decrease the financial burden on individual members.

Council proposal

The recent Council meeting discussed the recommendations of the Strategic Review Committee and proposed a change in the membership in line with the spirit of these concerns.

As students, associates, members and life members would all qualify for the new member classification these grades would all be merged. The unwaged and life members would only be distinguished by the fee structure. The rules for Fellow of the NZIC would remain unchanged except for the clarification that those involved in the management of pure and applied chemistry endeavours are eligible.

It is intended that this rule change will help the NZIC adapt to the future and enable the NZIC to become a more vibrant organization.

A.A. Turner
Honorary General Secretary for Council
6 November 1996

The motion on the change to the NZIC membership is detailed as follows:

MOTION ON CHANGES TO THE NZIC MEMBERSHIP

It is moved that the requirements of a member of the NZIC be changed to reflect the role of NZIC in the encouragement of interaction between those with an interest in chemistry rather than professional accreditation. In this regard the grades of student, associate and member shall be merged and that; any person shall be deemed to have complied with the requirements of membership if they have demonstrated; a sincere interest in the advancement and application of chemistry and chemical processes; or a determination to broaden the knowledge of chemistry through education, have agreed to abide by the NZIC code of ethics, and have been sponsored by two current financial members of the NZIC (whose signatures shall appear on the application form).

ANNUAL GENERAL MEETING

Notice is given that the NZIC Annual General Meeting will be held on Tuesday 3 December at 5:30 pm in the Castle Lecture Theatre 2, University of Otago, Dunedin.

The AGM is being held on the first day of the Conference in Dunedin.

Agenda

1. Welcome
2. Apologies
3. Minutes of 1995 AGM
4. Matters Arising
5. Annual Report
6. Financial Report
7. Offices for 1997
8. Prizes
9. General Business

NZIC BRANCH NEWS

WELLINGTON

The October AGM of the Wellington Branch was preceded by a delightful wine and cheese tasting. Excellent wines were provided by the Branch and some dozen gourmet cheeses were presented by Mr Peter Collins of Kapiti Cheeses Ltd. This local enterprise has been transformed from its small beginnings at Lindale, north of Paraparumu, into a major contributor of fine cheeses served on international flights and in better restaurants, its "Kikorangi" blue having won every competition into which it has been entered. Those who attended were taken through a range of soft European cheeses and several notable cheddars. The tasting culminated in the Kikorangi – there was plenty for everyone!

The branch AGM affirmed the intention to activate its links with members in the Nelson/Marlborough region, to continue in its efforts to secure RSNZ's Science Wellington as a service provider, and to fully support Dr Rob Whitney during his 1997 term as NZIC President. An NZIC Conference in Wellington in 1999 is highly likely – it is the centenary of both Victoria University and Easterfield's appointment as Foundation Professor of Chemistry and Physics; the incoming committee is to begin the planning.

Committee members elected for 1996-97 are:

Chair:	Dr Rod Tilbury (Senior Lecturer in Chemistry, Victoria University of Wellington)
Secretary:	Dr Cees Lensink (Scientist, IRL Ltd)
Members:	Mr Anthony Fake (PhD student, Victoria University of Wellington Student Representative)
	Ms Sue Freitag (Scientist, Central Laboratories, Works Consultancy)
	Dr Vince Gray (Consultant)
	Mr Graham Murray (Teacher, St Patrick's College, Wellington)
	Mr Jim Waters (Toxicology Advisor, Ministry of Health)

A profile of the Branch Chairperson has appeared previously as Rod has accepted a third year in Office – he can also be found under the Council members as he is also the Branch Delegate.

Victoria University News

Professor Brian Halton attended the first Gordon Conference held in Asia as an invited discussion leader. The meeting "Organic Structures and Properties" was held in Fukuoka, Japan, and is set to become a regular event on the Gordon conference calendar.

News from IRL

Dr Michael Romer, a petrographer from EMPA Swiss Federal Laboratories, Dubendorf, Switzerland, has recently joined the "Catalysis and Inorganic Materials Team" for a six month sabbatical. Dr Romer will be conducting research into new corrosion-resistant cements. Geochemist Dr John Patterson recently resigned from the team after more than twenty years on the Gracefield site to take up a position in the Victoria University Geology Department. He is responsible for the operation of the electron microprobe and the x-ray fluorescence spectrometer. During July, Team Manager Dr Neil Milestone attended Austceram '96 in Cairns, Australia, to present a number of papers related to specialist cementing systems.

Dr Ken Markham, Head of IRL Plant Chemistry, recently attended a "Group Polyphenols" international conference in Bordeaux, France. He chaired a session, presented a paper on "Capillary Electrophoresis of Flavinoids", and had the opportunity to sample the "local products". Dr Markham's team is currently investigating the chemical taxonomy of *hebes*, in collaboration with Victoria University and the Museum of New Zealand. During October Dr Ian Brown was among a number of IRL staff who received New Zealand Science and Technology Medals from the Royal Society of New Zealand. Dr Brown has led a team of scientists who have developed new ceramic technologies using New Zealand natural resources. The work has resulted in the establishment of an advanced ceramics industry, particularly the manufacture of refractories for the aluminium industry.

Brian Halton
Victoria University of Wellington

MANAWATU

Dr Brian Brooker, Head of the Food Macromolecular Science Division, Institute of Food Research (IFR), Reading, England spoke to the Manawatu Branch in the Seminar Room of the Dairy Research Institute on Tuesday 10 September 1996. The title of his talk was "Principles and Applications of Molecular Imprinting in Food Systems". In a fascinating talk Brian described the work being done in the construction of artificial molecular recognition systems. These systems are constructed by using a knowledge of chemistry to develop a template of binding sites for the target and then locking the structure in a polymer backbone. These artificial systems have been used to distinguish between optical isomers and even bacteria. They are cheap to produce and temperature stable over a much wider range than enzymes. Many of the audience saw immediate possibilities for their own work and Brian had to answer many questions about this exciting new technology.

