NZIC

chemistry
in new zealand
Vol 52 No 2 April 1988

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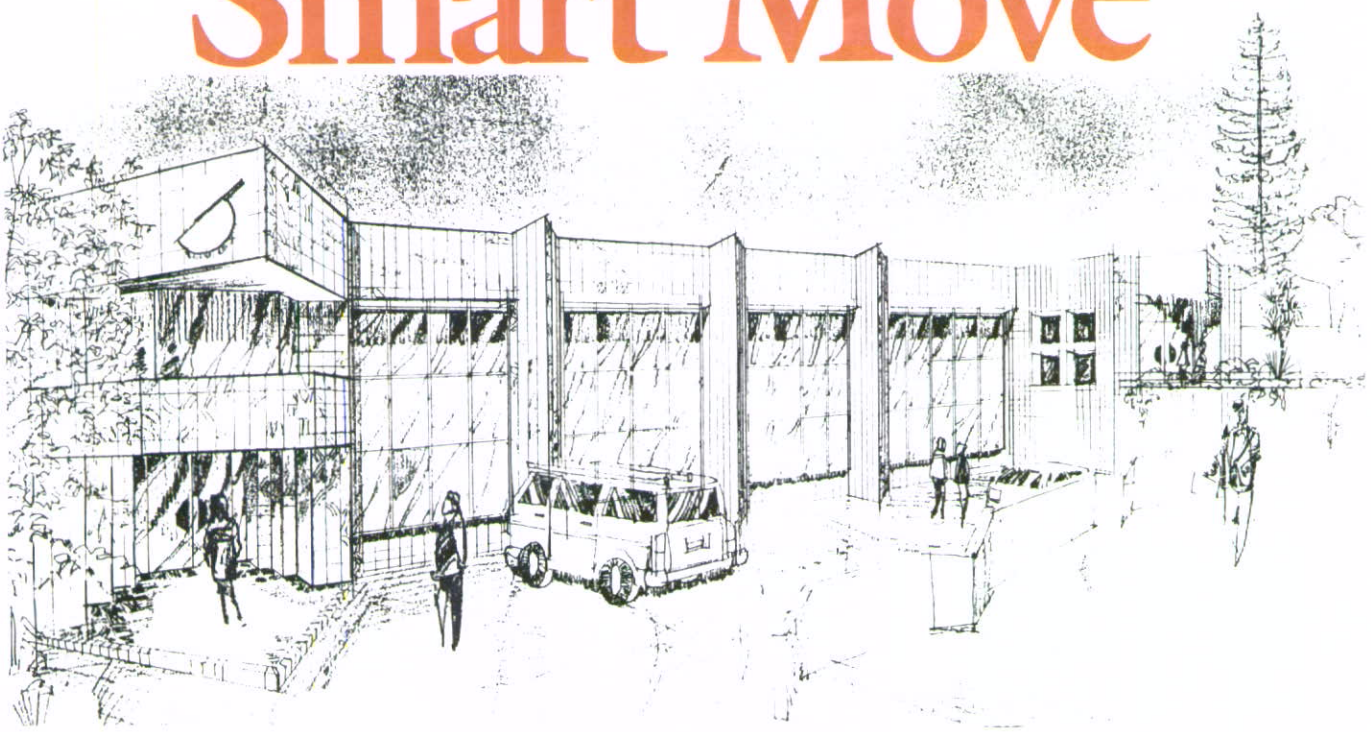

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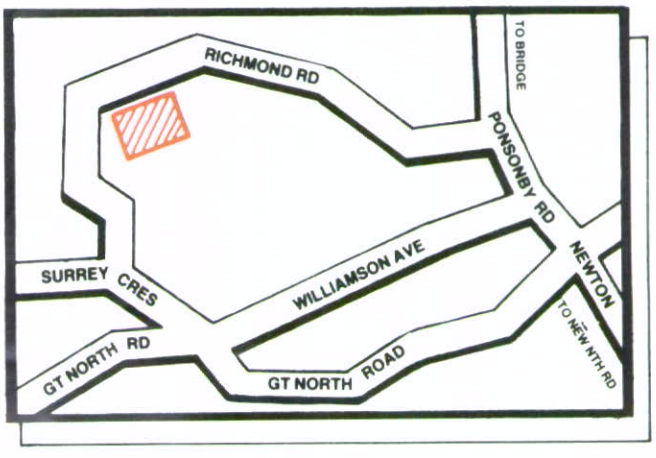

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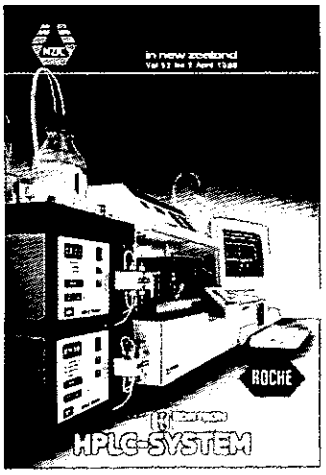
Front Cover Story



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Advertising Features

This Issue:
We look at gas chromatography and chemical safety. In the former we have information on some current instrumentation, and ancillary equipment such as integrators and specialised detectors. In the latter we cover labelling, lab safety equipment, and the International Safety Rating System from the ACC.

Next Issue:
Thermal analysis will be our featured technique. In addition we aim to look at laboratory supply houses and the range of services they provide. Careers in chemistry will also come in for attention as the magazine is to be distributed to all final-year chemistry students in tertiary institutions throughout the country.

PEOPLE

AAVA Chemistry Prize

Debra Nairn has shared the NZIC (Auckland Branch) prize and been awarded outright the NZIC national prize for the top Chemistry graduate in NZCS. Debra was appointed as a trainee science technician in the Food Section of Chemistry Division, DSIR, at the Mt Albert Research Centre in Auckland in January 1985. Her work there included analyses relating to food and customs regulations, certification of wines for export, and research into various aspects of foods such as fish storage, fish speciation, and juice processing. She was also involved in supervision and training of other technical trainees.

Debra has recently been appointed to a position in sales, trading and consultancy with James Hardie Impey Ltd., where she plans to extend her chemistry into a management orientated career.

Prof Warren Roper has accepted the award of an RSC Centenary Lectureship for 1988/89. He is one of three chosen for 1988/89 and the award will entail his travelling to UK where he will address a symposium in London. The topic of his address will be Stabilization of Reactive Molecules by Coordination to Platinum Group Metals. As part of the Lectureship he will also speak on this topic at several other venues in the UK, but these have not been finalized as yet. He will probably be travelling in December 1988 or March 1989.

James Duncan, Honorary Fellow

Professor James Duncan was elected an Honorary Fellow of the NZIC in August of last year. James Duncan was appointed to the chair of Inorganic and Theoretical Chemistry at Victoria University of Wellington in 1962 and he became a Fellow of the NZIC in 1963. He came to New Zealand from Melbourne University where he was a Reader in Radiochemistry. Prior to his appointment at Melbourne he had worked at the Chemistry Division of the British Atomic Energy Research Establishment at Harwell and during the second world war had worked on the "Tube alloy" project of the atomic energy programme in Britain under Sir Francis Simon. From 1969 to 1980 he was Head of the Chemistry Department at Victoria and during this time made significant contributions to the upgrading of the department while he and his students made notable contributions to its research work. His research output, which consists of more than 150 scientific papers, 100 articles and booklets on other topics, and three books, is characterized by its diversity, inventiveness and relevance to New Zealand. His earlier work at Victoria University of Wellington resulted in significant developments in our understanding of clay minerals, glasses and the local iron sands. He introduced Mossbauer spectroscopy to Victoria and chaired a Royal Society of New Zealand International Symposium on the topic. Latterly his interests turned towards bio-inorganic chemistry and his work with John Featherstone and Denis Nelson on the chemistry of teeth was notably successful.

James' life has been characterised by his enormous sense of social responsibility which has found many channels. He has been President of the Association of University Teachers, the New Zealand Association of Scientists, NZ secretary of ANZAAS, treasurer of the Royal Society of New Zealand, a member of the National Development Council, the National Commission for UNESCO, the NZ Inventions Development Authority, a trustee of the National Library, a member of the executive of the Cancer Society of New Zealand, and was Chairman of the Commission for the Future. Upon the demise of the latter body James set up and arranged the funding for the New Zealand Futures Trust which has continued work in that area.

James played a pivotal part in the development of the Science Fair movement in New Zealand. He was responsible for the foundation of Science Fairs in Wellington and was chairman or on the organising committee for the first fourteen Wellington Science Fairs. He then conceived the idea of a New Zealand Science Fair and was chairman of the board of the New Zealand Science Fairs from 1978 to 1985 and has been Patron of the Science Fairs since 1986.

James' work has received many awards and recognition. He was the Sir Ernest Marsden Medallist for services to science in 1973, a Cawthron Lecturer, the Frank Dwyer Lecturer and Medallist at the University of New South Wales, was elected a Fellow of the Royal Society of New Zealand in 1968 and was awarded the Order of the British Empire in 1975.

EDITORIAL

Times Of Change

Most members of the Institute will probably have been affected in some way or other, by the changes that are taking place in New Zealand today; in Government, in Commerce, and in Society generally. At its meeting in February, Council discussed changes for the Institute which will also have an affect on members, and possibly on membership as well. For the future well-being of the Institute it is essential that members reflect on these changes, and the reasons behind them, and give Council the support and input that it needs.

The major change proposed by Council is the establishment of a permanent secretariat. The need for this was first alluded to by George Petersen in a Guest Editorial on these pages two years ago. Ever since its inception the Institute has relied for its administration on the hard work of a few dedicated, long-serving and largely unpaid, individuals. With the growth in the Institute the magnitude of these tasks has grown to such a stage where it is quite unreasonable to expect such efforts to be made without due recompense. The time for a fully paid, professional administration is now upon us. The benefits to the Institute should be significant improvements in efficiency and in the range of services and benefits that can be offered to members. An initial dis-benefit will be regrettably, a significant increase in subscriptions to support such a move.

When the need for a permanent secretariat was first discussed by Council one of its first actions was to establish a Development Fund. With an initial contribution from Institute reserves and an annual "levy" on subscriptions thereafter, this fund has now grown to the point where initial setting up costs should be covered. The annual operating costs of such an organisation will of course be significant — considerably more so than the roughly $10,000 that is currently paid out for such services each year. As a first estimate, something like 3 to 4 times this sum will be required, and it is to meet this additional expense that subscriptions will have to be raised. Details of the proposed increases are given in Council News elsewhere in this issue.

It is Council's intention that a permanent secretariat for the Institute be established by the end of this year. Exact details as to the structure of this organisation, its relationship to the present Institute structure, and any appropriate changes to the latter, are currently being considered by a sub-committee chaired by the President, Terry Hitchings. A suitable "home" for the organisation will be required and discussions have been held with various organisations such as RSNZ, IPENZ, NZCIC, and so on, in search of some suitable arrangement. As this latter point has been by no means finalised, any further suggestions would be most welcome.

Undoubtedly the above changes will be of considerable interest, and in some cases concern, to all members, particularly with regard to the effects on our pockets! The President intends to discuss these changes during his addresses to branches during June and July. Members are urged to attend these meetings so that Mr Hitchings can be made aware of your views. Other options available would include contacting other members of Council, and branch committees, including Council Delegates in particular (refer NZIC Directory in the February 1988 issue). Correspondence through these pages will of course, also be welcome. These are probably the most significant changes ever proposed for the Institute and it is essential that final decisions are arrived at on the basis of the greatest possible input from all members.

Bruce Graham

1988 NZIC/NZBS ANNUAL CONFERENCE

Palmerston North, August 23-26

Invitations to present plenary lectures have been accepted by eight prominent overseas research scientists. Many of these lecturers, together with a further four invited overseas people, will also address Specialist Group sessions. Brief biographies of some of these people appeared in the February issue of Chem. in NZ.

Seven symposia, two poster sessions, a student paper competition and various AGMs will be held over the three days of the main part of the Conference. Specialist groups will conduct parallel meetings to some of these activities, but care has been taken to minimise any possible clash of interests.

Conference Speakers

The Palmerston North Medical Foundation has agreed to underwrite the visit of **Professor Raymond Baker** who is Director of Medicinal Chemistry at the Merck Sharp and Dohme Research Laboratories in Essex, England. Professor Baker, a graduate of Leicester University, held the Chair of Organic Chemistry at the University of Southampton before taking up his current appointment. His early researches were concerned with organic reaction mechanisms, elimination and solvolysis reactions. Following these studies, Professor Baker's interest turned to aspects of organometallic chemistry that are useful for the synthesis of compounds. Novel methods for converting dienes and allenes into acyclic, macrocyclic, heterocyclic and terpenoid products were found by applying organometallic complexes in the syntheses.

Professor Baker has also been involved in studies of the isolation and synthesis of bioactive compounds from insects. This work lead to a greater understanding of the behaviour of insects and to new ways of controlling them. Professor Baker's current work at the Neuroscience Research Centre of Merck Sharp and Dohme involves fundamental studies on the chemistry of the brain and central nervous system. Particular focus is placed on programmes related to drug discovery for major disease areas such as senile dementia, Alzheimer's disease, depression, schizoprenia, terminal pain and neuro-protection following stroke and cardiac arrest.

PROFESSOR BAKER

Dr David Rothman is a Research Associate in the Analytical Sciences Laboratory of the Dow Chemical Company in Midland, Michigan, USA. A graduate of the doctoral programme in analytical chemistry at Michigan State University, he came to Dow in 1976 after postdoctoral work with Professor Lockhart Rogers at the University of Georgia. His areas of work have included gas and liquid chromatography, computerisation of analytical instrumentation, trace analysis and capillary electrophoresis. He has served as an adjunct faculty member at two state universities, teaching graduate level courses in separations science and electronic instrumentation and as a guest editor for the periodical Chromatography Forum.

