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NZIC Chemistry
IN NEW ZEALAND

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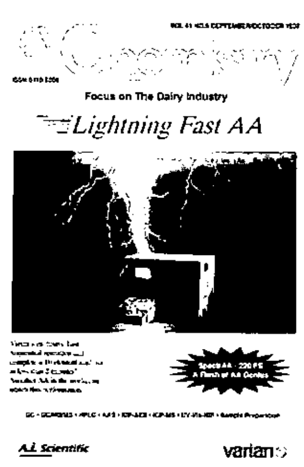
UP FRONT ...

The Varian SpectrAA-220 FS is the first Fast Sequential Atomic Absorption Spectrometer. It measures samples element by element, unlike conventional AA systems which determine all samples for one element, before repeating those samples again for subsequent elements. Complete results for each sample are achieved many times faster with the SpectrAA-220 FS.



For further information see the cover story article on page 2

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IN THIS ISSUE ...

COMING UP ...

November 1997 - Petroleum and Oil Industry

January 1998 - Environmental Control, Waste Management, Water Analysis

Deadline for material:
5th of the month of publication

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COVER STORY

LIGHTNING FAST AA FROM VARIAN - A FLASH OF AA GENIUS

SPECTRAA 220 FS - MAXIMUM PRODUCTIVITY

The Varian SpectrAA-220 FS is the first Fast Sequential atomic absorption spectrometer. It measures samples element by element, unlike conventional AA systems which determine all samples for one element, before repeating those samples again for subsequent elements. Complete results for each sample are achieved many times faster with the SpectrAA-220 FS.

Conventional AA systems determine samples for each element before moving onto the next element and measuring each sample again.

Conventional AA systems

Elements	Zn	Pb	Cu
Sample 1	0.375		
Sample 2	9.877		
Sample 3	5.344		

The SpectrAA 220FS measures all elements for a sample before moving onto the next sample.

The Fast Sequential system

Elements	Zn	Pb	Cu
Sample 1	0.375	9.877	5.344
Sample 2			
Sample 3			

Halve your analysis time
In tests conducted by Varian, the SpectrAA 220 FS completed analysis in a little over half the time taken by conventional AA. Here are the details:

When operating with:
SPS-5 Autosampler
10 elements: Na, Ca, Cr, Cu, Mg, Mn, Fe, Co, Ni, Pb
3 standards, 20 samples
air / acetylene flame
2 x 5 second integration, 12 second read delay
Multi-element lamps: Cr/Cu/Mn/Fe/CoNi, Ca/Mg
Na
Pb
All other parameters were default.

- Analysis time: Fast Sequential: 1 hour 22 minutes
- Analysis time: Normal Operation 2 hour 23 minutes

When combined with our revolutionary SIPS Sample Introduction Pump System and the SPS-5 Sample Preparation System, huge time savings (routinely more than 25% when compared with conventional AA systems) over a complete batch of samples are achieved for flame and vapour determinations. The more elements you determine, the greater the time saving and the greater the productivity of your laboratory.

The SpectrAA-220 FS also provides a host of other benefits. Not only will you save valuable time and improve sample throughput, you will also reduce sample consumption and reduce running costs as more samples can be determined in less time.

How is Fast Sequential operation achieved?
Considerable time and sample volume are wasted with each pre-read delay in flame AA. By measuring all of the elements in one solution before proceeding to the next solution, the delay time and the total analysis time are reduced.

Five key design innovations have facilitated this dramatic improvement in sample throughput using Fast Sequential operation.

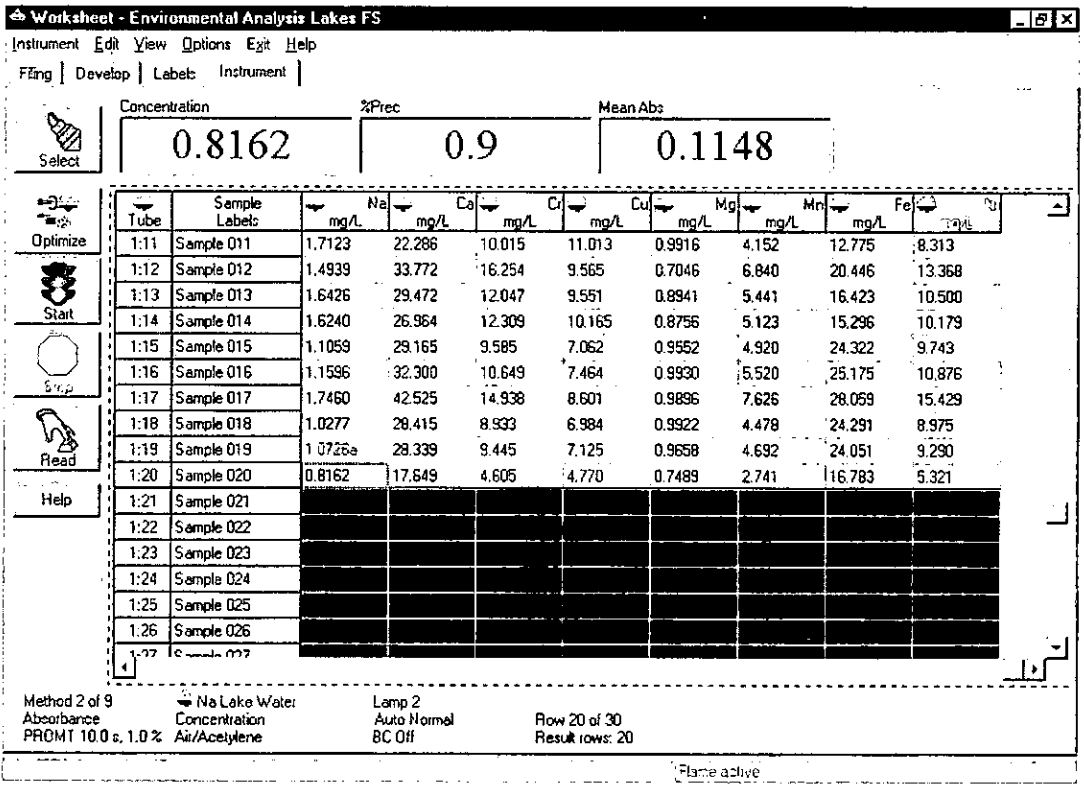
Five aspects to Fast Sequential operation
1. FS Wizard
Intelligent software is the key to achieving Fast Sequential operation. Our FS Wizard automatically sorts elements into the order which assures the fastest possible speed of analysis. Elements are sorted by wavelength and flame stoichiometry to optimise determination time.

2. Rapid Response Gas Control
To enable fully optimised conditions when determining successive elements, gas flow rates must change instantaneously, to avoid delays. Only Varian's unique Hammer Gas Control system is capable of this. This system employs an oscillating solenoid valve to digitally regulate the gas flow. Gas flows can now be controlled with unmatched repeatability, precision and most importantly, speed.

3. High Speed Wavelength Drive
In Fast Sequential mode, the SpectrAA-220 FS measures all elements in each sample, before proceeding to the next sample. In order to rapidly change wavelengths, a new wavelength drive system was developed. This is a very fast, rugged and reliable system which uses intelligent software to guarantee reproducible positioning.

4. Automated Sample Handling
To obtain the maximum possible time saving in Fast Sequential mode, the SpectrAA-220 FS can be combined with the SIPS Sample Introduction Pump System and the SPS-5 flame autosampler. This combination enables automatic presentation of solutions and allows multi-point calibration from one multi-element standard, eliminating time consuming manual standard preparation. SIPS also provides the additional benefit of fast on-line dilution of over range samples.

5. Fixed Lamps
Conventional rotating lamp turrets are too slow for Fast Sequential operation, so we've eliminated them. Up to four lamps can be positioned in fixed lamp sockets. A fast motor driven mirror is used to enable rapid lamp selection. And with multi-element lamps, it is not even necessary to change lamps.



Concentration: 0.8162
%Prec: 0.9
Mean Abs: 0.1148

Tube	Sample Labels	Na mg/L	Ca mg/L	Cr mg/L	Cu mg/L	Mg mg/L	Mn mg/L	Fe mg/L	mg/L
1:11	Sample 011	1.7123	22.286	10.015	11.013	0.9916	4.152	12.775	8.313
1:12	Sample 012	1.4939	33.772	16.254	9.565	0.7046	6.840	20.446	13.368
1:13	Sample 013	1.6426	29.472	12.047	9.551	0.8941	5.441	16.423	10.500
1:14	Sample 014	1.6240	26.964	12.309	10.165	0.8756	5.123	15.296	10.179
1:15	Sample 015	1.1059	29.165	9.585	7.062	0.9552	4.920	24.322	9.743
1:16	Sample 016	1.1596	32.300	10.649	7.464	0.9930	5.520	25.175	10.876
1:17	Sample 017	1.7460	42.525	14.938	8.601	0.9896	7.626	28.059	15.429
1:18	Sample 018	1.0277	28.415	8.933	6.984	0.9922	4.478	24.291	8.975
1:19	Sample 019	1.0726a	28.339	9.445	7.125	0.9658	4.692	24.051	9.290
1:20	Sample 020	0.8162	17.649	4.605	4.770	0.7489	2.741	16.783	5.321
1:21	Sample 021								
1:22	Sample 022								
1:23	Sample 023								
1:24	Sample 024								
1:25	Sample 025								
1:26	Sample 026								

Method 2 of 9
Absorbance
PROMT 10.0 s, 1.0 %

Na Lake Water
Concentration
Air/Acetylene

Lamp 2
Auto Normal
BC Off

Row 20 of 30
Result rows: 20

AA SAMPLE INTRODUCTION SYSTEM (SIPS)

The Sample Introduction Pump System (SIPS) is an innovative sample introduction and dilution system for flame AA. SIPS is available in 2 versions:

- •The single pump SIPS 10
- •The dual pump SIPS 20

It makes up standards for you!
SIPS will calibrate your instrument on-line by diluting aliquots from a single bulk standard. You simply enter the concentration of the bulk standard, the number of standards you require and the top standard concentration. Get a cup of coffee and watch while SIPS does the work. This eliminates the need for the manual preparation of multiple standards.

It dilutes over-range samples during analysis
SIPS will automatically dilute and re-analyse over-range samples. If any sample is over-range, SIPS automatically reruns that sample, using a dilution factor calculated to bring the sample within the calibration range. This eliminates the need for both pre-dilution before analysis and manual dilution during analysis. Imagine the productivity gains this will bring you! You no longer have to stop the run, dilute the sample and restart the run. And SIPS is at least twice as fast as diluting manually, and more accurate - with less than 2% error. SIPS also minimises other sources of error, such as loss of analyte and contamination.

Standard additions and modifers are handled as well
The dual pump SIPS 20 can automatically prepare a standard additions calibration using a single standard. It can also add modifiers or perform on-line analytical spiking of samples.

For more information on Varian's lightning fast AA instruments,
Contact: Kevin Moloney, A.i.Scientific (NZ) Ltd
P O Box 35579 Browns Bay, Auckland
Ph: (09) 4781351, Fax: (09) 4781360
circle number 1 on the reader reply card

LOCAL NEWS

ANNOUNCING THE FORMATION OF ACORN SCIENTIFIC

Acorn Scientific is a new 100% New Zealand-owned company, specialising in the importation of laboratory equipment for quality assurance and control in the dairy, food and associated industries.

Agencies include:

BIOTRACE, world leaders in hygiene monitoring, HACCP and measurement of water contamination.

INFRARED ENGINEERING, suppliers of on-line and at-line food analysers for cheese, milk powder, meat, paper, timber products, plastic materials and coating thickness measurements.

RETSCH GmbH, a company specialising in sample size reduction, grinding, crushing, sieving and other physical analysis.

For further information on Acorn Scientific or their products for food quality, hygiene or other analysis please contact:

Laurie Powell
Acorn Scientific Ltd
P O Box 58697 Greenmount, Auckland
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Email: acornsci@ihug.co.nz

STUDENTS RETURN WITH MEDALS FROM CHEMISTRY OLYMPIAD IN MONTREAL

Three top secondary school students, Luke Baxter, a student of Westlake Boys' High School, Nick Webb, a student of Shirley Boys' High School, and Malcolm Lowe, a student of Auckland Grammar School, returned from the 1997 International Chemistry Olympiad held in Montreal, Canada 13-22 July with Bronze medals. Nick is the first Christchurch student to win a Chemistry Olympiad medal. The other member of the team was Alexander Ng, a student of Auckland Grammar School. Both Nick and Luke were placed in the top 50% of competitors. 47 countries competed in the Olympiad. The New Zealand performance was very pleasing, especially when one considers that the New Zealand students were competing against students who were older or had at least a years more study of Chemistry at school. While the Australian team won two silver and two bronze medals, the New Zealand performance was better this year than the British team who also won three bronze medals. In Montreal, the students faced 2 exams - a practical and theoretical exam, each lasting about 5 hours. The team were accompanied by Dr Sheila Woodgate, of The University of Auckland and Mr Tim Oughton, Deputy Rector of St Andrew's College, Christchurch. New Zealand has competed in the International Chemistry Olympiad since 1992. Last year Ben Clark, a student from Wellington College, won a silver medal at the Olympiad held in Moscow. Significant sponsorship for the training camp has come this year from Fletcher Challenge Trust. The Chemistry, Mathematics and Physics Olympiads have also received financial support from the Ministry of Research, Science and Technology and the NZQA.

CASH INJECTION INTO BUSINESS TECHNOLOGY FUND

Business access to new technology has been boosted with a $15.6 million injection of Government funding through the new Technology New Zealand scheme.

The initiative builds on the successes of the existing Technology for Business Growth and Graduates in Industry Fellowship schemes, which together have funded over 550 technology R&D projects in businesses over the past six years. Funding for these two schemes has been increased by $2 million to reach $13 million per annum.

Extra funding is also now available through the new $2.64 million TechLink scheme. TechLink will help business (especially small and medium size enterprises) assess their technology needs and develop strategies to bolster their technology expertise and innovation. Businesses will also be able to acquire new business-related technologies through industry associations, business networks and Tradenz Joint Action Groups.

A Technology New Zealand website is to be established, giving a point of entry into New Zealand's technology information networks and providing smoother access to available local and international technology.

Technology New Zealand will be managed by the Foundation for Research, Science and Technology. For more information contact:

John Manning
Foundation for Research Science and Technology
Ph: (04) 4992559

A SITE FOR SORE EYES GBC ON THE WEB

Taking the first step into cyberspace, GBC Scientific Equipment recently launched their website at: http://www.gbcsci.com
Designed around user-friendliness, the site is simple to use and easily navigated through to reveal details on:
GBC Corporate Head Office - Australia
Product generic information
- AAS
- UV-Vis
- HPLC
- ICP-OES

Detailed instrument features
Company news
Email facility for new enquiries; and
General communications

Various hotlinks to other sites, such as GBC distributors, international events, directories, search engines etc. will be continuously added to ensure the user can move to sites in their own vicinity or of special interest to the scientific community.

"We are excited to be a part of the internet and see many advantages for our customers, distributors and ourselves with information transfer. Dealing with customers around the world, this site will remove the issue of global time zones." said Robert Peile, Marketing Manager, GBC.

"We also envisage using the site to promote our growing distributor network, ensuring customers can easily and quickly communicate with their local representatives, offering the benefit of a new level of customer service."

GBC welcomes any comments you may have towards improving their site - please email your responses to Anne-Marie Ward on award@gbcsci.com

NAME AND STRUCTURE CHANGE FOR TELARC NEW ZEALAND

As of 1 July 1997, Telarc's accreditation of laboratories and inspection bodies now operate under the name International Accreditation New Zealand (IANZ). The New Zealand Quality College and the Environmental Choice Labelling Programme will also be part of IANZ. Dr W L Richards will continue as Chief Executive of IANZ, reporting to the Testing Laboratory Registration Council.

Certification programmes for quality management systems (ISO 9000), environmental management systems (ISO 14001) and Q-Base will become a separate commercial operation, trading as Telarc Limited. Telarc Limited will have its own Board of Management, and Mr Terry Hoskins has been appointed Chief Executive.

This change has been prompted partly by international trade considerations and partly by New Zealand regulatory preferences. Telarc was established as a statutory body in 1972. Telarc's initial function was to accredit testing laboratories. In 1983, it was given the added responsibility for the establishment of a registration programme for quality management systems. This second activity developed into Telarc's ISO 9000 certification business.

In the 1990s, and particularly since the conclusion of the GATT Uruguay Round, international conformity assessment systems have evolved as a hierarchy. Accreditation bodies are usually owned or endorsed by government and operate on a non-profit basis. Telarc's accreditation of laboratories and inspection bodies is in this category. It is also at this level that Telarc negotiates Mutual Recognition Agreements for testing and inspection with counterpart bodies overseas in support of New Zealand exports.

Certification is another level of conformity assessment and organisations that certify companies with quality management or environmental management systems need to be accredited by JAS-ANZ (Joint Accreditation System for Australia and New Zealand). Telarc Ltd will continue to offer quality management system certification to the ISO 9000 series and QS 9000 as well as to the environmental management system ISO 14001 and to the Q-Base Code for small and medium enterprises.

Internationally, the pattern now is for there to be a single national accreditation body and for certification to be carried out as a separate activity. This structure is already in place throughout Europe and is being established by New Zealand's other trading partners, including those in the Asia-Pacific region. In this international context, Telarc's historical structure has appeared increasingly anomalous. Regulators in New Zealand also prefer that Telarc's accreditation functions be distinct from its certification activities.

The names International Accreditation New Zealand and Telarc Limited will make it clear to Telarc's international colleagues and to the regulators in New Zealand that the two activities are separate and conform with the now internationally accepted structure. The recognition of accredited laboratory status will be the same with New Zealand but enhanced internationally as more of New Zealand's trading partners sign Mutual Recognition Agreements.

VICTORIA UNIVERSITY LEADS THE WORLD WITH MOVE TO A GLASS-FREE LABORATORY

Janet Butler, Laboratory Manager at Victoria University, and Stephen Lee of Medic Corporation discuss the benefits of Nalgene plastic equipment at the launch of Victoria University's new glass-free laboratory.

Victoria University has scored a world first with the launch of a glass-free laboratory. An animal physiology and cell biology teaching laboratory will carry out comparative research for 12 months between the use of Nalgene plastic in one laboratory and glass in the laboratory next door. The project is being run by Janet Butler, laboratory manager for the School of Biological Sciences.

"The use of plastic in research and teaching laboratories is a growing trend overseas, but nowhere else has a move been made to replace glass almost entirely with Nalgene plastic," says Mrs Butler. The glass equipment being replaced by Nalgene plastic includes measuring cylinders, reagent bottles, conical flasks, beakers and volumetric flasks.

Mrs Butler says the benefits of Nalgene plastic over glass include that it does not break and cause injuries, has lower operating costs through reduced breakages, and is easier to store and lighter to transport. "Safety considerations are very important in laboratories and I think there will be a real shift towards Nalgene plastic for this reason," she says.

The Victoria University trial was encouraged by visiting overseas scientists and academics familiar with using plastic equipment, particularly in America and Britain. "I was challenged by Nalgene to confront my pro-glass prejudices by doing a 12 month comparison between the two materials," Mrs Butler says.

Scientists, medical professionals and teachers will follow the glass-free laboratory research at Victoria with interest and many are expected to visit the laboratory to try the plastic equipment for themselves. Nalgene plastic scientific and medical equipment is manufactured in the United States and distributed in New Zealand by Medic Corporation Limited. Medic Corporation will assess the performance of the Nalgene plastic equipment throughout the trial, gaining feedback from staff and students using the laboratory.

For further information:
Janet Butler
Laboratory Manager, Victoria University
Ph: (04) 4721000 ext. 8138

UNIVERSITY TECHNICIAN WINS $5500 AWARD

A University of Otago technician has won a $5500 1997 Queen Elizabeth Technician's Study Award. Mrs Marianne Dick, a technician in the Department of Chemistry's Microanalytical Laboratory, is one of only 13 people nationwide to receive the award.

The award assists technicians to study topics in other Commonwealth countries that will benefit New Zealanders, and enables recipients to further their education and skills through overseas training and experience.

The Microanalytical Laboratory is the only one of its type in New Zealand. Its role is to analyse substances for their basic elemental makeup, a service which is mainly used by univeristy chemistry departments in New Zealand and Australia.

Mrs Dick has worked in the Microanalytical Laboratory for the past 14 years. She will use the award to visit similar laboratories in the United Kingdom towards the end of next year.

THE FORESIGHT PROJECT

Science and Technology Priorities for a Knowledge Society

Over the next two years, a comprehensive review of the priorities for public good science and technology will be carried out. The 'Foresight Project' has been designed by the Ministry to enable this review. Priorities for the Government's investment in public good science and technology need to be based on a clear understanding of the basis for future prosperity and well-being, including sources of future competitiveness. Foresight is critical.

This project is being carried out as the 'knowledge revolution' is arriving. This revolution will be as profound for our society as the industrial and agricultural revolutions were for earlier societies. It will change the nature of every organisation and every job - changing all that we produce, all that we earn, and all that we do.

Why foresight?

Finding paths to a knowledge-based future requires an active process that recognises four key imperatives:

- the focus on the future must not be shackled by what we have been doing in the past
- technology is a key driver for the knowledge revolution
- a globalised economy requires us to be internationally competitive, and
- the Government's strategic investment in public good science and technology must be used effectively to underpin our investment as a knowledge society.

The link between an outcome-focused Government investment and our future development as a knowledge society is foresight.

What is foresight?

The essence of the process is that we move into the future with confidence. We do not allow ourselves to be run over by a future that we never saw coming.

Foresight is about changing mindsets. We must not base public good science and technology on an understanding of how today works. The future will be fundamentally different from today, so we must ensure that priorities for public good science and technology are relevant to the needs of tomorrow These priorities must be used to develop the competencies required for a very different future ahead of us.

Foresight is not centralised planning. Rather, it is a process where we generate, and keep generating, a shared sense of where we wish to go as a society. It is about being better prepared for the future, by understanding key trends, uncertainties, and influences and drivers that will shape the way the future develops. Foresight allows us to use this view of the future to put in place now the science and technology strategies that will drive us in the desired direction.

Why now?

Following the last review of priorities in 1995, we reviewed the strengths and weaknesses of the approach taken. We identified several areas where improvements could be made, particularly in relation to the restricted time available, the limited consultation with end-users of science and technology, the quality of data for determining priorities, and the poor linkage between strategic priorities and subsequent research strategies. We recognised the need for continuous improvement in the design and implementation of priority setting process and methodology.

At the time of the last review of priorities, a two-year cycle for allocating funding from the Public Good Science Fund (PGSF) was implemented. Planning for allocations for the period 1998-2000 is now well underway. We quickly concluded that it would be impossible to review priorities in time to influence that allocation round. The new 'Notice to the Foundation for Research, Science and Technology', outlining the Government's policies and priorities for public good science and technology, issued in July 1997, does not include any changes to the output framework or the funding targets.

The target for a new set of priorities is therefore the following allocation round, for the period 2000-2002, and the timing of the Foresight Project has been based on an estimate of the work required to carry out a comprehensive review.

The Design of the Foresight Project

The Foresight Project is designed to establish a sense of direction for New Zealand's future as a knowledge society, and then use it to create the investment priorities that will help us move confidently into the future. The Foresight Project has four phases (Figure I).

The project must first establish a context for thinking about the future. We must develop the best possible assumption base about the shape of the future. This phase will culminate in a 'think-tank', in November of this year, that will be used to create a national view on required competencies and a national strategy for setting priorities.

The project requires information to be used to develop a widely shared and compelling understanding of what is important, for New Zealand generally and for the various sectors of our society and economy. Phase two of the Foresight Project will focus on knowledge foresight, sector foresight and economic evaluation of previous public good science and technology investments. We expect this information phase of the project to be completed by about October 1998.

The Government must make decisions about the priorities for public good science and technology that will help drive us towards that desirable future. Phase three will involve developing a method for developing priorities and hence allocating the future public good science and technology investment. The decision phase of the project should be completed by about March 1999.

This will lead to phase four - implementing the new priorities and investment processes. This phase will be completed as the new allocations are made from July 2000.

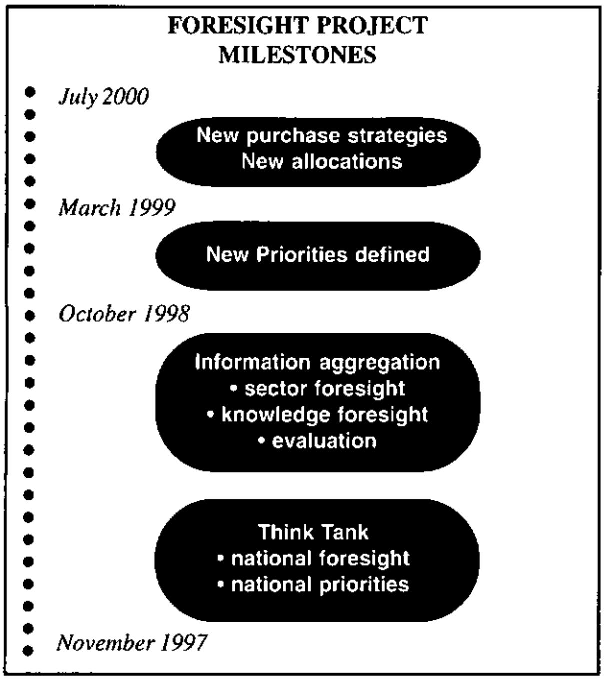

Figure 1

Information
As the Government sets priorities for future investment in public good science and technology, it must have comprehensive information available. The Foresight Project includes three key and interlocking information projects:

- **Sector Foresight** - to encourage all sectors of society and the economy to develop their own foresight, to define challenges and opportunities, and hence provide information on their science and technology priorities and strategies,
- **Knowledge Foresight** -to describe new knowledge trends around the world, and the significance of strengths and gaps in our own knowledge base, as a basis for identifying where our own knowledge-base needs to be strengthened, and
- **Evaluation** - to describe the value accruing from past public good science and technology investments, so that we will understand better how to ensure value for money from future investments.

The Ministry will be coordinating or facilitating these three projects during the next year.

Stakeholder Involvement
The Foresight Project has been designed to encourage broad participation right across the science and technology community. The project will be inclusive - we can only create the future if there is a shared understanding of where it lies.

A wide range of inputs is being sought from a wide range of stakeholders. There will be wide circulation of documents and of proposals for strategies and action as these are developed. The project will maintain a strong focus on communication. We will be making a lot of use of the communication tools of the knowledge age, including cyberspace forums, in addition to the traditional focus on public briefings and individual consultation. This will ensure that a wide range of stakeholders can become actively engaged in the process.

Future Trends and Uncertainties
We are living in an age of rapid change. While the industrial revolution shook societies for a period of 40-50 years in the 19th Century, the knowledge revolution will hit us much more quickly. We are now only on the brink of this revolution - the changes over the next two decades will be immense. We have a choice - we can keep up with this rate of change, or face the prospect of slipping to Third World status. The Foresight Project gives us a chance, and a framework, for examining some of the more important changes, based on an analysis of global trends and uncertainties.