Ian Gray retired from New Zealand Dairy Research Institute on 8th November 1996 after 31 years with the Institute. Ian graduated with a MAgSci (Hons) from Massey and joined the Chemistry Group working on land cress flavour in butter. He later moved to the Fats Laboratory and developed many pesticide test procedures. In 1971 he moved to the Flavour Section for three years to continue research on cress flavours, then in 1974 returned as Section Manager to the Analytical Chemistry Section, a position he held for the next 20 years. In 1994 he was appointed Special Projects Manager providing consultancy services to industry and working on the NZTM3 Chemical Methods test manual. Ian plans to enjoy his retirement in his garden, adding to his stamp collection and restoring his 1928 Reo vintage car.

Two of the NZIC members in Landcare Research at Palmerston North have travelled overseas recently. Benny Theng was invited as a foreign specialist in clay-organic chemistry to a Conference on Chemistry of Clays and Clay Minerals held in Sapporo, Japan, 9-12 September 1996. This conference was convened to find out the state-of-the-art of clay science in Japan. Twelve keynote papers by Japanese researchers outlined advances in the various fields of clay mineralogy and chemistry. Benny and nine other invited overseas scientists assisted the Japanese in determining how Japan compared with other parts of the World and to identify gaps in Japanese research.

Kevin Tate was invited to participate in a Global Climate and Terrestrial Ecosystems (GCTE) workshop on the functional role of soil biota under global changes: an ecosystem-level perspective, held in Paris in October. While in Europe, Kevin visited IACR (Integrated Approach to Crop Research) Rothamsted to discuss research on methane oxidation by soils and to analyse some Craigieburn soils from Canterbury. He also discussed collaborative work with the Rothamsted Modelling Group.

A Marsden Fund award has been gained by Professor P A Sullivan (Biochemistry Department, Massey University) in collaboration with Dr J T Christeller and Dr W A Laing (Hort+Research, Palmerston North), and Dr J F Cutfield (Biochemistry Department, University of Otago). Their research topic is the "structure and mechanism of action of a novel aspartic proteinase inhibitor", with total funding of $425,000 over three years. Aspartic proteinase inhibitors that are themselves proteins seem to be scarce in nature, in contrast to the many known proteinaceous serine proteinase inhibitors. The research team has recently isolated a novel aspartic proteinase inhibitor (API) from squash phloem exudate. It is a small protein apparently unrelated to any known protein family. They will purify and characterise API and study the interactions with a range of aspartic proteinases. The cDNA will be cloned and used to develop an expression system to produce milligram quantities of recombinant inhibitor. The team can use this more abundant source of API to crystallise both the inhibitor and a proteinase-inhibitor complex prior to determining the 3-D structures by x-ray crystallography. The results obtained will lead to greater insights into the specificity of interaction of aspartic proteinases with their substrates and may enable the research team to design more specific inhibitors.

There are two Manawatu Branch representatives in the student paper competitions being held in December in Dunedin at the National Conference of the NZIC and the NZ Society for Biochemistry and Molecular Biology (NZSBMB). The NZIC representative is Simon Fielder who graduated from the University of East Anglia (Norwich, England) in 1986 and after working and travelling for four years emigrated to New Zealand. Simon has worked in Palmerston North since 1990, initially for the DSIR (Fruit and Trees) and later, after its inception, for Hort+Research. Currently Simon is in the second year of his PhD at Massey University's Chemistry Department studying synthetic organic chemistry. His research interests include the synthesis of biologically active terpenoid peroxides with a particular interest in alpha-farnesene autoxidation products. His PhD supervisors are Dr Mick Sherburn (Chemistry Department, Massey University) and Dr Daryl Rowan (Food and Biological Chemistry, Hort+Research, Palmerston North). The NZSBMB representative is Daniel Johnson who is currently in the second year of his MSc degree in the Biochemistry Department at Massey University. Research on his thesis topic, the bovine lactoferrin promoter, is being carried out under the supervision of Drs Kathryn Stowell and John Tweedie (Biochemistry Department, Massey University). Bovine lactoferrin is developmentally regulated in the mammary gland at the level of mRNA expression. Daniel is investigating this regulation using reporter gene constructs that are transiently transfected into endometrial cell lines. Another focus is the identification of the transcription start point by DNA footprinting and primer extension experiments.

Harry Percival

Professor David A Buckingham
AN APPRECIATION

By Charles R Clark and Allan G Blackman

Many among the chemistry fraternity in New Zealand will still be unaware of Dave Buckingham's quiet retirement from the University of Otago in February 1996, and his departure for what promises to be a very active life in Wanaka. Dave was Professor of Chemistry at Otago for eighteen years, and from 1988 was Mellor Professor. He came to Otago with an impressive, and internationally acclaimed, research record. His fascination with chemistry was evident at an early age, and while still at high school in Rangiora he converted the family garage to a laboratory. It was here that he carried out the first experiments of what was to become an exceptional career in chemical research. He gained his MSc through studies on iron-acetylacetonate complexes at Canterbury with Cuth Wilkins, but much of his subsequent career was spent overseas. His research with Frank Dwyer at the ANU resulted in the award of PhD in 1962, following which he was appointed Research Associate at Chapel Hill, North Carolina (1963-64) and then Associate Professor at Brown University, Rhode Island (1964-65). He returned to the ANU as Research Fellow in 1965 and was soon promoted to Fellow (1968) and then Senior Fellow (1970). He was appointed to the Chair at Otago in 1978. Dave has made substantial contributions to knowledge in such diverse research areas as: C-H acidity in barbituric acids[1], iron(III) and bimetallic porphyrins[2], HPLC of coordination complexes[3], synthesis of osmium complexes[4], metal ion substitution chemistry (an interest which continued throughout his career)[5], applications of NMR (^{1}H, ^{13}C, ^{15}N, ^{17}O, ^{31}P) to coordination chemistry[6], metal ion-promoted synthesis of peptides[7], reactions of coordinated ligands[8] and the promoted hydrolysis of chelated carbonyl substrates.[9]

On his retirement Dave could list more than 160 significant research publications, most of which were in the area of coordination chemistry. He rates amongst his best work that done with Jim Collman in developing the β-$[Co(trien)(OH_2)(OH)]^{2+}$ reagent for cleaving N-terminal amino acids from peptides.[10] This complex, as its perchlorate salt, was for many years available through the Aldrich catalogue as 'Buckingham's Reagent'. He made use of perchlorates extensively, and their often explosive oxidising properties were only occasionally his undoing. His one and only attempt to use anhydrous perchloric acid as a reagent proved somewhat hazardous to his own health, and was more or less disastrous for the well-being of the fumehood in which the reaction mixture was contained.