Workshops and Symposia

"New Approaches to Science Education", is the title of the Chemical Education Symposium sponsored by ICI (NZ) Ltd., Glaxo (NZ) Ltd. and the DSIR. The aim of the symposium is to foster a more positive attitude towards science by school children and the general public. Two sessions on "interactive science" and "science and the media" are planned. The symposium's plenary speakers will include **Dr Ben Selinger** (Australian National University, Canberra), who is well known for his book "Chemistry in the Market Place", **Dr John Emsley** (Kings College, London) and **Dr R White** (The Exploratorium, San Francisco).

Dr Emsley is well known for his research into phosphorus chemistry and hydrogen bonding. He is a Reader in inorganic chemistry and a regular contributor to the New Scientist, writing scientific articles of interest to a wide section of the community. Dr Emsley has also contributed to the lecture programme for young people at the Bloomsbury Science Theatre, London.

DOCTOR EMSLEY

Dr White was recently appointed Director of the Exploratorium in San Francisco, one of the foremost interactive science museums in the world. It was founded in 1969 by the physicist, Dr Franks Oppenheimer, and many of its exhibits have been copied by other interactive science centres. Dr White has been a university professor, research scientist and university administrator. He transferred to The Exploratorium because "of the absolutely unique and extraordinary creativity of the place in both exhibiting and teaching programmes;

Continued next page

FROM THE CONFERENCE CHAIRMAN

On behalf of the organizing committee for the 1988 Combined Annual Conference of the NZIC and NZBS, I warmly invite you to come to Palmerston North this August. The Conference promises to have something for everyone whether you are involved in industry, government research laboratories, high schools or the universities.

An exciting lineup of overseas speakers will be presenting lectures and the NZIC Specialist Groups and the NZBS have been active in arranging programmes to highlight what is going on in the New Zealand chemical scene. I hope you will also attend the symposium — "New approaches to Science Education" — especially if you are not involved in teaching. We all know the public equates "chemistry" with "pollution" and "drugs" to "substance abuse". If we want the chemistry profession to exist in the future we must all take responsibility to educate people that "everything is chemical" and "the vast majority of chemicals are beneficial and necessary". The symposium will give you some ideas about what you can do.

We also have a good social programme to help you to relax after the stimulating scientific sessions and to allow you to renew old friendships. All full delegates will receive complimentary tickets for two evening meals — The Trades Mixer and the Vice-Chancellor's Buffet. We have been fortunate to obtain the Massey University Orator to entertain you at the Conference Dinner. Friends and colleagues of Professor's R.D. Batt and A.D. Campbell will have the chance to socialize with these well known New Zealand scientists at a special function being held in their honour.

Organizing a conference always presents new challenges and this one has been no exception. Massey University's extramural programme has expanded so much that we could no longer use the traditional venue. We are therefore basing the conference at Palmerston North Teachers College with most accommodation in motels. Free buses will transport you between your accommodation and the conference venue. The change of venue has pushed our costs up a little but before you complain about the registration fee just compare it to that of recent overseas conferences you have been to and look what we are offering.

Conferences organized by the Manawatu Branch have gained a reputation for being good ones. We are confident you will not be disappointed and we look forward to seeing you here.

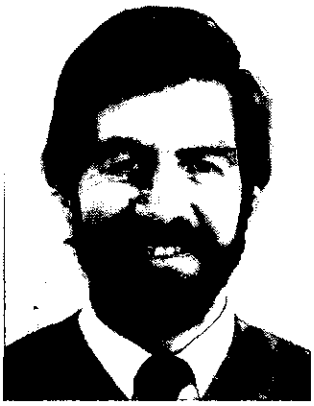
Andrew Brodie
Conference Chairman

1988 ANNUAL CONFERENCE CONT'D

the blend of science, perception and art; and the remarkable competency and dedication of the staff". Dr White will provide an insight into the role of interactive science centres in the science education of children and as a means of presenting science to a much wider public.

In conjunction with the Conference, a Chromatography and Mass Spectrometry Workshop will be held at the Biotechnology Division of DSIR on 23 August. The Division's recently acquired VG70-250S gas chromatograph/mass spectrometer/data system will be available and in operation. A variety of chromatographic and mass spectrometric problems and methodologies will be discussed and illustrated at the workshop.

A Chromatography Symposium, in which **Professor Paul Haddad** (University of New South Wales) is the principal speaker , will take place on 24 August. Dr Haddad will talk on computer optimisation methods in liquid chromatography. He graduated from the Royal Military College Duntroon as a full-time army officer in 1969 and subsequently obtained BSc(Hons) (1971) and PhD (1975) degrees from the University of New South Wales, working under the direction of Professor Lloyd E. Smyth on the spectro fluorometric analysis of ternary Complexes. Professor Haddad has served as a senior tutor at the Australian National University and was appointed as a lecturer at the



PROFESSOR HADDAD

University of New South Wales in 1979. He is currently an Associate Professor of Analytical Chemistry, and Director of the university's Centre for Chemical Analysis. He has held the positions of Visiting Professor at the Technical University, Delft, Holland, and visiting scientist at Waters Chromatography Division of Millipore, Milford, Massachusetts, USA.

Professor Haddad's chief interests are ion-chromatography and computer optimisation techniques for the selection of mobile phase composition in liquid chromatography. He is an internationally recognised scientist in these areas and is the author of more than 90 scientific papers, patents and book chapters. He is currently preparing a book on ion chromatography for the Journal of Chromatography Library, to be published this year.

Other Special Lectures

The following are the topics of some of the principal specialist lectures. **Dr Raymond Baker** will be discussing his approach to chemical syntheses with the Organic Chemistry Group. **Professor Jeremy Knowles** (Harvard University, USA) in his lecture to the Organic Chemistry Group will describe the use of the double isotope fractionation method to discern whether reactions (enzymic or non-enzymic) proceed via stepwise or concerted pathways. The title of Professor Knowles' paper is "Concert and Synchroneity in Enzymic Reactions". **Dr Mark Florence** (CSIRO Sydney) is scheduled to discuss aspects of trace element chemistry with the Analytical Chemistry Group. The Inorganic Chemistry Group will receive lectures from **Professor Karl Wieghardt** (Ruhr-Universitat Bochum, West Germany) and **Dr John Emsley** entitled "Synthetic Model Compounds of the Active Sites in Hemerythrin and Some Mangaese Containing Proteins" and "The Limits of Hydrogen Bonding" respectively. The Physical Chemistry Group will receive lectures from **Professor Tamotsu Kondo** (Science University of Tokyo, Japan) and **Dr Ben Selinger** entitled "Preparation, Stability and Applications of Polymer-complexed Lipid Vesicles" and "A Trilogy: MacFourier, MacMarkov and MacThermo: or Phys Chem can be Fun" respectively. **Dr Bill Hancock** (a Reader in the Department of Chemistry and Biochemistry, Massey University, currently on secondment to Genetech Ltd., San Francisco), who is well known for his development of HPLC purification methods for natural proteins and peptides produced by solid phase synthesis, will discuss his use of MS-MS techniques at the Chromatography Symposium.

PROGRAMME SUMMARY

Tuesday, 23 August: Morning — the Chromatography and Mass Spectrometry Workshop.
Afternoon — continuation of the workshop together with registration for the Conference.
Evening — the Trades Mixer and a public lecture given by Dr John Emsley entitled "The Cost of a Box of Matches". This lecture will include illustrated demonstrations of the struggle to produce an "instant" flame.

Wednesday, 24 August: Morning — a plenary lecture on aspects of enzymology from a bio-organic perspective titled "The Evolution of Enzyme Function" will be given by Professor Jeremy Knowles. Dr Peter Colman (CSIRO Division of Protein Chemistry, Melbourne) will follow with his plenary lecture titled "The Three-Dimensional Structures of Two Complexes Between Antibody and the Influenza Virus Antigen Neuraminidase". These lectures will be followed by a symposium entitled "Protein Structure and Function".
Afternoon — a poster session followed by the student paper competition. Parallel specialist sessions will take place during the latter part of the morning and the afternoon.
Evening — the Official Opening, followed by the Presidential Address and Massey University's Vice-Chancellor's Buffet.

Thursday, 25 August: Dr Mark Florence will present his plenary lecture entitled "Recent advances in Electro-analytical Chemistry", followed by Dr David Rothman discussing 'The Impact of Modern Analytical Chemistry on the Chemical Industry: A Molecular Biology Symposium will follow, with parallel specialist séssions.
Afternoon — the second poster session followed by Professor Raymond Baker's plenary lecture on chemical aspects of diseases of the brain and the central nervous system. The Watson Victor Lecture, various specialist group AGMs and parallel specialist sessions will follow Professor Baker's lecture.
Evening — NZIC AGM followed by the Conference Dinner.

Friday, 26 August: Morning — As part of the Education Symposium, plenary lectures will be presented by Dr R. White (title not available), Dr John Emsley ("Chemists Can't Write") and Dr Ben Selinger ("Chemistry in the Market Place"). The Animal-Plant Biochemistry Symposium and the last of the specialist sessions will follow these lectures. Afternoon symposia honouring Professor Dick Batt (Massey University) and Professor Arthur Campbell (University of Otago). Speakers to Professor Batt's symposium will be given in our next report. A range of analytical topics, from forensic to industrial chemistry, will be discussed at Professor Campbell's symposium by;

- Dr Peter Nelson, Chemistry Division, DSIR, Auckland
- Dr Max Robertson, Chemistry Division, DSIR, Christchurch
- Dr Don Hannah, Chemistry Division, DSIR, Wellington
- Dr Kip Powell, Chemistry Department, University of Canterbury
- Dr Jack Garside, TELARC, Auckland and
- Mr Stan Winter, Southland Co-op Phosphate, Invercargill.

Plenary Addresses will then be presented by Professors Batt and Campbell. Evening — a social function for friends and colleagues of Professors Batt and Campbell.

10th Geothermal Workshop, Auckland, New Zealand

The Geothermal Institute will host the 10th New Zealand Geothermal Workshop at the University of Auckland on November 2-4 (inclusive), 1988.

The three days of technical sessions, presentations and discussions cover all aspects of geothermal systems. Topics covered in past meetings include specific case studies, hydrothermal alteration, geochemistry of hydrothermal fluids and their deposits, geophysics of geothermal systems, exploration and development of geothermal resources. The meeting is run on an informal basis and provides a relaxed forum for the exchange of ideas and information on geothermal systems worldwide.

All accepted papers are published in the Proceedings which are presented to all participants.

To receive the first circular with further details of the meeting, contact: Dr Keith Nicholson, Geothermal Institute, University of Auckland, Private Bag, New Zealand. Telephone (NZ code) 9 737-999, Telex NZ 21480 UniLib, Fax 0064 9 371-183.

THE COMMERCIALISATION OF CHEMISTRY

Ashley F. Wilson

Commercialisation of Chemistry was the overall theme of the 1987 NZIC/NZBS Annual Conference. Dr Ashley Wilson, Managing Director, NZFP Technology Limited, was the Keynote Speaker for the conference and the text of his address is reproduced below.

It was highly appropriate that the organising committee should choose someone from industry to give the opening address at this conference. We share the interest of the groups represented by the other speakers in wanting to see more research in biochemistry and chemistry done in New Zealand. However, the increasing trend to user-pay research means that if industry isn't prepared to fund more of this research, it will not be done. So the attitude of business leaders to user-pay research is very important.

Further, more so than the universities or government research laboratories, industry has a key responsibility in taking good research work, or innovative ideas, doing pilot-scale development work where it's needed and launching new industrial operations. This is the essence of the commercialisation of chemistry -- to develop and produce on a commercial scale, useful and profitable products that satisfy society's needs.

Industrial R & D in New Zealand

When you read in Dr Bollard's report[1], the Beattie report[2], and many recent articles in our Journal, you are left with the impression that research is such a good investment that our industry leaders must be foolish not to want to spend more on research! In fact there are some very good reasons why investment in research and development is not at the top of the list of investment decisions by business leaders.

Some senior executives believe that so much more good research is done overseas by research organisations, companies and equipment suppliers in their business, that similar research in New Zealand cannot be justified. I can recall one executive saying that the best way to do research in New Zealand was to put a technical person on an overseas plane. This executive kept his technical staff employed on product and process improvement work and sent them overseas regularly to check on new developments in his industry, especially when considering a new product or process. In New Zealand's closely knit society some executives are concerned that there is more chance that competitors will learn of interesting R&D developments if the work is done in New Zealand.

The adjustment in New Zealand industry over the past three years as a result of government policy changes, expecially in manufacturing, has created a short-term survival or 'tighten the belt' approach for many companies concerned about low returns on investment. Under these conditions technical work is more likely to be directed to give short-term results.

The emphasis on quality improvement has also occupied the attention of many managers. Japanese experience, verified by the results in many New Zealand companies, has demonstrated the success of the 'Kaizen' or gradual improvement approach to improving many aspects of a company's operations. Low financial outlays can generate substantial cost savings with this approach.

The corporate changes in recent years have created shareholder interest in companies that grow by acquisition rather than by investing in R&D.

Scale of operations is also a factor that limits R&D in New Zealand. In a large New Zealand industrial research establishment there may be enough resources to work on only one or two radically new product or process projects. The chances of success on such projects may be only in the 10-30% range. If such projects go on for a year or two and they do not result in successful commercialisation, then the whole financial health of the company may be severely affected.

A relevant example within N.Z. Forest Products Limited is the development project to extract tannins from Radiata bark. The timing of this project is shown in Table 1. The project still hasn't reached the break-even point. Only a relatively large company could have sustained the development costs to keep this project going. Smaller development teams in this country may also lack the various specific skills required for a major development.