We can't change global trends such as those shown in Figure 2, but we will certainly be affected by them.

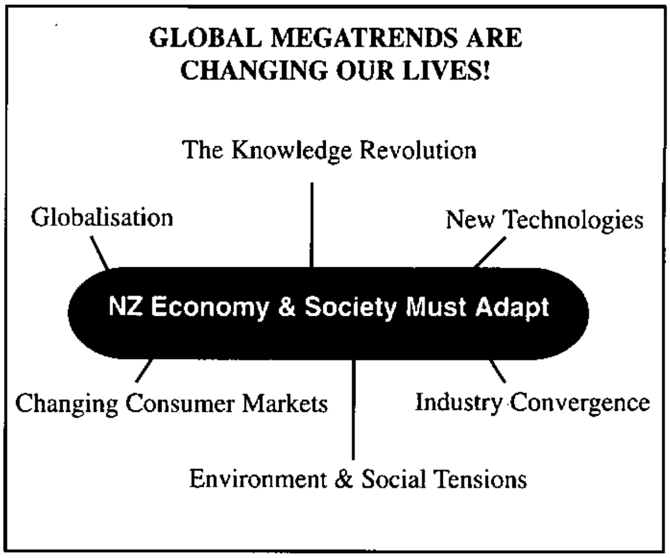

Figure 2

We are currently witnessing unprecedented global integration. For the first time in history, all regions of the world are interlocking their economies and becoming increasingly interdependent. The growing wealth of Asia, and the associated emergence of a large 'middle class', will provide huge market opportunities. The integration of Europe is allowing this region to recover from an economic slump and is providing a huge engine driving economic growth. And the increasing openness of all economies means that it is getting easier and easier to supply any market from anywhere else in the world.

New technologies are driving increased productivity and powering economic growth. Important technologies that are influencing us all include computers, telecommunications, biotechnology, nanotechnology, and new energy technologies. New developments in each of these areas of technology are likely to occur with ever-increasing pace. These technologies are also providing us with new opportunities to establish a more sustainable balance between economic productivity, environmental quality, and social cohesion.

Consumer markets are constantly changing. As consumers place increased value on niche attributes of the products they buy, there is less and less value in the traditional commodities that we have been exporting. Consumers are increasingly able to specify individually what they want and how they want it, and we are seeing a continual rise in the value of services for consumers.

Industry convergence is constantly occurring. The most obvious example is the convergence between computing, communications, and entertainment. Of similar significance, especially for New Zealand, are convergences between food and entertainment, food and health products, and tourism and food.

There is also a growing concern in the late 20th Century with a range of environmental and social tensions. The ability to sustain our consumer largesse is a key question. The economic consumption of the US, if replicated across all populations on earth, would require four times as many resources as the earth is able to sustainably provide! Social tensions, between the haves and have-nots, will change as new ways of discriminating between rich and poor emerge. Within New Zealand, we have a particularly significant risk in biosecurity.

Phase One - The Think-Tank

The first phase of this project will culminate in a two-day 'think-tank' in November led by the Minister of Research, Science and Technology. The think-tank will provide a strategic assessment of New Zealand's future as a knowledge society. This will include scenarios and implications of these for sectors. It will also outline what further information is needed, and how overall allocations might be made to achieve relevant national competencies. But the key outcome will be a process of consensus building and foresight creation that should inform, involve and capture the imagination of the people that will be involved in the subsequent phases of the project.

The think-tank will follow detailed consultation and analysis of trends, uncertainties and discontinuities (Figure 3). This work is already underway. A key part of this work is a series of interviews with Chief Executives, opinion leaders, and creative thinkers across all sectors of society and the economy. These interviews are drawing together views about the future issues and challenges, possible breakthroughs, and desirable future scenarios for specific sectors and for New Zealand as a whole. We are complementing this work with some detailed research on the changing role of science and technology in a knowledge society.

We will be developing scenarios of the future. Again, these scenarios are not central planning, but are ways of visualising different kinds of futures that adequately capture driving trends as well as our hopes and fears. Scenario development will allow us to think convergently about divergent futures. While it may be very difficult, if not impossible, to be right about the future, scenario planning minimises the chances of being wrong about the future.

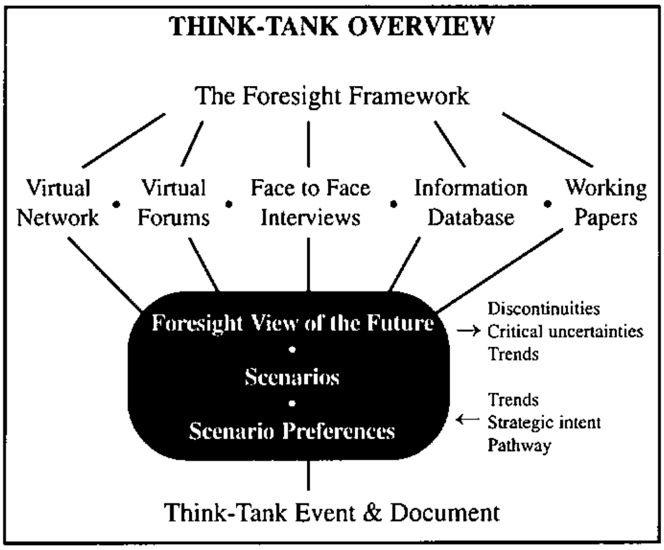

Figure 3

Who's Involved?

The project is being led by a small team within the Ministry, comprising James Buwalda, Kathy Gärden and Paul Gandar. The Hon. Maurice Williamson is also closely involved. Nick Marsh and Mike McAllum, of the Foresight Institute, have been commissioned to assist with various aspects of this project.

The Foresight Project brings together many aspects of the Ministry's work, so many other staff within the Ministry will be involved throughout. In addition, other stakeholders are closely involved. At this time, the Foundation for Research, Science and Technology and the Association of Crown Research Institutes are already contributing directly to this project.

NEW ARRANGEMENTS FOR FUNDING HEALTH RESEARCH

The Government has recently agreed to new arrangements for funding health research. Now health research will be funded from Vote Research, Science and Technology (RS&T), along with all other areas of public good science and technology. This change will reduce the chances of 'gaps' between sources of funding, overcoming difficulties with areas such as medical engineering and environmental health. It should also ensure that funding commitments for biomedical research are maintained.

Health research was not included in the major science reforms of the last decade. Left within Vote Health, funding for health research (through the Health Research Council) had to compete with all other demands for health funding. Furthermore, health research was marginally funded, and institutions carrying out the research were expected to cover the costs of overheads from other sources.

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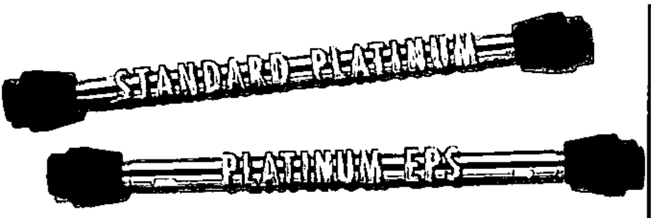

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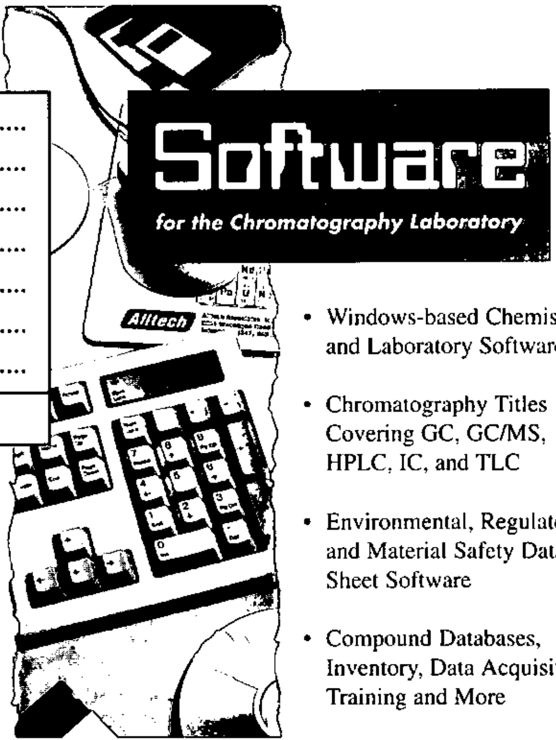

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In recent years, a funding crisis for health research became apparent. In particular, direct funding for biomedical research was cut, health research providers were also finding it increasingly difficult to meet the overhead costs of marginally funded health research. Health researchers became acutely aware of their plight as they saw funding increases for various research, science and technology programmes pass them by.

The Ministry of Research, Science and Technology worked with the Ministries of Health and Education, and with health research providers, for more than a year and a half to develop proposals for integrating heath research with other areas of public good science and technology. This work focused on ensuring that the priorities for all research areas could be considered together. An integrated priority setting exercise requires similar funding arrangements for all areas, so a move to full funding for health research also had to be achieved. Key features of the new funding arrangements are:

- About $26 million of health research funding previously within Vote Health has been transferred to Vote RS&T. An output for Health Research now sits alongside the 17 Public Good Science Fund (PGSF) outputs, in the 'Public Good Science and Technology' output class purchased by the Government.
- Funding for health research has been increased by about $5 million in the 1997 Budget. Further increases for health research will be considered in future years, as increased funding for the Science Envelope is allocated across the Government's various science and technology programmes.
- Health research providers will voluntarily contribute EFTS funding from Vote Education, adding this to the direct funding for health research, to enable health research projects to be fully funded. Auckland and Otago Universities are the major health research providers involved, but a range of other tertiary education institutions are also likely to be involved.
- The Health Research Council will be contracted by the Minister of Research, Science and Technology to purchase health research, according to priorities agreed by the Government. This arrangement is structurally similar to that applying to the Foundation for Research, Science and Technology (FRST) and the PGSF, but its purchase activities will be directed by a statement of priorities.

While the new arrangements take effect from 1 July 1997, a period of transition is anticipated before full implementation. During this transition period, special arrangements will provide some funding certainty for those providers voluntarily committing Vote Education funding to enable health research projects to be fully funded.

These new arrangements pave the way for a complete integration of health research with other areas of public good science and technology. In particular, health research priorities will be considered as part of the comprehensive review of priorities for public good science and technology over the next two years.

For further information on the new arrangements for health research, contact:
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BUDGET '97
VOTE RESEARCH, SCIENCE AND TECHNOLOGY

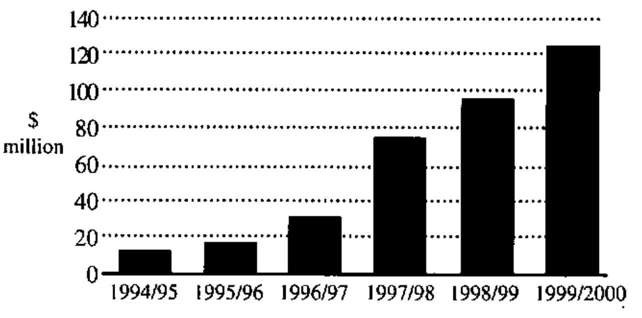
The Government maintains a long-term commitment to science and technology
The Government's investment in research, science and technology is continuing to increase, giving effect to the strategic goals and direction outlined in RS&T:2010: The Government's Strategy for Research, Science and Technology in New Zealand to the Year 2010, which was released last year. Total research, science and technology investment, across all of the Government's programmes will increase by $45 million in 1997/98, and by $95 million over the next three years (1997/98-1999/2000).

The portfolio 'Research, Science and Technology' (RS&T) is not the only Vote through which science and technology is funded by the Government. The total public investment is being considered as a 'Science Envelope', which includes investment in other Votes. The increases in science and technology expenditure are being allocated through this envelope. The increases announced now for the three-year period from 1997/98 to 1999/2000 represent an increase of nearly 20% for the Science Envelope.

Taking an across-portfolio approach to investment in RS&T requires priorities to be set at a high level. These priorities are initially considered in terms of the following major categories of investment:

- public good science and technology (strategic and non-prioritised programmes
- practical application (including technology linked programmes and research in Government departments), and
- underpinning services (especially management of the science and technology investment).

CUMULATIVE INCREASE IN FUNDING ABOVE THE 1993/94 BASELINE



The main themes in the 1997 Budget are consistent with the priorities outlined in RS&T:2010:

- Increasing the emphasis on technology - The new Technology New Zealand scheme provides a focus for the Government's investment in technological innovation.
- Increasing high quality science and technology investment - investment in public good science and technology, including

health research, will increase, as will investment in the Marsden Fund for excellent, non-prioritised research.

- Science and technology for improving government decision-making - The increasing investment in science and technology includes funding for new research to support the operations of Government departments.
- Promotion of science and technology - Enhancing values and attitudes supportive of science and technology as critical to future prosperity and well-being will be supported by increasing the investment in promotion of science and technology.

The Public Good Science Fund

At $282 million (including $14 million newly-invested in 1997/98), the Public Good Science Fund (PGSF) is the Government's major investment in strategic science and technology. The absolute size of this investment, and the Government's commitment to further increases, recognises the crucial role of science and technology in underpinning sustainable economic growth, a cohesive society and a 'clean green' environment in New Zealand, for this and future generations.

The PGSF is allocated through a contestable bidding system, and is used for the purchase of research, development, scientific services and technology transfer. The allocation of funds is guided by priorities which are determined through a widely consultative process, involving both practitioners and users of science. Priorities are expressed by setting funding levels for 17 broad areas to which research, scientific services and technology are expected to contribute. The funding levels for 1997/98 and targets for 2000/01 are shown in the table below.

Promotion of Technology for Business Growth

The Government has introduced a new scheme for the promotion of technology for business growth, known as Technology New Zealand that will increase the ability of companies to adopt new technology and to apply technological innovation for business growth. Funding will increase by $4.42 million, to $15.694 million in 1997/98. The increase in funding reflects the increasing level of importance the Government is placing on technology as a factor in enhancing New Zealand's competitive advantage.

The Technology New Zealand scheme will be managed by the Foundation for Research, Science and Technology and will consist of three programmes, TechLink, Technology for Business Growth, and Graduates in Industry Fellowships. A key element of the overall scheme will be the coordination, in conjunction with other technology providers, of the provision of national and international information and technology services that are relevant to New Zealand companies.

TechLink, a new programme, is intended to create awareness and facilitate access by companies to new technologies. TechLink will support a wide range of activities, from the promotion of technology success stories and the establishment of Internet-based technology services, through to assisting firms in identifying technology-based opportunities. The outcome of the programme will be an increased ability by New Zealand companies to access new technology and undertake technological innovation.

The other two programmes Technology for Business Growth and Graduates in Industry Fellowships, are existing programmes that have been expanded to make them more accessible to a wider range of firms.

Technology for Business Growth aims to foster research and development and technological innovation within companies. This will be achieved through part-funding of technology-based projects that will enable companies to undertake projects they would otherwise not be able to pursue. The scheme will support projects within companies varying in current technological capability. Companies will have the opportunity to engage, where necessary, the services of an appropriate technology partner. The outcome of the programme will be an increased capability by New Zealand companies to develop strategic

Area to which science and technology is to contribute	1997/98 funding ($M)	Target level for 2000/01($M)
1. Animal Industries	36.7	37.0
2. Dairy Industries	13.2	16.2
3. Forage	21.0	22.5
4. Horticultural, Arable & Other Food and Beverage Industries	51.3	51.3
5. Forestry & Forest Product Industries	23.4	26.7
6. Fisheries & Aquaculture Industries	7.4	10.1
7. Manufacturing Industries & Industrial Technologies	30.4	35.9
8. Tourism, Commercial & Other Services	1.3	3.1
9. Information, Communications Networks & Services	3.4	6.5
10. Construction	4.9	6.8
11. Energy	5.8	7.8
12. Transport & Distribution Systems	1.5	2.7
13. Society & Culture	6.9	10.1
14. Earth Resources & Processes	16.4	20.7
15. Land & Fresh Water Ecosystems	33.1	40.0
16. Marine Environments, Climate & Atmosphere	23.2	30.3
17. Antarctic Research	2.1	2.6
TOTAL	282.0	330.0

technology management skills and to undertake technological innovation.

Graduates in Industry Fellowships will provide support for science and technology-based projects carried out within a company, or a group of companies, conducted by an individual. The types of individuals able to participate in the programme have been expanded to include both senior undergraduates and postdoctoral fellows. In the majority of projects, support will be provided by an appropriate research provider, for example a University or polytechnic. The outcome of the programme will be an enhanced level of scientific and technologically qualified individuals working within New Zealand companies.

The Public Good Health Research

New funding of around $5 million has been allocated to public good health research through Vote RS&T. Health research has previously been funded only through Vote Health. Priorities for the new funding will be:

- ensuring that all new research is fully funded, in the same manner as other public good science and technology in Vote RS&T

- making sure that the integrity of underpinning biomedical research is maintained and enhanced, and

- ensuring that research which has until now tended to fall between the jurisdictions of the Health Research Council and the Foundation for Research Science and Technology is not disadvantaged.

The new funding will be administered by the Health Research Council.

The Marsden Fund

The Marsden Fund is to double in size, from $11 million in 1996/97 to $22 million in 1997/98.

The Marsden Fund supports excellent research and researchers on the basis of scientific merit, The objectives of the scheme are:

- to enhance the underpinning scientific knowledge-base in New Zealand, and
- to broaden and deepen the research skill-base in New Zealand.

The fund complements and underpins the Government's strategic investment through the PGSF by enhancing both the human resource base and the fundamental knowledge base. In 1997/98, the scope of the Marsden Fund is being extended to include research in the humanities.

In supporting excellent research 'for its own sake', the Government is ensuring that New Zealand is contributing to, and benefiting from, the advancement of knowledge globally, and is laying the foundations for strategically-oriented research of direct benefit to New Zealand. This scheme also provides for the long-term and sometimes random aspects of research, which may lead to profound or unexpected discoveries, or catalyse significant developments in previously unrelated and strategically important fields of science.

In supporting excellent researchers, the government is contributing to the enhancement of the quality of the research environment, by creating increased opportunity for researchers to undertake research of their own choosing in New Zealand,

The Marsden Fund is a contestable fund, administered by The Royal Society of New Zealand on the advice of the Marsden Fund Committee which is appointed by the Minister of Research, Science and Technology. Eligibility to bid to the fund is unrestricted.

Departmental research supported through the science envelope

The concept of the Science Envelope means that the Government is taking an aggregate view at investment in science and technology. Increased funding through the Science Envelope will not be confined to Vote RS&T.

A new initiative in the 1997/98 year is to support additional research in Government departments as part of the increase in public investment in science and technology. This recognises the importance of the practical application of research so that the government's own activities are based on adequate scientific and technical knowledge.

This year a total of $3.72 million will be allocated to departments to carry out specific research projects. Funding will be transferred to the host department for the duration of the project, then returned to the Science Envelope for reallocation.

Research proposals were selected through a contestable process run by the Ministry of Research, Science and Technology. All departments were invited to submit proposals that were then ranked on the basis of four broad criteria:

- the extent to which the proposal advanced the Government's strategic objectives, particularly those set down in the Coalition Agreement

- the level of cross-portfolio relevance and commitment

- the merit of the proposal in a technical sense, and

- the 'fit' with other departmental research, and research funded through the PGSF.

Science input into public policy and coordination of science

Greater emphasis in the coming year is to be given to supporting scientific and technological input into public policy, and the coordination of science activities.

Decision-making across the Government needs to be supported by high quality scientific and technological information, analysis and advice, particularly for complex and uncertain areas of policy. It is important that balanced scientific information is presented, uncertainty reduced, gaps in knowledge identified and alternative courses of action analysed. Many issues surrounding trade, international conventions, natural resources, environmental protection, public safety and welfare, and key areas of social policy require sound scientific and technical input.

In a devolved science system, active coordination is necessary to ensure alignment between various key strategic areas of

Government activity, and the purchasers, providers and the users of science. National Science Strategies are a formal Government-approved mechanism for facilitating coordination that have proved effective in several areas, such as Climate Change and Possums and Bovine Tb Control. Other coordination mechanisms are also important, such as *ad hoc* committees, expert groups, workshops and publications

Science and Technology for Public Policy Programme
Three broad areas of activity will be carried out under this programme:

- improving the capabilities of individual departments to recognise the need for and develop processes to incorporate appropriate scientific and technical advice into policy,
- providing or facilitating independent advice on issues that fall outside or across individual departments or where public confidence requires independent advice, and
- providing or facilitating scientific and technical advice arising from the policy work of departments, both through official committees and as directed by Ministers or Cabinet.

Coordination of Science Programme
Three broad areas of activity will be carried out under this programme.

- conduct a Knowledge Foresight exercise based on science disciplines to identify future opportunities for New Zealand and requirements for capability formation and changes in funding priorities. This is linked to the larger foresight activity being carried out by the Ministry as part of the PGSF priority setting process
- support for current National Science Strategies in Possums and Bovine Tb Control, Climate Change and Sustainable Land Management, and
- consideration of other areas that may warrant National Science Strategy status, such as Biodiversity and Marine Science, and support of *ad hoc* coordination activities.

Promotion of Science and Technology
This year science and technology promotion activity will receive an additional $0.98 million, taking the overall investment to $2.93 million. Approximately half of this increase will be directed towards a new high profile Science and Technology Promotion Campaign, to be administered by the Ministry of Research, Science and Technology.

New Science and Technology Promotion Campaign
The aim of the campaign is to improve and promote the overall image of science and technology and its role in New Zealand's knowledge-based future. The campaign represents the Government's leadership in championing the role of science and technology in underpinning competitive industries, sustainable resource management and the enhancement of social cohesion.

The core activity in the promotion campaign will be media-based (including television and the Internet), and will draw together appropriate science and technology promotion activities sponsored by governmental and non-Crown Organizations.

Increased Funding for James Cook Fellowships
Funding for James Cook Fellowships will double from $360,000 in 1996/97 to $720,000 in 1997/98. The prestigious James Cook Fellowships are awarded annually to senior researchers who have achieved sustained excellence in their respective fields. Two new James Cook Fellowships will be offered in 1997/98, bringing the total number of fellowships to six. In addition, the level of funding per fellow will be increased. The scheme is administered by the Royal Society of New Zealand.

Increased Funding for Maori Fellowships
An additional $100,000 will be made available to the Tuapapa Putaiao Maori Fellowship Scheme, bringing total funding to $400,000 in 1997/98. The objectives of the programme are to develop and promote Maori role models in science, technology and engineering research, by providing fellowships for suitably-qualified Maori students to undertake postgraduate research. The scheme is administered by the Foundation for Research, Science and Technology.

Carter Observatory
The Government supports the promotion of a science and technology culture through its support of the Carter Observatory. An additional $100,500 will be made available in 1997/98, bringing the total level of funding to $227,000.

International science and technology linkages
International linkages are a key ingredient in New Zealand's development and productive use of science and technology. At all levels, from scientist-to-scientist research collaboration to multilateral inter-governmental treaties, we must seek to maximise the benefit from our international linkages.

The Government has an International Science and Technology (ISAT) Linkages Fund to help ensure this benefit is gained. The ISAT Linkages funding supports the Government's multilateral and bilateral international commitments, and enhances researcher and institutional linkages to ensure our science and technology activities are fully integrated with the best international R&D efforts. In 1997/98, funding for the ISAT Linkages will increase by $150,000, to $1.038 million.
There are three broad areas to which funding is allocated:

- *Bilateral Linkages* - support for collaborative international linkages, principally at a researcher to researcher level. These sub-programmes give priority support to building New Zealand relationships with countries of the Asia-Pacific region ($305,000).
- *Non-Governmental* - support for the Royal Society of New Zealand and similar national bodies to establish and enhance their international linkages, especially within the Asia-Pacific region ($150,000).
- *Strategic Initiatives* - funding allocated to support Government-level initiatives and responsibilities, including support for New Zealand participation in APEC projects ($583,000).

The Bilateral Linkages sub-programmes and the funding for Non-Governmental activities will be administered by the Royal Society of New Zealand in 1997/98, while the Ministry of Research, Science and Technology will administer the funding allocated to strategic initiatives.

Increased support for national measurement standards

In recognition of the key role National Measurement Standards play in the New Zealand economy, the Government's investment in this area has been increased to $4.154 million for 1997/ 98. This represents an increase of approximately 17% over the previous year.

The additional funding is to support comparative work establishing the accuracy of standards in relation to other countries, and to extend coverage of New Zealand's measurement standards into new fields which are of increasing importance in terms of commerce and international trade. This new funding will support:

- Developing new standards for humidity, which is an important parameter for many of New Zealand's products. For example, the successful export of perishable foodstuffs from New Zealand relies on maintenance of optimum conditions of temperature and humidity during transport to world markets.
- Improving the existing standard for alternating voltage, which is fundamentally important in the distribution of electrical power. This has direct implications for important sectors such as navigational safety, telecommunications and the use of electrical energy. It also supports basic electrical testing that is essential for New Zealand's trade in electrical and electronic goods.
- Investigating the establishment of chemical measurement standards, which will strengthen all national and local body legislation where chemical measurement is involved. Examples include agricultural inspection, food hygiene, blood alcohol, pollution, and illicit drugs. The continued international acceptance of New Zealand's goods will also be enhanced by improved chemical standards.

Summary of 1997/98 Budget announcements

Public funding of science and technology will continue to increase in 1997/98, as part of the Government's commitment to lift public investment towards 0.8% of GDP. Continuing the pattern of previous Budgets, this Budget includes commitments for a three-year period, including funding increases of $45 million for 1997/1998, $20 million for 1998/1999 and $30 million for 1999/2000.

Details of the distribution of the investment are available for only the immediate year ahead, 1997/98. Of the overall increase of $45 million, the largest part will be an increase of more than $14 million for the PGSF, bringing this investment to $282 million. This increase continues the commitment to lift the total investment in the PGSF to $330 million by 2000/2001. Most of the increase will be allocated for new science and technology on the environment, manufacturing, forestry and fisheries. In addition to the increased funding for the PGSF, funding for health research will increase by about $5 million.

The Marsden Fund, for supporting excellent research, will increase by $ 11 million, to $22 million in 1997/98. The scope of the Marsden Fund has also been widened, to include research in the humanities. Investment in the Marsden Fund is now clearly on track to reach 10% of the PGSF.

A significant increase in funding for technological innovation programmes is a key feature of this Budget. The new Technology New Zealand Scheme, including the TechLink, Technology for Business Growth, and Graduates in Industry Fellowship programmes will be funded at $ 15.7 million. Increasing the investment in technology programmes is likely to continue in future Budgets.

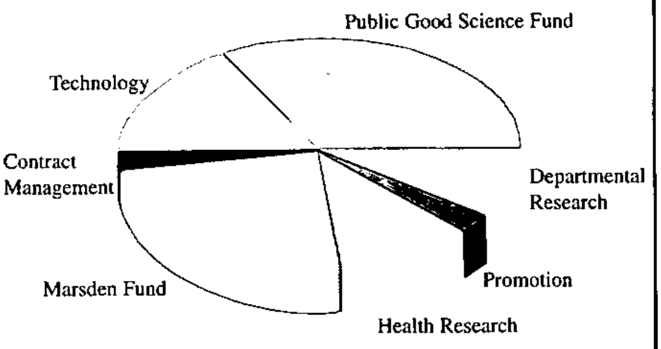
Not all the increased public investment will occur within Vote RS&T. This year, more than $5 million has also been allocated for new research in other Government departments, to support decision-making by the Government in general. Further increases in departmental research are expected in future Budgets. Funding for providing scientific and technical advice and coordination by the Ministry of Research, Science and Technology has also been increased by $600,000.