Dave liked nothing better than working at the bench with his research students, and his skill in inducing their recalcitrant compounds to crystallize became legendary. His optimistic assessment of the length of time a particular task would take was often dismaying however. The student who heard the phrase: "It'll only take a couple of days" when applied to her projected ^{17}O NMR study of oxygen exchange in chromium(VI) species found herself involved in a study which required 3 years of intensive effort.[11] Such incidents were not unusual in Dave's laboratory where studies were always carried out at a depth often not achieved elsewhere.

International recognition of Dave's achievements in chemistry is seen in his being the recipient of a number of awards and invited lectureships. Notable among these honours is the Edgeworth David Medal (1970, Royal Society of NSW), the Corday Morgan Medal and Prize (1970, The Chemical Society, London), the Bailar Medal (1975, University of Illinois) and the ICI prize (1991, NZ Institute of Chemistry). Dave was on the advisory panel to select candidates for the award of the Nobel Prize in Chemistry. These are not his only achievements. He is a talented musician and now intends spending much more time playing viola than was available previously. It was during his period in Canberra that he had the distinction of being one of only two amateur musicians in what was otherwise a fully professional symphony orchestra. His sporting record also impresses. Dave has played both rugby and cricket at representative level. His mastery of leg spin bowling while playing for the Australian Capital Territory gained him a record for wickets taken in a first-class match that was to last many years. He was also selected to play in an Australian Universities team against the visiting West Indians. In retirement he is a highly competitive tennis player at Masters level and he combines this with a continued interest in writing up papers, and in spending quality time with his grandchildren.

Coordination chemistry is much the poorer for his departure.

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CONFERENCES & SEMINARS

2-6 December 1996

NZSBMB/NZIC Joint Conference 1996:
"Molecules for the Future"

Venue: University of Otago, Dunedin, New Zealand

Contact: Dr K J F Farnden
Biochemistry Department
University of Otago
P O Box 56, Dunedin, New Zealand
Ph +64-3-4797874
Fax +64-3-4797866
Email:kevinjff@sanger.otago.ac.nz

See Conference Programme on pages 27-34.

9-11 December 1996

4th Annual RACI Research and Development Topics In Analytical Chemistry Meeting

Venue: RMIT, Melbourne, Australia

Contact: Marie Bou-Raad
Secretary of the Organising Committee
Tel: (+61-3)-96602557
Fax: (+61-3)-96391321
Email: chem_rd96@bunyip.ph.rmit.edu.au

10-14 December 1996

Fifth Eurasia Conference on Chemical Sciences

Venue: Zhongshan (Sun Yatsen) University
Guangzhou (Canton), China

Contact: Professor Liang-Nian Ji
General Secretary, EuAsC_2S-1996
Biotechnology Research Centre
Zhongshan (Sun Yatsen) University
Guangzhou (Canton) 510275, China
Tel: (+86-20)-4185461

or Tel: (+86-20)-4186300-7115
Fax: (+86-20)-4189173 or (+86-20)-4185551
Email: leiy@pebc2ihep.ac.cn

or Professor Charmian O'Connor
Chemistry Department, University of Auckland
Private Bag 92019, Auckland, New Zealand
Tel: (+64-9)-3737999

13-15 December 1996

Second Symposium on Oceanian-Japanese Organic Chemistry Synthesis and Natural Products

Venue: Tokushima Bunri University
Faculty of Pharmaceutical Sciences, Japan

Contact: Associate-Professor Rob A J Smith
Chemistry Department
University of Otago
P O Box 56
Dunedin, New Zealand
Tel: (+64-3)-4797924
Fax: (+64-3)-4797906
Email: rajsmith@alkali.otago.ac.nz

16 December 1996

Current Methods to Characterise Biomolecular Interactions. British Biophysical Society Discussion Meeting

Venue: London, England, UK

Contact: Walter Ward
ZENECA Pharmaceuticals
Mereside, Alderley Park, Macclesfield
Cheshire, SK10 4TG, England, UK
Fax: (+44-1625)-583074
Email: walter.ward@gbapr.zeneca.com

1-5 February 1997

The Miami Biotechnology Symposium on Biomolecular Design, Form and Function

Venue: Fort Lauderdale, Florida, USA

Contact: Tel: (+1-305)-233597

2-6 February 1997

The Australian and New Zealand Society for Mass Spectrometry 16th Conference (ANZSMS 16)

Venue: University of Tasmania, Tasmania, Australia

Contact: Mures Convention Management
Victoria Dock
Hobart, TAS 7000, Australia
Tel: (+61-002)-312121
Fax: (+61-002)-344464
Email: mures@hba.trumpet.com.au
http://www.csl.utas.edu.au/ANZSMS/anzsms16.html

3-7 February 1997

22nd Australasian Polymer Symposium

Venue: Auckland, New Zealand

Contact: Mr N R Edmonds
Faculty of Science and Engineering
Auckland Institute of Technology
Private Bag G P O, Auckland, New Zealand
Tel: (+64-9)-3079999 ext: 8181
Fax: (+64-9)-3079973

4-7 February 1997

'Cardiovascular Disease Prevention III'

Venue: London, England, UK

Contact: The Secretariat
Hampton Medical Conferences Ltd
Hofer House, 185 Uxbridge Road
Hampton, Middlesex TW12 1BN, England, UK
Fax: (+44-181)-7830292

5-7 February 1997

WAGGA '97: The Combined New Zealand and Australian Institutes of Physics Annual Condensed Matter Physics Meeting

Venue: Pakatoa Island Resort, Hauraki Gulf, Auckland

Contact: Associate Professor Rod Lambert

or Professor Paul Callaghan
Massey University
Palmerston North
New Zealand
Email: wagga@massey.ac.nz
http://www.massey.ac.nz/~wwphys/WAGGA/wagga.html

5-8 February 1997

Fluorescence Spectroscopy in the Biosciences – A Workshop
This will run in tandem with the Lorne Conference on Protein Structure and Function.