The survey done by the N.Z.Manufacturers' Federation some years ago (Table 2) showed that a surprising number of companies were working on developing new products or processes. I'm sure that much of this work is in introducing to New Zealand manufacturing, new products and processes that have been launched overseas. This is not to say that some innovative new products have not been developed in New Zealand — we know there have been. In particular we need to ensure that we maximise research effort on innovative products from raw materials available, by world standards, on a relatively large scale in New Zealand. We must also bear in mind that the majority of successful new product developments are not resource or technology pushed but market pulled — that is products are created for which there are receptive markets.

The major contribution that most industrial R & D groups can make in their companies in New Zealand is in process improvement work. In large-scale process operations small improvements can add up to make major contributions to company profits. This is particularly so if the R & D group can develop small-scale processes in the laboratory or pilot plant that closely simulate plant-scale operation. Process improvement work can then be done much more cheaply than by running mill trials and the trials can be confined to verifying good small-scale results. NZFP Technology Limited more than pays its way by this approach. We can chemically pulp wood in small pilot equipment. We can bleach pulp in a five-stage process using a few hundred grams of pulp and scale up confidently thousands of times to give cost and product quality information on a plant scale. When PAPRO, the Pulp and Paper Research Organisation of New Zealand, decided to do experimental work on mechanical pulping, the investigation undertaken before ordering the equipment showed that useful

Table 1 Development Of Tannaphen — A Phenolic Material Extracted From Pinus Radiata Bark

Research Work Started	1952
Patent Applied For	1959
Research Work Restarted	1972
Approval of $200,000 Pilot Plant	1974
Pilot Plant in Operation	1975
Decision to Erect $8 million Commercial Plant	1979
Plant Start-Up	1981
Plant Shut Down	1985
Plant Restarted based on Market Forecast and Economic Review	1986

Table 2 Questions And Answers In Manufacturers' Survey

Has Your R & D Involved:	Percent Answering Yes	
	Small-Med. Companies	Large Companies
Developing New Products, Processes, Services or Systems?	77	94
Improving (Significantly) Existing Products, Processes, Services or Systems?	77	94

Source: New Zealand Manufacturers' Federation Survey 1983/84 (See Footnote)

results would be obtained only from a commercial-size refiner. So over $2 million was spent on a building and the equipment.

The ability to simulate on a small scale what happens to your product in your customers' operations can be just as valuable. It can lead to your having a far better understanding of customer requirements than your competitors.

N.Z. Forest Products Limited has for many years run one of the largest industrial research establishments in New Zealand and the evolution of the nature of the technical work done provides some useful lessons. In the early days, the late forties and early fifties, the technical effort was on a small scale but it played a very vital part in the early development of the company. Alan Mackney, the senior technical man at the time, went off to the U.S. with the managing director of NZFP to prove that P. radiata could be chemically pulped and made into paper. When production began technical staff were sometimes used effectively by production managers. Other managers, often unqualified but with years of experience in the art of papermaking, often resented the growing application of technology to the operations since it would eventually displace their craft knowledge.

In many cases technical work on a process was done with little knowledge by the relevant production manager. When the work was reported it was often difficult to get production staff to implement the ideas. In some cases where there was a conflict between the technical staff recommendations and the disbelief of a production manager that the technical work had produced useful results, it was necessary for some senior manager in the company to arbitrate on which views were correct.

A few years ago, after developing a better rapport with mill staff, we evolved to a charge-out system. Consultation between production and technical staff established what work was to be done in a budget year, what it would cost and when reports on interim and final results were to be issued. The final step in this evolution of a technical organisation was taken in April 1987 when NZFP Technology Limited was set up as a separate company. We prosper by setting up contracts for work with other members of the Group, some outside companies and the parent company, NZFP, especially for longer-term projects.

An important matter that an industrial R & D division or company must address is the protection and use of intellectual property. The organisation should have a specialist within its ranks or at least ready access to someone who can act for them. A modern R & D organisation must regard one of its important roles as being the selling of know-how in an appropriate form. In turn there will be times when licensing in will save money by reducing development costs, reducing risks and buying time. Technology today is often a perishable commodity so one must move fast to utilise what value it has.

The New Zealand Manufacturers' Federation is currently running a survey on research and development in the manufacturing sector. The last survey in 1983/84 reported that $135 million was being spent on R & D within the manufacturing sector. Many were surprised the figure was that high. I for one do not expect to see an increase in relative terms, say over GDP growth, when results of the current survey are released. (see Footnote)

Industrial research in New Zealand is not growing at a sufficiently fast rate and certainly not as fast as in Australia. With the 150% tax concession now operating in Australia R & D expenditure as a percentage of GDP is estimated to have increased 2½ times over the past three years.

Government and University Research

I want to turn now to the links between industrial research in New Zealand and research done by DSIR, by research associations and our universities. In the forest products industry, the Government funded research has been provided by the Forest Research Institute. About six years ago the major pulp and paper companies in the industry decided that with the second crop of Radiata starting to come to our mills from about 1995, we needed to see a major increase in co-operative pulp and paper research. So PAPRO, the Pulp and Paper Research Organisation of New Zealand, was formed out of the Pulp and Paper Research Section of FRI. FRI gets no direct funding from industry, unlike research associations in New Zealand, but PAPRO, with a current budget of over $2 million, is funded 50:50 by industry and the Government. Because of the existence of FRI, and now PAPRO, our industry has not had very stong contact with DSIR. FRI, PAPRO, DSIR and research associations in New Zealand are now under tremendous pressure to accomodate Government moves to reduce Government funding. DSIR is responding to this and needs to know to what extent the Government is committed to maintaining some long-term research in New Zealand. Certainly some pruning of funding will have some beneficial results in causing a thorough review of the roles of these organisations. Many of us in the forest products industry have long believed that there is too much effort in FRI in research on growing trees, compared to research on utilising the wood from them. In chemistry and biochemistry, I believe DSIR must focus on a few discrete research areas and concentrate teams on those areas. Because of the small size and fragmentation of New Zealand industry, DSIR must be prepared to carry some development projects through to piloting or commercialisation. To do this it has to select top quality project managers and use a team-type organisation for projects as opposed to organisation by discipline for the type of chemical work they do.

Table 3 CSIRO — Research Priorities

1. Technology-based manufacturing, particularly technologies which have applications in a wide range of industries, e.g. computer aided design and manufacture, robotics, lasers, industrial vision systems and process instrumentation.
2. Raw materials processing, covering the upgrading of Australia's main commodity exports by additional processing and conversion into new products.
3. Information technology.

Other areas to receive some extra resources are:

4. Water resources research.
5. Human nutrition.

(Source : Reference 3)

In a recent talk in Australia[3] Dr Boardman, Chief Executive of CSIRO, spoke of similar challenges facing CSIRO. The challenge is that in just a few years CSIRO must change its approach more profoundly than at any other time in its history so that it can contribute to Australia's economic recovery. He said that should they fail to meet that challenge, he doubted that CSIRO would survive the 1990s. CSIRO has responded to the challenge to its future by setting up a corporate style board headed by Neville Wran. This brings to CSIRO a powerful combination of outside experience and expertise. CSIRO has identified a number of research priorities, and these are listed in Table 3.

Also in Australia, the Victorian Government has injected $60 million to attempt to link the States' researchers and industry, to develop products and processes that will arrest industrial decline in the State. The targetted fields are plant and animal biotechnology, pharmaceuticals, bio-medical and advanced materials.

DSIR must address similar challenges and ensure that its research is made as effective as possible.

A case can be made for having DSIR deliberately neglect the well established industries. Most job creation and export sales generation around the world is occurring less in the larger, well established companies and industries, but more in the smaller, innovative, high technology companies.

I believe that biochemical research in New Zealand needs to be increased. Something like 90% of our exports are based on biological macromolecules. I've referred to Australian interest in biotechnology. The Japanese are racing to strengthen their research in the life sciences since many there believe that Japan can be a world leader in biotechnology going into the 21st Century. A Japanese company, for example, has succeeded in producing a kind of bacteria cellulose in a pilot plant

Footnote: The results of the 1986/87 Manufacturers' Federation R & D Survey were released in December 1987. A summary of the findings appeared in Chemistry in New Zealand, p16, 1988.

and high strength, very fine fibres have been made that can be blended with wood pulp to yield stronger papers.

As for university research in New Zealand, I have long considered that there is a great reserve of talent in our universities that is too infrequently tapped for benefit by New Zealand industry and society. The University system produces many good papers but very few patents. There are of course exceptions to this. In our industry one university staff member with a great capacity for innovative ideas has carved out a world-wide reputation and greatly assisted the New Zealand industry. Massey University was established by its founding fathers with the clear intention that its research should be relevant to national and local objectives. I believe it has succeeded in that goal, but for many other university departments in New Zealand I am reminded of the comment some years ago of a UK industrialist. He described the greatest brain drain in the UK as going into the universities.

The industry/university interface was addressed by Alan Mackney in his (NZIC) presidential address two years ago. In some ways it is surprising that it exists. In our small society we know each other relatively well.

As many of you will know, Professor Pimental, a speaker at the Conference, was chairman of the committee that surveyed opportunities in the chemical sciences in the US in the report Opportunities in Chemistry[4]. The second recommendation of that report is that "new mechanisms and new incentives should be sought for strengthening links between industrial and academic research".

Table 4 identifies possible ways to improve the interaction. Funding of university research by industry is only one approach.

The publication Opportunities in Chemistry reported that US industry contributed $10 million in 1983 to university chemical research and another $10 million to chemical engineering research. Considering the population difference, the New Zealand situation is probably not greatly out of line with this.

In one respect industry does benefit substantially from our university system. This is in the supply of high quality graduates. There is nothing wrong with engineering and scientific teaching in our universities.

It's likely that our universities will be squeezed for research funds and that some high cost research that is not in the national interest will have to go. We are out of step with many advanced nations, especially Canada, the US and Japan, in failing to organise industry/university association for the national good.

Table 4 University-Industry Interactions In Chemistry

1. INDUSTRY PROVIDING SERVICES TO UNIVERSITIES
1.1 Student Experience in Industry ("Cooperative" or "Sandwich")
1.2 Part-Time Study
1.3 Student Visits to Industry
1.4 Appointment of Staff from Industry
1.5 Industrial Experience for University Staff
1.6 Information from Industry
1.7 Financial Assistance

2. UNIVERSITY ASSISTANCE TO INDUSTRY
2.1 Consultancy
2.2 Provision of Post-Experience (Continuing Education) Courses
2.3 University Staff Teaching in Industry

3. RESEARCH COLLABORATION
3.1 Joint Projects
3.2 Sharing of Instruments
3.3 Liason Centres and Liason Officers

4. COMMUNICATIONS
4.1 National Meetings and Conferences
4.2 Advisory Committees in Departments
4.3 Exchange of Information

Source: Unesco Guidelines Prepared for A Symposium in Toronto, December 1978.

Chemistry and Society

Finally in my talk I turn to the subject of chemistry and society. We need to convince society that our work, and the products we make, are useful and necessary for everyone's welfare. In preparing for this talk I came across an article in Fortune Magazine that reported on America's most admired corporations. Top of the list and displacing IBM was the giant pharmaceutical company, Merck. It won that honour because firstly it has made a lot of money for its stockholders. Secondly, the public is clearly aware of the many new pharmaceuticals it has developed in recent years. The current president was the director of research when these products were developed. It is of interest that under him Merck changed its research approach from a largely trial and error approach, in which laboratory workers created thousands of compounds and then tested them for useful medical results, to a targetted approach. Research workers now concentrate on understanding the biochemical reactions that a disease triggers and then try to devise chemical methods to stop these reactions. Merck spent $(US)460 million on research last year. Perhaps it's not surprising that near the bottom of the list came Union Carbide, the company responsible for the Bhopal tragedy.

We know in our professions what value biochemical and chemical research has been to society. Dr Bollard listed some in his report, but also quoted an NRAC comment that "It is doubtful if many people appreciate the extent to which our living standards have been maintained and improved as a result of research endeavour." An editorial on the report Opportunities in Chemistry described it as a towering achievement and said it was up to the chemical community itself to make it an achievement in convincing the public, and hence policy makers, that chemistry almost certainly has more potential than any single science to improve the human condition.

Our press reporting is generally poor. We have frequent reports on chemical spills and fires. I'm sure that a majority of people at times question why pesticides were ever developed, since they are such harmful chemicals. The answer to that of course is that they are harmful chemicals, harmful to pests that kill humans. In an excellent article in a little read publication "On Guard" produced by the Pest Control Association of New Zealand, Brian Shorland, one of the grand old men of our profession, presents a strong defence of the use of pesticides.

None of us should accept practices that occur from time to time, such as poor application of pesticides, chemical spills, mishandling and poor effluent control. The industry late in 1985 set up an N.Z. Chemical Industry Council which has made a very positive start to promote safe handling and use of chemicals. The Council Committee consists of the managing directors of companies in the industry. It will, I'm sure, continue to address public relations and the benefits of chemical production.

But a problem we face in chemistry is the fact that we have no large identifiable chemical industry. Our chemical and biochemical processing takes place largely in other New Zealand industries such as pulp and paper, the dairy industry, the fertilizer industry and the energy industry. I'm sure that this weakens our ability to speak for chemistry — to argue indeed that more research should be done. I believe that it would be very useful to review the state of chemistry and biochemistry in New Zealand in the way it was reviewed in the US study. It wouldn't take us so long and it would obviously be much smaller in scope. Such a study could well help us determine the priorities for future research and in which research laboratories it should best be done.