Funding for promotion of science and technology has been increased by nearly $1 million. This funding will be used for a range of programmes for promoting awareness and understanding of science and technology, and their role in supporting future prosperity and well-being.

Other changes include an increase of $620,000 for enhancing the research supporting New Zealand's National Measurement Standards, and an increase of $150,000 for expanding its range of international linkages.

The following chart shows the distribution of the new funding ($45 million) for 1997/98.

DISTRIBUTION OF THE $45 MILLION FOR 1997/1998



For further queries on the 1997 Budget decisions relating to Vote RS&T, please contact:
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Fundamentals and Applications of Electrospray Ionisation Mass Spectrometry in the Dairy Industry

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Introduction

Recent advances in ionisation technology has seen mass spectrometry emerge as a fundamental tool in understanding protein structure and interactions. Electrospray ionisation mass spectrometry (ESI-MS) in particular has proven to be extremely useful in the analysis of large, labile biomolecules up to 200 kDa with a precision of 0.01% or better (Fenn *et al.*, 1989). This exceeds the accuracy of conventional techniques such as sodium dodecyl sulfate - polyacrylamide gel electrophoresis (SDS-PAGE) by orders of magnitude. By gradually increasing the amount of energy added to the sample (during ionisation, acceleration, or by collision with other molecules), a wide range of compounds from non-covalently bound complexes through to extensively fragmented products may be detected.

For the protein biochemist peptide mapping is a powerful tool for the characterisation and identification of proteins. Peptides from protein hydrolysates have been traditionally separated by reverse phase HPLC and subsequently sequenced by Edman degradation. Development of robust N- and C-terminal sequencing chemistry, and automated amino acid sequencing equipment have substantially reduced analysis times. However branched chain sequences, blocked termini and modified residues often make sequencing difficult. ESI-MS combined with liquid chromatography makes it possible to perform peptide maps with on-line spectral and mass information. Identification of a parent protein may be deduced by comparison of digest fragments with theoretical digests from a database of known proteins. By inducing fragmentation of separated peptides, partial or full primary sequence information may be derived during chromatography including modified residues.

Fundamentals

The production of gas-phase molecular ions is central to the process of mass spectrometric analysis. This is achieved either by charge transfer (Figure 1a) or proton transfer (Figure 1b). The mass of the molecular ion ($M^{\cdot+}$) is nearly identical in mass to the original molecule (M), as the mass of an electron (9.11×10^{-28} g) is negligible compared to the mass of the molecule (e.g. 1 molecule of alanine = 1.48×10^{-22} g).

(a) Charge transfer	(b) Proton transfer
$e^- + M \rightarrow M^{\cdot+} + 2e^-$ $M^{\cdot+} + 2e^- \rightarrow A^+, B^+, M^{\cdot+}$ Where A^+, B^+ = fragment ions, $M^{\cdot+}$ = molecular ion	$XH^+ + M \rightarrow MH^+ + X$ e.g. $CH_4 + e^- \rightarrow CH_4^{\cdot+} + 2e^-$ $CH_4^{\cdot+} + CH_4 \rightarrow CH_5^+ + CH_3^\cdot$ $CH_5^+ + M \rightarrow CH_4 + MH^+$ Where MH^+ = quasimolecular ion

Figure 1: *Comparison of charge transfer and proton transfer processes showing production of molecular ($M^{\cdot+}$) and quasimolecular (MH^+) ions.*

The quasimolecular ion (MH^+) has a mass of one unit higher than the original molecular mass. Molecular ions are then introduced to a mass analyser which functions to separate ions according to their mass to charge ratio (*m/z*). Discrete ions are focused on a detector where the signal is amplified. By varying the field strength in magnetic sector, quadrupole, ion trap and Fourier transform ion cyclotron resonance analysers, ions of different *m/z* are focused on the detector. With time-of-flight detectors *m/z* is determined from the time interval between sample ionisation (usually by pulsed laser) and detection at a remote location - heavier ions taking longer to travel from source to detector.

Mass analysers have a limited range over which they operate. Typically a quadrupole analyser may scan up to 4,000 *m/z*; magnetic sector analysers vary from 5,000 to 20,000 *m/z* depending on field strength. The upper mass range of singly charged ions able to be resolved is thus limited by the *m/z* range of the analyser.

The major breakthrough in mass spectrometry of large biomolecules was the development of electrospray ionisation and later matrix-assisted laser desorption ionisation (MALDI). Electrospray ionisation produces intact molecules in an ionised form by nebulisation in the presence of a strong electric field (2 - 5 kV). Sample solution in a volatile solvent emerging from a capillary is dispersed into an aerosol of charged droplets. Droplets diminish in size by solvent evaporation assisted by heat or dry gas. At some critical field value repulsion forces between similarly charged ions clustered at the droplet surface overcome surface tension resulting in ionised material being emitted from the droplet into the gas phase (Figure 2).

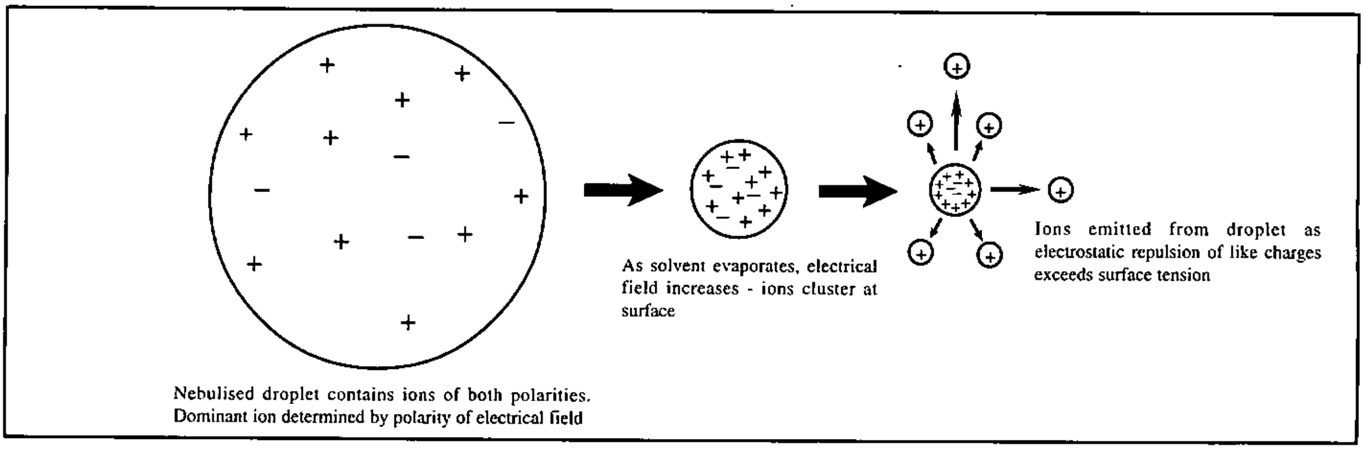


Figure 2: *Gas phase ion production via electrospray ionisation.*

Ionised molecules in the gas phase may carry several charges ($(M+nH)^{n+}$). Thus for a single molecule a family of charged states may be formed. On average, proteins and peptides carry between 5 and 15 charges per 100 residues depending on amino acid composition. A protein of molecular mass 10,000 carrying 10 protons would be detected at a *m/z* of

$$\frac{(10{,}000 + 10)^{10+}}{10} = 1001.0$$

- back into the *m/z* range detectable by most detectors. The mass of a multiply-charged compound is then determined by the *m/z* of adjacent peaks. Deconvolution software calculates a mass value for each pair of adjacent peaks, averages the values and converts the data to a true mass scale (Figure 3).

In tandem mass spectrometry (MS-MS) two consecutive stages of mass analysis are utilised. The first stage selects a single parent ion, directing it to a collision cell. There it is bombarded with a neutral gas causing fragmentation in a process called collision-induced dissociation (CID). The resultant family of fragmentation (or daughter) ions is scanned by a second mass analyser. Partial, if not complete sequence information may be deduced from the mass differences between successive fragments.

Applications in Protein and Peptide Analysis

The analysis of flavour compounds using mass spectrometry has been applied by the dairy industry for many years. To date ESI mass spectroscopic analysis of proteins and peptides have taken priority over analysis of lipids, oligosaccharides, biopolymers, vitamins, minerals, trace contaminants, nucleic acids, and metabolites. But the potential applications of mass spectrometry are much wider than simple(!) analysis. Reports have been published utilising mass spectrometry for a much wider range of applications such as:

- secondary and tertiary structure analysis using deuterium exchange
- characterisation of binding sites
- enzyme kinetics
- chiral differentiation
- recombinant DNA and protein analysis
- determination of non-covalent interactions
- and even purification of viral particles.

Much of the New Zealand Dairy Research Institute's initial ESI mass spectrometry experience has concentrated on detection of milk protein variants to confirm phenotypes determined by traditional gel electrophoretic techniques. Traditionally milk

Figure 3: (a) Raw spectrum of a mixture of two proteins. Numbers above peaks indicate the charge states of each ion species.

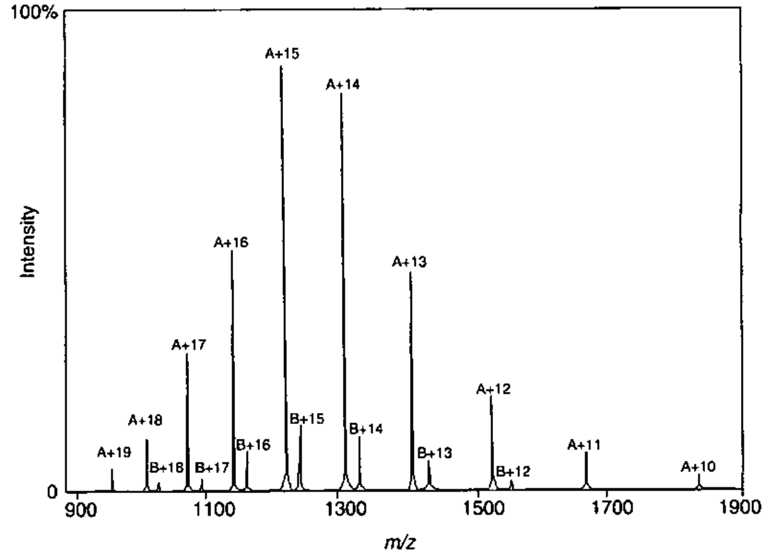
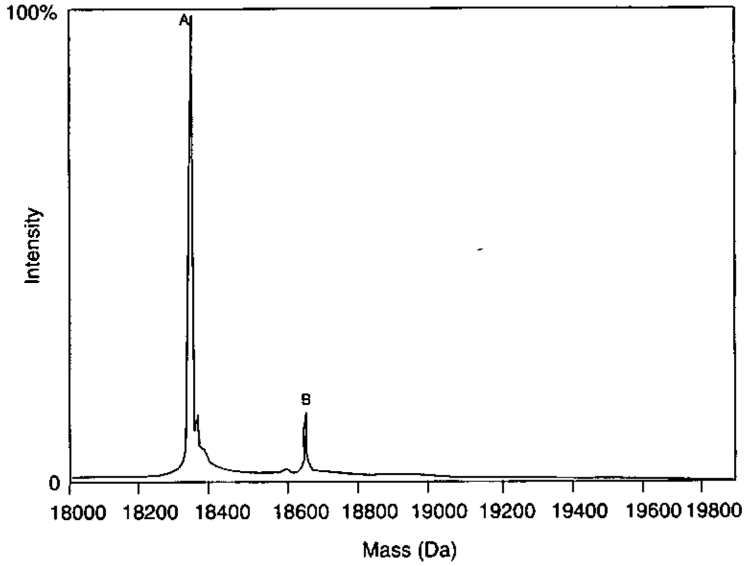
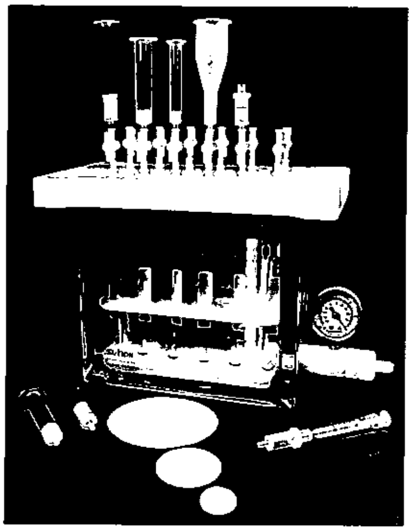


Figure 3: (b) Reconstructed mass spectrum of (a) after transformation to a true mass scale.



protein variants have been detected by electrophoretic techniques that are able to resolve proteins differing in net charge or isoelectric point. Mutations that do not alter the net charge (neutral or similar charge residue substitutions) are unlikely to be detected by polyacrylamide gel electrophoresis (PAGE). These 'silent' variants are likely to be associated with changes in milk physico-chemical properties, composition, yield of milk components and functionality of milk, as observed with 'electrophoretic' variants.

The major bovine milk proteins range from 14 kDa to 25 kDa. Proteins are variously phosphorylated, glycosylated and disulfide bonded. Typically the mass of milk proteins were resolved to 2 mass units or better enabling confirmation of sequence and post-translational modifications with a reasonable degree of certainty. It has been a surprise not to have detected any new silent variants to date, suggesting a rather restricted gene pool for milk proteins within New Zealand's dairy population (Burr *et al.*, 1994; Burr, 1997).



Many dairy products rely upon specific hydrolysis patterns to develop their taste and functional properties. The complexity of a milk system makes traditional peptide separation, isolation, sequencing and identification of the peptide source a daunting task. With a carefully defined milk protein database it is possible to:

(a) scan unseparated peptide mixtures for parent ions of common fragmentation products of peptides
(b) select identified parent ions for MS-MS
(c) obtain sequence information from fragmented peptides
(d) identify the parent protein from a comparison of derived peptide sequences and milk protein sequences
(e) define enzyme specificity within a 'real' milk system (cf. isolated protein system)

within a much shorter time frame than traditional sequencing methodology using as little as 1 mL of sample at a concentration of 10 fmol/mL.

Various types of cross-linking and amino acid modifications occur during processing and storage (racemisation, formation of lysinoalanine, histidinoalanine, lanthionine, oxidation products of methionine, Amadori rearrangement products, deamidation and dephosphorylated products), which impact upon the nutritional quality and functional characteristics of milk products. To a large degree many of the potential modifications are poorly characterised and are difficult to analyse by conventional HPLC or other methods due in part to a lack of standards. ESI-MS is now taking a role in characterising these products and quantifying them in milk products.

This is but a drop in the proverbial milk pail of applications within the dairy industry. It is increasingly clear that the ability to analyse mass spectrometric data is even more important than being able to generate it. The development of sophisticated search and match algorithms is central to quickly returning meaningful results. Interlacing data acquisition/analysis with on-line remote database searching (EMBL/SwissProt/Genpep etc.) expands the horizons of possibilities even further.

As with any newly introduced technology the learning curve has been steep. It is anticipated that the view from the top of the curve will be spectacular!

References

Burr, R, Hill, J P, Moore, C H, Ng-Kwai-Hang, K F (1994). Identification of silent milk protein variants in the milk produced from New Zealand dairy cows. In *Brief Communications and Abstracts of Posters and Invited Papers. 24th International Dairy Congress, Melbourne,Australia, 18th-22nd September, 1994*, p. 181. International Dairy Federation, Brussels.

Burr, R (1997). Phenotyping of bovine b-lactoglobulin genetic variants in a New Zealand dairy cattle population. In *Milk Protein Polymorphism II, IDF Special Issue.* International Dairy Federation, Brussels (in press).

Fenn, J B, Mann, M, Meng, C K, Wong, C F, Whitehouse, C M (1989). Electrospray ionisation for mass spectrometry of large biomolecules. *Science*, **246**, 64-71.

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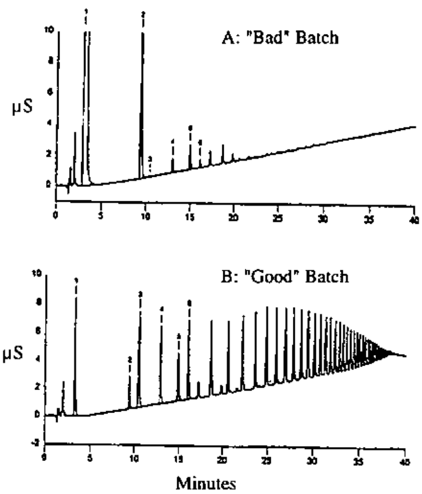
Dairy Industry Applications

Phosphates in Cheese Products



Column: IonPac AS11 (2 mm), AG11 guard (2 mm), and ATC trap (2 mm)
Eluent: Sodium hydroxide gradient
Flow Rate: 0.3 mL/min
Injection Volume: 10 µL
Detection: Suppressed conductivity, ASRS, AutoSuppression, recycle mode
Peaks: 1. PO_4
2. P_2O_7
3. P_3O_9
4. P_3O_{10}
5. P_4O_{12}
6. P_4O_{13}

Reproduced from Baluyot, E.; Hanford, C.G. *J. Chromatogr.*, 1996, A. 739, 217-222.

Phosphates are widely used additives in products such as fruit juices and canned goods to prevent discolouration and off-flavours. They are also used for curing ham, tenderizing vegetables, as emulsion stabilisers for cheese, and to retain moisture in frozen entrees. The functionality of polyphosphates in these applications is strongly dependent on their sequestering power and buffering capacity, which is related to the polyphosphate chain length.

Commercial polyphosphates are mixtures of polyphosphates with different chain lengths. The most widely accepted method for characterising these products has been to determine average chain length by end-group titration. Microbore ion chromatography is increasingly being adopted for lot-to-lot quality control and for identification of polyphosphate products in unknown samples because it provides a "fingerprint" of the actual chain-length distribution. The chromatographic profiles shown above are of two 50% sodium hexametaphosphate solutions that were prepared from the same lot of dry powder but produced cheese products with significantly different characteristics. These chromatograms indicated a different degree of hydrolysis at a critical point in the processing and pinpointed a problem with solution handling.

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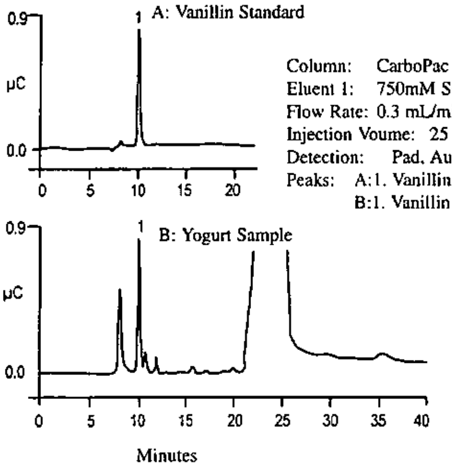
Vanillin in Yoghurt

Vanillin is the most widely used flavouring in food products. Adulteration of natural vanillin by synthetic products is also a major concern. Vanillin is an aromatic aldehyde and can be detected by pulsed amperometric detection with high sensitivity and specificity. This is particularly advantageous when determinations are made in complex food matrices since clean-up procedures can be minimised. The chromatograms below show the determination of vanillin in a sample of yoghurt. Sample preparation involved a 10-fold weight/volume dilution and filtration (0.45 µm).



Column: CarboPac MA1
Eluent 1: 750mM Sodium hydroxide
Flow Rate: 0.3 mL/min
Injection Voume: 25 µL
Detection: Pad. Au electrode
Peaks: A:1. Vanillin Standard 0.46 µg/L
B:1. Vanillin in Sample 0.45 µg/L

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New Applications From Aurora Instruments

The following abstracts are from papers presented at XXX Colloqium Spectroscopium Internationale, Melbourne, 21-26 September 1997.

AN AUTOMATIC ATOMIC FLUORESCENCE SPECTROMETER WITH FLOW INJECTION/ HYDRIDE GENERATION FOR TRACE ANALYSIS

Atomic Fluorescence Spectrometry (AFS) exhibits good advantages in terms of a wide linear working range and low detection levels. Fluorescence signals can be enhanced by increasing the intensity of the excitation source. Therefore, pulsed high intensity hollow cathode lamps have been used and demonstrated to give significantly improved detection limits. The limitation of this technique, namely interfering species is minimised by coupling AFS to a vapour generator. This combination offers both high sensitivity and specificity.

The Aurora Instruments AI 3100 employs the FIA technique to generate a hydride. On-line dilution and batch sample preparation have been performed on an automated system, therefore, unattended operation from the time the raw sample is gathered to the time the read-out is made is possible. The AI 3100 is designed to completely eliminate scattered light from entering the atomisation system. A temperature monitor mounted inside the atomiser is used to provide strict control of reaction conditions. The lamps used on the instrument have been specifically designed to ensure high intensities and long lifetimes.

The dynamic linear range of measurement spans 3 orders of magnitude. Elements determined using the AI 3100 include: Hg, Se, As, Pb, Sb, Te, Bi, Sb, Sn, Ge and Zn. This method is applicable to the areas of: food and dairy products, environmental, bio-medical, pharmaceutical, petrochemical, agricultural, metallurgical, and geological testing.

THE RADIO FREQUENCY ISOTHERMAL GRAPHITE PLASMA FURNACE - A SOURCE FOR ANALYTICAL ATOMIC SPECTROSCOPY

Graphite Furnace Atomic Absorption Spectrometry (GF-AAS) and Inductively Coupled Plasma-Optical Emission Spectrometry (ICP-OES) are two of the most popular methods of elemental analysis. The strength of GF-AAS lies in its low detection limits, use of small sample sizes and relative freedom from spectral interferences. Unfortunately, due to the manner in which GF-AAS is carried out it suffers from low sample throughput and moderate problems with chemical interferences. ICP-OES, on the other hand, is noted for relatively high sample throughputs, the wide range of elements it is applicable to, the ability to use internal standardisation and freedom of chemical interferences. The advantages of ICP-OES are offset however by poorer detection limits, the need for larger sample volumes and spectral interferences.

Graphite Furnace-Capacitively Coupled Plasma (GF-CCP) Spectrometry is a novel analytical atomic emission technique that combines the sensitivity of GF-AAS with the simultaneous, multi-element capability of ICP-OES. The source used consists of a graphite furnace atomiser similar to that used in GF-AAS which has a centre electrode running longitudinally through the furnace. By applying RF power to the centre electrode, an atmospheric-pressure plasma can be initiated and maintained in the inner volume of the furnace. The GF-CCP combines the high-efficiency atomisation exhibited by electrothermal atomisation and the high excitation efficiency inherent in atmospheric pressure plasmas. Some analytical figures of merit are presented with an emphasis on detection limits for both metals and non-metals. Results are also being compared to those of other established methods.

GRAPHITE FURNACE CAPACITIVELY COUPLED PLASMA EMISSION SPECTROMETRY FOR THE DETERMINATION OF TRACE PHOSPHORUS

Graphite Furnace Capacitively Coupled Plasma (GF-CCP) spectrometry is a novel analytical emission technique that combines the sensitivity of Graphite Furnace Atomic Absorption Spectrometry (GFAAS) with the simultaneous multi-element capability of Inductively Coupled Plasma-Optical Emission Spectrometry (ICP-OES). A helium plasma is easily initiated and maintained within the furnace tube, which is especially beneficial for the determination of non-metals in terms of sensitivity.

The GF-CCP is a tandem source in that the high efficiency excitation inherent in plasmas is used in conjunction with the efficient atomisation found with electrothermal vapourisation. Furthermore, to a certain extent, the atomisation and excitation process can be epitomised separately which offers obvious advantages over the techniques of ICP-OES and GFAAS.

In the present work, a method using the GF-CCP for the determination of trace phosphorus in metal powders has been developed. Optimised conditions for the plasma and furnace have been determined. They provide good sensitivity and a highly stable plasma as well as an optimised furnace temperature profile for precise results. Satisfactory detection power, measurement precision and accuracy are demonstrated by analysing real-world samples.

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Applications of the KA-40.100 or Other Fixed-Angle Centrifuge Rotors For Density Gradients

The KA-40.100 or other fixed angle rotors from Composite Rotors, Inc. such as the KA-30.50, can be used with Oak Ridge type centrifuge bottles with metal screw caps similar to those used in the Beckman Ti 45 and the Ti 50 rotors. The KA-40.100 can be used with adapters for 38.5 mL and 13.5 mL bottles at 40,000 rpm generating 200,000 x g. The KA-30.50 can be used with the same adapters at 30,000 rpm generating 100,000 x g.

The KA-40.100 will handle all applications for the SW 40 Ti and the SW 28 rotors, except those involved in puncturing polyallomer or ultraclear tubes to collect fractions from gradients. When using gradients in fixed angle rotors with screw capped bottles equal volumes of different concentrations of a step or discontinuous gradient must be layered in the bottle.

It is always suggested to use a 10% to 40% gradient in layers of 10%, 20%, 30% and 40% sucrose or other viscous gradient material. Use a long hypodermic needle that reaches to the bottom of the bottle and introduce the lightest concentraton first. Then underlay the 20% concentration followed by the 30%, concentration finally ending with the 40% layer. Care must be taken not to disturb the interface between each layer.

Leave enough volume on the top of the tube to layer the sample. Cap the bottle carefully so as not to disturb the layers. During acceleration the step gradiation will become linear. Accelerate the rotor slowly up to 750 rpm then rapidly up to maximum speed for the duration of the run. Remember the run time for this run will be about 40% shorter than when the SW 40 Ti rotor is used and about 50% shorter when the SW 28 rotor is used.

Deceleration after the run must be slow from 1000 rpm to rest to prevent disturbing the separated bands. Visible bands can be aspriated with the long hypodermic needle or a Pasteur pipette.

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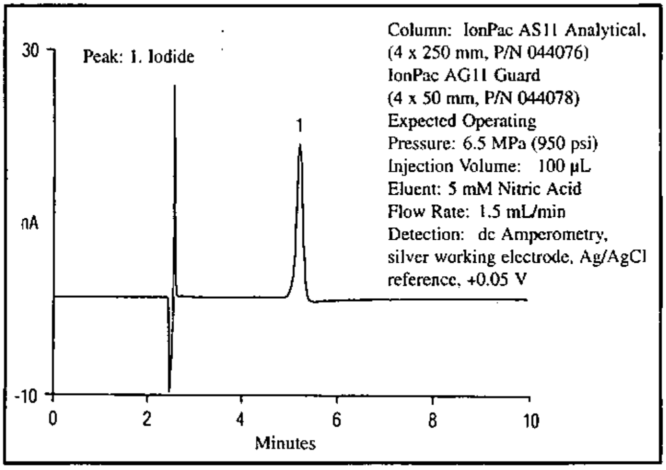
The Determination of Iodide in Milk Products

Trace levels of iodide are necessary for normal physical and mental development; however, excess iodide can lead to thyroid disorders. Common sources of iodide include iodised table salt and seafood, but other food products also contain iodide. Within the dairy industry, iodophors are used as disinfectants, which can also lead to increased iodide consumption by the public.[1] This scenario has led to a concern over high iodide levels in the diet and a nutritional labelling requirement for iodide/iodine. Milk products are particularly challenging matrices; as a result, various sample preparation methods were tested for maximum recovery of iodide.