CONFERENCES & SEMINARS

Venue: Melbourne, Australia
Contact: Professor Bill Sawyer
Department of Biochemistry and Molecular Biology
University of Melbourne, Parkville
Victoria, Australia 3052
Tel: (+61-3)-9344 5923
Fax: (+61-3)-93477730

9-13 February 1997
1997 Lorne Meeting on Protein Structure and Function
Venue: Lorne, Victoria, Australia
Plans for the meeting will be available on the WWW site:
http://grimwade.biochem.unimelb.edu.au
Contact: lorne_orgs@unimelb.edu.au

10-14 February 1997
Microscopy 97. Microscopy New Zealand Conference
Venue: Medical School, University of Auckland
Auckland, New Zealand
Contact: Dr Ian Hallett
HortResearch, Private Bag 92169, Auckland
Tel: (+64-9)-8493660
Fax: (+64-9)-8154201
Email: ihallett@hort.cri.nz

1-5 April 1997
4th International Symposium on 'Responses of Plant Metabolism to Air Pollution and Climate Change'
Venue: Egmond aan Zee, The Netherlands
Contact: Symposium Secretariat
Department of Plant Biology
University of Groningen
P O Box 14
9750 AA haren, The Netherlands
Fax: (+31-503)-632273
Email: g.stulen@biol.rug.nl

16-20 May 1997
Seventh Asian Chemical Congress
Venue: International Conference Centre Hiroshima
Hiroshima, Japan
Contact: Mr A Nakanishi
Head, Administration Office of 7ACC'97
Chemical Society of Japan
1-5, Kanda-Surugadai
Chiyoda-ku, Tokyo 101, Japan
Tel: (+81-3)-32926161
Fax: (+81-3)-32926318
Email: 7acc97@chemistry.or.jp
www: http://www.t.soka.ac.jp/chem/csj/7ACC.html

28 June - 2 July 1997
6th International Symposium on Perspectives on Protein Engineering
Venue: Norwich, England, UK
Contact: POPE6 Secretariat
Biodigm Ltd
64 Langdale Grove, Bingham
Nottingham NG13 8SS, England, UK
Fax: (+44-1949)-876156
Email: biodigm@dial.pipex.com
www: http://www.cryst.bbk.ac.uk/CEC/pope6.html

20-24 July 1997
4th International Conference on Essential Fatty Acids and Eicosanoids
Venue: Edinburgh, Scotland, UK
Contact: Vicki Grant/Wendy Adegesun
c/o Meeting Makers, 50 George Street
Glasgow Gl IQA, Scotland, UK
Tel: (+44-141)-5531930
Fax: (+44-141)-5520511
Email: mm@meetingmakers.co.uk

27-30 July 1997
6th International Symposium on 'The Maillard Reaction'
Venue: London, England, UK
Contact: The Organisers (Maillard Symposium)
Department of Food Science and Technology
University of Reading
PO Box 226, Whiteknights
Reading RG6 6AP, England, UK
Fax: (+44-1734)-310080
Email: Maillard@afnovell.reading.ac.uk
www: http:\\www.fst.rdg.ac.uk/people/aamesjm/maillard.htm

18-22 August 1997
8th European Congress on Biotechnology,
70th Event of The European Federation of Biotechnology
Venue: Budapest, Hungary
Contact: Professor Laszlo Nyeste
Department of Agricultural Chemical Technology
Technical University
Budapest, H-1121 Budapest XI
Hungary
Tel/Fax: (+36-1)-463220

25-29 August 1997
5th International Conference on Amino Acids
Venue: Chalkidiki, Greece
Contact: Professor Dr M Liakopoulou-Kyriakides
Aristotle University of Thessaloniki
Department of Chemical Engineering
540 06 Thessaloniki, Greece
Fax: (+30) 31996193
Email: markyr@vergina.eng.auth.gr

28 August - 2 September 1997
Structure and Mechanism of Oxidases and Related Systems
This meeting will focus on recent advances on structure and mechanisms of oxidases and related iron-containing enzymes including peroxidases and catalase, di-iron enzymes, P-450 and oxygen-binding proteins
Venue: Devon, England, UK
Contact: Kelly Alderton
The Biochemical Society
59 Portland Place

London W1N 3AJ, England, UK
Tel: (+44-171)-5803481
Fax: (+44-171)-6377626
Email: meetings@biochemsoc.org.uk

21-26 September 1997
XXX Colloquium Spectroscopicum Internationale
Venue: World Congress Centre
Melbourne, Australia
Contact: The Meeting Planners
108 Church Street
Hawthorn, Victoria 3122
Australia
Tel: (+61-3)-98193700
Fax: (+61-3)-98195978

29 September - 3 October 1997
International Symposium on Biotechnology of Tropical and Subtropical Species
A symposium run by the Commission Biotechnology and the Commission Tropical and Subtropical Horticulture of the International Society for Horticultural Science
Venue: Brisbane, Australia
Contact: Organisers Australia
P O Box 1237
Milton, Queensland, Australia
Tel: (+61-7)-33697866
Fax: (+61-7)33671471
Email: oa@bnec.design.net.au

26-30 October 1997
5th Pacific Polymer Conference
Venue: Hotel Hyundai, Kyongiu, Korea
Contact: Professor Sung Chul Kim
Secretariat of PPC-5
Department of Chemical Engineering
KAIST
Yusong-gu
Taejon, 305-701
Korea
Tel: (+81-42) 8698431 ext 3914
Fax: (+82-42) 8698430
Email: kimsc@sorak.kaist.ac.kr
ppc5@cais.kaist.ac.kr

23-25 November 1997
6th Conference of the Society for Free Radical Research (Australasia)
Venue: Dunedin, New Zealand
Contact: Dr Mike Murphy
Biochemistry Department
University of Otago
P O Box 56, Dunedin, New Zealand
Tel: (+64-3)-4797871
Fax: (+64-3)-4797866
Email: murphy@sanger.otago.ac.nz

25-28 November 1997
Pacific Oils 2000: An International Conference on Plant Oils and Marine Lipids
Venue: Auckland, New Zealand
Contact: Professor Con Cambie, Conference Chairman
Chemistry Department
University of Auckland
Private Bag 92019
Auckland, New Zealand
Tel: (+64-9)-3737999 ext. 8259
Fax: (+64-9)-3737422
Email: c.cambie@auckland.ac.nz

2-5 December 1997
13th Symposium on Biological Macromolecules and Ligands: Structure, Interactions and Applications.
Venue: Quezon City, Philippines
Contact: Dr Gisela P Concepion
University of the Philippines
Marine Science Institute
Quezon City 1101
Republic of the Philippines
Tel and Fax: (+63-2)-9213799

13-17 July 1998
MACRO 98 AUSTRALIA
37th IUPAC International Symposium on Macromolecules
Venue: Gold Coast, Queensland, Australia
This forefront conference will bring together polymer-oriented scientists, technologists, educators and students from all areas of the scientific community: academia, industry and government. It will provide an international forum for the communication and discussion of general and specific contemporary topics of interest to the polymer community.