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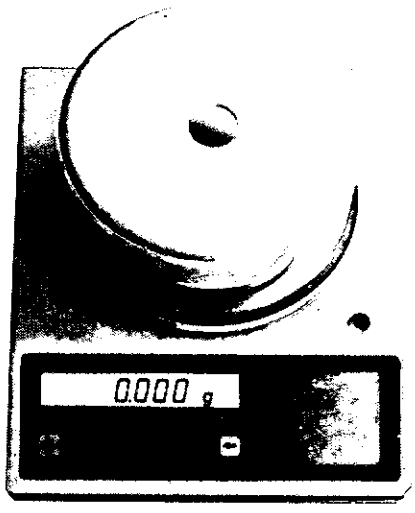
CLEARLY BETTER BALANCES



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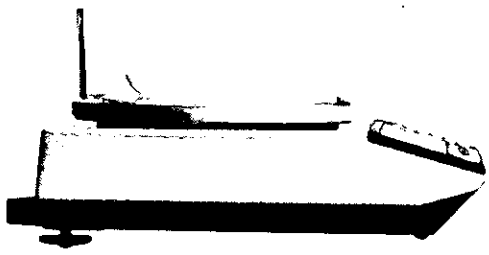

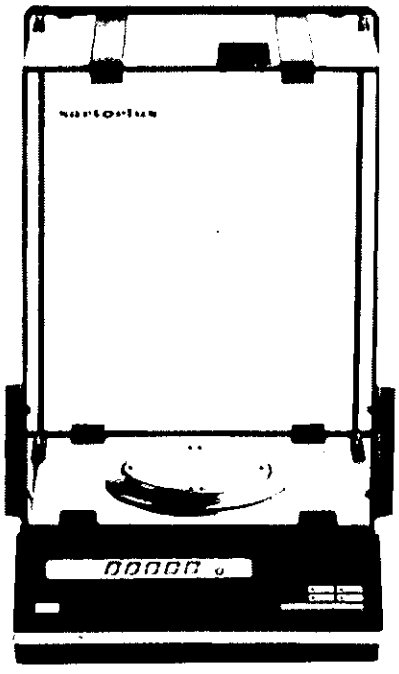

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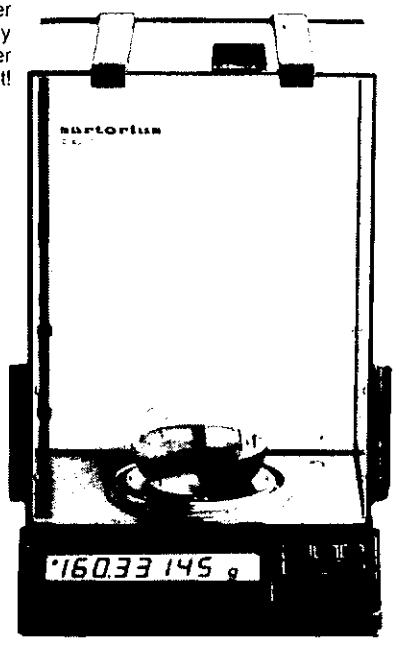

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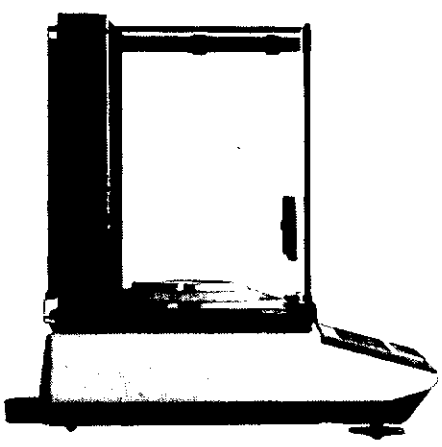

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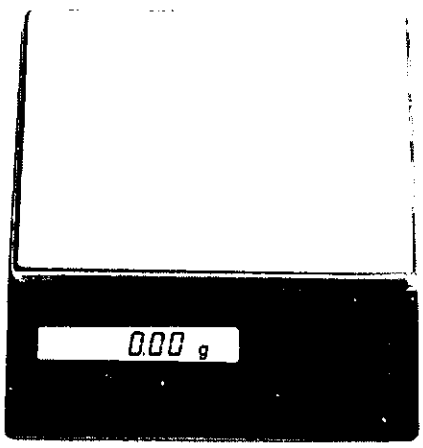

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MICROWAVE DISSOLUTION: A NEW SOLUTION?

Jeremy P. Batchelor
New Zealand Steel Limited, Glenbrook

Jeremy Batchelor has been employed by New Zealand Steel for the last fourteen years, most of which have been spent in the analytical labs. He recently changed positions and now divides his time between the Environmental and Oils labs as the environmental chemist. He gained his NZCS in 1979 and is now completing the RSC course at ATI.

Over recent years the domestic microwave has carved for itself a substantial niche in the field of fast food preparation. With very minor modification, these ovens can be used in the laboratory for the rapid dissolution of a wide range of sample materials.

The advantage of microwave systems for sample dissolution is time; for example a sample of shellfish tissue that takes 300 minutes by conventional heating can be digested in 10 minutes by microwave to a clear solution.

Microwave dissolution is now being applied in laboratories worldwide, to a variety of different materials and processes. Notably: geological sediments[1], metals[2], plant and animal tissues[3] and also the drying of materials prior to digestion for soil analysis [4].

In this technique's simplest guise, the samples are weighed directly into screw-capped polycarbonate containers. A small amount of reagent (acid or alkali) is added to each. The containers are sealed, placed in the oven, and irradiated for specific periods with differing levels of microwave radiation. The radiation is absorbed directly by the solvent, being a liquid, and to a lesser degree by the sample. Solvent atoms then begin to vibrate at many millions of times per second — generating heat. It is this heat together with the build up of pressure that dissolves the sample. (A general article on how microwaves generate heat is given in reference five)

The containers are removed from the oven, dissolution is visually confirmed, and the samples allowed to cool. Normal analysis procedures may then be applied.

Apparatus

The greatest problem facing microwave digestion is the effect of corrosive fumes on the central electronics, expecially the delicate magnetron. This problem can be alleviated, to a degree, by a number of corrective measures.

It is necessary to increase the flow through the oven by pumping in nitrogen or compressed air at about 5 L min^{-1}. This can be done by inserting 1 mm i.d. tubing through the inlet ventilation grids. *(It is extremely dangerous to drill through the oven wall in order to insert the line and this should not be attempted).* As the acid fumes are extracted by the unit's fan, the microwave oven needs to be located in a fume cupboard.

Expansion of the sample vessel lids at a different rate to the rest of the container, can lead to quite substantial fume leaks. Wrapping the thread of the vessel with a strip of teflon tape and screwing down hard reduces any leaks.

The individual sample containers had a useful life of up to four digestions. The combination of heat, pressure stress and solvent attack usually weakened the plastic walls to such an extent that further digestions lead to rupturing.

To prevent this, each container was limited to only two digestions before disposal. A further safeguard was the use of a holder for the digestion vessels during irradiation. (See Figure 1)

Digestion Procedures

Actual dissolution of the sample is dependent upon a number of factors, notably: solvent type, heating cycle and time (both during irradiation and standing).

The choice of solvents is usually dictated by the analytical procedure used after digestion. Certain solvents, notably perchloric acid and organics were avoided because of the danger of explosions. Sulphuric acid similarly was avoided because of its tendency to accelerate aging of the dissolution vessels. Typical solvents were therefore usually limited to dilute mineral acids i.e. hydrochloric, nitric or hydrofluoric. Hydrogen peroxide was occasionally added to aid oxidation.

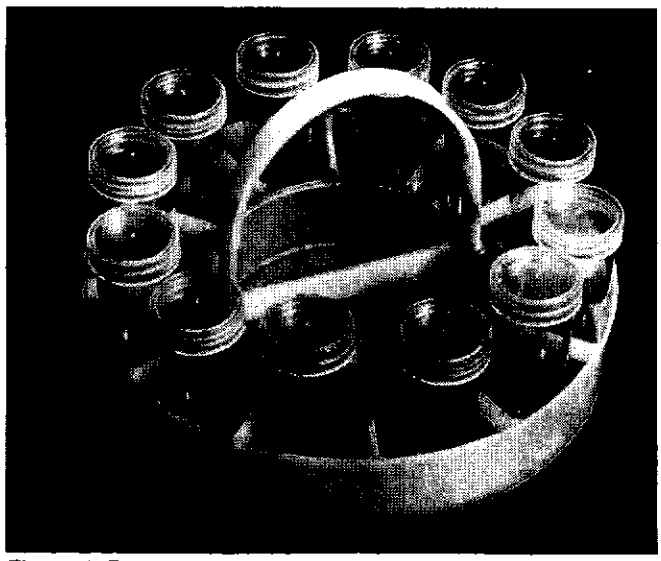

Figure 1: Polypropylene bottle holding rack

The use of the right digestion medium is, of course, the major contributor to the solubilisation of a sample. Alteration of the variable power controls in a manner analogous to temperature programming, aids the speed at which the process continues. The operation of the oven at full, for the complete sequence, appears to increase leaks because of localised or rapid boiling. Starting the oven at a low output for a brief period before increasing the irradiation to greater level, reduces this problem.

Results

Initial tests on microwave digestion were limited to determining the necessary parameters to achieve a visually "clean" solution with no reference to analytical accuracy or precision.

All samples were irradiated in a National Type NE 6790 microwave with forced air ventilation, using 100ml polycarbonate Kayline-type sample jars with polypropylene threadable lids. These containers are manufactured by Bunzl and purchased in New Zealand from Kempthorne Medical Supplies.

Final conditions for a variety of materials, are given in table one. All samples had a final standing time of not less than 5

Table One Sample digestion conditions

Sample	Solvent Volume/ml	Sample Size/g	Heating Cycle/min	Sample Condition
Oyster Tissue	HNO_3-5ml/H_2O-10 ml H_2O_2-0.25ml	1.0	MED-(2) HIGH-(3)	Clear with some free fat
Estuarine Sediment	HCl-5ml/H_2O-5ml HNO_3-5 ml/HF-0.5ml	0.5	LOW-(2) MED-(5) HIGH-(5)	Reasonably clear. Slight suspension
Steel	HCl-5ml/H_2O-5ml HNO_3-2ml	0.25	LOW-(3) MED-(2)	Clear. High gas evolution
Fish	HCl-5ml/H_2O-5ml HNO_3-2ml	0.25	LOW-(3) HIGH-(5)	Clear.
Liver	HNO_3-5ml/H_2O-5ml H_2O_2-0.25ml	5.0	LOW-(5) HIGH-(8)	Clear.

minutes in a closed oven with a continuous gas purge. After optimisation of conditions, (this was usually done on a purely visual basis), the sample was processed and analysed. From this data recoveries were determined.

Two instruments were used in the final analysis, an ARL 3520 Sequential ICP and a Shimadzu Atomic Absorption 670 Spectrophotometer.

Six samples each of Oyster Tissue, (NBS Std 1566), Copepod Tissue, (IAEA Std MA-A-1) and Mussel Tissue, (IAEA Std MA-M-2) were processed in the fashion as indicated by Table 1. The resulting solutions were analysed by ICP in batches of two. For final results, refer to Table 2.

Total digest time for both the steel and sediment samples as shown in Table 1 was again considerably faster than conventional techniques. Recoveries followed a similar pattern to that established by the shellfish with the sediment giving somewhat poorer results. Judging from the presence of suspended matter this could be attributed to incomplete digestion.

Six samples each of Low Alloy Steel (BS 410/1) and Estuarine Sediment (NBS 1646) were processed as in Table 1. The resulting solutions were analysed by AA in batches of three, and results are shown in Table 3.

Table Two Average analysis and recovery of Shellfish Tissue digested in a microwave oven and analysed by ICP-OES.

Sample Type	Elements Analysed All results expressed as mg/L.					
	Cu		Zn		Fe	
	found	present	found	present	found	present
Oyster	61.9	63.0 (98%)	847	852 (99%)	189	195 (97%)
Mussel	7.89	7.96 (99%)	152	156 (97%)	242	256 (95%)
Copepod	7.39	7.6 (96%)	154	158 (97%)	56.5	60.0 (94%)

Table Three Average analysis and recovery of Steel and Sediment digested in a microwave oven and analysed by Atomic Absorption.

Sample Type	Elements Analysed					
	Mn		Cu		Cr	
	found	present	found	present	found	present
Steel*	0.216	0.22 (98%)	0.354	0.36 (98%)	1.324	1.34 (98%)
	Fe		Cu		Zn	
	found	present	found	present	found	present
Sediment**	3.19%	3.35% (95%)	17.2	18.0 (96%)	130	138 (94%)

* All results expressed as %
** All results expressed as mg/L unless indicated otherwise.
(Percent recoveries shown in brackets)

Conclusions

Results show, that for a wide variety of sample types, dissolution time can be reduced by up to 90% with recovery rates usually exceeding 95%. As well as these initial benefits there were the hidden advantages associated with digesting materials in closed containers which satisfactorily minimised the possibility of material loss from sample volatilisation or evaporation. This would be particularly useful in the analysis of the more volatile elements.

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Continued on page 37

GC APPLICATION NOTES

Gas Chromatography is the basis of a Product Feature elsewhere in this issue. In support of this we present the following application notes which illustrate just a few of the many uses of this technique in New Zealand today.

GC APPLICATIONS IN A BREWING SITUATION

S.L. Campbell, Dominion Breweries, Auckland

Two of the most useful and frequent GC applications at Dominion Breweries are vicinal diketone (VDK) using ECD and flavour volatiles (higher alcohols and esters) analyses using FID.

Both of these are headspace techniques, requiring minimal sample clean-up/preparation and allowing extended life of the GC columns.

Two of the most useful and frequent GC applications at Dominion Breweries are vicinal diketone (VDK) using ECD and flavour volatiles (higher alcohols and esters) analyses using FID.