The Dionex IonPac AS11 column contains a hydrophilic resin, which is well suited to the chromatography of iodide. By using a nitric acid eluent, the iodide ion elutes from the column to allow detection in 5 minutes. Some methods couple either suppressed conductivity or UV detection with HPLC analysis. The detection limits of iodide for these analyses are in the mg/L range; however, the detection limit of iodide using amperometric detection is in the µg/L range. Using selective amperometric detection coupled with advances in column technology, the determination of iodide by ion chromatography in milk products is specific, sensitive, and rapid.

RESULTS AND DISCUSSION



Column: IonPac AS11 Analytical,
(4 x 250 mm, P/N 044076)
IonPac AG11 Guard
(4 x 50 mm, P/N 044078)
Expected Operating
Pressure: 6.5 MPa (950 psi)
Injection Volume: 100 µL
Eluent: 5 mM Nitric Acid
Flow Rate: 1.5 mL/min
Detection: dc Amperometry,
silver working electrode, Ag/AgCl
reference, +0.05 V

Figure 1: Iodide standard

The detection of iodide using an amperometric detector with a silver working electrode eliminates unwanted matrix effects when analysing milk products by ion chromatography. Amperometric detection allows for detection in the µg/L range (see Figure 1) and has high specificity for the iodide ion. Sample preparation should involve minimal dilution since the range of iodide in milk can be near the method detection limit (i.e. in the low to mid µg/L range). For this reason, milk is injected without further dilution after the sample preparation step (see Figure 2).

The method detection limit is 3 µg/L (three times the noise). Spiked recovery is 104% (see Figure 3) Iodide elutes at a retention time of 5 minutes. The concentrations of iodide found in selected dairy and non-dairy samples are listed in Table 1 (see Figure 4). The linearity (r^2) is 0.9999 over the concentration range of 10 to 10 000 µg/L and 0.9987 over the working concentration range of 6 to 200 µg/L.

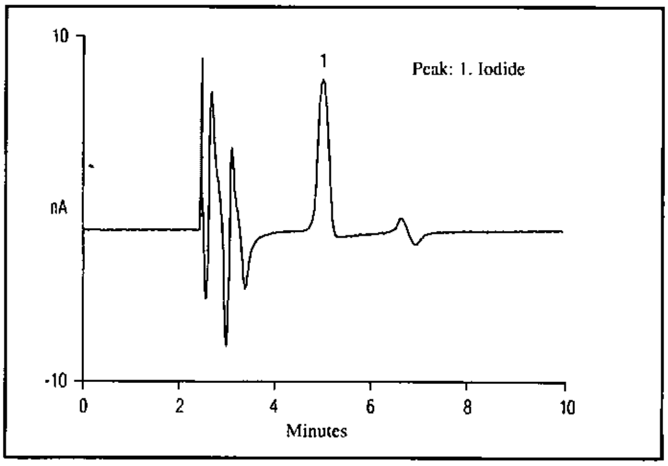


Figure 2: Iodide in whole milk

SAMPLE PREPARATION

Various sample preparation methods for milk were evaluated: 1) 50% methanol precipitation, 2) 50% acetonitrile precipitation, 3) acetic acid precipitation, 4) ultra-filtration (IDF Method)[2], 5) Centriflo filters (IDF and AOAC Methods)[3], and 6) nitric acid precipitation. The key to getting good spiked recoveries is precipitation and complete removal of suspended particulates. In general, cloudy solutions produce low recoveries, while clear solutions produce high recoveries.

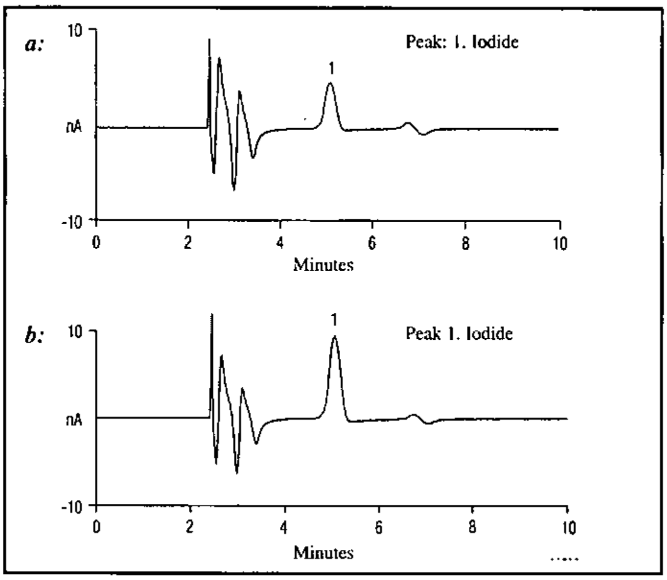


Figure 3: Figures 3a and 3b show iodide in unspiked whole milk and spiked whole milk, respectively. The spiked recovery is 104%.

Table 1: Sample Concentrations

Sample	Concentration (µg/L)	RSD (%)
Whole milk	214	2.42
Nonfat milk	103	2.47
Evaporated milk	191	0.77
Baby formula (milk-based)	73	2.85
Baby formula (soy-based)	45	2.26

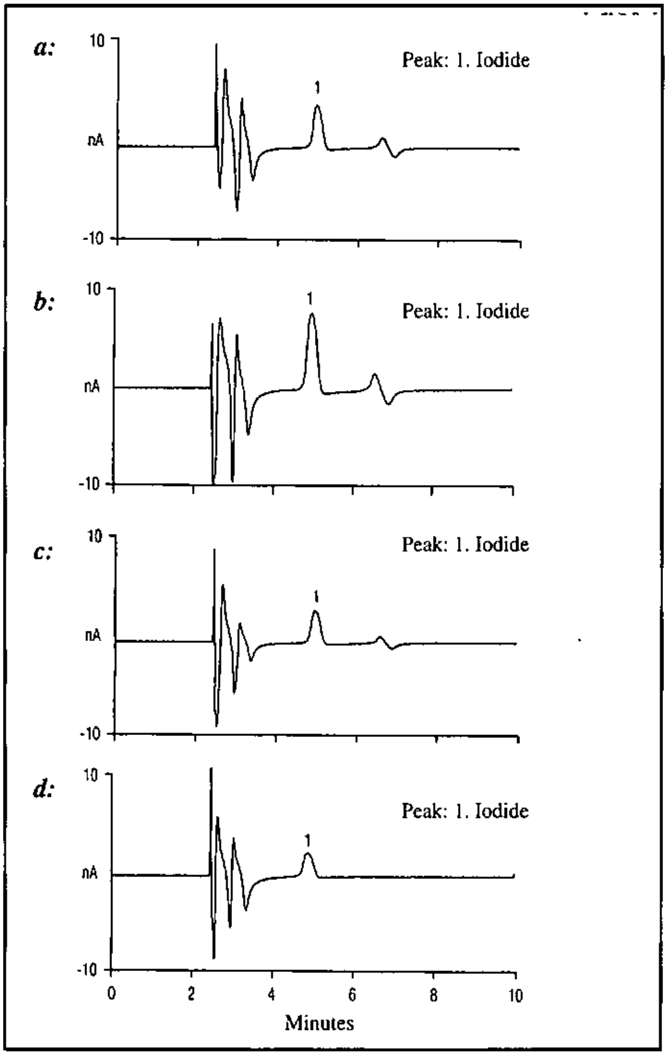


Figure 4: Figures 4a-4d show various samples containing iodide. Figure 4a: non-fat milk sample that contains 103 μg/L iodide. Figure 4b: evaporated milk that contains 191 μg/L iodide. Figure 4c: milk-based baby formula that contains 73 μg/L iodide. Figure 4d: a soy-based formula sample that contains 45 μg/L iodide.

The sample preparation for the 50% solvent methods are the same: an equal volume of either methanol or acetonitrile is added to the milk. The resultant mixture is centrifuged and the supernatant is filtered sequentially through a 1.0 μm, 0.45 μm, and 0.2 μm filter. Then, the supernatant is passed through an OnGuard-RP cartridge to remove fat. The resultant cloudy filtrate is analysed. These methods exhibit low recoveries.

The acetic acid precipitation is accomplished by adding 5 mL of glacial acetic acid to 50 mL of milk and diluting to 100 mL with deionised water. The resultant mixture is treated as in the solvent methods. The final filtrate is cloudy and recoveries are low.

Success with the Ultrafiltration cups (UFP1 LGC, Millipore) is mainly dependent on how dilute the milk mixture is when it is placed in the cup. All resultant filtrates are clear; however, filtering a 50/50 mixture of milk and water is very slow. A 1% milk solution has adequate flow, but results in an analyte level too low to analyse. Spiked recoveries were not determined for these samples.

The AOAC and IDF methods involved centrifuging a mixture of 50% milk through the Centriflo filters. This technique sometimes resulted in a clear filtrate and sometimes resulted in a cloudy filtrate. When clear filtrate was analysed, the resultant spiked recoveries were approximately 100%. However, samples often required several centrifugations to get enough clear filtrate to pass through an OnGuard-RP cartridge for analysis.

The method of choice is nitric acid precipitation (see below) which results in a clear final filtrate, 100% recovery of iodide and relative ease of sample preparation. Because of the oxidising nature of nitric acid, samples should be analysed the same day they are prepared. They may be stored overnight in the refrigerator and analysed the next morning without loss of response. However, after 48 hours, the response may be as low as two thirds the response of freshly prepared samples. An OnGuard-RP cartridge is used to remove the fat from the milk sample, otherwise the fat will build up on the column and cause eventual column plugging.

NITRIC ACID PRECIPITATION

Centriflo Preparation

Soak new membrane cones in a 20% (v/v) ethanol solution for at least 1 hour. Remove the cones from the solution, drain, and place each in a conical membrane support contained in a 50 mL centrifuge tube. Centrifuge at 1000 x g (rcf) for 5 minutes. Invert cone with support to drain remaining solvent. Place in new centrifuge tube. Cone is ready for sample. After use, discard remaining prefiltrate and flush cone with hot water (70 °C) to remove remaining proteins. Place cone back in ethanol solution. It may be used again after soaking for at least 1 hour.

OnGuard-RP Preparation

Pass 5 mL of methanol, followed by 10 mL of deionised water, through the cartridge at 4 mL/min. Pass the sample through the cartridge at 4 mL/min. Discard the first 3 mL of sample.

Milk Sample Preparation

Place 50 mL of milk product in a 100 mL volumetric flask. Add 4 mL of 3% acetic acid and mix. Add 1 mL of concentrated nitric acid and mix. Dilute to the mark with deionised water. Pass sample through a Whatman 2 V filter. Fill prepared Centriflo cones to within 5 mm of the top. Centrifuge samples at 1000 x g (rcf) for 25 minutes. Pass the filtrate through a prepared OnGuard-RP cartridge and inject into the chromatograph.

Direct Current (dc) Amperometry

Direct current (dc) amperometric detection measures analyte oxidation current using a constant applied potential. The iodide from the sample combines with the silver of the working electrode surface to form silver iodide precipitate, oxidising silver in the process. This silver iodide is conductive so that as it builds up on the surface of the working electrode, the detection sensitivity is not affected. Voltages ranging from 0.00 V to +0.005 V yield chromatograms that look essentially the same. At low pH, the positive potential limit is high. This ensures that H_2O will not oxidise and as a result the background remains low.

A platinum working electrode can also be used for this analysis (+0.8 V). However, the working electrode surface's condition has a direct effect on its response to the iodide oxidation. A non-iodised electrode surface gives little or no response. A used, polished electrode gives high sensitivity, but has an unstable signal and baseline drift. A polished, then iodised, electrode gives a stable reproducible response, but it must be reconditioned periodically.[4]

Ion Chromatography

Dionex anion exchange columns are engineered using a polymer base for stability and durability in the 0-14 pH range. The IonPac AS11 Column contains a very hydrophilic pellicular resin that produces improved peak shape for iodide compared to other anion-exchange columns. Iodide elutes in 5 minutes using 5 mM nitric acid eluent. Although the iodide peak elutes more quickly using higher eluent concentrations, the separation is subject to interferences from the void volume and consequently is not as reproducible as those using lower eluent concentrations.

PRECAUTIONS

The IonPac AS11 column is packed in sodium hydroxide. The column should be flushed with water for at least 30 minutes before equilibrating with the nitric acid eluent.

The silver electrode may yield a dip directly after the iodide peak. Care must be taken when integrating the peak so that the dip is not integrated; the standards and samples should be integrated in the same manner as each other. Increasing the applied potential by 0.05 V to 0.10 V may reduce or eliminate the dip.[2]

REFERENCES

1. Hurst, W J; Snyder, K P; Martin, R A, Jr, *J. Liq. Chromatogr.* **1983**, 6 (11), 2067-2077.

2. IDF Standard 167:1994, IDF Annual Sessions in Minneapolis, USA, October 1993.

3. AOAC Official Method 922.22, *Official Methods of Analysis of AOAC International, 16th Edition,* Supplement March 1995.

4. Han, K; Koch, W F; Pratt, K W, *Anal. Chem.* **1987**, 59, 731-736.

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The type of deactivation you choose should depend on the following criteria:
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Minimum retention or interaction with the solutes of interest,
No retention of solvent.

Methyl non-polar deactivated tubing is widely used as retention gaps and guard columns to eliminate the interaction of reactive solutes with the active silanol (hydroxy) groups on the surface of fused silica (quartz) tubing. At the same time it protects the analytical column from non-volatile material in the sample. Methyl deactivated tubing is compatible with many commonly used solvents, mainly hydrocarbons, such as pentane, hexane, heptane, iso-octane, aromatics and mixed solvents (n-paraffins/chlorinated solvents).

Phenylmethyl deactivated tubing is of medium polarity ensuring an additional choice of surface deactivation for the complete range of solvents used in sample preparation. Phenylmethyl deactivation improves the wettability of the retention gap/guard column for chlorinated and some aromatic solvents ensuring good peak shapes for both early and late eluting compounds.

Carbowax deactivation is used for direct aqueous injections. This surface deactivation is water-resistant and therefore suitable for both vapourising and cool-on-column injections of solutions containing substantial quantities of water. Interaction of a quartz surface with water can as readily result in column deterioration as can the introduction of "dirty" (non-volatile) components. Only a few injections of aggressive water containing samples is sufficient to produce an active surface on untreated quartz that can selectively absorb compounds from your sample. Carbowax deactivation prevents this and is ideal for GC analysis of LC sample fractions. Carbowax deactivation permits large aqueous injections ensuring detection of low ppm level compounds, and the polar nature of Carbowax allows non-functionalised compounds like n-paraffins and simple aromatics to be analysed directly, without any further sample preparation.

Only short 2-5 meter lengths of tubing are required to protect your analytical column and are available in convenient and economical 5 packs. Undeactivated tubing if preferred for interfacing the analytical column to a mass spectrometer is also available.

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* * * * *

A Multi-Technique Approach to Surface Analysis

Part 1. XPS and AES

Dr Richard Haverkamp
Research Centre for Surface and Materials Science, University of Auckland, Private Bag 92019 Auckland

What's in it for me?

Surfaces and interfaces are the boundaries between two phases such as between a polymer and air, a metal and an oxide or an electrode and an electrolyte. It is at these interfaces that many of the important characteristics of the material, for example, the appearance, chemical reactivity and abrasion resistance, are decided. Often the bulk composition of a substance is very different from that at the surface. With the realisation of their importance, the analysis of surfaces is an area of research that has been rapidly growing over the last twenty years.

How much of the surface are we really interested in? In some case this might mean only the first atomic layer, but for most practical applications we are interested in several layers or more. The techniques described in this series of articles also vary in the depth of analysis so that "surface analysis" has a different meaning depending on the technique used.

There are a now a wide range of techniques which are available to study surfaces. This article will concentrate on those that are available in the Research Centre for Surface and Materials Science (RCSMS) at The University of Auckland. These facilities are available to and are used by industry and Crown Research Institutes and other University departments at Auckland or elsewhere.

The techniques available

At the RCSMS, the techniques available include X-ray Photoelectron Spectroscopy (XPS), Auger Electron Spectroscopy (AES), Scanning Probe Microscopy (SPM), Scanning Electron Microscopy (SEM) and Energy Dispersive Spectroscopy (EDS).

This article will describe XPS and AES, while Part 2 will describe Scanning Probe Microscopy.

X-ray Photoelectron Spectroscopy (XPS)

The instrument

XPS is also known as ESCA (Electron Spectroscopy for Chemical Analysis). At RCSMS in Auckland we have a Kratos XSAM800 dual-technique instrument for XPS and Auger analysis. This is currently the only instrument for these techniques in New Zealand.

The technique

In XPS a sample is irradiated with X-rays that excite photoelectrons which escape from the surface. Two general types of information can be obtained. The photoelectron energy is dependant on the precise chemical configuration of the surface atoms so that pronounced chemical shifts (changes in the energy) are produced in the peaks of the XPS spectrum. We can therefore obtain information on the elemental composition of the surface and also on the chemical state of these elements.

Quantification

XPS gives relative concentrations of elements (and chemical species as described below). It is not a precise technique but is still extremely useful for determining the difference between surface and bulk compositions or between two samples. A detection limit of about 0.1 - 1 % is possible, depending on the element and analysis conditions. All elements except H and He can be detected. An example of a "wide scan" spectrum is given in Figure 1 showing the photoelectron peaks (Fe 2p, C 1s etc.) and the Auger peaks (O KLL, C KLL).

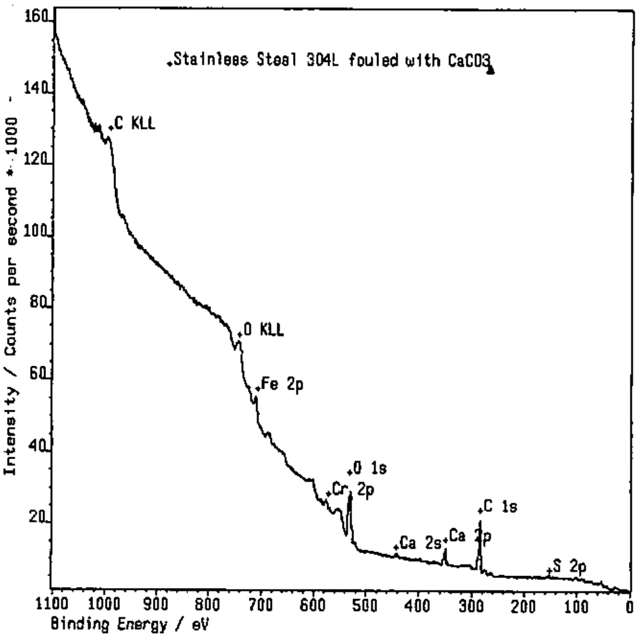

Figure 1: XPS "Wide Scan" spectrum for Stainless Steel 304 L fouled with $CaCO_3$

Chemical information

The real forte of XPS is that it is capable of supplying chemical state information on surface species. Few other techniques are capable of this. This is possible by measuring the slight shift in the energy of the photoelectron peaks (the "chemical shift").

Chemical shifts in the XPS peak positions may be very large, as for example in the case of sulfur where for the following compounds the position of the S 2p peak is as indicated: FeS 161.6 eV, S 164.0 eV, $(CH_3)_2SO$ 166.5 eV, K_2SO_3 167.5 eV, $CuSO_4$ 169.3 eV. The resolution in the peak position possible is about 0.1 eV. These energies represent the energy with which the electron is bound to the atom. It is possible to get relative concentrations of the different chemical species when several components are present in one sample.

For carbon compounds, which are frequently studied, we again have quite large shifts in peak position. For example the following peak positions are found: Fe_3C 283.9 eV, graphite 284.5 eV, cellulose 286.2 eV, CH_3C^*OONa 288.2 eV, polycarbonate—OCO_2— 290.4 eV, teflon 292.2 eV
(* denotes carbon of interest).

On the other hand there are some very annoying cases of compounds having similar chemical shifts such as Si 2p for silicates (mica 102.4 eV) and for silicone (*p*-methylsilane 102.4 eV) making it impossible to distinguish between the two components. An example of the observed shift in energy in the carbon 1s photoelectron peak in a polymer due to the different carbon environments is shown in Figure 2.

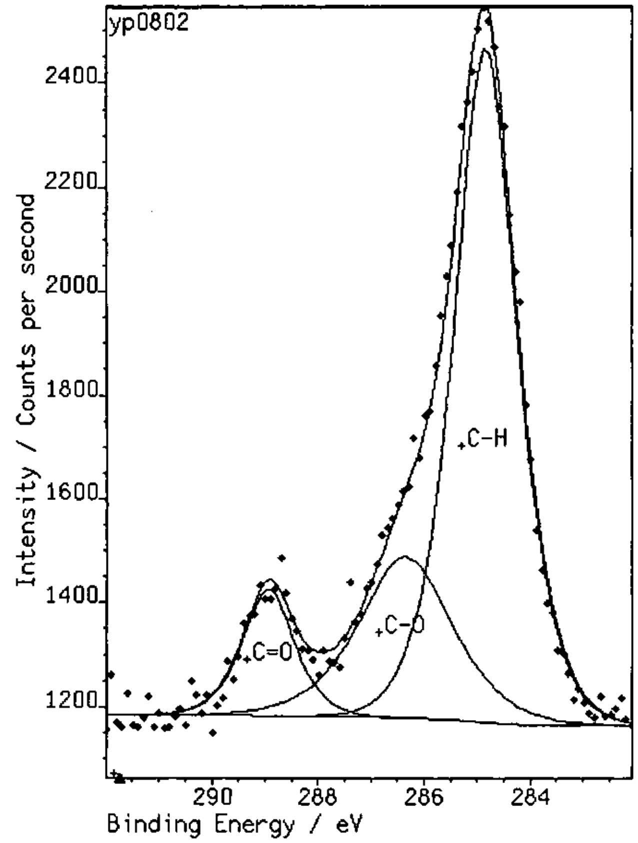

***Figure 2:** XPS "Narrow Scan" Spectrum for C 1s in a polymer.*

Sample requirements

X-rays are relatively non-destructive so that even delicate materials such as polymers and organic coatings can be analysed. The two main requirements for samples are that they can be placed in a vacuum (which of course excludes solutions and oils), and that the sample is a suitable size - preferably 15 mm x 15 mm (but they may be a powder or a sample as small as only 1 mm^2). Recent developments in XPS have resulted in instruments that are capable of small spot analysis and imaging but these are not yet available at Auckland.

Depth of analysis

The depth of analysis for XPS is determined by the escape depth of the photoelectrons. This is generally 1-5 nm. Depth distribution of elements and chemical compounds can be obtained from this technique by two methods.

One method is to simply rotate the sample from normal (at right angles) to the electron energy analyser, to an acute angle. The escape depth of the electrons is defined by their energy and, to a lesser extent, the composition of the sample. Therefore the thickness of the surface layer from which electrons are collected will vary as $l/\cos\theta$ where θ is the angle of departure from the normal to the analyser. This method is useful for probing the surface to less than the escape depth of the electrons (1 - 5 nm).

For depth analysis greater than 1-5 nm (and up to 0.1 μm) it is necessary to etch the surface with an ion beam and record successive XPS spectra between etches. For this purpose the XSAM800 is fitted with an argon ion gun.

Auger Electron Spectroscopy (AES)

The technique

In AES a beam of electrons is used to excite Auger electrons from the surface. Since an electron beam can be focused into a fine spot this technique can be used to make an image of the region under analysis. When used in conjunction with a photodetector, as in the XSAM800, it is possible to get both an image of the sample similar to that from a scanning electron microscope and also an image (usually referred to as a map) representing the distribution of a particular element.

Sample requirements

Similar constraints apply to AES as to XPS with the additional restriction that it is preferable that the sample is electrically conducting otherwise the surface may charge which results in a shift in Auger electron energies. This is particularly important when making elemental maps.

Quantification, depth of analysis and chemical information

Similar considerations for quantification and depth analysis apply as for XPS. It is also possible to gain chemical information from AES although this is not quite as easy or precise as with XPS.

Related techniques

It is also possible to use the Auger setup to record EELS spectra and maps (Electron Energy Loss Spectroscopy). The basis of this technique is that a low energy electron beam is used (500 eV compared with 3-5 keV for Auger) and the inelastic portion of the spectrum is recorded (those electrons that have an energy from just under 500 eV to perhaps 450 eV). The nature of this part of the spectrum depends on the valence orbital bonding of the surface species.

Applications of XPS and AES.

The challenge

The range of possible applications of XPS and AES is very wide. At Auckland, we have applied these techniques to studies ranging from quick sample analyses through to more complex industrial problem solving, research of a longer term, or more pure science applications. I have selected just a few of the types of studies we have carried out in the last couple of years.

Short and long-term industrial projects

Discolouration of silver-plated light fittings in new houses. Deposits or corrosion products on aluminium components. Black marks on steel. We are presented with a large range of problems involving corrosion, deposition or discolouration which we can often (but not always) solve.

Surface chemical studies of wood and wood fibres for composition affects on colour and other properties.

Optimisation of bonding in heterogeneous systems. These include carbon/ceramic composites and adhesive bonding to metal foils.

Performance studies of materials in service. This ranges from bio-compatibility of dental implants to corrosion behaviour in selected environments.

Other long-term research

The effects of surface chemistry on fouling in industrial environments including the chemical and dairy industries. This is a potentially large new field of study that we started at the end of 1996 on the basis that previous studies of fouling by other workers have generally neglected surface chemical effects which we now have the ability to investigate.

The deposition of diamond films from oxyacetylene flames. This has practical applications in forming insulating coatings, high quality cutting and polishing surfaces and wear-resistant films.

Gas/solid absorption process in catalysis and emission controls, including investigating novel routes to surface modification for specialty applications.

Engineering design and surface treatments for wear minimisation. This ranges from production of coatings for performance enhancement in the process industry to improving wear-resistance of artificial hip joints using ceramic coatings.