The conference will embrace both the fundamental and applied aspects of polymer chemistry, polymer physics, materials, technology and engineering. The program will focus on a number of broad themes which will incorporate a range of symposia, involving plenary and invited lectures, and contributed verbal and poster presentations. Plenary speakers will be Professor J Economy (USA), Professor J Feast (UK), Professor A Khokhlov (Russia) and Professor Y Tabata (Japan). A special International Symposium will be held in honour of the late Professor Jim O'Donnell.

Contact: MACRO98 Secretariat
Chemistry Department, University of Queensland
Brisbane, Queensland 4072
Australia
Fax: (+61-7) 33654299
E-mail: macro98@chem.chemistry.uq.edu.au
Homepage:
http://www.uq.edu.au/~cmawhitt/macro98.html

6-11 February 2000
RACI 11th National Convention
Venue: Canberra, ACT, Australia
Contact: Dr W D Cook
Department of Materials Engineering
Monash University
Clayton VIC 3168, Australia
Tel: (+61-3)-99054926
Fax: (+61-3)-99054940
Email: WDCOOK@eng2.eng.monash.edu.au

Athol Rafter 1913-1996:New Zealand's First Nuclear Geochemist?

By J R Hulston, FNZIC, Institute of Geological & Nuclear Sciences Ltd, Wellington

Dr T Athol Rafter's scientific career began in February 1940 when he joined the Dominion Laboratory of DSIR (later Chemistry Division). He spent four years as a coal chemist before moving into the field of rock analysis that included studies on uranium minerals in the beach sands of the West Coast. Some of these minerals were extremely resistant to fluxing agents. In conjunction with Fred Seelye, a rock analyst, this problem was solved using low temperature fusion with sodium peroxide in platinum and their reputation in this field was made.

Following a Cabinet decision in 1946 to establish nuclear research in New Zealand, Athol was sent overseas in August 1948 to study at the Radiochemical Centre at MIT, Boston, and the Mass Spectrometer Laboratory of Colombia University, New York, and to visit other nuclear establishments in America, Canada and England, returning to New Zealand in October 1949. From 1949 to May 1955 a small group of physicists at the Dominion Physical Laboratory led by Gordon Fergusson worked in close collaboration with Athol's group of chemists at the Dominion laboratory to introduce some of the newer techniques of nuclear science into New Zealand's scientific problems. Radioactive phosphorus was used in fertilizer trials in 1950 and for medical therapy from 1951 to 1956; a radioactive survey, using modern electronic equipment, was made of the thermal areas. All these were successful but the most successful project of all was the perfecting of the techniques for the dating of carbonaceous specimens by their radioactive carbon content and the subsequent applications which Athol, his staff and various collaborators from all parts of the world made of this new technique.

Using these new methods, many conventional carbon-14 age measurements were made for geologists and archaeologists in New Zealand and overseas.

Contributions to the carbon cycle

After establishing one of the world's first radiocarbon dating facilities in Lower Hutt, and achieving an accuracy of ±50 years, Athol was quick to realise the potential use of this new technique in geochemistry. He pushed through projects to study natural variations in radiocarbon and in the process discovered the link between nuclear weapons testing in the atmosphere and rising levels of radiocarbon in the atmosphere and the oceans. Although similar work was going on in some of the large US laboratories with big budgets, Athol and his team were able to keep up with the pace and contributed much to international understanding of the carbon cycle. He also made a significant contribution to the understanding of the fixation of carbon in soils through his collaborative work with John Stout at Soil Bureau.

The measurements of radiocarbon in the atmosphere that Athol started in the 1950s still continue and have become the longest consistent measurement of atmospheric trace gases anywhere. At one stage he was running a network of seven stations stretching from the Antarctic to the equator and steadily gathering information on the spread of "bomb carbon" throughout the environment. Together with Bernie O'Brien he pieced together some of the earliest uses of radiocarbon to estimate how rapidly the oceans were taking up atmospheric CO_2. This led to his strong support for a project proposed by Dave Keeling, to measure CO_2 at Baring Head near Wellington. New Zealand's present atmospheric chemistry research and particularly this country's world leading expertise in trace gas isotopic techniques stem from these beginnings.

Sulfur isotope studies

When I joined the group at Gracefield in January 1955, I worked on another of Athol's geochemical interests – that of stable isotopes. My role was the adaption of the recently constructed mass spectrometer to allow the accurate measurement of stable isotopes, while Athol worked on the chemistry aspects. Athol was able to overcome the problems of developing suitable extraction techniques to quantitatively convert the sulfur in geological materials into SO_2 gas for measurement on the mass spectrometer. Although the first New Zealand measurements were made on high sulfur coals from the West Coast, attention quickly turned to sulfur gases in the geothermal areas and White Island: the start of the work, with Ian Kaplan (a New Zealander who subsequently moved to the USA) and Stuart Wilson (an early pioneer in geothermal investigations) that continued for many years.

The sulfur isotope studies were then becoming internationally known and Australian geologists were asking for our cooperation to assist in the study of Australian sulfide minerals. In 1962 a key paper on the Broken Hill deposit was published with L J Lawrence where it was recognised that cogenetic sulfides could be used as geothermometers.

As part of the sulfur isotope work, Athol developed techniques to analyse sulfate minerals and sulfate from natural waters. At the same time, novel ways of extracting the oxygen from the sulfate for oxygen isotope analysis were developed and published. There were and still are only a few laboratories in the world where this can be done. It was one of the achievements in Gracefield in that sulfate-sulfur and sulfate-oxygen isotope studies have continued to be useful tracers in groundwater, hydrological, geothermal, volcanic, mineralisation and environmental problems. In 1968 Athol was awarded a DSc for his research in this field.