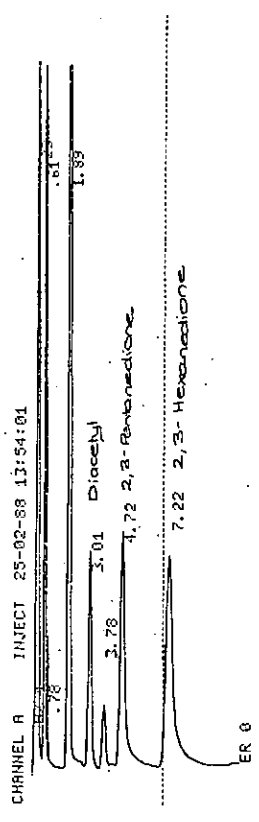
Both of these are headspace techniques, requiring minimal sample clean-up/preparation and allowing extended life of the GC columns. VDKs and flavour volatiles are all by-products of fermentation and by monitoring their levels we have an indication of the progress of the fermentation and beer maturation process.

Both methods require a 5ml sample of beer and an internal standard to be injected into a nitrogen-flushed vial and equilibrated for at least an hour prior to analysis.

i) Vicinal Diketones (See Figure 1)

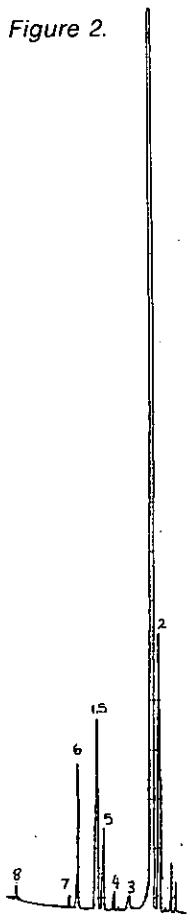
The major VDKs in beer are 2, 3-butanedione or diacetyl (buttery flavour, taste threshold 0.1 ppm), and 2, 3-pentanedione (buttery, taste threshold 1 ppm). Concentrations of diacetyl above 0.15 ppm in bottled beer can be disagreeable to some tasters whilst low levels of diacetyl can contribute to a beer's fullness.

Figure 1.



Vicinal diketones profile

Figure 2.



Flavour volatiles profile

Compound	Flavour	Taste Threshold	Concentration in beer
Diacetyl	Buttery	0.1 ppm	0.06 ppm
Pentanedione	Buttery	1.0 ppm	0.05 ppm
Acetaldehyde	Green Apples	15.0 ppm	4.00 ppm
Propanol	Solventy	600.0 ppm	15.00 ppm
Isobutanol	Solventy	?	6.00 ppm
Isoamyl alcohol	Solventy	?	49.00 ppm
Ethyl acetate	Fruity, UHU glue	30.0 ppm	10.00 ppm
Isoamyl acetate	Bananas	1.1 ppm	2.90 ppm
Ethyl hexanoate	Apples, aniseed	0, 2 ppm	0.12 ppm
Ethyl octanoate	Pineapple	?	0.12 ppm

Table 1: DB Draught Profile

The GC method supercedes a time-consuming colourimetric method which could not differentiate between the two homologues or indeed between the diketones and their precursors.

All water used for preparing standards must be boiled to remove co-eluting chloro-hydrocarbons and the beer is passed through C-18 Bond-Elut cartridges to remove other interfering compounds. The headspace injection is made via a Dani Automatic Headspace Sampler, HSS 3950, into a PU4500 GC equipped with an electron capture detector, which is sensitive to the conjugated carbonyl groups in the diketones. The autosampler holds up to 24 samples and is normally programmed to run overnight.

Chromatographic Conditions

Injection Port:	90°C
Column:	70°C
ECD:	150°C
Carrier Gas:	Nitrogen

at 30 ml/min Column: 1/4" glass column containing 10% Carbowax 20M on Chromosorb WAW, 80/100 mesh; precolumn of 20% Diglycerol on Chromosorb WAW

Internal Standard: 2, 3-Hexanedione

ii) Flavour Volatiles (See Figure 2)

This is a similar analysis to VDK determination but uses an HP5890 GC equipped with FID and a manual headspace injection. Compounds quantified by this method are: Acetaldehyde (high levels in bottled beer indicate oxidation and age), Ethyl acetate, Isoamyl acetate, Ethyl hexanoate, Ethyl octanoate. Propanol, Isobutanol, Isoamyl alcohol (high levels of these alcohols induce headaches)

Chromatographic Conditions

Injection Port:	150°C
Column:	55°C for 2.5 mins, ramp to 130°C at 10°C/min, hold at 130°C 5 mins
FID:	180°C
Hydrogen:	28 ml/min
Air:	300 ml/min
Carrier & Make-up:	Helium, 26 ml/min
Carrier:	Helium, 25cm/sec
Column:	Superox Nonpakd column
Internal Standard:	N-butanol

Table 1 describes VDK and volatiles levels typically found in a sample of DB Draught.

In summary, both of these headspace methods are relatively rapid with regard to sample preparation and analysis time. They provide useful information for process studies, they are valuable as QC checks on our products and they are an integral part of the overall flavour evaluation.

PYROLYSIS CAPILLARY COLUMN GC-MS OF WOOD PLASTIC COMPOSITE PRODUCTS

Robert A. Franich, Forest Research Institute, Rotorua

Depolymerisation of complex polymeric materials by pyrolysis in an inert atmosphere offers a means of characterisation, by analysis of the monomeric compounds arising from thermal rearrangement and degradation reactions. Coupling of a pyrolysis inlet to a capillary column gas chromatgraph-mass spectrometer allows direct production, separation and analysis of the pyrolysis products.

The technique has been applied at FRI to examine some commercial wood-plastic composite materials. In Japan, use is made of these composites in strip flooring, where the benefits of a very hard scratch and indentation resistant, yet decorative, floor are being realised.

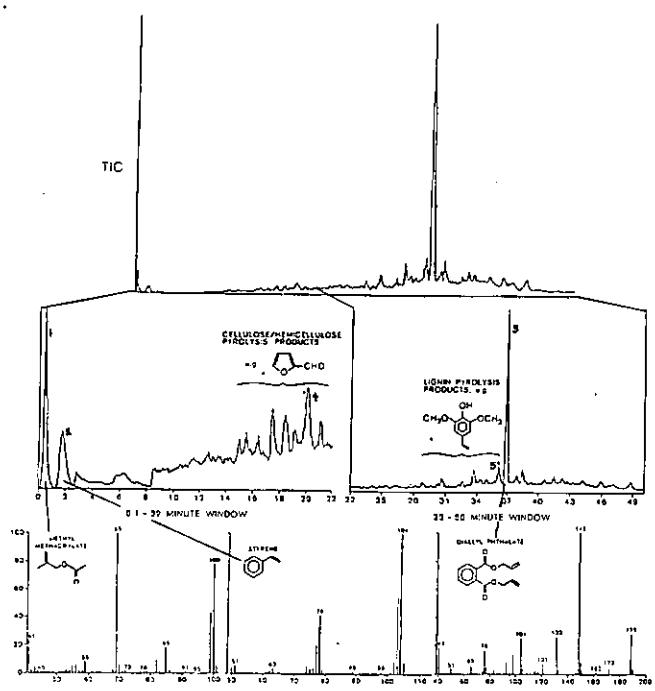


Figure 1. Ion chromatogram of pyrolysis products (upper), with mass spectra of peaks of interest (below).

Approximately 200ug of a Japanese flooring product was sampled for pyrolysis GC and GC-MS investigations. The instrumentation was a Chemical Data Systems coil pyrolyzer mounted on an HP 5840 GC fitted with a 25m X .2mm SP2330 capillary column, and both FID and mass spectrometer (HP 5985B).

The small chips of flooring (50ug) were placed in a quartz tube (10mm X 1.5mm) loosely stoppered with quartz wool (to prevent small pieces of sample being blown away by the helium carrier gas) and inserted into the platinum coil. The pyrolysis probe was inserted into the pyrolyzer oven which was held at 200°C. After a wait (30s, to allow any air in the oven to be expelled by helium) the sample was heated rapidly. Optimum yield of products was obtained at a pyrolysis temperature of 750°C.

The ion chromatogram is shown in Figure 1. Three plastics monomers were identified, viz. methyl methacrylate (1), styrene (2), and diallyl phthlate (3). All other GC peaks were due to wood pyrolysis products such as furfural (4) from cellulose pyrolysis and syringyl compounds (5) from lignin pyrolysis. That syringyl rather than guaicyl lignin pyrolysis products were present indicated that the wood was a hardwood species. (It was separately identified as birch).

Evaluation of commercial products such as the wood plastic composite by pyGC-MS has proved to be a very simple process. An important advantage of the method is the very small amount of material required to carry out the investigation, and that no sample pretreatment such as solvent exraction is needed. A disadvantage of the method is the difficulty in carrying out the analyses quantitatively. Very small amounts of solids need to be accurately weighed (using a six-place balance), and it is difficult to find a material of similar composition that will undergo pyrolysis to yield a single GC peak (or even a simple mixture) that can serve as an internal standard. Use of stable isotope labeled compounds and mass spectrometer detection can offer a solution to this problem in some instances.

INVESTIGATION OF VAPOUR PHASE CONTAMINATION OF FLASH POINT SENSITIVE FUELS.

Peter C A Bailey, Flinders Cook (Technical Services) Ltd, Auckland

Shipments of kerosine, diesel and residual fuels have quality parameters inclusive of a minimum closed-cup flash point. On occasion parcels of these fuels arrive for discharge with their flash point severely eroded. This may be the result of direct liquid contamination by a low flash product such as petrol or naphtha or by the dissolution of vapour transferred from such a cargo by common tank venting systems or an inert gas system.

Establishing the source of this contaminant is vital in order to ascertain how to dispose of the contaminated cargo (eg. re-refining or blending).

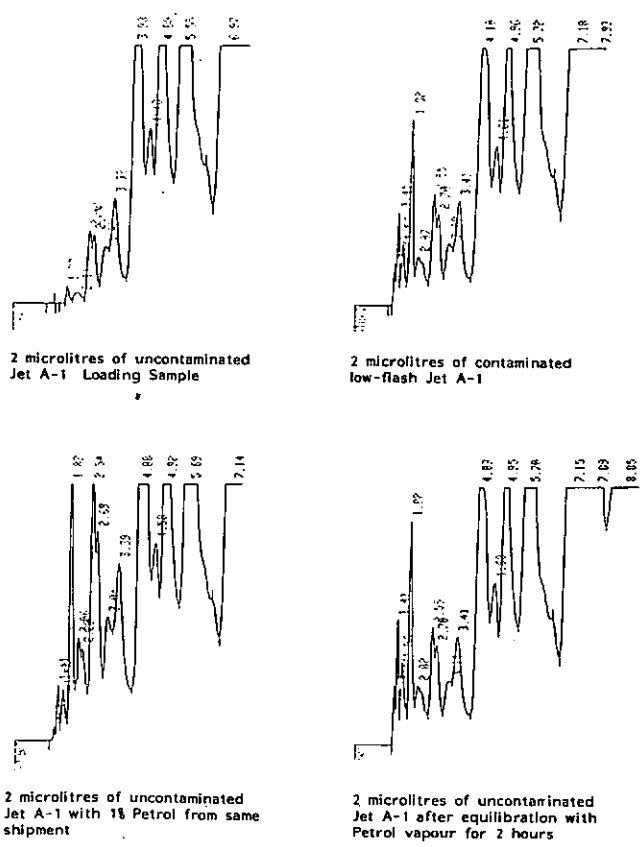
We have used the following GLC conditions to investigate a number of these contamination situations both in New Zealand and overseas.

Hewlett Packard Model 5890
Single FID
N_2 Carrier Gas
Integrator: HP 3390A
Column: 2mm x 3mm 10% OV101
Program: 70°C Isothermal for 10 minutes then to 250°C at 30°C/minute.

Standards are prepared by using an uncontaminated loading sample or a sample from an uncontaminated tank and adding known volumes of the suspected contaminant for liquid contamination standards. Vapour contaminant standards are readily prepared by connecting the uncontaminated fuel and its suspected vapour source in an enclosed system allowing free vapour transfer.

The GLC traces shown in Figure 1 are from a recent con-

Figure 1. Analysis of contaminated Jet Fuel



tamination of Jet Fuel resulting from transfer of petrol vapours through a faulty valve in the vessel's inert gas system. It can be seen that the relative levels of the most volatile components indicate vapour rater than liquid contamination.

Such a laboratory investigation would be associated with a full investigation of events and the ship's pumping/ventilation systems, plus measurements of lead levels, where petrol contamination is concerned.

GC-MS OF BUTYLATED TIN DERIVATIVES

Roger Meder, Forest Research Institute, Rotorua

An interest of ours at FRI has been the separation and identification of butyl tin species in timber preservatives using GC-MS and high resolution NMR.

The GC technique requires the samples to be derivatised to their hydride using a method described by Tsuda et al. (1987). A 1 ml sample is added to 5 ml of ethyl acetate before adding 1 ml of HCl (35%) and shaking. The ethyl acetate layer is rotary-evaporated to dryness and immediately taken up in 1 ml of ethanol. Hydrogenation is carried out by addition of 2 ml of 2.5% sodium borohydride in ethanol for 5 minutes. The solution is neutralised with 10 ml of NaCl(sat.) and the organics extracted with hexane, and concentrated to approximately 1 ml.

The samples are run on a HP 5840 gas chromatograph using a 25 m X 0.2 mm OV-101 column. A O.5ul sample is used for split injection onto the column.

Argon is used as the carrier gas at a flow of 10ml/min. The injection port temperature is held at 150°C. The column oven is programmed to remain steady at 50°C for 1 minute then increase at 15°C/min for 6 minutes followed by 8°C/min for a futher 13 minutes.

Mass spectra are acquired every 1.3 s on a HP 5985B mass spectrometer operating in electron ionisation mode, 70 eV, 300uA electron energy and an ion-source temperature of 200°C.

Excellent separation is achieved between the mono-, di- and tributyltin hydrides. The mass spectra clearly display the ten isotopes of tin of the dibutyltin dihydride peak indicated in Figure 1.