Contacts:

If you are interested in finding out more about the surface analysis facilities at the University of Auckland or wish to be involved in a joint research project or want to get a surface analysis problem solved then you should get in touch with:

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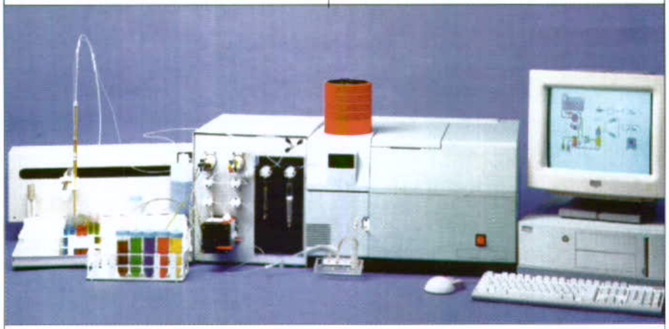
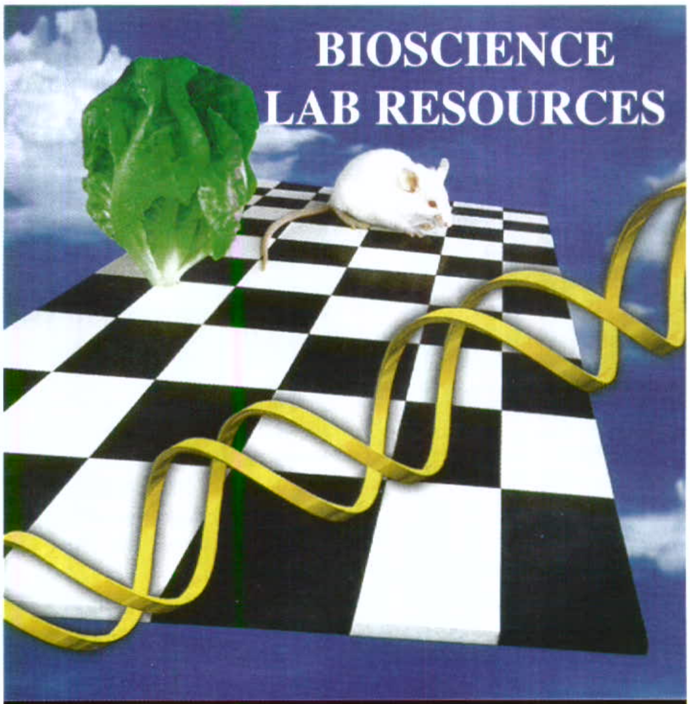
Research Centre for Surface and Materials Science
The University of Auckland
Private Bag 92019, Auckland
Tel: (09) 3737599 x5813, Fax: (09) 3737463
Email: r.haverkamp@auckland.ac.nz

About The Author

Dr Richard Haverkamp is Technical Director of the Research Centre for Surface and Materials Science and lecturer in the Department of Chemical and Materials Engineering at the University of Auckland. He has previously worked for Fletcher Challenge, Colgate Palmolive and the DSIR in New Zealand, and for the University of Toronto in Canada, SENTEF in Norway and has spent time at Pechiney CRV in France. He has published over 90 scientific papers and technical reports and has been awarded 1 patent.

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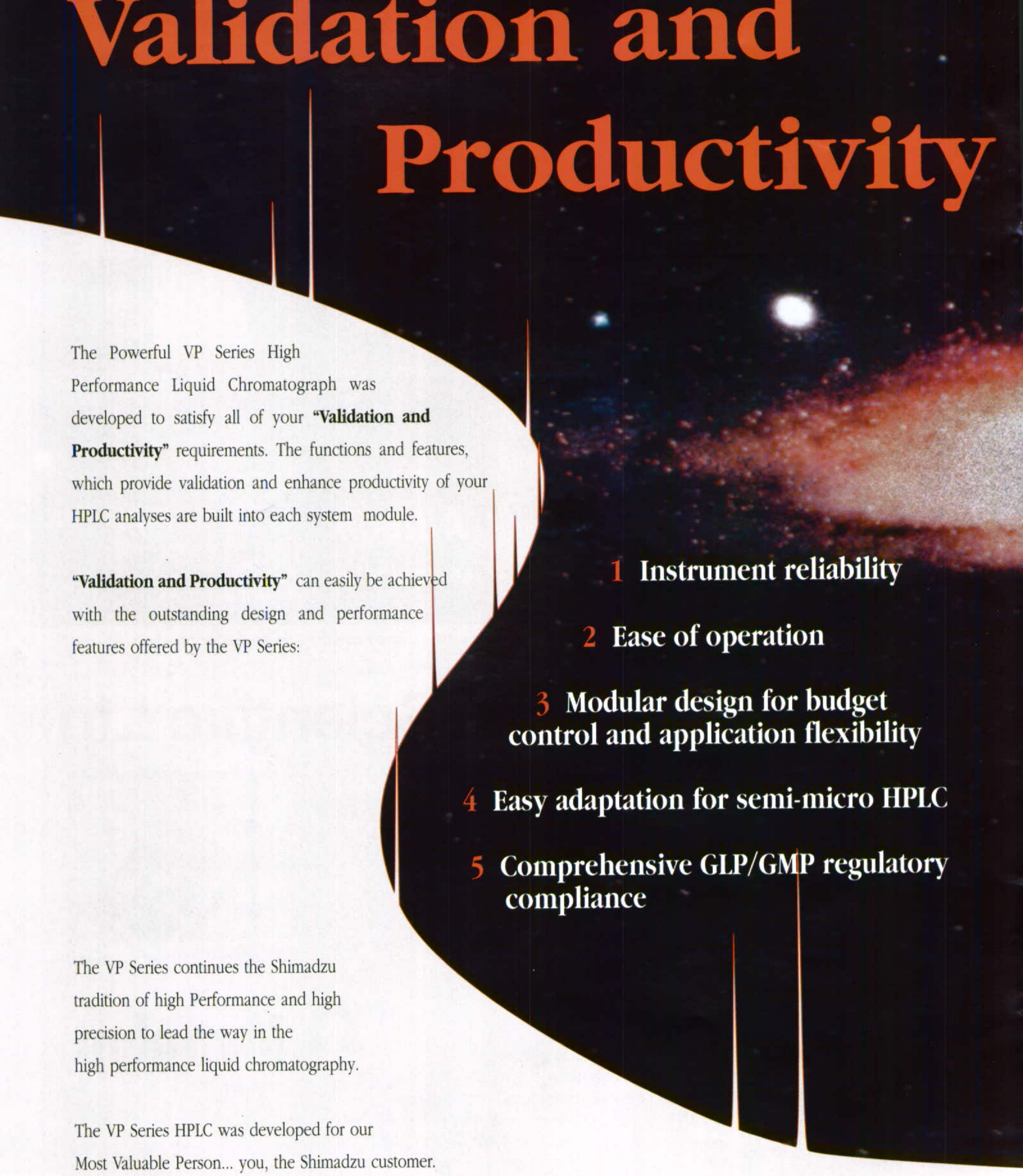

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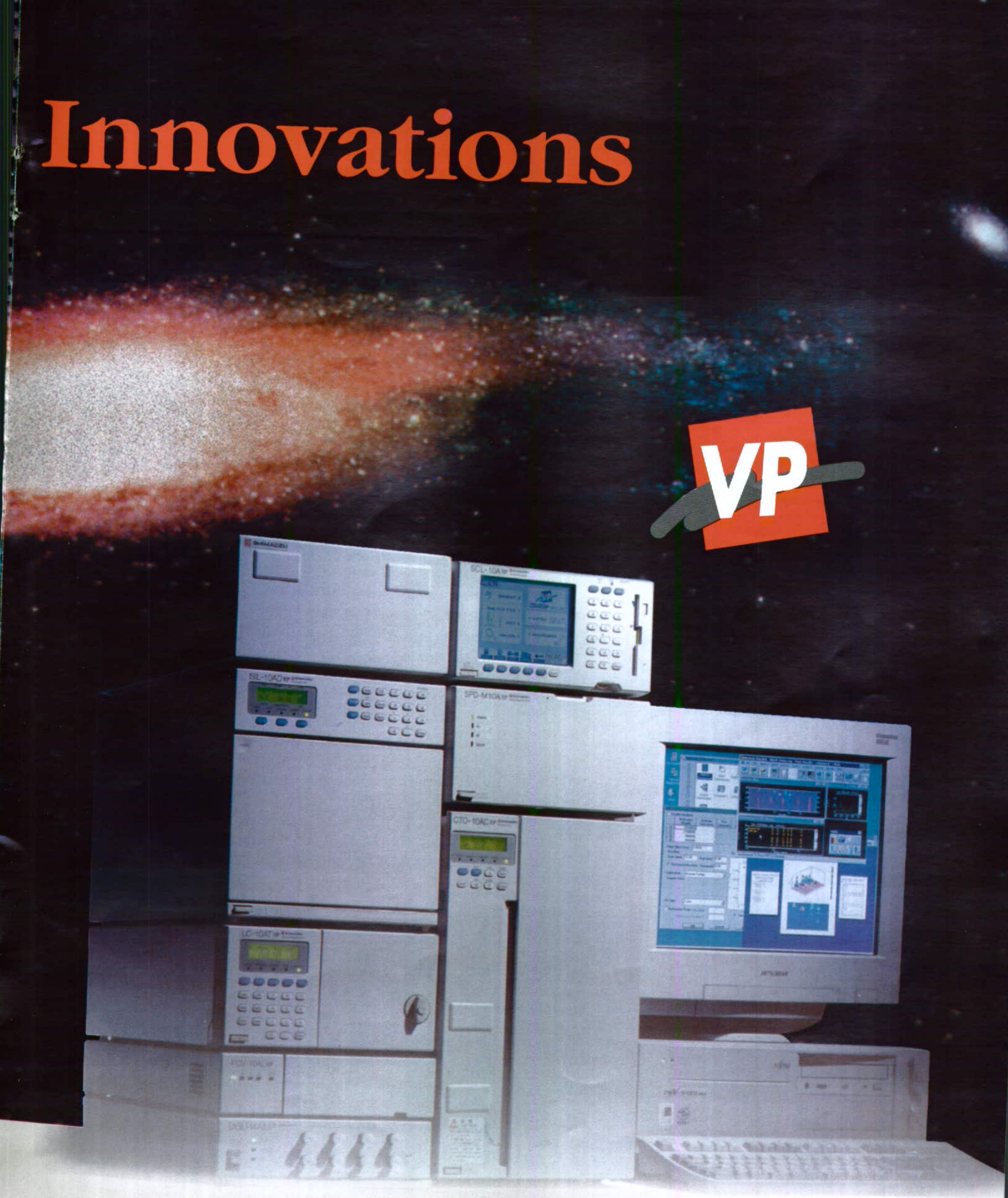
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Eppendorf is proud to announce that Lockheed Martin Engineering & Science Services, Houston, USA has chosen the Eppendorf Centrifuge 5417C for scientific experiments during a NASA space mission!

For easy handling by astronauts, the OEM components of the 5417C will be incorporated into a housing manufactured by Lockheed. To allow it to fit into the narrow surroundings of the spacecraft, the 5417C is to be mounted in one of several drawers from where it can be simply unfolded. Eppendorf is supplying six sets of all centrifuge functional components which will be used as either prototypes, for load testing or as back-ups. The astronauts will finally use one set only. How will the Centrifuge 5417C function in space?-watch this space! For more information on this or any of Eppendorf's "space age" centrifuges,

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NEW IRIS ADVANTAGE ICAP SPECTROMETERS FROM THERMO JARRELL ASH CORPORATION

Thermo Jarrell Ash Corporation have released their new IRIS Advantage ICAP Series Spectrometers.

The IRIS Advantage ICAP Series offers the simple operation of a Simultaneous ICAP and the power of a Photographic Spectrograph for complete confidence in your analytical results. The Charge Injection Device based echelle optics will meet your toughest analytical requriements while TraceTech simplifies your trace determinations in the most complex of matrices. Accessories such as the TJA 300 Autosampler, a variety of Sample Introduction Systems and Solid Sampling Excitation Accessory add even more value and power to the system.

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DIONEX ASE 200 ACCELERATED SOLVENT EXTRACTION

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NEW ATOMIC ABSORPTION/PLASMA EMISSION SPECTROMETERS FROM AURORA INSTRUMENTS

- Fast simple conversion between flame, graphite furnace, plasma furnace and vapour generation atomisers.
- The transversely-heated graphite furnace's 3800 Ks^{-1} heating rate, combined with the patented plasma furnace emission

option make the AI 1100/2100 the most unique furnace spectrometer in the world.

- The three-dimensional fully programmable autosampler works with all atomisation sources.
- MS Windows 95 multi-tasking environment, built-in templates and spreadsheets make routine analysis as easy as pushing a button.

The AI 1100/2100's unique graphite furnace provides very low detection limits for traditionally difficult to determine elements like Mo, Ba, Al and Si.

The transversely-heated graphite furnace and 3800 Ks^{-1} heating rate provide virtually spatial and temporal isothermal atomisation. A fully programmable, optimised fast-dry technique allows 20 second turn around times without sacrificing precision. The graphite furnace deterioration monitor ensures consistent drying and ashing temperatures by using a photo sensor to detect the real temperature of the furnace. The patented innovation of using plasma emission inside the furnace tube combines the merits of GFAAS with ICP-AES to give superior sensitivities for both metals and non-metals.

The unique design of the nebuliser and the corrosion-resistant, titanium burner head provide high sensitivities and low dead volumes. Typical performance of 0.4 AU for 2 mg/L Cu. High precision; better than 0.5% RSD from ten 4 sec. integrations under optimised conditions. Integration of the flame and the autosampler optimises run times by performing immediate calibration from a single standard, adding releasing agents, and automatically diluting over-range samples into the proper range. Software control of the gas flow and safety system ensure reliable, optimised analysis conditions.

Aurora Instrument's HIHCLs overcome the fundamental limitations of standard HCLs. A secondary discharge is struck between an efficient electron emitter and the anode to ensure that the majority of atoms at the front of the cathode are excited. Self-absorption effects are eliminated, thus increasing signal-to-noise ratios, sensitivities and linear working ranges.

A built-in template and spreadsheet allow analysis to be started with the push of a button. The multi-tasking environment delivers real-time peak display, full data storage, and the ability to export to Windows software including Word and Excel for customised reporting tables and statistical data handling. Data editing and Quality Control permits easy deletions, re-runs, recalibrations, data transformation and updating of results.

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AUTOMATED POWDER FLOWABILITY

The API Aeroflow is an automated instrument for determining the flowability of powders. The powder to be studied is placed in a cavity disk, in the instrument, which is slowly rotated. The powder builds up to an unstable condition and an avalanche occurs. This avalanche is measured and summarised using both graphical and numerical presentations.

The system is operated under a Windows environment and the analysis is completely automatic. The addition of the temperature and humidity accessory allows experiments to be conducted at different user-defined conditions.

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PILOT SIMULATED MOVING BED CHROMATOGRAPHY SYSTEM

The Simulated Moving Bed (SMB) chromatography range has been designed for the purification of optically pure products from racemates or for final polishing of products prepared by conventional processes and for binary separations of any kind. The SMB systems permit a continuous separation (raised productivity) and the reduction in solvent use for reduced costs.

A new system adapted to pilot scale high efficiency separations has been introduced to the range of PROCHROM SMB systems.

The SMB 8-50 system details are:

- Productivity up to 200 g/day
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- Any packing material can be used
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PROCHROM SMB chromatography systems cover the range from 10 mm ID laboratory scale through 50, 60, and 80 mm pilot units to production equipment using columns from 110 to 800 mm. Thus, a separation can be scaled from its early stages to full production using the same technology throughout.

Validated software and qualified equipment assure an easy passage through the validation of new production processes. Flexible systems allow the user to adjust the configuration and to adapt it to their changing needs.

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Ph: (+33-383) 312244, Fax: (+33-383) 312051
Email: prochrom@millipore.com
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SGE HPLC PRODUCT BULLETIN

This comprehensive document will be an invaluable resource as an aid to understanding your HPLC needs, and give you the technical information you need to make the right decisions. It would be easy to consider an HPLC system to consist of a pump, a detector, a column and some solvents. While essentially true, there is a lot more to HPLC than that. This manual is designed to take out a little of the mystery surrounding HPLC columns and accessories. The HPLC Product Bulletin provides detailed product information on SGE filters, tubing, sample loops, connectors and guards as well as the all important column.

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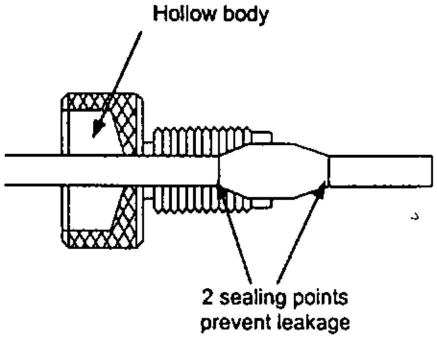
SGE EASYLOK THE ULTIMATE HPLC FINGER-TIGHT FITTINGS



SGE's EasyLOC provides a perfect leak-free HPLC connection with the unique double ended ferrule and finger-tightened nut. As the name suggests, EasyLOC is an "Easy" to use HPLC connection that "LOKs" HPLC columns and accessories to tubing. Comprising of a knurled stainless steel nut and a double-ended PEEK ferrule the EasyLOK simply slides over any 1/16th OD tubing to the required position and is easily tightened by hand for a high pressure seal (5,000 psi). The double-ended ferrule is replaceable and seals in two places making it less prone to distortion, for greater durability and leak prevention.

The fitting is particularly useful when making awkward connections as the hollow body facilitates connection to bent or very short tubing.

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RHEODYNE INTRODUCES NEW LABPRO AUTOMATED FLUIDICS INSTRUMENTS

Rheodyne, has introduced the first phase of a new family of self-contained, motorised, multi-position automated fluidics instruments for precision and repetitive fluid switching applications. Rheodyne's new family of "Plumb and Play" productivity enhancing tools for the laboratory will be marketed under the LabPRO trade name.

The phase one release of Rheodyne's new LabPRO instruments includes a total of seven devices - each specifically designed for a particular fluid switching operation. New instruments include: Solvent Selector, Inert Low Pressure Unit, Injector with Purge, Two Channel Selector with By-Pass, and a High Pressure 10-Port device. All high pressure LabPRO instruments are rated at 5000 psi, and are available in stainless steel or biocompatible PEEK.

The LabPRO product family is based on Rheodyne's RV Series of precision electronic valves, and is ideal for applications requiring computer-controlled laboratory automation. Each compact LabPRO instrument is fully self-contained, ready-to-use, and supports a variety of popular communications protocols. All LabPRO instruments are CE certified.

Rheodyne LabPRO automated fluidics instruments are available through instrument manufacturers and authorised Rheodyne resalers.

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OPTIMIZE TECHNOLOGIES NEW LC AND FLUID HANDLING CATALOGUE

OPTIMIZE Technologies have released their new liquid chromatography and fluid handling component catalogue.

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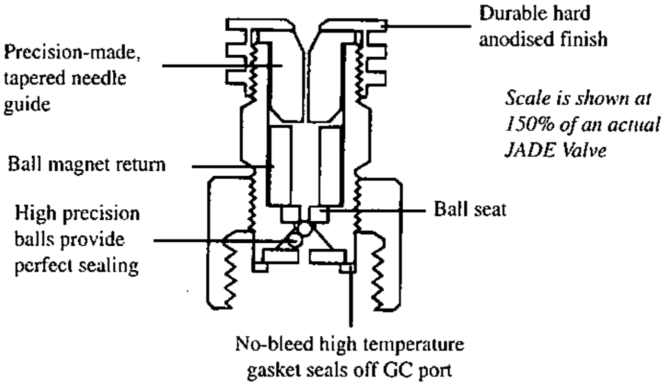
NEW! SPME VERSION OF THE JADE VALVE



A new SPME version of the JADE septumless GC injection valve is now available to make solid phase microextraction more reliable. SPME is a sample preparation technique that uses a coated fibre as the adsorption medium for analytes. The fibre is enclosed in a sheath to protect it and the device operates like a syringe. The JADE valve eliminates septa problems and makes sample desorption more consistent. A special needle guide sized to accommodate the fibre sheath of an SPME device allows the analyst to use the no-bleed, no-failure JADE valve septum-replacement injection system. It is possible to convert an existing JADE valve to an SPME JADE valve by changing the needle guide. Simply order part # 8081.

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RHEODYNE RHEBUILD KITS FOR INJECTION VALVES

RheBuild kits are a complete selection of all the parts you need for general repair of your specific Rheodyne high pressure valve. For the "DIYer", kits for front-loading injection valves include: Standard Rotor Seal, Stator Face Assembly, Isolation Seal, Needle Guide, Needle Port Cleaner, Hex Keys(2) and Instructions. Kits for Models 7250 and 7526 also include the Rotor Removal Tool. There are also kits for rear-loading valves. Or take advantage of our repair service and send the defective valve with a repair purchase order to Alltech's Auckland office at Unit 13, 46 Ellice Road, Glenfield. We will install a RheBuild Kit for you and return the tested valve within 48 hours. For all the latest Rheodyne part numbers, valve and loop information, request Alltech bulletin #367, Rheodyne Valve Catalogue, from Alltech.

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J&W CONNEX-MEGABORE

Connex is now available for Megabore (0.45 and 0.53 mm ID) gas chromatography columns. Connex is designed for quick column installation. The Megabore Connex system is ideal for the quality control analysis of solvents or when the technician changes columns frequently. Megabore Connex also greatly simplifies fitting retention gaps to columns.

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RAPID, ECONOMICAL REPAIRS ON ALL RHEODYNE HIGH PRESSURE VALVES

Alltech offers rapid, economical repair service on all Rheodyne high pressure valves. We also stock repair parts for the "DIYer". To take advantage of our repair service send the defective valve with a repair purchase order to Alltech's Auckland office at Unit 13, 46 Ellice Road, Glenfield. Be sure to include a detailed description of the problem and the name and phone number of the person Alltech should contact for additional information. Most valves can be repaired , tested and returned within 48 hours, and of course all work is fully guaranteed.

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CAPILLARY ELECTROPHORESIS PROCEDURES MANUAL

The new Capillary Electrophoresis Procedures Manual from J&W Scientific is a comprehensive and practical reference guide for anybody interested in capillary electrophoresis. This 287 page manual contains quick tips, applications, and information regarding capillary electrophoresis instruments and supplies. The quick tips section provides information regarding, preparation of running buffers, capillary cleaning/ conditioning and quantitative results. Applications and procedures covered are:

- Drugs and pharmaceuticals
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- Miscellaneous chemicals
- Pesticides
- Proteins, amino acids and peptides
- Forensics/ explosives
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NEW!! THE AI 3000 ATOMIC FLUORESCENCE SPECTROMETER FROM AURORA INSTRUMENTS

Aurora have introduced the new AI 3000 Dual-channel Atomic Fluorescence Spectrometer (AFS). This instrument has a unique design, intelligence and automation. It provides the user with high sensitivity and detection limits in the ppt range. Atomic fluorescence offers superior detection limits when compared to ICP or AA and has a large linear range, especially when coupled to vapour-generation techniques.

The AI 3000 employs flow injection analysis (FIA) hydride generation to minimise liquid phase interference during the reactions. Scattering light is completely prevented from illuminating into its atomisation system.

A newly designed temperature monitor mounted in the atomiser enables reaction conditions to be strictly controlled which results in a high level of reproducibility. The lamp of the instrument is specially designed and manufactured to provide a high intensity output and a long life.

- Unique hydride generation and FIA capabilities
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- Dual-channel detection for two elements simultaneously
- A linear dynamic range of 3 orders of magnitude
- Combines with the AI 4000 for a fully automated operating system
- Up to 150 samples per hour

Applications include:

Clinical:
blood, urine, tissue, nails, hair, Pb, Hg, As, Sb, Bi, Ge, and Se
Environmental:
soil, sludge, water (nature, river and drain) Cd, Hg, Pb, Zn, As (III), As (IV), Sb (III), Sb (V), Se (IV), and Se (VI)
Agricultural:
dairy products, wine, feeds, meat, cigarettes, and produce, As, Hg, Pb, Sb, and Se
Geological and Metallurgical:
ore, rock, minerals and metals, Ge, Hg, Se, As in Sb, Se and Te in Cu
Pharmaceutical:
active ingredients, fillers, Hg, Pb, As, and Se
Petrochemical:
fuels, lubricants, crude oil, Pb, Hg, Cd, As, Sn, and Zn

Contact: Andrew Pearce, SciTech
P O Box 663 Dunedin
Ph: (03) 4777860, Fax: (03) 4777870
Email: apearce@scitech.co.nz
circle number 46 on the reader reply card

NEW JASCO P-1000 SERIES DIGITAL POLARIMETERS

The new Jasco P-1000 Series polarimeters have been designed to cover a wide range of applications. Main features not offered in previous models are:

- designed to meet the GLP requirements
- industry-standard printers can be used
- positive identification of the filter (standard model)
- positive identification of the lamp (for dual lamp mode).

Three models are available in the range:
The P-1010 is the entry level instrument with halogen lamp, but can accept external optional light sources. It is supplied as standard with Polaroid polarisers but a Glan Taylor version is available as a factory option.

The P-1020 is supplied with a 589 nm filter and Na lamp and can accept an external light source (usually Hg, but even W or a monochoromator). It is supplied as standard with Polaroid polarisers but a Glan Taylor version is available as a factory option.

The P-1030 research polarimeter cannot be fitted with additional light sources but its applications are expanded with 405 nm, 334 nm, 325 nm, 302 nm, 296 nm, 280 nm, and 253 nm filters.

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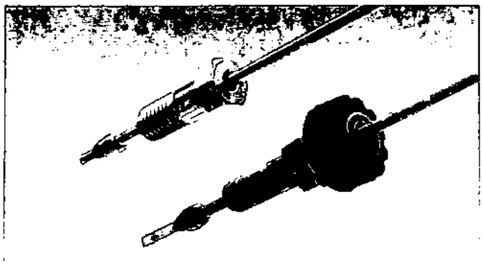
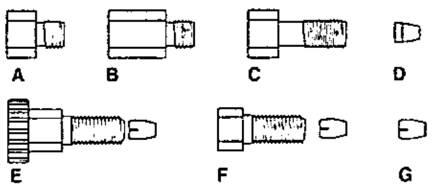
NEW FITTINGS FOR ALL RHEODYNE INJECTION VALVES



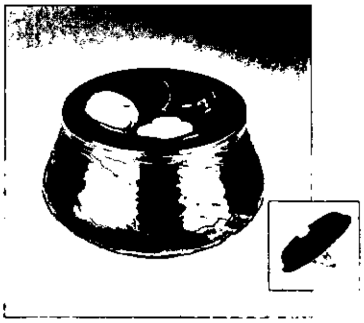


Rheodyne have changed their fittings and obsoleted all the old ferrules and bushings which you may be familiar with. The old non-standard Rheodyne ferrule has been replaced with a ferrule of familiar industry standard profile and the bushings have been modified to match. Once old stocks are gone only the new ferrules and bushings will be available in kits of 10 each bushings and ferrules in stainless steel and three different bushing lengths, with ferrules also available separately (10/pk), or 5 each

RheFlex® bushings and ferrules in PEEK in two bushing lengths, with ferrules also available separately (5/pk). Titanium bushings in two lengths as well as titanium ferrules are available singly. For all the latest Rheodyne part numbers, valve and loop information, request Alltech bulletin #367, Rheodyne Valve Catalogue from Alltech.

Contact: Alltech Help Desk
Freephone: 0800 ALLTECH (0800 255 832)
Fax: (09) 4442399 or Email: alltech@alltech.co.nz
and request Bulletin #367.
circle number 48 on the reader reply card

COMPOSITE ROTORS, INC. LEADING THE WAY IN CENTRIFUGATION TECHNOLOGY



Composite Rotors' "Kompspin" revolutionary carbon-fibre rotors help you get 50% higher productivity from your floor model centrifuges, making them the most advanced centrifugation technology available today.