Being very much a person's person, Athol fostered relations with people all over the world to collaborate in his sulfur isotope research and scientists came from Japan, Italy and the USA to work in his laboratory. Then in August 1976 over 60 scientists, many from overseas, gathered at Lower Hutt for a conference*

to mark 20 years research in the stable isotope field at DSIR and in honour of Athol's impending retirement.

On the occasion of his 80th birthday he joined with former colleagues in a function at the Institute at which the Radiocarbon Laboratory was re-named the "Rafter Radiocarbon Laboratory" in honour of his work in this field.

Athol was Foundation Director of the Institute of Nuclear Sciences from 1959 to 1978 and chairman of the Council of the Central Institute of Technology from 1969 to 1978. His wife Val died a few years ago and he is survived by their three children, Ken, Ian and Janet.

* Robinson, B W, (1978), *Stable isotopes in the earth sciences.* 229 p. DSIR Bulletin 220. Science Information Division, DSIR, Wellington.

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LEONARD STORKEY SPACKMAN QSM, FNZIC

1902 - 1996

The inaugural meeting which formed the New Zealand Institute of Chemistry was held in Auckland in February 1931 under the chairmanship of Professor Easterfield. Among those present was a 28 year old who was already quite a veteran in the field of analytical chemistry, Leonard Storkey Spackman.

Len Spackman entered the field of analytical chemistry as an employee of the late Alf J Parker, subsequently established his own laboratory, and became one of the four great public analysts which this country has produced, the others being Dr R Gardner in Dunedin and Mr H W Lawrence in Johnsonville.

Len's time with Parker was prior to the establishment of the Government Analyst's laboratory in Auckland (this work being contracted to Parker). Len appeared as an expert witness in many of the major trials of those days and established a reputation for reliability and clarity of evidence which assured him of ready acceptance by the Courts.

He was a scientist to his fingertips, always studying, always ready to explain and never happier than when he was teaching his craft to younger people.

He spent his working life practising his profession in that rarest of fields, the public analyst, covering a breadth of science which would be unthinkable in these days of specialisation and automation.

Len was a pioneer in the analysis of many export commodities which we take for granted these days. Tallow was one of his specialities, as was casein. Kauri gum, a curio today, was a major export commodity, and Len carried out some pioneering research on the extraction of kauri gum which was adopted widely overseas.

On setting up his own laboratory, he became an expert on the processing and analysis of milk, and as consultant to the then Auckland Metropolitan Milk Board played a major part in the development of present-day household milk. This required skills in microbiology, so Len set to and developed great capability in this aspect of science. There were instances in his milk research when he was decades ahead of his time, the truth of his early statements being recognised as much as thirty years later.

As soon as the Second World War broke out, Len volunteered his services, and was co-opted to assist in preparation of war gases for use in training armed service personnel to combat this hazard. He was often in the thick, literally, of the gases themselves, proving to army instructors how to cope with these substances.

He established a wartime factory on Kawau Island, producing wood alcohol from ti-tree, a vital product for New Zealand in the war years.

Len's skills were not restricted to the laboratory; he acted as a consultant out in the factory and in the field in relation to foodstuffs, animal husbandry, fertiliser utilisation, water treatment, sewage ... the list goes on and on. All the while he was training younger people in his techniques and guiding them in their various careers. One chemist who was trained by Len, George Page, is forgotten today but went on to achieve high renown during the war as an atomic scientist at Los Alamos.

Parallel with his interest in chemistry, Len was a pioneer in radio transmission as a "ham". He developed his first transmitter during the First World War, but it was not until after the war ended that radio was permitted and he was soon communicating all over the world by this means under the call sign ZL1AC. He went on to develop audio public address systems and formed a commercial sound recording company, making records for public broadcast.

Over the years Len was a constant supporter of the New Zealand Institute of Chemistry, holding various offices and finally acted as honorary auditor. In recognition of this lifelong support he was appointed an Honorary Fellow of the Institute, a recognition which gave him much pleasure.

But to Len, ever the monarchist and traditionalist, humble about his achievements and deprecating when they were mentioned, probably his proudest moment was when he was awarded the Queen's Service Medal in 1988. Len couldn't understand why he had been singled out; but his friends and colleagues in science, who knew of his career in the service of New Zealand, who had good cause to be grateful to him for all his help, and who never forgot his unfailing courtesy, knew why and were glad.

Jim Sprott

LOCAL NEWS

HANNA INSTRUMENTS IN NEW ZEALAND

Hanna Instruments are pleased to announce that as of 1st January 1997 Hanna Instruments Australia will expand to cover the New Zealand market.

Hanna Australia will take responsibility for marketing activities, stock supply and technical support for the region and seek to expand the re-seller base, making Hanna Instruments products readily available to end users.

Distributor enquiries welcome.

For further details please contact:
Hanna Instruments Pty Ltd
18 Fiveways Boulevarde
Keysborough VIC 3173
Australia
Ph: (+64-3) 97690666, Fax: (+64-3) 97690699
Email: hannaains@ozemail.com.au

PROGRAMME REVIEWS FOR FUNDING ALLOCATION (PGSF)

From 1998 onwards, decisions on the allocation of the PGSF will be made in two ways. The first, for the majority of programmes (about 80% of the PGSF by $ value), will continue to be based on appraisal of applications by external referees and Foundation Advisory Committees. These programmes will be identified as being in *Application Mode.* The second (for up to 20% of the PGSF by $ value) will be based on the on-site evaluation of programme achievements, performance and future plans by external review teams (including Advisory Committee members) followed by appraisal by the full Advisory Committees. These programmes will be designated as being in *Review Mode.*

For *Review Mode* programmes, the on-site reviews that will provide the information for funding decision-making are called *Programme Reviews for Funding Allocation.* Some researchers have already participated in reviews of this type, in 1994 (18 programmes) and 1995 (25 programmes), the findings from which were used as additional inputs to the traditional decision-making process. Future *Programme Reviews* will differ from past reviews in several ways, the most significant of which is that review findings will provide the sole basis for decision-making for the programmes concerned, as explained below.