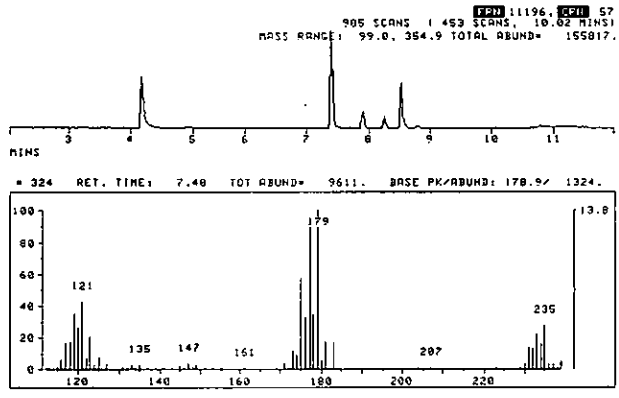


Figure 1. Total ion chromatogram (upper) and mass spectrum of the major peak at 7.4 mm (lower), for a butyltin based preservative.

Reference: Tsuda T., Nakanishi H., Aoki S. and Takebayashi J. J. Chromatogr., 387, 361-370 (1987)

Continued from page 34

5. Walker, J. The Amateur Scientist. Scientific American, 98-102 (1986)

6. Jackwerth, E. and Gomiscek, S. Acid pressure decomposition in trace element analysis. International Union of Pure and Applied Chemistry, **56**(4) 479-489 (1984).

Acknowledgements

The author wishes to thank members of New Zealand Steel Environmental Department and Tony Herd of ATI for their help in developing the above procedures. The author would also like to thank his friends and colleagues on the Royal Society of Chemistry's Certificate in Applied Chemistry (Analytical) course run by the Auckland Technical Institute. This report in part contributes to the end assessment.

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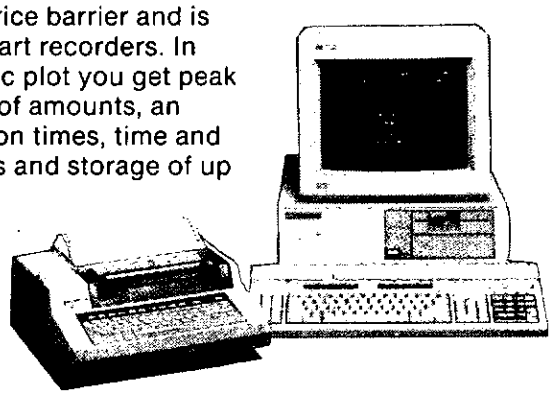

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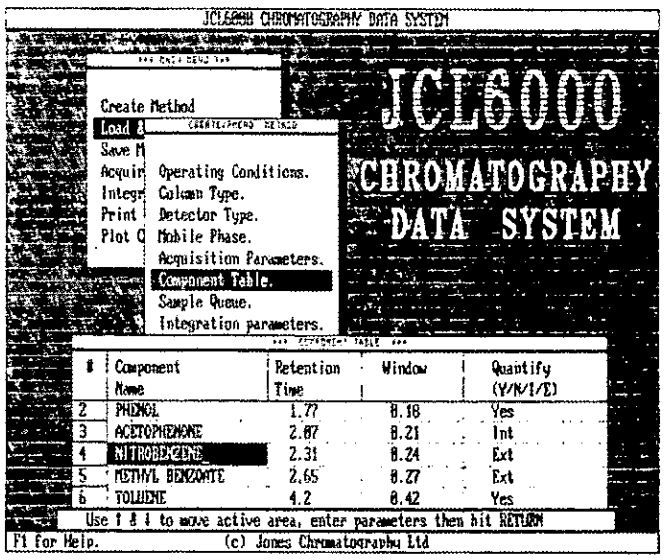

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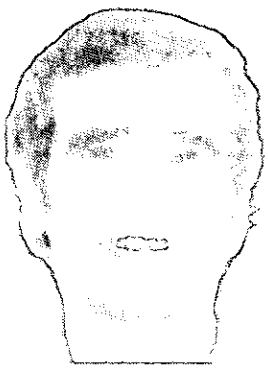
THE 1988 BRANCH CHAIRS

Auckland — R.V. Winchester

Robert Winchester was born in England but educated in Auckland, completing a PhD in radiation chemistry in 1968 under the direction of Dr J.E. Packer. After 18 months as a post-doctoral fellow with the National Research Council of Canada and 2 years as a lecturer at the University of the South Pacific in Suva, he worked for four years in the food irradation programme of the South African Atomic Energy Board. He



joined the food section of Chemistry Division, DSIR, at Gracefield in 1976 and worked largely on regulatory analysis of foods until 1980. Seeking a break from the laboratory bench he transferred to the Department of Health as an occupational hygienist, based in Auckland, and spent the next four years involved with the measurement of hazardous chemicals in the workplace and advice and liaison with industry. He rejoined Chemistry Division in Auckland in 1984 to work in the general area of food science, and still retains an interest in food irradiation.

He has been a Member of NZIC since 1971 and a Fellow since 1985, and was branch treasurer in 1986-87. Interests, other than his family of four children, include philately, local history, playing the piano, and taming an unruly garden.

Waikato — R.T. Gallagher

Rex Gallagher was born in Auckland, and graduated BSc and MSc (hons) in chemistry in 1967 from Auckland University. He received his PhD in 1971 from Massey University, where he lectured in chemistry until 1974. He then worked as a research scientist with the Applied Biochemistry Division, DSIR, Palmerston North, and was a post-doctoral fellow at Iowa State University 1976-78. In 1980 he transferred to the Ruakura Animal Research Station, MAF, Hamilton.

Rex has been a Member of the Institute since 1971, and has served as a committee member and branch editor of the Manawatu Branch, committee member of the Waikato Branch, and was the 1987 chairman of the Waikato Branch. Last year he was active in promoting public discussion on science research funding, and is a founding member of a steering committee aimed at establishing a Science and Technology Park in Hamilton. Rex was seconded part time to the Hamilton City Council for three months at the end of last year, to assist in a major feasibility study on a S & T Park for Hamilton.

His main research interests have involved natural products chemistry. He has isolated, purified and determined the structure of a number of potent plant and fungal toxins, including the remarkable lolitrem neurotoxins, the causative toxins of the livestock disorder ryegrass staggers. Currently he is studying immunochemistry and toxin poisoning of animals.

Manawatu — A.R. Furness

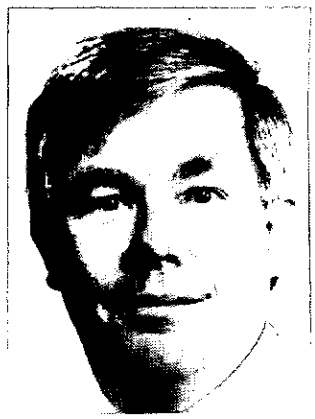
Alan Furness is a born and bred Palmerstonian, attending Freyberg High School and Massey University. At Massey he completed his BSc (First Class Honours in Chemistry), the project for which resulted in the synthesis of a new series of derivatives of the group VI metal carbonyls. In 1977 he completed his PhD in chemistry. His thesis dealt with nuclear magnetic resonance studies of internal rotation. He attended Auckland Teachers' College in 1975 where he gained his Diploma in Teaching.

Alan taught at Manawatu College, and later at Palmerston North Boys' High School where he was Dean of Form III and Head of Physics. In 1984 he took up a position with the Lactose Company, Kapuni, as Laboratory Manager. He is currently employed as a tutor in chemistry at Manawatu Polytechnic.

Alan has a keen interest in people, helping them to develop to their full potential. He is Director of the National Leadership and Development Course held at Blenheim each year for young men and women between the ages of 16 and 17. In addition, he is currently serving as the National President of The Boys' Brigade.

Wellington — D.C.Weatherburn

David Weatherburn was born and educated in Australia, graduating from the University of Sydney with a BSc with first class honours in 1962, MSc in 1964 and PhD in 1968. After three years of post-doctoral experience working with Dale Margerum at Purdue University he accepted a position as Senior Tutor at the University of Queensland. After two years in Brisbane he was appointed to a position of Lecturer in Chemistry at Victoria University of Wellington where he is now a Senior Lecturer.



David's research interests are in the mechanisms of inorganic reactions and in the study of bio-inorganic chemistry. He has spent two periods of sabbatical leave working with the blue copper proteins, azurin and plastocyanin. The first period was spent at the University of Leeds working in Geoffrey Sykes group on the mechanisms of the oxidation of the proteins using cobalt (III) complexes. The second period was spent at the University of Texas at Austin working with Bill Woodruff measuring the Raman spectra of the proteins. Currently his research group (one PhD student) is investigating manganese chemistry with the aim of developing models for the oxygen evolving complex in photosynthesis. He has also been active, in association with Neil Curtis, in studying the reactions and mechanisms of first row transition metal macrocyclic complexes.

David has been a member of the Institute since coming to New Zealand and served as conference treasurer in 1979. He managed to avoid other involvement in the Institutes affairs by a mixture of good luck and by being overseas at the right time but in 1986 he was elected to the Wellington Branch committee.

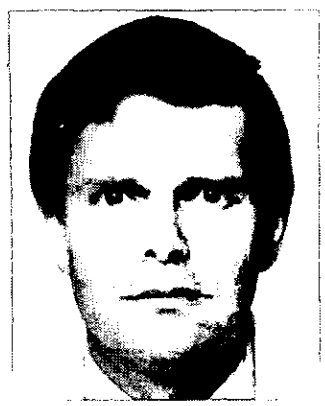
Canterbury — A.G.Groves

Mr Geoff Groves is the Head of the Science Department at Ellesmere College, Leeston. He has been a member of the Institute since 1985 and has served on the branch committee for the last 2 years.

Geoff has been teaching chemistry and science for 15 years, initially at Tapawera District High School, Shirley Boys' High School and since 1981 at Ellesmere College. In 1984 he was appointed a teaching fellow at Canterbury University and worked principally on 6th Form Certificate material. In 1986 he was awarded the inaugural Chemical Education prize by the NZIC.

Otago — Barrie Peake

Barrie Peake is a graduate from the University of Canterbury where he completed a BSc(Hons) in 1968 and a PhD in 1971. Following a Post-Doctoral Fellowship with Professor Fabian Gerson at Basel University, Switzerland he took up a lectureship in the Chemistry Department at Otago University where he is currently a Senior Lecturer and Sub-Dean of the Science Faculty. In 1978 he was awarded a Nuffield Foundation Commonwealth Travelling Fellowship for study leave at Leeds and Leicester.



His research interests have largely centred around spectroscopic studies of free radicals in a wide range of organic, inorganic and biological systems. Most recently he has become interested in the study of organic material and paramagnetic species in aquatic environments. He has also had a long interest in applications of computers in chemistry and developed a course for programming the Apple II microcomputer which resulted in the

Continued on page 42

COUNCIL NEWS

The first of Council's two meetings for the year was held in Wellington on 22/23 February. The following were amongst the items discussed.

Permanent Secretariat

This item is discussed in the Editorial elsewhere in this issue.

Subscriptions 1988/89

The proposed rates are as follows (rebated rates for prompt payment shown in brackets):
Fellows, Members $110 ($100)
Associate $65 ($55) ($45, first 5 years)
Local $65 ($45) ($10, no Journal)
Student $15 (n.r.)
Life $15 with journal only

All the above are exclusive of GST.

These rates represent substantial increases over previous years, for the reasons outlined in the Editorial elsewhere in this issue.

Grades of Membership

Members were canvassed on this issue during 1987, with the results of the ballot being published in Chemistry in NZ in December. A motion that the grades of Associate, Technician and Graduate be combined into one, to be known as Associate, was voted on by Council and passed unanimously.

Various rule changes to effect this resolution were discussed and after minor redrafting these should be approved at the August meeting. Changes to the "Commentary" are also being prepared and it is expected in particular, that these will address the way in which Associates may progress to full Membership depending on their initial qualification level.

Council Committees

On the suggestion of its members, it was agreed that the Chemical Syllabus Committee should go into recess. The work for which this committee was originally established has now been either completed or superceded by other developments and no requirement for further activity is perceived in the immediate future.

Various personnel changes on other committees were noted. Dr J Love is convenor of the Hazardous Chemicals Committee and Dr M H G Munro joins as Council representative. Dr R Whitney replaces P Best as Council rep. on the Chemical Education Committee. Mr Hitchings commented on the excellent work that this committee was currently doing, including having a significant input to Education Department policy on matters such as fume cupboards, laboratory safety and the like.

International Activities

Mr Hitchings has been made an Honorary Fellow of the Canadian Institute of Chemistry during his term of office. Council agreed to reciprocate for this and future years as appropriate.

Prizes & Awards

Rule 5 of the Shell Prize has been changed to allow for a nomination or application, once made, to stand for five years.

Members are reminded that applications for the Easterfield, ICI, Shell, and Chemical Education prizes close with the Administrative Secretary, PO Box 29-183, Christchurch, on 30 April 1988. Nominations for the NZIC-RACI Visiting Speaker to New Zealand in 1989, and entries for the Chemical Essay Prize close on 30 June 1988.

Council Officers

Nominations for the positions of 2nd Vice President and General Secretary are required by 30 June 1988.

Bruce Graham, Editor

Membership Changes, 22 February 1988

Member:
ALBERTSON, Stephen John, BSc. Alliance Freezing Co. Ltd., Invercargill (Development Technologist).
MATHESON, Trevor Walter, BSc(Hons) PhD(Otago). Coal Research Assn. of N.Z., Lower Hutt. (Acting Director).
WILLIAMSON, Wayne Sinclair, NZCS. Electricorp NZ Ltd., New Plymouth Power Station. (Stn. Chemical Officer).