Mega Volume - The larger volume lets you process 33% more biological particles for faster results.

Ultra Light Weight - Rotors are significantly lighter, they're easier to handle, accelerate faster and place less wear and tear on you and your centrifuge drive.

- Fits All Existing Centrifuges - Fits Beckman, Sorvall and all other Super/High and Ultra speed centrifuges.
- Non-Corroding - The carbon-fibre rotors will not corrode, so you'll enjoy years of trouble-free use.
- 7 Year Warranty - An incredible, unconditional warranty with no speed reduction due to aging.
- Better Temperature Control - Carbon-fibre composites maintain their temperature much longer than metals so your sample will experience better temperature stability.
- Autoclavable
- Biocontainment - Dual-locking lid option.
- Many Models Available - To meet specific applications.

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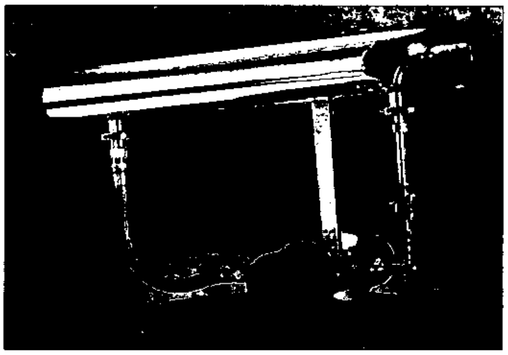
IN-PROCESS PARTICLE SIZE ANALYSER FOR DAIRY AND OTHER INDUSTRIES



Malvern Instruments has released the Malvern INSITEC EPCS-3 Particle Size Analyser for the measurement of dry powders and sprays in process environments.

Built as a dedicated High Concentration Particle Size Analyser for process environments, it covers the range of 0.5 to 1000 microns and is available in various forms to suit the particular application, from an Abrasive Material version for industries like cement and mining, to a Pharmaceutical Grade version for the manufacture of food and medicinal products.

One version of the instrument is ideal for the measurement of Spray Dried Milk Powders, on-line and in real-time.

The instrument also features the ability to measure dry powders in high concentration, so the variation due to "slugging" which commonly occurs during dry powder transport does not cause errors in results.

The instrument has been used in applications from cement and powder coatings to monitoring the real-time particle size of the product of spray driers. In each case, the data generated is used to monitor and, if desired, control the process.

The instrument is operated and controlled using Windows NT, a common platform for process applications, but is able to report via a range of hardware and software systems.

Contact: Analytical Technologies New Zealand
P O Box 65304, Mairangi Bay, Auckland 10
Ph: (09) 4784040, Fax: (09) 4780340
circle number 50 on the reader reply card

NEW SHIMADZU LC-10AVP HPLC SERIES

Shimadzu's new powerful "VP Series" (Validation and Productivity Series) HPLC has been developed to satisfy the growing chromatography requirements for "Validation" and "Productivity".

"Validation" and "Productivity" can easily be achieved with the outstanding design and performance features offered by the new VP series. Shimadzu continues the tradition of high performance and high precision to lead the way in high performance liquid chromatography.

Instrument Reliability
Greater reliability leads to lower operating costs and fewer problems. Shimadzu's HPLC systems are well known for their reliability. The increased reliability of the VP series is the result of the robust design of each system module. This directly affects the reliability of the analysis and ultimately the capability to enhance productivity.

Overall performance of the VP series has been taken to a higher level in every aspect of system operation including solvent delivery, sample injection, separation, detection and data processing.

Fibre optics interfacing between modules offers plug-and-play convenience and assures noise-free signal transfer for positive module control. All communication between modules is digital and actually enhances detector sensitivity and dynamic range.

Precise design and specifications of materials used in system construction and in the choice of highly durable consumable parts are standard in the new "VP Series". Each component has been carefully engineered and selected to ensure higher solvent resistance and extended operational lifetime.

The VP series is designed to stand up to the more demanding QC or field operation, yet it provides the high sensitivity and performance demanded by research and academic environments.

Comprehensive GLP/GMP regulatory compliance "built-in"
Validation support functions built into each VP series module will enhance validation and productivity for GLP/GMP regulatory compliance. Each module records its operational history in on-board memory which can be reviewed and output by pressing the VP key.

All products are developed and manufactured in compliance with quality standards registered by ISO 9001 and delivered with documentation to assist customers in regulatory compliance.

The VP series modules are designed to comply with safety criteria specified in international standards. They carry CE and C tick to meet European and Australian standards.

Ease of Operation makes for effective utilisation by all staff
Enhanced ease of use can extend productivity both in routine operation as well as familiarising the customer with the functions of the instrument. The VP series offers operation functions which anticipate the customer's requirements and reduce cumbersome procedures.

A new Graphic User Interface on the VP System Controller provides larger, more readable characters and icons, and reduced menu selections to facilitate easy operation. Method transfer between multiple VP systems can be accomplished simply with the built-in floppy disk drive and without the need of a PC workstation. This enables the creation of a method in one location and permits direct transfer to other systems.

Each VP module allows stand-alone operation to augment any existing system, as well as complete integration using the powerful VP system controller. Clear luminous displays on each module provide easy assessment for operation parameters and instrument status.

Advanced automation capability of the VP auto injector enables sample pre-treatment including reagent addition, dilution and spiking. The system permits pre-programmed unattended operation, labile samples are also kept at constant temperature and safety features include leak sensors.

Modular design for budget control and application flexibility
Flexibility and expandability were built into the design of the VP series. Customers can start with a simple isocratic system and expand the system to a low pressure gradient configuration or a high pressure gradient configuration simply by adding the required modules. This can be accomplished economically and without sacrificing past investments.

The VP series will provide long term financial benefits to users who have budget limitations and require future expandability of their HPLC system.

By incorporating a modular design, the VP series satisfies the customers requirements for unlimited application flexibility. Customers can design their own optimised system configuration and apply advanced techniques such as post-column derivatisation for analysis of amino acids, carbohydrates, organic acids, carbamate pesticides, as well as for ion chromatography, gel permeation chromatography, and more.

The flexibility of the VP series offers an advanced and convenient automated column switching technique, which enables sample trap and concentration procedures, as well as protein removal procedures to be performed easily.

Easy adaptation for semi-micro HPLC
A need to lower operating costs and reduce environmental contamination is becoming everyone's concern. Lower solvent consumption with semi-micro LC operation is the ideal solution to these important issues. The VP series provides performance and functionality in conventional HPLC mode and can easily be configured in semi-micro LC mode by simply changing the detector cell. This feature can result in up to 80% saving in solvent consumption and expense.

Another advantage of the VP semi-micro LC configuration is higher sensitivity. The synergistic combination of pulse-free solvent delivery, high sensitivity detection, and precise auto-sampling makes semi-micro LC a reliable and affordable analytical tool.

Contact: Clare Hodgson, Shimadzu Scientific Instruments
Ph: 0800 735 725, Fax: (09) 836 7757
Email: clareh@shimadzu.co.nz
circle number 51 on the reader reply card

NEW PRODUCTS

NEW DB-MTBE FROM J&W SCIENTIFIC

J&W's latest capillary column for environmental laboratories is the new specialty stationary phase developed specifically for analysis of volatiles in ground and surface water. MTBE, which stands for methyl-t-butyl-ether, is one of the primary "oxygenates" widely used for making clean burning fuel. DB-MTBE columns are specially tested and are available in two Megabore configurations:

- DB-MTBE, 30 m x 0.45 mm ID x 2.55 mm
- DB-MTBE, 30 m x 0.53 mm ID x 3.00 mm

Contact: Alltech Help Desk
Freephone: 0800 ALLTECH (0800 255 832)
Fax: (09) 4442399 or Email: alltech@alltech.co.nz
circle number 52 on the reader reply card

WHAT'S NEW FROM J&W SCIENTIFIC?

DB-200
J&W introduces their newest GC stationary phase, DB-200, with a 35% trifluoropropyl substitution and temperature limit of 300/320 °C. DB-200 columns have selectivity indistinguishable from other columns of this type. Ideal for the analysis of pesticides, herbicides, silanes, substituted benzenes, solvents, propylene oxide and Freons.

- 35% trifluoropropylmethyl polysiloxane, high-polarity stationary phase
- Higher temperature limit
- Great for environmental and industrial chemical applications
- Column-to-column reproducibility guaranteed!

Application Notes available: Citrus Pesticides on DB-200

DB-225ms
Because of it's unique selectivity, DB-225, a (50% cyanopropylphenyl) - methylpolysiloxane column has long been the column of choice for certain FAMEs and tetrachlorodibenzo-*p*-furan analyses. By extending the "ms" technology, J&W has developed a higher temperature, lower bleed DB-225: DB-225ms.

DB-225ms has virtually identical selectivity, to DB-225, for critical separations. The lower bleed allows for more sensitive analysis of trace components in bleed sensitive detectors and less detector fouling. The higher isothermal upper temperature limit (260 °C for DB-225ms vs 220 °C for DB-225) can be used to shorten run times for late eluting compounds and elute more retained components at higher temperatures while still maintaining reasonable run times.

DB-HT Sim Dis
DB-HT Sim Dis is a new, thin film, stainless steel GC column for extended temperature (430 °C) simulated distillation analysis. Ideal for crude oil and paraffin wax analysis, it exhibits excellent inertness and low bleed. It is a superior alternative to other metal clad, high temperature, simulated distillation columns.

- For extended temperature simulated distillation
- 430 °C upper temperature limit
- Rugged stainless steel

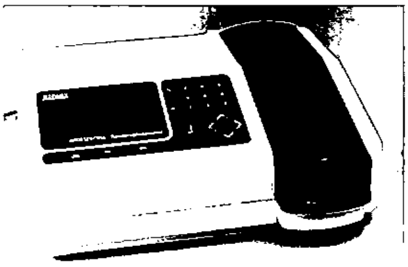
On-line Article: Heating Up Simulated Distillation

GS-Alumina/KCl
J&W's new potassium chloride, deactivated alumina GC PLOT column is great for the analysis of light hydrocarbons. GS-Alumina/KCl quantitatively separates the highly volatile solutes at normal temperature (35 °C).

- Ideal for light hydrocarbon analysis
- Lower polarity than GS-Alumina
- Column-to-column reproducibility guaranteed.

Contact: Clare Hodgson, Shimadzu Scientific Instruments
Ph: 0800 735 725, Fax: (09) 836 7757
Email: clareh@shimadzu.co.nz
circle number 53 on the reader reply card

NEW UV/VISIBLE SPECTROPHOTOMETER FROM JENWAY



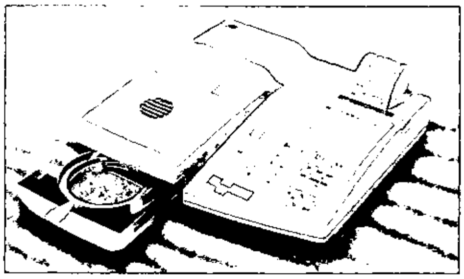
The Model 6405 is a new single beam UV/visible Spectrophotometer. It operates over an extended wavelength range of 190-950 nm. Particular care has been taken during the design stages of the Model 6405 to provide superior optical performance; the results of which can be seen in the excellent low stray light characteristics and stability rarely found in a single beam spectrophotometer.

Main specifications and features:
- Bandpass 5 nm
- Absorbance range: -0.300 to 3.00 AU
- Stray light: <0.05% @ 340 nm
- Drift: ±0.001 AU/hour
- Photometric linearity: ±0.005 AU @ 1.0 AU
- Graphics display: 240 x 128 pixel LCD
- Menu driven
- In-built clock: Real time displayed continuously.
- Analogue output and bi-directional RS232 interface.
- Long-life lamps.

Contact: Labsupply Pierce (NZ) Ltd
P O Box 34234 Birkenhead, Auckland
Ph: (09) 4435867, Fax: (09) 4447314
Email: labsupply@labsupply.co.nz
circle number 54 on the reader reply card

NOVEL DETERMINATION OF THE MOISTURE CONTENT OF FOODS UNDER HALOGEN LIGHT

With a completely new combination of drying and weighing, Mettler-Toledo offers the food industry an efficient determination of the moisture content of substances under halogen light. As regulations governing foods stipulate maximum values for consumer protection, it is mandatory to measure the moisture content during various stages of the production process. The traditional drying oven method is slow and impedes rapid corrective actions in the ongoing process.



After intensive development work, Mettler-Toledo AG has developed the "Halogen Moisture Analyser" which drastically reduces the time needed for determination of the moisture content of liquids, powders, pastes, or organic or inorganic substances in the dairy, food, chemical and pharmaceutical industries.

The new compact and ergonomically designed "Halogen Moisture Analyser" dependably measures the moisture content of liquids, powders or pasty substances with a readability of 0.01% in the range of 0.5% to 99%. A striking feature is the sample chamber, which is controlled at a keystroke and reminiscent of a CD player; it accommodates the sample in an aluminium pan and automatically transports it to the instrument interior where drying starts immediately under halogen light.

The new offering of Moisture Analysers is available in 3 models:

- HR73 (Professional Level)
- HG53 (Standard Level)
- LJ16 (Basic Level)

The HR73 Model is particularly distinguished by its universal application and can store the drying procedures for up to 20 different types of substances in its database, as well as manage a separate measured value journal and measured value statistics for each type. The adjustment of the balance and dryer ensures that exactly the same measured value is obtained anywhere in the world under a wide range of environmental conditions. These features combined with four temperature programming possibilities are testimony to a product unparalleled in its class.

The HG53 Model has been designed for simpler routine determinations. A printer can be integrated with both models if desired to record the measurement results with time and date, and utilising the LocalCAN RS232 data interface the results can also be sent to an attached PC. The screen with easily understandable symbols and the easy-to-clean keypad with its plastic protection are constructed so that both highly trained and semi-skilled staff can work dependably and quickly.

Contact: Watson Victor Ltd
P O Box 1180, Wellington
Ph: (04) 3857699, Fax: (04) 3844651
circle number 55 on the reader reply card

LETTER TO THE EDITOR

Dear Sir

Care should be taken regarding conclusions drawn from the blood alcohol level of the deceased driver of Princess Diana's car.

Alcohol has been found in instances of violent death when it has been established beyond doubt that the person had not ingested alcohol. The anomaly comes about because the blood, which is normally sterile, becomes contaminated with yeasts which are capable of fermenting blood sugar to alcohol.

When a person suffers a violent death and internal organs are ruptured, special procedures are necessary in sampling of blood for analysis. Blood taken from such deceased persons for forensic purposes must be sampled very soon after death and stored under refrigeration in bottles containing preservative adequate to inhibit fermentation. Hospital-type sample bottles normally contain only anti-coagulant, which does not inhibit fermentation. Interestingly, the proportion of alcohol found in the blood of the driver (170 mg alcohol/100 mL blood) is comparable with that found in other cases, including British airforce trainees (known not to have taken alcohol) whose planes had crashed. In such circumstances the levels appear to be relatively constant, and are probably related to the proportion of blood-sugar in the blood, a fairly constant parameter.

This point does not exclude the possibility that the driver had been drinking. But conversely, the fact that alcohol was found does not prove that he had been drinking, unless stringent sampling and storage methods were adopted. Similarly, even if he had been drinking, the amount of alcohol found in the blood does not necessarily relate to the amount of alcohol he had consumed. This aspect of forensic chemistry may not be well known. The matter should be closely examined before conclusions are drawn regarding prior drinking by the driver.

Yours faithfully,

T J Sprott

Patent Proze

by Jane Calvert and Greg Lynch

The Intellectual Property Office of New Zealand (IPONZ) is the new name for the New Zealand Patent Office. The new name is considered to be more appropriate as the Office administers registration systems for trade marks, designs and geographical indications, in addition to patents. The new name came into effect on 1 August 1997.

The expression "intellectual property" is widely used to cover more than those aspects of intellectual property which form the realm of IPONZ. Although there is no standard definition, the expression extends to many forms of knowledge or expertise which may have commercial or cultural significance. The ambit of the expression includes copyright, plant varieties, trade secrets and some other statutory and common law rights. We will discuss some of these forms of intellectual property in a future Patent Proze.

IPONZ is a business unit of the Ministry of Commerce. For some months IPONZ has been reviewing its organisational structure with a view to enhancing office efficiency, reducing costs and increasing effectiveness. It now comprises three smaller business units.

A Business Centre located at Levin House in Lower Hutt is responsible for examination of patent, trade mark and design applications. The public searching library is also located at Levin House. Handling of certain non-examination related matters, file maintenance and file storage are the responsibility of the Document Information and Service Centre at Seaview in Lower Hutt. The third business unit is the Hearings Office located in central Wellington.

The Hearings Office focuses on *ex parte* and quasi judicial matters.

From the view point of applicants, the most noticeable change resulting from the restructure is the rapid examination of applications. A year ago, the delay in examination of trade mark applications was 18 months to 2 years. The delay was 9 to 12 months for patent applications. Applications for patents, trade marks and designs are now being examined within approximately 2 weeks of filing. This means that grant of a patent or registration of a trade mark or a design can be achieved shortly after an application is filed.

Examination in New Zealand is now significantly faster than in most other countries. This is advantageous in many circumstances but may have pitfalls. For example, early publication of the details of a patent specification or a design may not be desired. Your patent or trade mark attorney can circumvent problems of this nature.

Another important change is that applications may now be filed at any Companies Office. The Companies Office does not process the applications other than to date stamp them. Use of the Companies Office may be more convenient for those located remote from Wellington, particularly where urgency is required in obtaining a filing date.

On the recent retirement of Bruce Popplewell as Commissioner of Patents, Trade Marks and Designs, Neville Harris, a Deputy Secretary of the Ministry of Commerce, has assumed the position of Commissioner.

Readers may be aware from our previous issue of Patent Proze, that the allowability of Swiss style claims in New Zealand is being challenged in the High Court. These claims have particular importance for the pharmaceutical industry as they relate to new medical uses for known pharmaceuticals. It is uncertain as to when the matter will be heard by the Court.

However, we can inform readers that more than 25 of the world's major pharmaceutical companies have now joined the proceedings as defendants against Pharmac's challenge.

We will keep you informed of progress.

If you wish to get any further information, please direct enquiries to: *Patent Proze*, Baldwin Son and Carey, P O Box 852 Wellington, Email: email@bscwlg.baldwins.co.nz

Jane Calvert

Jane Calvert and Greg Lynch are both employed in the patent department of Baldwin Son and Carey, Patent and Trademark Attorneys, and Solicitors, where they specialise in chemistry patents. Jane joined Baldwins after completing a PhD in chemistry at the University of Canterbury 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 postdoctoral researcher at Oxford University in the United Kingdom.

Greg Lynch

ENVIRONMENTAL ISSUES

THE MINISTRY FOR THE ENVIRONMENT'S CLEAN-UP TECHNOLOGY REPORT

The Ministry for the Environment has recently received a research report on the performance of a new procedure to treat soil contaminated by organochlorines. The report presents the work carried out in the development of a thermal desorption treatment of soil and materials contaminated by pentachlorophenol (PCP), dioxins[1], and several organochlorines pesticides.

These pilot scale trials demonstrated, perhaps for the first time internationally, the potential for a single-stage soil heating process (i.e. thermal desorption) to clean up organochlorine- and dioxin-contaminated soils. The main findings of this report are outlined below.

Background

The thermal desorption technology had previously been successfully demonstrated at the laboratory scale, and is referred to in this article as the Phase 1 Study. The purpose of the second series of trials, (Phase 2 Study), was to further assess the effectiveness and feasibility of the technology. This pilot scale assessment is an intermediate step in the research and development of the technology prior to a full-scale clean up. The technology report will be of interest to the owners of sites contaminated by residues of PCP and dioxin arising from historic wood treatment operations in New Zealand. This technology potentially could also assist to clean up the Mapua pesticides site near Nelson which is contaminated by DDT.

About the technology

The thermal desorption process involves the heating of a mixture of contaminated soil and lime. The process renders the organochlorine contaminants in the soil into harmless constituents, namely water, carbon and inorganic chloride. All gaseous emissions from the process are washed and filtered, and any particulate material entrained in the movement of gases is captured and recycled back through the process. The treated soil is sterile and safe to return to the site and if desired may be amended with compost to restore its viability as a plant growing medium.

About the trials

The assessment of this pilot-scale technology was jointly commissioned and partially funded by Fletcher Challenge Forests, Carter Holt Harvey Timber Group, Forestry Corporation of New Zealand Limited, and the Ministry for the Environment, in conjunction with ADI Limited and ESR Limited.

The technology assessment used a pilot-scale experimental thermal desorption unit owned by ADI Limited, Australia, and jointly operated with ESR Limited. The trials were carried out at the Gracefield campus of ESR Limited with all analytical work undertaken in the ESR laboratory.

Phase 1 Study

Phase 1 of this study was commissioned in April 1995 and was reported to the Ministry for the Environment in December 1995. It confirmed, at a laboratory scale, the effectiveness of the ADI thermal desorption process and suggested operating conditions and additives necessary to remediate soils contaminated with PCP and dioxins.

ADI's ADOX-BCD[2] process for destroying organochlorine substances, was also verified at the laboratory scale as being capable of destroying any organochlorine condensates produced from the thermal desorption process.

As a result, pilot scale trials were recommended to further develop the technology and to build confidence in the process at a semi-commercial scale.

Phase 2 Study

In this pilot scale study, PCP and dioxin contaminated soil samples were treated in a continuous, indirectly-heated, thermal desorption pilot plant in the presence of lime. Several residence times were investigated at the process temperatures chosen.

One important technical objective was to establish the feasibility of achieving residual concentrations in the soil less than 50 parts per billion (ppb) of PCP, and less than 1 ppb (TEQ[3]) dioxins. These levels are less than the target clean up criteria judged suitable for residential landuse[4].

First trial series

In the first series of trials, PCP levels in contaminated soils (range 561-1440 parts per million (ppm)) were reduced to less than 20 ppb (the limit of detection of the analytical method used). Dioxin levels (TEQ) were reduced from around 17 ppb to less than the target level of 1 ppb.

Second trial series

A second series of trials were conducted using 10% and 25% contaminated sawdust/sand mixtures. Clean river sand rather than soil was used as a carrier medium for the contaminated sawdust. PCP levels (range 2020-3110 ppm) were reduced to below 0.02 ppm after treatment. Dioxin levels (range 190-245 ppb TEQ) were reduced to below 3.2 ppb after treatment; this suggested that with further process optimisation it would be possible to treat contaminated sawdust to residual dioxin levels less than 1 ppb TEQ.

Third trial series

A third series of trials were conducted on contaminated soil samples containing the organochlorine pesticides DDT (482 ppm), lindane (γ- HCH, 241 ppm), and chlorothalonil (587 ppm). This trial was carried out to determine how effectively the technology treated soil contaminated by organochlorine pesticides.

The levels of the DDT and lindane pesticides (and any chlorinated organic compounds of decomposition) were less than 1 ppb after treatment. No chlorothalonil was detected in the treated soil using analytical techniques sensitive to levels above 0.1 ppm.

Fourth trial series

The ADI Thermal Desorption process produces a variable amount of dust (usually less than 5% of the original soil feed), and condensates, both containing dioxins. While these are captured and contained within the system, they must be able to be safely decomposed for the total process to be considered effective.

The initial intent was to chemically destroy any residual organochlorine substances in the collected dusts and the condensates in a small but separate ADI ADOX-BCD plant designed for that purpose. However, as results obtained early in the desorption study suggested strongly that significant destruction of PCP and dioxins was occurring during the thermal treatment process, the possibility of completing their destruction by recycling them in the plant was proposed.

To test this approach, a trial was undertaken where the contaminated dust collected during the project was mixed with clean sand and lime, and then treated by thermal desorption.

From an initial level of 1280 ppb (TEQ), residual dioxin levels in the treated material of below 0.1 ppb (TEQ) were achieved, demonstrating an almost total destruction of dioxins under the treatment conditions employed.

From these results it is concluded that a single stage thermal desorption treatment process could be employed in the treatment of organochlorine contaminated soils and materials. In other words, a second stage separate facility or method to destroy the organochlorine substances associated with the dusts and condensates may not be necessary.

Conclusions

The trials of the thermal desorption process demonstrated that:

A range of soils contaminated with various levels of PCP, dioxins and organochlorine based pesticides can be effectively treated using the ADI indirectly-heated thermal desorption process.

The target performance criteria of less than 50 ppb PCP and 1 ppb dioxin (TEQ) in treated soils can be safely achieved.

Sawdust contaminated with PCP and dioxins, when mixed with sand, can also be effectively treated.

The levels of the organochlorine pesticides DDT and lindane in soils can be reduced to below 1 ppb, and chlorothalonil can be reduced to below 0.1 ppm, after treatment.

It is feasible to implement a single stage treatment technique based on the recycling of dusts and condensates from the process vapour streams back through the desorber. This could be provided for in the design of a full scale plant.

ADOX-BCD TRIAL ON ORGANOCHLORINE PESTICIDES

A study into the effectiveness of the ADOX-BCD[2] technology to destroy waste organochlorine pesticides has been commissioned by the Ministry for the Environment. The study is also being undertaken to identify the Resource Management Act consent and conditions that would be needed for use of this technology in New Zealand.

The BCD process was first developed and patented by researchers working for the USEPA. This technology has to date mainly been used to treat PCBs[5] in transformer oils. It offers a viable alternative to the high temperature incineration of contaminated oils. ADI Limited is one of several companies to acquire the rights to the BCD process.

The BCD process uses a hydrocarbon oil to dissolve the organochlorine substances. Following the addition of common alkalis, such as caustic soda, and proprietary catalysts, decomposition and dehalogenation of the organochlorines occurs at temperatures between 280 °C and 340 °C.

As a result of extensive research and development by both ADI Limited and the USA-based BCD Group, a more cost-effective ADOX-BCD liquids process has been developed for the destruction of organochlorine compounds. The reaction is faster and yields non-toxic residues including carbon and sodium chloride. The diluent oil used in the reaction is recovered and can be reused. The ADOX-BCD process is being applied in the New Zealand trials.

The pilot scale trial is being carried out at the Gracefield campus of ESR Limited using a BCD unit owned by ADI Limited, Australia, and jointly operated with ESR Limited. Test quantities of a range of organochlorine pesticides (including DDT, lindane, dieldrin, PCP) for the trial have been supplied by regional councils. Bench scale reactions are being carried out prior to the commissioning of the pilot scale unit.

* * * * *

---

[1] The full report: "The Remediation of Pentachlorophenol and Dioxin Contaminated Soils: Phase 2 - Pilot Plant Treatability Studies", ADI Limited Technology Group and ESR Limited, 1997, is available from ESR Limited, Wellington Science Centre, P O Box 30547, Lower Hutt, New Zealand.

[2] ADOX: Accelerated Decomposition of Organic Halides; BCD: Base Catalysed Decomposition.

[3] TEQ: Toxic equivalents.

[4] refer "Health and Environmental Guidelines for Selected Timber Treatment Chemicals", Ministry for the Environment/ Ministry of Health, June 1997.

[5] PCBs: polychlorinated biphenyls.