Judging from experience and discussions to date, it appears to be generally accepted by providers that on-site *Programme Reviews* add value to the funding decision-making process and provide benefits both for providers and the Foundation (e.g. useful interactions between researchers and reviewers, immediacy of feedback to researchers). However, the Foundation recognises that having programmes in different modes in the PGSF allocation process raises issues of equitability and contestability and has put measures in place to ensure that programmes in the two modes are treated equivalently. The measures include that:

- all funding recommendations will be made concurrently by full Advisory Committees
- all funding decisions will be made concurrently by the Board
- *Review Mode* programmes will revert to *Application Mode* after one allocation round
- all review teams will include two Advisory Committee members
- reviewers will act as referee equivalents for the proposed research described in reviews
- providers will supply reviewers with written core information about research plans
- providers will present information about achievements and performance
- providers will be able to comment on draft review reports.

Programmes to go into *Review Mode* will be selected by the Manager (PGSF) using specific criteria, including that programmes will usually be:

- well established (with achievements for review)
- large enough, alone or when 'clustered' with others, to warrant review (>$250,000)
- part of a representative portfolio of Outputs and provider categories.

Reviews will be conducted by small teams of suitably qualified and experienced scientists (each including two Advisory Committee members). The teams will visit the researchers on site to evaluate programme achievements, research team performance and capabilities, and the merit and relevance of research proposals. Written reports will be made available to the researchers for comment before being forwarded, together with the comments, to the full Advisory Committees. Advisory Committees will consider all applications for programme funding (i.e. for both *Application Mode* and *Review Mode* programmes) at the same time, to ensure that their relative merits are properly evaluated and that all receive fair and equivalent treatment.

The Information Sheet *Programme Reviews for Funding Allocation (PGSF)* has been distributed to all major providers. Copies are available from the Foundation. The provisional lists of programmes selected for *Review Mode* for the 1998-2000 PGSF allocation round have been sent to the providers concerned. They will be contacted shortly by Evaluation and Review Officers to begin the process of planning the *Programme Reviews.* The foundation is looking forward to working with providers over the next twelve months to undertake the reviews.

SMALL COMPANIES TAP INTO BIG POTENTIAL

Small companies are amongst New Zealand's most innovative when it comes to using new technology to crack lucrative new markets, according to an analysis just completed by the Technology for Business Growth scheme (TBG).

The study looks at the composition of companies which have applied for grants from the business technology funding programme operated by the Foundation for Research, Science and Technology.

The results mirror those from overseas; that it is the small and medium-sized companies which are turning into the world's greatest innovators. Such companies are traditionally quick to seize an opportunity and small enough to be flexible in its implementation.

Since the TBG programme began in 1989, more than 350 companies have received grants. John Manning, of the TBG Scheme, says the analysis shows some interesting trends.

"When the scheme started, grants tended to be smaller and companies which applied for funding were generally the larger ones, usually with a median turnover of between $10m - $14m," he said.

"The analysis we've just completed shows the typical business that now gets TBG support has a turnover of less than $2.5m and employs about 20 staff. The company is likely to be a manufacturer, but is often a producer in or supplier to the primary sector."

The type of businesses supported by TBG grants remains varied. Manufacturing comprises the biggest single group (30%) with the electronics sector a significant part of that. However, John Manning said there had been a recent boost in applications from agricultural and horticultural businesses, which were now receiving 25% of available grants.

Maarten Groen, managing director of French Maid Foods, used a TBG grant to revolutionize vinegar production. According to Groen, such research would have been beyond the means of the small Lower Hutt company without the assistance of a grant.

Not only has the company benefited by creating a new product that will open up new markets, but its success has encouraged Groen to place on-going importance on Research and Development as a business philosophy.

Dr Alastair Sinton, of Christchurch electronics company PulseData International, said the 50-strong company expects a large boost to its synthetic speech business from an Research and Development project nearing completion.

He said that without TBG funding the company would not have been able to attempt to improve the technology underlying its synthetic speech products. Now, PulseData expects substantial

new sales worldwide from its products, which have revolutionised the way blind and speech-impaired people carry out computer-related activities.

According to John Manning, such companies are the high-profile tip of the iceberg of New Zealand businesses.

"Generally, New Zealand companies tend to be small and often unsure of how to carry out technological developments, whether or not to choose a research partner and, most importantly, how to evaluate technological opportunities.

He said the application process was designed to focus the company on its existing business and commercial potential. Analysis showed applications written by the companies themselves, or in conjunction with their chosen research partner, had a better chance of succeeding than those prepared in isolation by research agencies or consultants.

The TBG programme has $7.8m per annum available to businesses to carry out technology research and development.

For more information contact: Tania Mann
The Foundation for Research, Science & Technology
P O Box 12-240, Wellington

1997/1998 POST-DOCTORAL FELLOWSHIPS

For the 1997/98 New Zealand Science and Technology Post-Doctoral Fellowships, and for future rounds, the closing date will be in mid-March, with funding available from 1 July. The 1997/98 application form, guidelines and conditions will be available from January 1997.

If you wish your name to be added to the Fellowship mailing list, or require further information, please contact Karen Lewis at the Foundation for Research, Science & Technology, P O Box 12-240 Wellington.

WHAT'S HAPPENING AT LABSUPPLY PIERCE?

Aliza Glanville has moved from customer services into the role of sales representative previously managed by Kirsten Butt. Aliza has a BSc majoring in Pharmacology and Psychology. Some of Alisa's favourite interests are netball, touch rugby, running and modern jazz. Aliza is looking forward to meeting you all.

Michael Crowhen has moved from customer services into the role of sales representative previously managed by Cornelia Riethmann. Mike has a BSc in Zoology. Some of Mike's interests include music, indoor soccer, and in previous years he has competed in surf life-saving competitions. Mike is enthusiastic to meet you all and assist you with your requirements.

Cornelia Riethmann has been with us for six years as a sales representative which more recently included additional product specialities. She has now moved into the role of Product Specialist in Microscopy, in which her experience will enable her to contribute a good company and market knowledge. Cornelia has a NZCS in Chemistry and has worked in industrial laboratories and other sales roles previously. Currently Cornelia is working towards a Diploma in Business Management. Her interests include music and breeding one of the newest registered breeds of cat – the Tonkinese. Cornelia is also a regular "Warriors" supporter at Ericsson stadium.