Member — from Graduate:
HULSE, Miss Carol Ann, BSc(Hons)(Cantuar). Papua New Guinea University of Technology, Lae, PNG. (Scientific Officer).
LYON, Robert Barry, BSc. Sci-Med Divn. of EBOS Group, Auckland. (Sales Manager).
WELSH, Ian Kenneth, BSc. Dip.Sci. Southland Boys' High School, Invercargill. (Science Teacher).

Associate:
FLETCHER, Ross Alan, NZCS. Dip.Sci. Chemistry Divn., DSIR., Gracefield. (Technical Officer).

Associate — from Technician:
GUNN, Bruce Ian, NZCS. Printpac Ltd., Auckland. (Chief Chemist).
McKENZIE, Graeme James, NZCS. Southland Catchment Board, Invercargill. (Charge Technician).

Graduate Member:
CRONSHAW, David Robert, BSc. Rotorua Boys' High School, Rotorua. (Science Teacher).
HODGE, Suzanne Joy, BSc (Hons)(Otago). Chemistry Dept, University of Otago. (Student).
LEADBETTER, Robert Ian, BSc. Cadbury Schweppes Hudson Ltd., Dunedin. (Chemist).
TRENT, John Olaf, BSc(Hons)-(Cantuar). Chemistry Dept., University of Canterbury. (PhD Student).

Technician Member:
GIBBS, Marie Therese, NZCS. Ivon Watkins-Dow Ltd., New Plymouth. (Lab. Chemist).

Resignations:
D S Cruickshank (Man); P A Nash (Auck); N J Eggers, J M Erskine (O/S).

Life Members:
H M Stone (Well); E R Entwistle (Otago).

SURVEY OF CONSULTANTS' FEES

Last year I was asked to repeat my earlier Survey of Consulting Analysts Fees, to assist members of our Institute who are considering setting up a laboratory service, to act as a guide for analysts setting fees, and advise the general membership of what they can expect to pay if they need the services of an analyst. When the initial Survey was done, over ten years ago there were very few private labs in existence. Since then the number has steadily grown and recently the New Zealand Association of Consulting Laboratories has been formed. Letters were sent to all appropriate members of the Association and a 65% return was achieved.

As with the previous Survey, the Fees "Scale" is divided into groups, as follows:

Senior professional staff, with around 10 years or more experience: $80/hour
Junior professional staff: $50/hour
Technical Staff $35/hour

As this Survey was conducted in late 1987, probably 10% should be added for inflation to bring it up-to-date for 1988.

The above fee rates are for general work only. Where very expensive equipment or chemicals are used, the rates would be higher. The rates quoted should only be taken as a guide to an appropriate level.

Four main points came out of the Survey:

1. As might be expected in a small country, fees charged are fairly uniform.
2. The fee levels set by DSIR and other Government agencies are seen as greatly influencing the fees that can be charged by private laboratories. This is interesting, because Government scientists claim that they try to set fees in keeping with the private labs and do not compete just on price. There would seem to be a need for DSIR and the Association of Consulting Laboratories to get together, if analysts fees are ever going to rise to those of other professions — see 4. below.
3. There is a tendency for South Island labs to charge less than North Island labs.
4. On a personal note, as one who has been a private analyst and who currently works with other professions such as lawyers and accountants, there is no doubt in my mind that chemists as a profession are underpaid and their professional fees, when related to overheads and competence are considerably too low.

I believe that this Survey should be conducted annually, either through or with the support of the Association of Consulting Laboratories and probably the assistance of DSIR. It may be preferable for some independent person to actually gather the results together, to avoid problems of confidentiality.

Ian Devereux

GOVT DEPARTMENTS AND RESEARCH INSTITUTES

DSIR, Biotechnology Division

On 16-17 February the Biochemical Processing Centre held a symposium at Massey University entitled "Bioprocessing for the 1990's." The symposium was opened by **Dr Jim Ellis** (Director-General, DSIR) who discussed areas of biotechnological research that could be of importance to New Zealand in the future. Dr Ellis cautioned that we must not be simply repeating experiments that have been carried out overseas. Strong competition for markets can be expected from many directions as even developing countries are providing large investments in biotechnological research.

Experiences of biotechnologically-based companies in Australia were related by **Dr Wolf Hanisch** (Qlone Ltd. Queensland) and **Dr Neil Goss** (Biotechnology Australia). New Zealand industries producing vaccines (**Mr Steve Flint**, Coopers Animal Health) animal by-products (**Mr Lance Smith**, Waitaki International Biosciences) provided speakers to the symposium. Messrs Smith and Witters showed how their companies have diversified from their "traditional" products.

Research being carried out in the Biotechnology Division of DSIR, the Biotechnology Department of Massey University and at Nelson's Cawthron Institute were presented by **Drs Susan Rodriguez, Ian Maddox and Andrew Broderick** respectively. Dr Laurie Kennedy described the development of the Biochemical Processing Centre's fermentation facility, in particular the recently acquired 1000 litre vessel. 'Going back overseas', **Dr Keith Joblin** of the Biotechnology Division described his experiences in Japan, a country with the world's most advanced and diverse fermentation industry. Dr Joblin went to Japan to evaluate "things Japanese", to see how their industries operate (and occasionally co-operate) and to see if any of their ideas could be used in New Zealand.

The symposium gave its participants a valuable insight into how New Zealand's industry and research efforts have changed over the past few years. The message was clear that many more changes will be made in the years to come to which Society will need to adapt.

Dr Paul Reynolds, Leader of the Plant Gene Expression and Manipulation Programme, is visiting Germany to attend the International Nitrogen Fixation Symposium 13-20 March. He will also visit laboratories in Germany, Britain and the United States to set up collaboration agreements for the exchange of materials for plant molecular research in the Division's Programme.

Dr Mike Boland, Officer in Charge of the Biochemical Processing Centre, will be visiting the Institute for Biotechnology Research, Braunschweig, West Germany from July to December. He will be working with Dr H. Hustedt on adapting methods for the aqueous liquid-liquid extraction of microbial enzymes and other proteins. This may result in the development of new methods for the preparation of important proteins, such as insulin, from by-products of the freezing industry.

Palmerston North DSIR divisions recently held a farewell function for their Head Librarian, **Miss Cynthia Owen**. The library has grown considerably since Miss Owen joined it in 1964, with many new functions being undertaken. Most of the division's scientists have required Miss Owen's assistance in their work and it is appropriate that she said "I trust the majority of you came to realise that 'my bark was worse than my bite'." Our new Head Librarian is **Mr Steven Northover**, from the Massey University Library.

The Division recently acquired a VG70-250S gas chromatograph/mass spectrometer/-data system. This instrument has EI, CI fast atom bombardment ionisation modes, providing both positive- and negative-ion mass spectral data. A Hewlett-Packard Model 5890 gas chromatograph, fitted with an autosampler for automated on-column and split/splitless injection, provides high performance capillary gas chromatographic separations. The capillary column is directly connected to the ion source. Liquid chromatography — mass spectrometry operations are also available with thermospray and plasmaspray interfaces. For further information, contact Dr John Shaw.

New Director Appointed for the Coal Research Association

Dr R.S.(Robert) Whitney has been appointed Director of the Coal Research Association of New Zealand. He succeeds Mr Peter Toynbee who retired last October after 20 years as Director of the Wellington-based research organisation.

Dr Whitney, who will take up his new appointment on March 21, says he would like to see the Coal Research Association develop further as a research and technical organisation sensitive to the needs of the coal industry and its market, being a bode from the University of Essex. Prior to coming to New Zealand he worked in Wales and England and was holder of a Royal Society European Fellowship at the University of Freiburg, Institute of Macromolecular Science, West Germany, 1971-72.

He has had several BRANZ publications to his name in the past 12 years and has also addressed building research related conferences in New Zealand, the United States, Canada and Finland.

Dr Whitney is a member of the New Zealand Institute of Chemistry and Wellington branch delegate on the NZIC Council.

MAF, Ruakura

Dr Ross Clark has joined the Growth Physiology group at Ruakura as a Scientist (Protein Chemist). After graduating from Ms. His interests are in the physiology and pharmacology of the peptide hormones regulating body growth, especially the hypothalamic peptides growth hormone releasing factor and somatostatin.

Forest Research Institute

FRI recently hosted a "Chemists Day" where science teachers from several Rotorua high schools were shown the power and versatility of some modern chemical instruments. Eleven of the teachers took part in problem solving activities on FRI instruments: flame atomic absorption spectrometry (quantification of copper in wood), nuclear magnetic resonance (structure and couplings of a-pinene), capillary column gas chromatography (comparison of essential oils from cedar species) and gas chromatography — mass spectrometry (analysis for 2, 4, 5-T in pine needles). Those who took part not only had an enjoyable afternoon, but gained an appreciation for the chemistry being done at FRI. A similar day is being arranged for Rotorua 6th and 7th formers, in the hope that exposing them to chemists in action will generate more enthusiasm for chemistry.

DSIR Chemistry Division, Gracefield

The Division has purchased a VG-70-250S mass spectrometer. It will be operated by **Dr Lawrence Porter** and **Ms Carolyn Sheppard.** The instrument will initially specialise in environmental and health projects with emphasis on chlorodibenzodioxin (TCDD) and dibenzofuran analyses. It will also be used to facilitate the general work of the Division in organic chemistry, including toxicological, forensic, and pharmaceutical sciences. A wide range of experiments may be performed on the instrument. Samples may be introduced via a solids probe, septum inlet, or gas chromatograph. Analyses may be performed by EI or CI in positive or negative ion mode or by use of a caesium ion gun for SIMS type analyses.

Dr A D Woolhouse left in February for 4 months study leave to carry out organic geochemical work at Oklahoma State University. **Dr L J Porter** left in March for 6 weeks as a visiting scientist at the Flinders University of South Australia.

Dr T Stevenson has joined Dr R H Furneaux's group as a Post Doctoral Fellow. Dr Stevenson previously worked with Professor Albensheim in Athens, Georgia.

Dr T D R Manning is now the Group Manager of the Forensic and Drugs Group. **Dr G L Dick** is now Section Head of the Forensic Section and **Dr G J Sutherland** Head of the Drugs and Alcohol Section. **Ms D Kapitos** and **Ms L Johnson** have joined the latter section.

Continued on page 43

UNIVERSITY NEWS

Otago

Professor Brian Robinson has been appointed Head of the Chemistry Department, on the retirement of Arthur Campbell.

Brian Robinson was born in Christchurch and educated at Churchurch Boys High and Canterbury University. He graduated MSc(Hons) in Chemistry and did a PhD under Professor Wilkins and Dr J Fergusson on halide clusters of rhenium and molybdenum. After graduating PhD, in 1965, he did a postdoctoral year at Newcastle-upon-Tyne with Norm Greenwood on the chemistry of boron compounds, funded by the US Air Force. In 1966 he was 1851 Exhibition Research Fellow with Professor J Lewis, during which some of the earliest heavy metal carbonyl clusters were discovered and mass spectrometry developed as an analytical tool for these compounds. He was appointed Lecturer at Otago in 1967, Associate Professor in 1974 and received a Personal Chair in 1985.

Brian was a Nuffield Fellow in 1973-74 at Cambridge, Visiting Lecturer at Monash University, 1976 and NSERC Research Fellow at University of British Columbia, 1986. He has published 90-odd research papers, one book and several reviews. His research interests are mainly in the areas of metal clusters and catalysis with a current emphasis on electron transfer and solid state properties of cluster compounds, silver chemistry and the toxicity and carcinogenic properties of organometallic compounds.

Dr R. H. McKeown has left the Pharmacy Department, Otago University, and is now with Pharm Chem Research Laboratories Ltd., P.O. Box 5313, Dunedin.

Canterbury

Professor Michael Benn, University of Calgary, is spending a short sabbatical leave in the department. **Professor Leon Phillips** has returned from leave in time to set up the new infrared diode laser.

Dr Alan Happer spent 3 months over the summer at the University of Sussex working with **Professor Colin Eaborn.**

Dr Peter Steel has left to spend study leave at the Cambridge Chemical Laboratory working with Dr E.C.Constable. **Professor Michael Hartshorn** is visiting universities in Australia, the United States and Britain on an Erskine Fellowship.

Massey

Dr Kathy Crowe (Department of Chemistry and Biochemistry) has been awarded a grant from the Palmerston North Medical Research Foundation to assist with her research on the "Regulation of Ethanol Metabolism in Mammals".

Dr David Harding of the same department has been awarded a grant from the Leprosy Trust Board to assist with research, in collaboration with Professor Jim Watson, University of Auckland Medical School. This grant will provide technical help and some working expenses for evolving a diagnostic system for leprosy and the development of a vaccine against leprosy.

Waikato

The papers of **Dr Walter (Wattie) Whittlestone** (1914-1985) have been presented to the University of Waikato Library. Dr Whittlestone was well known in the Waikato, New Zealand and world scientific communities for his research into milking machines, mastitis and dairying in general, much of which is included in the papers.

Dr Guy Claxton, Senior Lecturer in Psychology of Education, Kings College, London, is visiting the University's Science Education Research Unit from January to April 1988. This is Dr Claxton's third visit in as many years, and on this occasion he will be closely involved in planning the fourth Learning In Science Programme (LISP 4).

First year chemistry undergraduate enrolment numbers are well up on 1987. Last year's totals for the two main first year courses were 180 and 157: the 1988 figures are 220 and 196 respectively, an increase of about 23% in each case. Second year numbers remain about the same, while the increase in third years is quite marked: a staggering 100% in the case of third year Inorganic Chemistry. First year MSc figures are slightly down, but the number of DPhil students is up, increasing from 8 to 13.

Auckland

Professor John E. Bertie of the Department of Chemistry, University of Alberta, Edmonton, Alberta, Canada is visiting the Department of Chemistry, unitl April 10. Professor Bertie's interests are in vibrational spectrocopy, particularly FTIR. While at the University he will be working with Professor Ralph Cooney.