* * * * *

International News

J&W HOLDING CORPORATION ANNOUNCES THE ACQUISITION OF HUMONICS AND R&D SEPARATIONS BY J&W SCIENTIFIC INCORPORATED

J&W Scientific Incorporated, a wholly-owned subsidiary of J&W Holding Corporation, has acquired two Rancho Cordova companies, Humonics, Inc. and R&D Separations, Inc. The move is part of an overall strategy for expansion and growth for J&W, the leading manufacturer of high resolution gas chromatography columns worldwide. This expansion strategy began in 1995 when J&W Scientific, a division of Curtin Matheson Scientific, Inc. (CMS), was sold by Fisons plc and purchased by J&W co-founder Walt Jennings and management with the investment assistance of Saratoga Partners, the corporate buy-out arm of Dillon, Read & Co., Inc. The union of Humonics and R&D Separations with J&W Scientific enhances the position of J&W in the worldwide chromatography marketplace and supports the strategy voiced by Christian L. Oberbeck, Managing Director of Dillon, Read, "to growing the company and increasing its considerable market share in the gas chromatography equipment market worldwide by building on its innovative technology and by exploring further potential acquisitions."

Humonics Inc. was founded in 1986 and later purchased by the current stockholders Bob Jameson and Michael Ford in 1991. Humonics has become a leading manufacturer of gas and liquid flow measurement devices for chromatographic science. The firm is based in Rancho Cordova, California, and manufactures bubble flow and digital type flowmeters. The Humonics flow measurement products combined with the J&W's ADM Model flowmeters will allow J&W to offer customers virtually any type of flow measurement device possible. Humonics' proven technology is recognised worldwide by gas chromatography instrument manufacturers and users.

R&D Separations, Inc. specialises in the manufacture of carrier gas purification traps/systems and other accessories for gas chromatography. This Rancho Cordova firm has grown from its established beginnings in 1980 by founding partners Robert Jameson and Dave Godines. The expertise and product technology of R&D Separations will greatly enhance the current gas chromatography product accessory line offered by J&W.

Said Jameson, President of R&D Separations, "We see this association as an excellent partnership opportunity to better serve practising chromatographers worldwide. J&W's strengths in distribution and marketing will be a significant asset to our current product line and technology, allowing for further growth." Jameson will join J&W in a new position as Accessories Business Development Manager.

Both companies will be incorporated under the J&W facility located in Folsom, California as soon as possible. Humonics personnel will be moved immediately to the J&W site at 101 Blue Ravine Road. All present employees of the two companies are expected to remain in their current positions.

Oberbeck commented on the goal of the acquisition, "We see the technology offered by these two companies as an ideal match, allowing J&W to continue to offer the best flow measurement devices and gas chromatography accessories with world class service for our mutual customers. J&W plans to continue development of leading edge technology for chromatographic supplies within the field of separation science."

THREE NEW NATIONAL ADHERING ORGANISATIONS OF IUPAC

The IUPAC Council approved three applications for admission to the Union at its recent meeting in Geneva, Switzerland, 29-30 August 1997. The new National Adhering Organisations are the Chemical Society of Pakistan, the College of Chemists of Puerto Rico and the Union of Yugoslav Chemical Societies. This will bring the total number of National Adhering Organisations to 43 in 1998.

The International Union of Pure and Applied Chemistry is a voluntary, non-governmental, non-profit association of organisations each representing the chemists of a member country, a member country being a country whose Adhering Organisation has joined the Union.

IUPAC ADOPTS FINAL RECOMMENDATIONS FOR NAMES OF TRANSFERMIUM ELEMENTS

The Council of the International Union of Pure and Applied Chemistry (IUPAC) recently approved final recommendations for names of elements 101-109. By a vote of 64 to 5 (with 12 absentions) delegates from IUPAC's 40 member countries accepted the report of its Committee on Nomenclature of Inorganic Chemistry (CNIC), thus ending a three-year controversy over the names of these short-lived, artificially produced elements.

The names and symbols recommended by IUPAC are as follows:

Element	**Name**	**Symbol**
101	Mendelevium	Md
102	Nobelium	No
103	Lawrencium	Lr
104	Rutherfordium	Rf
105	Dubnium	Db
106	Seaborgium	Sg
107	Bohrium	Bh
108	Hassium	Hs
109	Meitnerium	Mt

The Commission's report recommended that elements 101, mendelevium; 102, nobelium; and 103, lawrencium should retain their commonly accepted names although it is clear that the original claim of discovery of nobelium is in error. The priorities for the discovery of elements 104 and 105 are disputed. CNIC accepted the name proposed for 104 by the Berkeley group, rutherfordium, and recommended that element 105 should be called dubnium in honour of the Dubna laboratory, where important contributions to the creation of transfermium elements have originated. Element 106 was uncontested as a discovery, and the name seaborgium (Sg) was accepted. Elements 107, 108 and 109 are also uncontested discoveries and CNIC accepted the proposals of the discoverers in the Darmstadt group, except for bohrium, rather than nielsbohrium for 107, after consultation with Danish authorities.

The final recommendations are based partly on suggestions received during the official five-month comment period called for in IUPAC's Bylaws. Comments came from individual chemists worldwide and from the 40 National Adhering Organisations that comprise IUPAC. The new names replace the provisional recommendations initially proposed by CNIC in August 1994.

The naming of the transfermium elements has been controversial, partly because of disagreements on priority for discovery of several elements. According to Alan Sargeson, Chairman of CNIC, the Commission accepted the conclusions on discovery reached by the Transfermium Working Group (TWG) in 1993. The TWG was formed jointly by IUPAC and the International Union of Pure and Applied Physics in 1986 to establish criteria that must be satisfied for the discovery of a new chemical element to be recognised and to evaluate competing claims. In selecting names, CNIC gave great weight to proposals by discoverers of the elements but considered other factors as well.

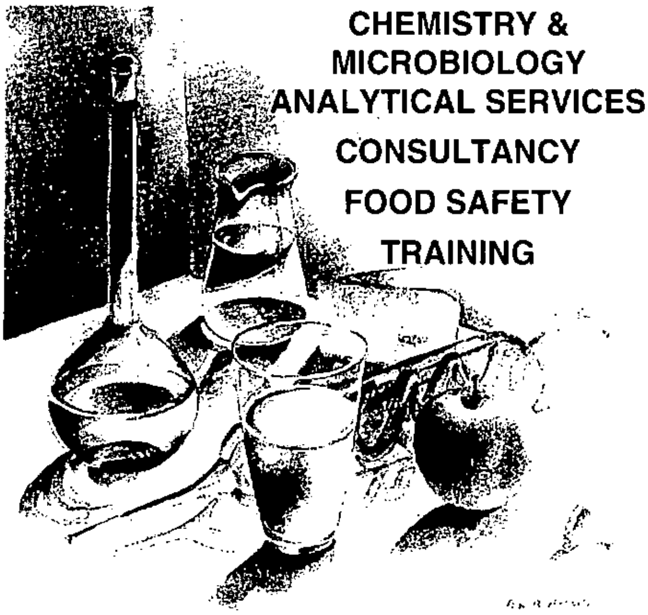
IUPAC's recommendations in a wide range of chemistry carry no legal force but are normally viewed as authoritative throughout the world. IUPAC President Albert Fischli pointed out that the process of proposing provisional recommendations, soliciting comments from the chemistry community and making revisions where indicated has worked well. "Unfortunately, he said, "with conflicting claims and preferences, it has not been possible to devise names that are completely satisfying to all the laboratories involved in these discoveries. I believe that the final recommendations come close to achieving our goal and we hope they will be used worldwide."

J&W SCIENTIFIC ACQUIRES GS-GASPRO GC COLUMNS

J&W Scientific, the leading manufacturer of high resolution GC columns worldwide, has acquired the GasPro GSC PLOT column business from Advanced Separation Technologies Incorporated (ASTEC), operating from Whippany, New Jersey. This porous layer open tubular (PLOT) column technology provides excellent chromatographic performance for the separation of low molecular weight hydrocarbons and a variety of inorganic compounds. The success of the GasPro column lies in its selectivity toward many classes of compounds and its ability to maintain retention time stability for samples that contain water. J&W plans to change the name to GS-GasPro, to be consistent with J&W's existing line of capillary GC PLOT columns.

Original research work on the GasPro technology was performed by Dr George Reid III under the supervision of Dr Dan Armstrong at the University of Missouri, Rolla. ASTEC commercialised this technology in 1994 and has extensively marketed the GasPro product line around the world.

J&W Scientific will begin production of GS-GasPro columns immediately under the assistance and expertise of ASTEC. J&W and ASTEC have taken steps to assure continuous product availability of the product while the technology transfer takes place.



CONFERENCES & SEMINARS

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

6-10 October 1997
7th International Symposium on Macromolecule-Metal Complexes (MMC7)
Venue: Leeuwenhorst Congress Centre,
Noordwiijkerhout, The Netherlands
Contact: Professor Dr J Reedijk
Leiden Institute of Chemistry
The Netherlands
Tel: (+31-71)-5274459
Fax: (+31-71)-5274451

12-15 October 1997
3rd Symposium/Workshops on Pharmacy and Thermal Analysis
Venue: Ascona, Switzerland
Contact: Dr E Marti
Ciba-Geigy Ltd
Tel: (+41-61)-6965348
Fax: (+41-61)-6969304
Email: erwin.marti@chbs.mhs.ciba.com

12-16 October 1997
Second International Conference on Isotopes (2ICI)
Venue: Hyatt Regency Hotel, Sydney, Australia
Contact: Dr Clarence J Hardy
P O Box 85
Peakhurst, NSW 2210, Australia
Tel: (+61-2)-95796193
Fax: (+61-2)-95706473
Email: cjhardy@ozemail.com.au

12-17 October 1997
Composites Design For Performance
Venue: Lake Louise, Canada
Contact: P S Nicholson
Department of Materials Science and Engineering
McMaster University
1280 Main Street, West Hamilton
Ontario, L854L7, Canada

13-15 October 1997
Manufacturing and Engineering Materials '97
Venue: Melbourne, Australia
Contact: The Events Manager
Institute of Metals and Materials Australasia Ltd
Tel: (+61-3)-93267266
Fax: (+61-3)-93267272

15-17 October 1997
7th New Zealand Coal Conference
Venue: Park Royal Hotel, Wellington
Contact: The Conference Secretary
Seventh New Zealand Coal Conference
P O Box 31-244, Lower Hutt
Tel: (+64-4)-5703700
Fax: (+64-4)-5703701

16-17 October 1997
Second Conference on Nuclear Science and Engineering In Australia (ANA 97)
Venue: Hyatt Regency Hotel, Sydney, Australia
Contact: Dr Clarence J Hardy
P O Box 85
Peakhurst, NSW 2210, Australia
Tel: (+61-2)-95796193
Fax: (+61-2)-95706473
Email: cjhardy@ozemail.com.au

19-22 October 1997
International Symposium on Laboratory Automation and Robotics (ISLAR '97)
Venue: Boston, USA

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Contact: James N Little
Program Chairman ISLAR '97
68 Elm Street, Hopkinton
MA 01748, USA
Email: islar@islar.com
WWW: http://www.islar.com

20-24 October 1997
6th SPSJ International Polymer Conference (IPC 97)
Venue: Kusatsu, Japan
Contact: IPC 97 Secretariat
Tel: (+81-3)-35433765
Fax: (+81-3)-35458560
Cable Address: SOCPOLYMER, TOKYO
Email: LDU00517@niftyserve.or.jp

21-23 October 1997
BioTechnica: International Trade Fair For Biotechnology
Venue: Hannover, Germany
Contact: Deutsche Messe AG
Messegelände
D-30521, Hannover, Germany
Fax: (+59-511)-8932626
WWW: http://www.biotechnica.de

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

26-31 October 1997
Postdoctoral Course on Degradation, Stabilisation and Reactive Modification of Polymers
Venue: Villa Gualino, Turin, Italy
Contact: Ms Giusy Spinasanta, COREP
Tel: (+39-11)-5645103
Fax: (+39-11)-5645199
Email: giusys@athena.polito.it

9-12 November 1997
Corrosion and Prevention 97
Venue: Hilton Hotel, Brisbane, Australia
Contact: Secretariat
Corrosion Prevention Centre
P O Box 5142
Clayton, VIC 3168, Australia
Tel: (+61-3)-95440066
Fax: (+61-3)-95435905
Email: corrprev@internex.net.au

11-15 November 1997
Fifth Chemical Congress of North America
Venue: Cancun, Quintna Roo, Mexico
Contact: 5NACC Congress Secretariat
c/o American Chemical Society
Tel: (+1-202)-8724396
Fax: (+1-202)-8726128

17-18 November 1997
The Seventh Annual Conference on Textile Coating and Laminating
Venue: Charlotte Marriott Executive Park, NC, USA
Contact: Program Division, TECHNOMIC Publishing Company Inc.
Tel: (+1-717)-2915609
Fax: (+1-717)-2959637

17-19 November 1997
1997 New Zealand Minerals and Mining Conference
Venue: Auckland, New Zealand

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: Conference Centre
University of Auckland, 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

30 November-5 December 1997
Nature Conservation in Production Environments
Venue: Taupo, New Zealand
Contact: University of Auckland
School of Environmental and Marine Sciences
Tel: (09)-3737599
Fax: (09)-3737042
Email: sems@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 Concepcion
University of the Philippines
Marine Science Institute
Quezon City 1101
Republic of the Philippines
Tel. and Fax: (+63-2)-9213799

6-8 April 1998
Conference on Production and Uses of Starch
Venue: Edinburgh, Scotland, UK
Contact: Dr C M Duffus
Crop Science and Technology Department
Scottish Agricultural College
West Mains Road
Edinburgh EH9 3JG
Scotland, UK

15-18 April 1998
Third International Meeting on Esterases Reacting with Organophosphorus Compounds
Venue: Dubrovnik, Croatia
Contact: Dr Elsa Reiner
"Esterase Meeting"
Institute for Medical Research and Occupational Health
P O Box 291, Ksaverska cesta 2
HR-10001 Zagreb, Croatia
Fax: (+385-1)-274572

19-22 April 1998
International Symposium on Stability and Stabilisation of Biocatalysts
Venue: Cordoba, Spain
Contact: Dr F J Plou

Department of Biocatalysis, CSIC
Campus Univ Autonoma
28049 Madrid, Spain
Fax: (+34-1)-5854760

26-29 May 1998
VIIIth International Symposium on Luminescence Spectrometry in Biomedical and Environmental Analysis
Venue: Las Palmas de Gran Canaria, Canary Islands
Contact: J J Santana Rodrigues
University of Las Palmas de GC
35017, Las Palmas de GC
Canary Islands, Spain
Fax: (+34-9)-28452922

24-26 June 1998
Asia-Pacific Society for Neurochemistry: Biennial Conference
Venue: Seoul, Korea
Contact: Peter Dodd,
Email: peterD@qimr.edu.au

or full details from:
Professor Yoo-Hun Suh
C/- Organising Secretariat of 4th APSN Meeting
Department of Pharmacology
Seoul National University College of Medicine
28 Yongon-dong, Chongno-gu
Seoul 110-799, Korea

26 June - 2 July 1998
9th Congress of the International Society for Biomedical Research on Alcoholism (ISBRA)
Venue: Copenhagen, Denmark
Contact: Professor Christer Alling
Department of Medical Neurochemistry
Institute of Laboratory Medicine
University Hospital
S-221 85 Lund, Sweden
Fax: (+46-46)-175376

13-17 July 1998
MACRO 98 AUSTRALIA
37th IUPAC International Symposium on Macromolecules
Venue: Gold Coast, Queensland, Australia

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Contact: MACRO 98 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

2-7 August 1998
The 9th International Symposium on Novel Aromatic Compounds (ISNA-9)
Venue: The Hong Kong Convention and Exhibition Centre
Hong Kong
Contact: Professor B Halton
Chemistry Department
Victoria University
P O Box 600, Wellington
New Zealand
Fax: (+64-4)-4955241
Email: brian.halton@vuw.ac.nz

24-28 August 1998
17th International Cancer Congress
Venue: Rio de Janeiro, Brazil
Contact: Congrex do Brazil
Ruad do Ouvidor, 60 gr 413
20040-030 Rio de Janeiro RG, Brazil
Fax: (+55-21)-2231492

December 1999
23rd Australian Polymer Symposium
Venue: Geelong, Victoria, 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.monash.edu.au

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

14-19 December 2000
Pacifichem 2000
Venue: Waikiki, Honolulu, Hawaii
Contact: Professor B Halton
Chemistry Department
Victoria University
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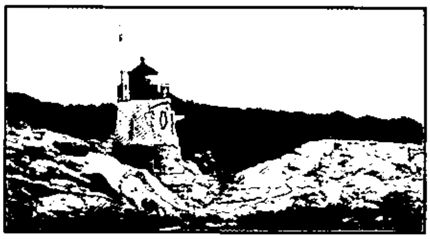

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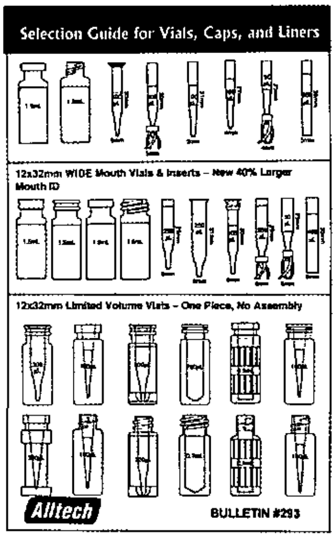

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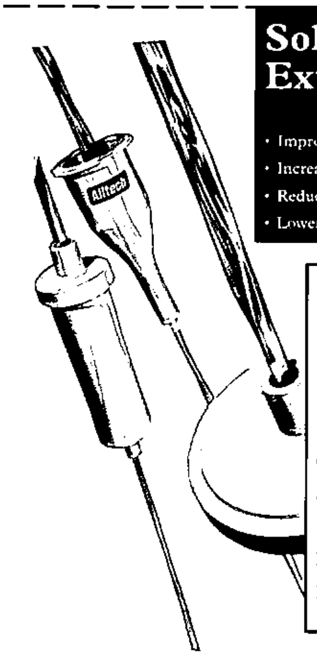

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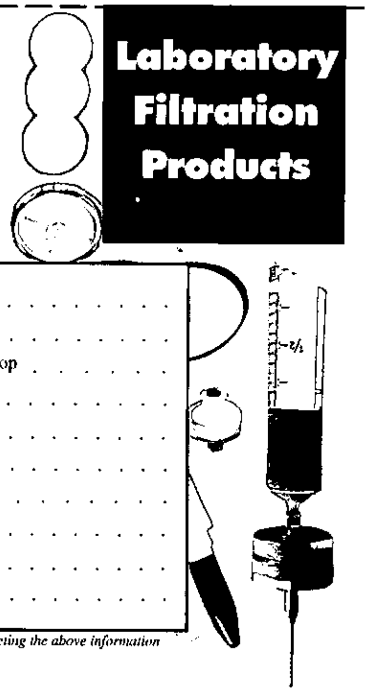

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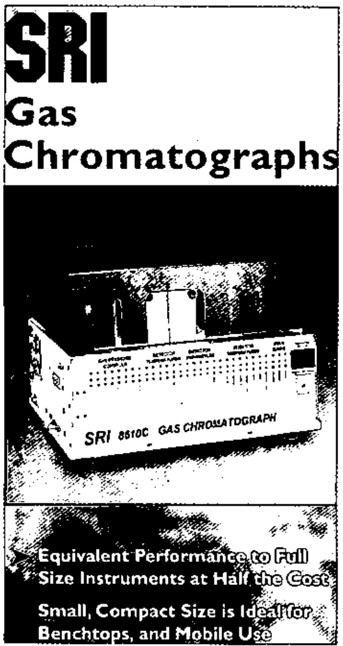

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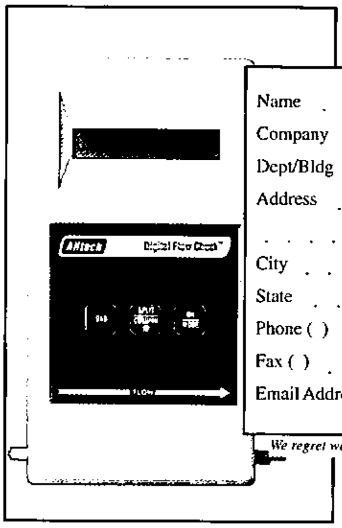

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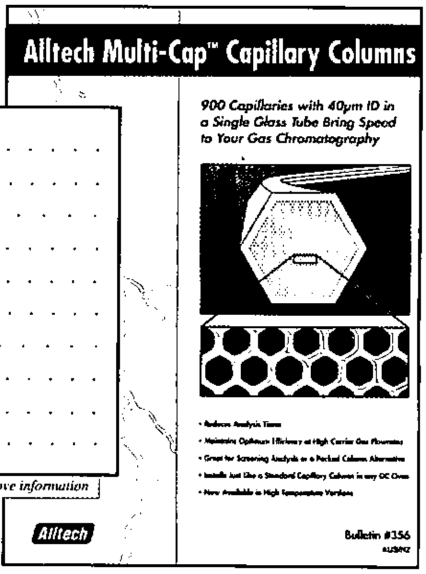

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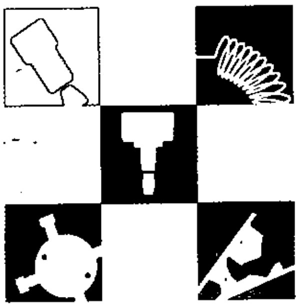

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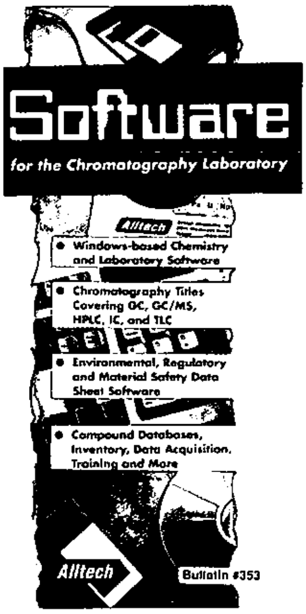

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25-28 November 1997

Venue:
The Conference Centre, University of Auckland, Auckland

Programme:

- The commercial environment for new materials and products – specifications, regulations and evaluation.
- Production and processing methods, and technology of plant oils.
- The manipulation of plant materials and crops before extraction to match product specification.
- Analysis, composition and evaluation of products from both essential oils and fixed oils.
- Pharmacological, nutritional and health aspects of plant oils.
- Composition, analysis and commercial aspects of marine lipids.
- Pharmacological effects of marine lipids.

Plenary and Keynote Speakers include:

Dr Bob Ackman	– University of Nova Scotia, Canada
Mr Bryce Bell	– Secretary, Oilseed Federation, Australia
Prof. Carlo Bicchi	– University of Turin, Italy
Mr Tim Denny	– Denny MacKenzie Associates, Australia
Dr Bob Gibson	– Dept. of Pediatrics, Flinders University, Australia
Dr James Henderson	– Stirling University, UK
Dr David Horrobin	– Director of Efamol, UK
Dr Daniel Joulain	– Director of Research, Robertet, France
Prof. Julie Miller Jones	– St Catherine College, Minnesota, USA
Dr Colin Moffat	– Food Science Laboratory, Aberdeen, Scotland
Prof. John Ohlrogge	– Michigan State University, USA
Dr Noel Porter	– Crop & Food Research Institute, Lincoln University, New Zealand
Dr Siew Wai Lin	– Porim, Malaysia
Dr David Topping	– CSIRO, Adelaide, Australia
Dr John Volkman	– CSIRO, Hobart, Australia
Prof. Alistair Wilkins	– Chemistry Dept., University of Waikato, Hamilton
Mr Geoff Webster	– Abels (NZ) Ltd, Auckland

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PACIFICHEM 2000

CHEMISTRY FOR THE MILLENNIUM

Honolulu, Hawaii, 14-19 December, 2000

Pacifichem 2000 will encompass the ten broad areas of chemical sciences listed below. New Zealand individuals willing to organise a symposium on a topic that falls within any category are encouraged to seek co-organisers from two other Pacific Basin countries and submit a proposal for consideration by the Organising Committee in the first round. If Pacifichem '95 is any guide, the majority of proposals that are approved will come from the first round of considerations. Your co-operation in promoting your science is sought now.

1. **AGROCHEMISTRY**
   - including agriculture, cellulose, carbohydrate, pulp and paper chemistry.
2. **ANALYTICAL CHEMISTRY**
   - including clinical, electrochemical and trace analysis.
3. **BIOSCIENCE AND TECHNOLOGY**
   - including microbial and pharmaceutical chemistry.
4. **CHEMISTRY AND THE COMMUNITY**
   - including chemical education (for chemists, non-chemists and the public), chemical economics and business.
5. **ENVIRONMENTAL CHEMISTRY**
6. **INORGANIC CHEMISTRY**
   - including nuclear and geochemistry.
7. **MACROMOLECULAR CHEMISTRY**
8. **MEDICINAL CHEMISTRY**
9. **ORGANIC CHEMISTRY**
10. **PHYSICAL & THEORETICAL CHEMISTRY**

Deadlines:

30 September 1997	for consideration in the first round
15 August 1998	for consideration in the second round
15 January 1999	last date for receipt of a symposium proposal

Further information and symposium proposal application forms are available from:

Professor B Halton, Professor of Chemistry,
Victoria University, P O Box 600, Wellington.
Fax: (04)-4955241, Email: brianhalton@vuw.ac.nz

IUPAC-SPONSORED SYMPOSIA IN 1997-1998

23-27 November 1997
International Conference on Biodiversity and Bioresources – Conservation and Utilisation
Venue: Phuket, Thailand

4 - 7 May 1998
1st International Conference on Trace Element Speciation in Biomedical, Nutritional and Environmental Sciences
Venue: Neuherberg/Munich, Federal Republic of Germany

28 June - 2 July 1998
12th International Conference on Organic Synthesis
Venue: Venice, Italy

6 - 10 July 1998
7th International Chemistry Conference in Africa
Venue: Durban, Republic of South Africa

20 - 23 July 1998
18th Discussion Conference on Macromolecules: Mechanical Behaviour of Polymeric Materials
Venue: Prague, Czech Republic

2 - 7 August 1998
9th International Symposium on Novel Aromatic Compounds
Venue: Hong Kong

5 - 8 August 1998
8th International Symposium on Solubility Phenomena
Venue: Niigata, Japan

16-21 August 1998
14th International Conference on Physical Organic Chemistry
Venue: Florianópolis, Santa Catarina, Brazil

30 August - 4 September 1998
33rd International Conference on Coordination Chemistry
Venue: Florence, Italy

11 - 16 October 1998
21st IUPAC Symposium on Chemistry of Natural Products
Venue: Beijing, China

For further information, please contact:
The NZIC Secretariat
P O Box 12-347, Wellington
Tel: (+64-4)-4739444, Fax: (+64-4)-4732324, Email: nzic@ipenz.org.nz

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Royal Society of Chemistry International Funds

VISITS TO DEVELOPING COUNTRIES

The Society, through its International Committee, has established a scheme of awards to enable members of The Royal Society of Chemistry to visit chemical establishments in developing countries. The visits must clearly be of benefit to the country concerned and the visitor would be expected to give lectures and engage in other forms of information exchange or, for example, to explore the possibility for future collaboration in research. Support will not be given for attendance at conferences. The grants will complement, where appropriate, those for visits to Commonwealth countries available from the Corday-Morgan Memorial Fund.