WHO'S WHO IN MEDIC CORPORATION

Ian Goode (Product Manager) manages four main national agencies at Medic Corporation's Scientific and Industrial Division (S&I), based in Lower Hutt. His main agency is Sartorius, a German-based manufacturer of filtration media, equipment and developer of separation technologies for industry. Sartorius' products and procedures are used in many applications in New Zealand industries, including pharmaceutical, biotechnology, food and beverage and research laboratories. Ian also manages Barnstead, Thermolyne and Sani-tech brands. Ian has been with Medic Corporation for five years. Before his current appointment he worked for Pepsi-Cola and in medical laboratories in London.

Ian Goode

Darron O'Donnell manages Steris, Nuaire, Elkay and Nalge agencies at Medic Corporation's Scientific and Industrial Division (S&I), based in Lower Hutt. Steris machines are used for sterilising heat sensitive theatre equipment and instruments. Nuaire manufacture incubators, laminar flow cabinets and ultra-low temperature refrigerators. Elkay and Nalge manufacture laboratory consumables and plastic products. Darron joined Medic Corporation in 1987 and has held a range of sales representative and managerial appointments. A keen sportsman, Darron plays squash at B1 grade, holds a blue belt in Nam Wah Pai Kung Fu and enjoys competing in triathlons and Ironman events. He is also currently restoring a 1920s villa in Lower Hutt.

Darron O'Donnell

Medic's S&I Division supplies a vast range of equipment to medical and scientific laboratories throughout New Zealand. Specialist areas of the Division include biotechnology, sterilisation and decontamination systems, membrane separation technology, molecular biology and environmental science and technology.

Along with the core business of equipment supply, the Division provides specialist advisory services to help clients manage upgrades in their businesses – including initial research, development, pilot scale runs, through to full production processes.

VISCHEM PROJECT

Some readers have had trouble accessing the worldwide web site for the Vischem Project as given in the last edition of *Chemistry in New Zealand*. The authors indicate that a better address is:

http://chem.st.nepean.uws.edu.au/VisChem/

NEW LITERATURE AND MEDIA

SWETSCAN TABLE OF CONTENTS DATABASE NOW AVAILABLE ON STN – A VALUABLE INSTRUMENT FOR LIBRARIES

Available now on STN, SWETSCAN offers the tables of contents of more than 13,000 international scholarly and research jounals. Coverage from 1993 onward includes social sciences, technology, medicine, science, and humanities. The database currently contains more than 260,000 records and is updated weekly with approximately 1,500 new records. A record in SWETSCAN contains all bibliographic data necessary for the provision of the journal article of interest, i.e. journal title, ISSN, volume and issue numbers, publication date or year. In addition, country of publication and language of the journal as well as author names and titles, and the producer's classification are searchable. Items included in the table of contents are articles, reviews, notes, letters, editorials, etc. Most journals are in English (approximately 75%). Other major languages are German, Dutch and French. Major countries of publication are USA (45%), UK (25%), France (7.3%), Germany (6%) and the Netherlands (4.7%).

The table of contents is available in various predefined formats in combination with source information. The default format TOC gives the source and the table of contents without field codes. The OF format (Order Format) shows the source plus the hit article only. Using the OF format, the journal article of interest can be directly ordered on-line from one of the 30 document suppliers linked with STN.

If you are a librarian, documentalist, information broker, or scientist, SWETSCAN will prove to be a most valuable instrument by keeping you abreast with the most current publications. SWETSCAN includes all of the useful STN features. Of particular interest will be the weekly SDI service for monitoring journals which are not available in the library of your organisation or institute.

SWETSCAN is produced by Swets and Zeitlinger, Lisse, The Netherlands, a major international supplier and information provider.

WSCA: INFORMATION ON PAINTS AND SURFACE COATINGS

STN International, one of the world's premier online hosts, has expanded its wide range of scientific and technical databases to include the WSCA file.

WSCA is a bibliographic database containing citations to the worldwide research, technical and trade literature on all aspects of paints and surface coatings. Topics covered include pigments; solvents; additives; polymers and resins; natural and synthetic rubber; paints; varnishes and lacquers; adhesives; inks; manufacturing plant; pretreatment; application and paint removal; paints for specific uses; radiation curing; optical rheological and other properties; colour, analysis, hazards; pollution and legislation; transport; corrosion and fouling; statistics and company profiles.

Citations include bibliographic data, in-depth indexing, and an abstract. Spanning the period from 1976 to the present, WSCA contains approximately 200,000 records and is updated monthly with about 800 new records. Sources are journals, patents, conference contributions, reports, legislations and standards, books, and dissertations.

The database corresponds to the printed World Surface Coatings Abstracts produced by The Paint Research Association, Teddington, Middlesex, UK.

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TOPICS IN ENVIRONMENTAL AND SAFETY ASPECTS OF COMBUSTION TECHNOLOGY

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Author
J C Jones, Department of Engineering, Aberdeen University, Scotland, UK.

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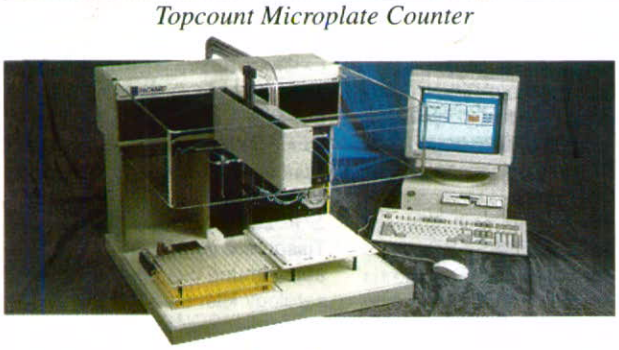

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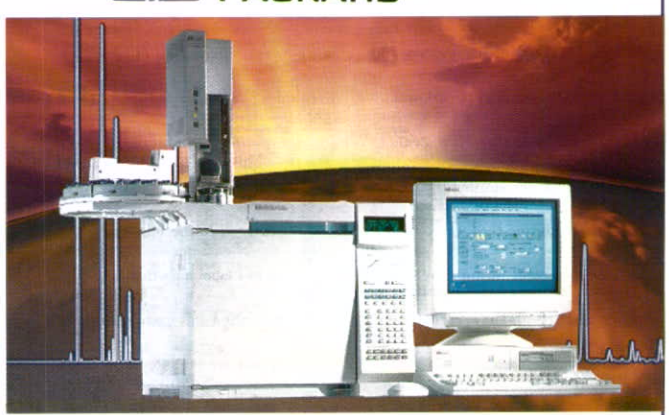

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