The intention is to help applicants make stop-overs in or diversions to a developing country while travelling elsewhere for other purposes. Support for travel within a developing country may be given where appropriate. Applicants must be members of the Society and the funding would cover or contribute to the additional travel costs involved, together with appropriate subsistence, up to a maximum of £500.

Applications should be submitted on the official form and will normally be considered within one month of receipt.

Application forms are available from the International Committee Awards, c/o The International Affairs Officer, The Royal Society of Chemistry, Burlington House, Piccadilly, London WIV OBN, United Kingdom.

THE CORDAY-MORGAN MEMORIAL FUND

The RSC Corday-Morgan Memorial Fund exists to assist members of any established Chemical Society/Institute in the Commonwealth to visit chemical establishments in another Commonwealth country. The intention is to help applicants to make stop-overs in or diversions to such countries while travelling elsewhere for other purposes. The visits must clearly be of benefit to the country concerned and the visitor would be expected to give lectures and engage in other forms of information exchange or, for example, to explore the possibility for future collaboration in research. Support will not be given for attendance at conferences.

The grants will complement, where appropriate, those for visits to developing countries available from the International Committee's fund, and funding would cover or contribute to the additional travel costs involved, together with appropriate subsistence.

The maximum award to any individual is normally £500 and persons eligible must be citizens of, and domiciled in, any Commonwealth country. Applicants must be travelling to another country (not necessarily in the Commonwealth) and would normally stop en route to visit the stop-over country, which must be in the Commonwealth.

Applications should be submitted on the official form and will normally be considered within one month of receipt.

An application form for support from the fund is available on request from the Corday-Morgan Memorial Fund, c/o The International Affairs Officer, The Royal Society of Chemistry, Burlington House, Piccadilly, London WIV OBN, United Kingdom.

RESEARCH FUND

The Royal Society of Chemistry is greatly indebted to the generosity of John William Thomas Jones, whose benefaction in 1992 greatly increased the Society's ability to support research.

The RSC Research Fund exists to assist members in their research by the provision of grants up to £1000, for example for the purchase of chemicals, equipment or for running expenses of chemical eduction research.

If you work in a university, polytechnic, college or school anywhere in the world and your work is held up for lack of moderate funding, the Research Fund may be able to help you. Applications from members of The Royal Society of Chemistry will be considered on merit, but account will be taken of any other source of financial aid available to applicants.

Preference will be given to those working in less well-endowed institutions and to those supporting their own research. Applications from those working in well-established universities will normally only be considered in exceptional circumstances and evidence to support such proposals must be provided. Council is especially anxious to see inventive applications of a 'pump priming' nature and is prepared to consider applications from those working in chemical education as well as chemistry research.

Members in developing countries should note particularly that additional funds have been made available to provide grants for successful applicants from such countries. Preference will be given to those able to cite collaborative research projects with institutions in countries other than their own.

Applications are limited to one per department and must be submitted through the head of that department. Application forms, together with the regulations governing the Fund, may be obtained from Stanley S Langer, The Royal Society of Chemistry, Burlington House, Piccadilly, London WIV OBN, United Kingdom. The closing date for applications is ***31 October*** *but submissions sent well in advance of this date would be much appreciated.*

* * * * *

OBITUARIES

Maxwell McGlashan (1924-1997)

Thermodynamicist, university teacher, researcher, actor, producer, science administrator, mountaineer. Max McGlashan was all of these and at every one he excelled. Born in Greymouth he was a student at Canterbury University College from 1943 to 1946 graduating with first class honours in chemistry. In addition to his academic studies Max took an active part in student affairs becoming Honorary Secretary of the Student's Association in 1945 and developed a love of mountaineering. He also became involved in the Drama Society, then very much under the direction of Dame Ngaio Marsh. His dramatic activities saw him on tour as stage manager for Ngaio Marsh productions in New Zealand in 1944 and in Australia in 1949.

From 1947 to 1949 Max was junior lecturer and then lecturer in chemistry at Canterbury and became one of a line of chemists who learned their rigorous approach to and enjoyment of physical chemistry from Hugh Parton. At that time the university was beginning to break out of its "colonial" mould, developing a character of its own and making research an integral part of its activities. Under the leadership and encouragement of Hugh Parton and Jack Packer people like McGlashan, Wilkins, Vaughan and Christensen, brought a new vigour to chemistry which was reflected in the enthusiasm of staff and students. The Department often echoed to the sound of McGlashan and Wilkins at the point of agreeing about something.

In 1950 McGlashan took leave to go to Reading University where he studied under Edward Guggenheim completing a PhD in 1951. In 1952 he returned to New Zealand and taught for two years before the attractions of being back in the centre of action and of working again with Guggenheim took him to a lectureship at Reading. There followed ten years of fruitful collaboration with Guggenheim and independent research in his own right.

Max was one of the relatively few who was equally comfortable with theoretical or experimental research. He was able to choose appropriately critical experiments to test new ideas. He not only recognised what measurements needed to be made but also was adept at seeing how they should be made. He held strongly to the view that thermodynamics is an experimental subject. The laboratory at Reading became a source of carefully chosen, high quality experimental measurements on liquid and gaseous mixtures and of techniques which were adopted by other laboratories around the world. Max thrived on the stimulus of vigorous interaction with his colleagues. The intense, often noisy but always friendly interaction that had existed with Wilkins at Canterbury was repeated in his verbal battles with John Prue at Reading which served to hone Max's debating skills as well as informing and entertaining their research students.

At Reading Max continued and for a while extended his involvement with theatre, almost always Shakespeare and generally with novice actors. His production of King Lear for the inauguration of the new university theatre at Reading in 1957 was highly acclaimed and a later production the The Two Noble Kinsmen in 1959 was taken as a fringe production to the Stratford Festival.

In 1964 Max was appointed to a chair of chemistry at Exeter University. The years at Exeter were devoted more exclusively to Chemistry and from 1969 with Edgar Westrum to the establishment and development of *The Journal of Chemical Thermodynamics*. This rapidly became the leading international journal for the publication of high quality experimental thermodynamic data. *The Journal of Chemical Thermodynamics* embodied Max's desire to create a repository for the presentation of well written, well documented accounts of purposeful, accurately determined experimental thermodynamic measurements. *The Journal of Chemical Thermodynamics* was something which Max treated as a very personal responsibility. An author's satisfaction at having a paper accepted was often tempered by the myriad of comments which had to be dealt with to satisfy the editor's uncompromising standards, but the result was always worth the effort.

The fifteen years at Exeter were active and very rewarding. The growing involvement with The Metrication Board, the International Union of Pure and Applied Chemistry and the International Standards Organisation, where his views on symbols and terminology were accepted and promulgated; a vigorous research group with visits from colleagues and collaborators from around the world and the success of *The Journal of Chemical Thermodynamics* all contributed. Added to this were the climbing trips on the Continent and the frequent social walks on Dartmoor with visiting chemists being inducted into the "Dartmoor Physical Chemistry Society" and Max making assertions like "misty conditions are the best because otherwise the view will detract from one's concentration on the walk!".

The publication of his book "Chemical Thermodynamics" in 1979 was a fitting climax to this period. This is a book in the Guggenheim tradition but with the McGlashan stamp. Clear, concise, precise and uncompromisingly correct. It is a book for those already initiated into the practice of rigorous and precise thought to savour - and to learn from.

In 1979 his move to the headship of the Chemistry Department at University College brought new challenges. Managing a large department undergoing major redevelopment at a time of financial stringency made new demands which reduced the time that Max had to spend in the laboratory with his students. University College surely benefited from his energy, determination and political skills but this was in many ways at the expense of further contributions he might have made to his chosen subject. Fewer were the times he had to spend in the laboratory regaling students with tales of climbing adventures, past practical jokes and his intellectual tussles with other scientists interspersed with sound criticism of their experimental techniques and discussions on how to improve them - all the things that help to make the study of science the human thing that Max so much enjoyed.

On retirement from University College he kept up much of his committee work in standards and nomenclature and with *The Journal of Chemical Thermodynamics* but transferred some of his energies to developing the 2 hectares of garden at the home ("Patoka") that he and Susan had established near Uckfield in East Sussex.

Max was uncompromising in his determination to get things right and to get them done. He conceded nothing to the cancer which finally killed him and only a few weeks before his death he chaired a meeting of an ISO/TC12 committee on units and terminology.

For over fifty years Max was supported by his wife, Susan whose imperturbability was an ideal complement to his ebullience.

Arthur Williamson

Zina Demchenko (1914-1997)

It is a privilege to be asked to reflect on the contributions of Zina Demchenko, with whom I worked for 11 years about 25 years ago, and who died in April this year.

The facts of her life are easily summarised. A chemical engineer educated in Kharkov in the Ukraine, she lived through the horrendous times of the Civil War, famine, and the Stalin terrors. Her mere survival over this period speaks volumes for her strength of character. With her husband Zosim, she was a refugee, arriving in New Zealand in the early 1950s, where she first joined DSIR, and later the New Zealand Pottery and Ceramic Research Association (PACRA). Zina served on the Wellington Branch Committee of the NZIC. Her community interests were wide, and included important contributions to the Orthodox Russian Church, and to the welfare of many immigrants.

Zina's character was the important aspect. My association with Zina was during my own employment at PACRA, from 1963-1974. Zina was responsible for the commercial testing and evaluation service the Association operated for its manufacturer members, and the important aspects of her character were soon evident to me.

First, I was the new "boss", who did not know anything about ceramics. This situation rapidly demonstrated her sincerity and helpfulness. Her humour, and deft support and training of the "new boy" were invaluable. Only later, when I had been "trained", did I realise how important she had been.

Secondly, PACRA was an association of voluntary ceramic manufacturer members. They maintained their financial support only as long as they had confidence in the Association's work. For many in the industry, their contact was directly with Zina, as the front line of the testing and consultancy service. It was soon clear how much respect she commanded in the industry.

Thirdly, 25 years later, I retain clearly the knowledge of Zina's professional integrity - her respect for facts and results, her care and thoroughness in chemical analysis, her scrupulous operation of physical tests. And there is no better proof of this than the fact that when we took on any new technical staff, their first few months were spent under Zina's supervision, so that professional attitudes were osmotically induced by association and example.

What a wonderful combination of personal attributes and professional skill.

Peter Foster
Former Director, Pottery & Ceramics Research Association

NEW ZEALAND INSTITUTE OF CHEMISTRY

NZIC

MESSAGE FROM THE PRESIDENT

Do you share with me a frustration when chemistry gets misrepresented in the media? Do you think there is a need for an authoritive "chemistry" view on controversal subjects - climate change - organic farming - aromatics in petrol - etc? Is this a role for the Institute?

This is not a task we should take on lightly. It will not be easy to come to a common Institute view. We have to remember that often we have members who are well qualified to speak and have access to up to date information, but cannot speak as "individuals" because of their responsibilities to their employers. We also have to be aware that to get media coverage we need to be able to respond quickly as issues arise, not on a time frame constrained by sub-committees and Council meetings.

If the Institute wants to take on such a role it has to have a good system in place, to prepare an authoritive and timely Institute view on contentious issues. We need up to date information about members' interests and expertise. We need an efficient mechanism to allow us to put together that view. We need to be able to appoint Institute spokespersons.

Informal but limited access to electronic bulletin boards would allow any interested members to be involved in forming the Institute view. Even members constrained by their professional responsibilities from participating publicly, could monitor the development of the view and make sure it was using the most up-to-date publicly available information and that its conclusions were sound.

Is this an idea we should look to develop further? If so, what are the types of issues we should comment on? Let's hear your views. Write to *Chemistry in New Zealand*, contact your branch committee, or email me on r.whitney@crl.co.nz Doing this properly will take resources. Is it something Council should be spending your subscription money on?

Rob Whit

R S Whitney
President, NZIC

NZIC BRANCH NEWS

OTAGO

The Otago branch started the year sweetly with branch members Katherine Edgecombe and Christine Ogilvy personally conducting us on a tour of Cadbury's. John Prescott entertained us with "sugar and fat and all things nice - the sensory appeal of chocolate" aided and abetted with appropriate samples. The branch Chairman endeavoured to lose an intrepid band of branch prospectors on a weekend trip to Whitestone cheese, the blue penguins, Oamaru stone quarry and McRaes gold mine. We were the first to hear the President talk on a hot topic "Coal - Spanning the Energy Gap". For those who have still not heard this interesting and informative lecture there is an important take home message. Most recently, the Otago branch with sponsorship from Manaaki Whenua - Landcare Research, the Dunedin City Council and the Royal Society was able to bring Professor David Waite, from the University of New South Wales, to give the first Manaaki Whenua - Landcare Lecture. "Fractals, flocs and filtration" proved to be very topical in a city where water and waste technology is an important subject. Professors George Christou, University of Indiana and Donald Macalady, Colorado School of Mines, gave lectures to the branch while they were on study leave in the Chemistry Department.

A number of stalwarts and long-time fellows of the Institute retired from the University of Otago or took the option of voluntary severance at the end of 1996, although we continue to see them from time to time. In no particular order I would like to mention Mel Carr ("ask Mel" was a bye word on the branch committee), George Emerson, Don Brasch, Ian Weatherall, Ross Grimmett and David Fenby. Then the whole Chemistry Department disappeared at the beginning of June when it went into Retreat. Retreats seem to have become the required prelude to a departmental review. The Department has reappeared all fired up with Jim Simpson providing a regular newsletter.

Last year's student representative on the branch committee is now Dr Paul Croucher and has been awarded an ARC postdoctoral fellowship to continue his research at Monash University. This year the Chemistry Department has seen seven PhD candidates graduate with at least 3 more to come, a record number. Lyall Hanton is on 7 months leave at the University of Nottingham. Kathryn (Kate) McGrath has joined the academic staff, a Canterbury graduate, she gained her PhD from ANU and completed postdoctoral studies at Princeton. Dr Paul Smith has recently joined the Brooker Bunch and Alisa Roddick has been awarded a two year FRST postdoctoral to work with Jim McQuillan.

There will be major changes in the prerequisites for second year Health Sciences courses from next year. These have led to a complete overhaul of first year chemistry and the introduction of a first year biochemistry course. The Food Science Department has a new GS-MS and, with help from the School of Pharmacy, has purchased a DSC. While the School of Pharmacy spearheaded the purchase of particle sizing equipment, both departments have since mounted Industry Short Courses in which the new equipment was used.

The second Intensive Flavour Science Course was held by the Food Science Department in June. The Course provided a mix of lectures, flavour tasting sessions and laboratory classes, and was designed for postgraduate students and for flavour science research training for professionals. This year 20 participants (10 from Industry) attended the course which included a one day workshop on "Advances in Wine Flavour". The course team consisted of Dr Patrick Etievant, a visiting William Evans Fellow and Director of the Laboratoire de Recherches sur les Aromes (INRA), Dijon, France with Leslie Norris, a research flavourist at McCormick & Co., Maryland, USA and members of the University of Otago academic staff with contributions from New Zealand industries and research centres. Everyone concerned appreciated the evaluation sessions on brewing and wine flavour characterisation which became a common theme requiring repeated participation.

Dr R Ledger, FNZIC
Otago Branch Chairman

WELLINGTON

The June meeting of the Branch was a fascinating talk entitled "The Brief History of Buckyballs" given by Professor Robin Ferrier and his PhD student Steven Holden. The excitement stimulated by the initial discovery of Kroto and Smalley was recounted with enthusiasm by Robin Ferrier. Steven Holden then reported on attempts to synthesise buckminsterfullerene from organic precursors using organic synthetic techniques as opposed to the non-specific arc discharge methods generally used. The chemistry and structure of the molecule was outlined. A sure sign of an interested audience was apparent from the stream of questions which followed.

The July meeting departed from the usual format with a 'Chemistry Magic Show'. About 100 people attended, ranging from small children (even a toddler or two), high school and university students, to parents, grandparents, and retired members of the Institute. The Show, held at Victoria University, was hosted by resident 'magician' Dr David Weatherburn with able assistance from Izabela Pomer, a Technician in Chemistry at Victoria University. The evening went off with a bang - several

NZIC COUNCIL ELECTIONS

Rule 16.2 states:-

The President, Vice-Presidents, Honorary General Secretary and Honorary Treasurer shall be elected annually from nominations made by Branches, or by any six corporate members, and forwarded to the Executive Officer by 31October 1997.

Please forward nominations to reach the Executive Officer by 31 October 1997.

P O Box 12-347
WELLINGTON
Fax (04) 473 2324

A A Turner
Honorary General Secretary for Council

in fact. The audience was then invited to use lighted tapers to produce fireballs from hydrogen filled balloons. Spot prizes of chocolate bars and Hoyts movie tickets were distributed throughout the show. The children particularly enjoyed seeing a dinosaur being produced from a foam reaction and then a brightly luminescent coil of luminol. But it was not just fun for the kids, when challenged to tear a coke can in half, one intrepid student managed (just!) to do this with bare hands, while Dr Weatherburn used a chemical method to split a can requiring little force. Other favourites included a magic flask which produced a rainbow of liquids, and a reaction changing a liquid to a solid which was then set on fire. The choking smoke from several spectacular volcano reactions encouraged a rapid exit by the audience, but not before everyone had collected a chocolate bar.

Although this July event was aimed primarily at students to promote the Institute, it was most encouraging to see families in attendance. Special thanks go to Hoyts Cinemas who sponsored the spot prizes of movie tickets. All in all the night was a great success and the Wellington Branch Committee is considering holding a similar event on an annual basis.

The August meeting was the annual Mellor Lecture and for the second time in the past 25 years the topic strayed from the traditions of inorganic chemistry to organic, and specifically to carbohydrate chemistry (we are sure that Dr Mellor would not have been unduly concerned). Dr Richard Furneaux, Team Leader of the Industrial Research Ltd, Carbohydrate Group, spoke on aspects of the work of the group - which now numbers some 17 scientists - over the past 15 years. From the initial beginnings that evolved carbohydrate-derived cyclic ether herbicides, the lecture covered aspects of the commercialisation of agar products from New Zealand seaweed feedstocks through to current studies aimed at assessing the efficacy of shark cartilage as a dietary supplement and its potential as an anti-cancer agent.

NEWS FROM BRANZ

Minor structural reorganisation at BRANZ sees Wayne Sharman with responsibility for all BRANZ science and engineering services, and Adrian Bennett extending his responsibilities to include the management of the concrete section as well as the materials durability area.

Stephen Meyer is busy cleaning up the metal corrosion coupons that have been exposed for ten years as part of the assessment of corrosivity in the atmosphere at sites throughout New Zealand. This is the final set of coupons and represents the conclusion of one of the most comprehensive national mapping projects of this type performed anywhere in the world. The data sets from 1, 2, 6 and 10 years should allow a curve-fitting process to provide a model for predicting corrosion rates based on shorter periods. Meteorological data for the year of initial exposure of the panels has recently become available for a sensible charge. This should now allow the effect of this initial period on the long-term corrosion path to be tested using previously published theories. Papers by Chris Kane, and by John Duncan and a CSIRO researcher, George King, are being prepared which examine aspects of the unreliability of the ISO 9223 standard for prediction of atmospheric corrosivity in New Zealand.

NEWS FROM VICTORIA UNIVERSITY

The official opening of the School of Chemical and Physical Sciences took place on 26th August 1997 and was coupled with the launch of a new Victoria degree - Bachelor of Science and Technology (BSciTech). The principal guest was Mr Maurice Williamson (Minister of Science and Technology). A component of the chemical sciences programme will involve collaborative ventures with Industrial Research Ltd and Dr Geoff Page (Managing Director) announced the creation of undergraduate scholarships and one graduate scholarship. A large group of staff and guests gathered for the occasion.

Dr Gary Burns completed his term as Assistant Vice-Chancellor (Academic) at the end of June and has now returned to Chemistry after a short period of leave in France. Professor John Spencer attended a conference on metals in organic synthesis at the University of Goettingen (Germany) in July while Professor Brian Halton visited several universities in the UK in June; he is to be a plenary lecturer at a conference in Matsuyama (Japan) in November.

Cees Lensink

MANAWATU

A very successful ChemEd '97 Conference was held over three days at Massey (7-10 July 1997). More than 150 chemistry educators from Universities, polytechnics, and high schools attended. The first day was devoted to the practice of chemical education with the first talk by Perth-based Bob Bucat focusing on the different ideas, knowledge, and skills required to know chemistry. Other international guest speakers included Ruth Ben Zvi from the Weizmann Institute in Israel, and Dwaine and Lucy Eubanks from the American Chemical Society's Examinations Institute. On the third day there were visits to industry and research laboratories. Participants were surprised at the range and depth of chemistry being practised in the local area. The fourth and final day focused on assessment in chemical education and included a panel discussion on the evolving National Qualifications framework and Unit standards. Social activities at the conference included the NZIC Manawatu Branch's Deddye Chemysts Society Meeting at Wharerata, an evening at the Science Centre concentrating on the chemistry of Crossroads wines, and a Chinese banquet to wind up the conference. The next (biennial) ChemEd Conference will be held in 1999 in Hamilton.

One of the keynote speakers at ChemEd '97, Bob Bucat, Senior Lecturer, Department of Chemistry, University of Western Australia, also gave a public lecture on "What does research have to say about chemical education? Some vignettes" on Tuesday 8 July 1997, at The Science Centre and Manawatu Museum. Bob pointed out that the last twenty years have seen considerable maturation of the research effort in science education in general, and in chemical education in particular. New Zealanders have been at the forefront of these developments. There was now the recognition that many 'misconceptions' were common to students of all ages, all levels of education, and all countries. These findings have led to questioning of the traditional 'transmission' mode of instruction, and a revival of ideas from the fields of educational and cognitive psychology. Current research into student's understandings is based on a view that learning is essentially a personal struggle to make sense of our experiences. Bob discussed some examples of relevant research. Particular attention was given to the importance of short-term memory demands, the ability to visualise behaviour at the molecular level, and the language of chemistry.

Dr Kevin Tate, Landcare Research, Massey University campus spoke to the Branch at the Seminar Rooms, New Zealand Dairy Research Institute on Wednesday 27 August 1997. His topic was "A biogeochemists journey through the trees", based on his leadership of the Landcare Research programme on Greenhouse Gases and Terrestrial Ecosystems. Kevin began his talk by pointing out that New Zealand signed the Framework Convention for Climate Change in 1993, and so made a commitment to stabilise our national CO_2 emissions to 1990 levels. This policy is largely based on increased plantings of new forest, mainly *Pinus radiata*. An average annual increase of 100,000 ha of new forest was needed to achieve 80% reduction of CO_2 emissions by 2020. Apart from the difficulty of achieving this planting rate, the policy posed two interesting research questions. First, was there any significant change in soil carbon associated with planting forest on land formerly in pasture? Secondly, what was the state of the carbon balance for our indigenous forests - by far the largest reservoir of vegetation carbon in New Zealand? Kevin illustrated his talk with many interesting slides, including those showing changes in vegetation cover in New Zealand from 700 AD up to the present, and maps of total carbon stored in plants and soils and in major ecosystems (the majority of plant storage is in indigenous forests). He described the use of the 'Rothamsted' model adapted for use in New Zealand to model gains and losses of carbon in soil processes. Simulated changes in soil carbon with land use change, such as afforestation of land previously in pasture, have shown that total soil carbon tends to decline in changing from pasture to pine forest. This means that the New Zealand policy on reducing CO_2 emissions by forest planting is not as robust as hoped, because the gain in uptake of CO_2 by planted trees could be offset by soil carbon losses. Model estimates of annual inputs of organic carbon to topsoils in New Zealand indigenous forests have been made but the carbon balance in these forests is still being determined. One interesting outcome of this research has been the recognition of the importance of inert organic matter (IOM) in soils, a recalcitrant fraction of soil carbon that does not decompose or only very slowly. From chemical investigation, including the use of solid state CPMAS ^{13}C-NMR, this organic matter seems to be largely made of polymethylene type compounds held within clay minerals in the soil.

The Manawatu Science and Technology Fair was held on 1-3 August, 1997, at the Convention Centre, Palmerston North. The Senior NZIC Manawatu Branch Prize (The Alan Furness Memorial Prize) of a trophy and $100 was awarded to Jenny Lane from Awatapu College for her project on microwaves and enzymes. Two highly commended awards went to Adrian Chaplin and Kai Crow from Awatapu College. The Junior Prize of $50 was awarded to Hamish Ward from Monrad Intermediate for his project on fruit power. A highly commended award went to Janelle Priest from Ross Intermediate. Later in August the Kiwi Dairies Taranaki Science and Technology Fair was held in New Plymouth (20-22 August 1997). The NZIC Manawatu Branch Prize for Forms 5-7 was awarded to Sally Cope for her project on enzyme action in saliva, and the prize for Forms 3-4 was awarded to Erin Dent and Kara Prakard for their project on chromatography of ink pens.

Roger Reeves, Chemistry Department, Massey University, was overseas from 9-26 July 1997, to attend an International meeting in the United Kingdom sponsored by Noranda Minerals and Exploration. Objectives of this meeting were to indicate ways in which the world's metal-tolerant plants could be utilised in mineral exploration programmes and to ensure that these floras were preserved while mining is in progress and used in post-mining land restoration programmes. Roger also carried out plant surveys, plant and soil sampling and seed collection of nickel-accumulating plants in southwest Turkey.

Two groups from the Chemistry Department were presented with New Tech Assessment Certificates from Massey University in recognition for their work which has been commercialised. John Ayers and David Elgar, along with the New Zealand Dairy Research Institute (NZDRI), have been developing ion-exchange resins for the isolation of whey products including ALACEN 895 which is now in high demand for food products and fortified sports drinks in the USA [previously reported in the March/April 1997 issue of *Chemistry in New Zealand*]. David Harding, Simon Burton and Neil Haggerty (now with NZDRI) received their certificates for research into mixed mode chromatographic resins for low cost protein purification [previously reported in the January/February 1997 issue of *Chemistry in New Zealand*]. The process is used for large scale protein purification applications and is licensed exclusively to Genencor International, Palo Alto, San Francisco.

Harry Percival


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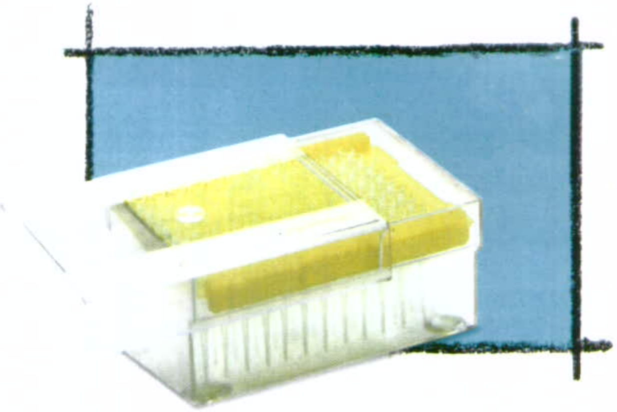

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