Continued from page 39

publication of an international textbook. He has since developed a number of microcomputer-instrument interface systems and is currently interested in the chemical applications of expert systems.

He has been a member of the Institute since 1969 and a Fellow since 1984. He has served for a number of years on the Otago branch committee as branch editor and secretary in 1980-81.

Other interests include orienteering, tramping and restoration of an Edwardian house.

BRANCH NEWS

Bay of Plenty Sub-Branch: The Formation Of A New Group

The Waikato branch has for a long time suffered from geographical size. At any one gathering, members from Hamilton, Huntly, Mt Maunganui, Tauranga, Kawerau and Rotorua might be expected to attend. In practice however, the Hamilton regulars most often form the bulk of a meeting. And yet all of these towns and cities have significant chemical or chemistry-related industries, as well as interested members. As a result, chemists in Rotorua, particularly those at FRI, have for a number of months been spearheading plans for the formation of the Bay of Plenty subbranch.

Physical separation is one obvious reason for the new group: of six or seven meetings throughout the year, all held in Hamilton, four are in the winter months, when the Mamaku and Kaimai ranges are either frosty or steeped in fog and low cloud. The journey to and from Hamilton is consequently long, tiring and sometimes hazardous.

Furthermore, chemistry is an expanding discipline at FRI, where chemists are active in diverse areas : forest establishment and chemical control, wood preservation, composite products, adhesive hydrolysis and fermentation, and wood structure modification. The increasing number of chemists, technicians and biotechnologists at FRI make it a natural focus of chemistry in Rotorua and the BOP.

Other areas of the Bay have related industries too : Pinechem processing at Mt Maunganui, horticulture in and around Tauranga and pulp and paper chemists at Tasman, Kawerau; all are well removed from the Waikato Branch. In sum, the need arose for NZIC branch activities closer to home.

Many visiting speakers in fact visit Rotorua as tourists, or express in advance their wish to do so. Capturing them during their sightseeing is therefore expected to be convenient and fairly inexpensive.

The inaugural meeting of the BOP sub-branch is to be held in the Rimu room, FRI, on March 10th, where **Richard Neidlein** will speak on Pharmaceutical chemistry and the industry. Local medical practitioners and interested parties will also be invited to attend. The meeting will give BOP chemists the chance to publicise the formation of the new group, along with some anecdotal reinforcement on the benefits of chemistry to society, with a bias towards the BOP and Rotorua interests.

Auckland

Dr Stewart Rutledge, winner of the 1987 ICI price, addressed a meeting of the Auckland branch to talk about his research work over the last 20 years. His talk entitled *New Routes To New Drugs* was enjoyed by the 30 members attending. The main direction of his work has been the investigation of chemical ways of preparing pharmaceutically active compounds, particularly from New Zealand natural products.

BOOK REVIEWS

SILENT SPRING REVISITED
Edited by Gino J. Marco, Robert M. Hollingworth and William Durham. American Chemical Society, 1987. ISBN 0-8412-0980-4 or ISBN 0-8412-0981-2 (PBK) US$21.95

Over 25 years ago a quiet American biologist threw down the gauntlet to chemists and politicians in a warning over the dangers of chemical pesticides. Rachel Carson's warning came in the form of a book unassumingly entitled *Silent Spring.*

At the time organic pesticides like DDT had just appeared on the market. They were hailed as a solution to the serious environmental problems caused by inorganic chemicals such as arsenicals, which had been used as pesticides until then. The new chemicals were used with gay abandon and with scant regard to their environmental consequences.

Silent Spring included some of the first evidence of the harmful effects of these new pesticides on the environment, based on comparatively crude analytical techniques.

The book sent shockwaves through the public, back to the administrators. They in turn responded by searching for new standards and safeguards on the use of these chemicals. Chemists were given bulging research budgets and sent scurrying in search of new techniques on which to base the new standards.

Silent Spring Revisited arose from a conference held by the American Chemical Society to review progress since the appearance of Rachel Carson's work. While the leading American researchers who participated may all disagree over the amount of factual content of her book, none of them doubt the impact her book had. In hindsight the perception of chemicals by the public and the politicians changed enormously. This gave the impetus to the chemists. They have since been able to develop new sensitive techniques capable of detection levels equivalent to a needle in a haystack, provided the haystack weighs over 100,000 tonnes.

While *Silent Spring Revisited* may not have the impact of *Silent Spring,* it does explore some of the new issues we face today. Pesticide contamination of ground water, measuring long term adverse effects and the dilemma of toxicologists in giving a "yes or no" decision on the safety of a pesticide are but a few of the issues that are covered. One contributor now suggests we may have come too far in considering the risks of using chemical pesticides over and above their advantages.

Silent Spring Revisited is so easy to read that it provides us all with an opportunity to review how far we have come with pesticide control and how far we have yet to go.

Andrew Jeffs
Dept of Conservation
Wellington

ENGINEERING SCIENCE OF POLYMERIC MATERIALS — Z.H. Stachurski, Monash University. Australian Polymer Science Series No. 1, published by Polymer Division of the Royal Australian Chemical Institute. NZ$50.00

To begin with the conclusion; this book is worth having as a broad and up-to-date introductory text with plenty of useful references. It is marred by careless production and by idiosyncratic subject choice and writing.

The book has four sections,

- Introduction to polymers
- Microstructure of liquid and solid polymers and the kinetics of transition between them.
- Mechanical behaviour of polymers
- Quest for stiffness and strength, which are dealt with in an often admirably lucid fashion as in the treatment, starting on page 48, of solidification diagrams for thermoplastics and the accompanying parallel discussion of vulcanization of rubbers and curing of thermosets. On the other hand, diagrams on page 81 showing the results of a computer simulation of cross-linking need discussion of their practical significance to be of value. Again, there is, on page 171, some intellectually interesting material on the relative change of volume with draw ratio for a cylinder made from oriented PET but practical implications for the ubiquitous PET soft drink bottle are not drawn and, one suspects, may not exist.

The book is not all-inclusive; such matters as rubber toughening and fracture phenomena, environmental effects and barrier properties are not covered. The author likes to supply names and biographic notes. In the first paragraph we are told Berzelius (1779-1848, Swedish Chemist) gave us the name 'polymer'. This is overdone when we are reminded on page 28 that Newton was an Englishman but when page 82 is reached we are disappointed that the name of Trommsdorf is not associated with auto-acceleration.

Errors noted range from typos (interchanges of form and from (pages 169, 182) matrerials (page 206)) to the claim that the feature of addition polymerization is that the backbone chain consists essentially of carbon atoms only (page 11).

Since five people are thanked for editorial advice, it would be unfair to blame Dr Stachurski for all the shortcomings of this book. He is an energetic researcher and contributor to the literature and the faults may merely reflect difficulties induced by the realities of 'publish or perish' in academia. Too bad there is not time for more mature reflection.

Prof. K. Free
Auckland University

COURSES

HPLC School, 1988

The Chromatography Group of the NZIC and Waikato Technical Institute will run a HPLC school at Waikato Technical Institute from May 10-13 inclusive. The school will have the same format as previous schools, ie lectures on the topics of HPLC systems, chromatographic theory, stationary phases (columns), mobile phases (solvents), detection systems, quantitation and sample preparation each followed by a practical session on the lecture topic. There will be extensive 'hands-on' experience with a number of different instruments. Although the lectures cover most types of HPLC the practicals are largely confined to reversed-phase systems with UV detection.

For further information contact Dr Peter Robinson, Science Department, Waikato Polytechnic, Private Bag, Hamilton.

ACOL Intensive Instrumentation Workshops

Atomic Absorption/Flame Emission Spectroscopy: A three day practical workshop. Tues, 5-Thurs, 7 July, 1988

This course is intended as an introduction to modern AAS and FES theory and practice. Participants will be sent the ACOL self teaching text 4-6 weeks prior to the beginning of the workshop with the intention that they will study the theory of the technique in their own time. The student's attention will be drawn to those sections of the text that will be covered in the practical sessions during the workshop.

Topics to be covered will include: Theoretical aspects of atomic absorption and flame emission spectroscopy, the components of a modern AAS/FES system, sample preparation and matrix problems, AAS from sample to flame, atomic absorption vs flame emission — and when best to use each, background correction in AAS.

The course time will be largely spent on practical work, with only a short time spent on a review of each theory section in the self teaching text that has been covered by the students themselves prior to the beginning of the course.

If you would like further information please contact: Bruce Fraser, School of Science, ATI, Private Bag, Wellesley Street, Auckland.

GOVT. DEPTS.

Continued from page 41

DSIR, Chemistry Division, Christchurch

Dr Max Robertson attended the 7th World Congress of Food Science and Technology in Singapore during September-October 1987. He went on to visit visit several analytical laboratories in both Malaysia and Australia.

DSIR, Wheat Research Institute

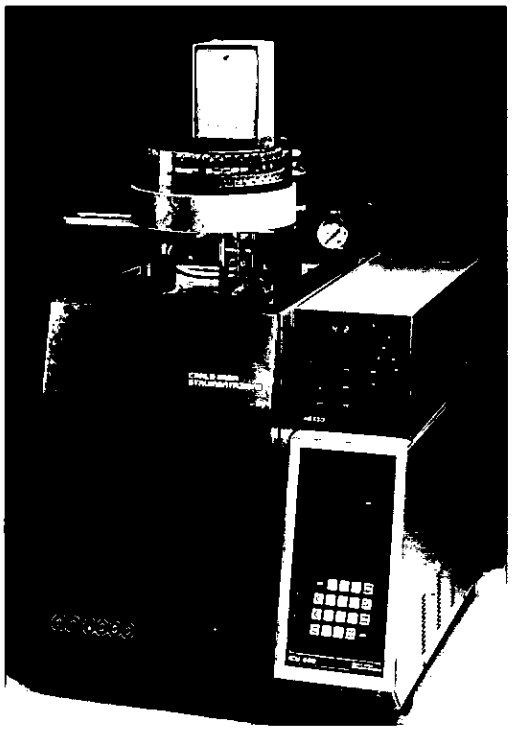
Sue Rutledge leaves the WRI in March to take up a position with the Industrial Processing Division of DSIR in Gracefield.

Wool Research Organisation of NZ

Margaret Leonard, a graduate in marine chemistry from the University of Otago has joined the Wet Processing group where she will be working on aspects aspects of the surface chemistry of the wool scouring process.

CARLO ERBA

LEADERS IN GAS CHROMATOGRAPHY



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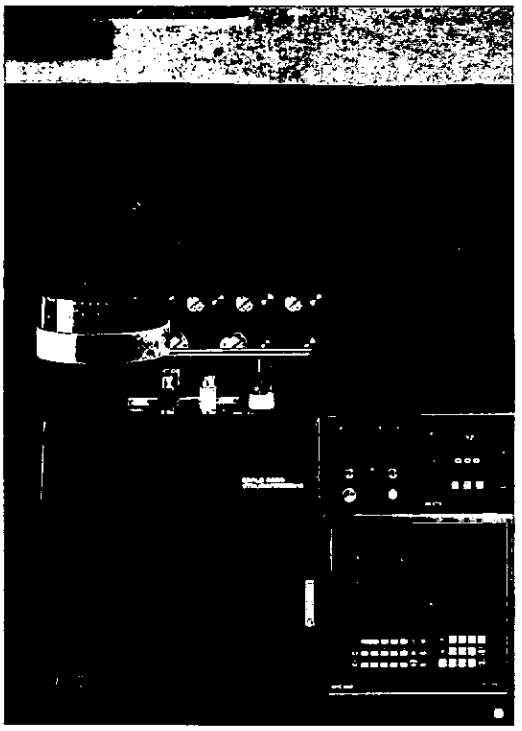

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For further information please circle no. 34 on reader reply card.

GAS CHROMATOGRAPHY AND ANCILLARY EQUIPMENT

A look at some of the current offerings in this area of instrumentation

Carlo Erba

Carlo Erba is the leading brand of gas chromatographs in Europe. Their innovative research and development has gained them a worldwide reputation as leaders in high resolution chromatography.

There are two GC's to choose from. The Vega Series for routine and the Mega for research.

The Vega is available as single capillary. either split/splitless or cold-on-column injection, and as single or dual packed versions.

The GC is controlled from the ICU600 controller with CRT screen for easy and convenient menu-driven programming using a minimum of keystrokes. Programmable external events control is standard and includes automatic control of splitter valves for Grob splitless injection. The Vega has the capacity to store up to eight complete analytical programs (with battery back-up) and with the two RS232 ports can be interfaced to a lab computer and connected with several other Vega's to form a complete communicating GC network.

A full range of easily interchangeable detectors and autosamplers as used on the Mega are available.

The Mega sets the standard in capillary GC for all others to follow. The large oven has been specifically designed for use with fused silica capillary columns (their low thermal mass requires an ultra stable thermally quiet oven) and is controlled to +0.05% of the actual temperature from 8°C above ambient to 420°C (up to 500°C in the High Temp. version).

The Mega is a dual column GC, with a variety of injector combinations available including packed, Grob split/splitless, septumless cold-on-column and cold split/splitless (P.T.V.).

The introduction by Carlo Erba in 1978 of the first commercially available cold-on-column injector represented a major breakthrough in injector design.

The injector is based on Grob's original design and is fitted with a patented secondary cooling system which, as well as ensuring complete sample transfer into the column, allows the use of injection temperatures higher than the solvent boiling point, therefore preventing the consequences of the flooding effect responsible for peak distortion.

High sensitivity and operational flexibility are features of all Carlo Erba detectors. For example the NP detector can be switched from N to P to NP mode and the carbon response can be adjusted to give a negatve peak to aid identification of nitrogen and phosphorous containing compounds. The electron capture detector can be operated in either constant current or constant frequency mode to allow the chromatographer to optimise the detector for particular applications. The E.C. detector can also be connected in series with other detectors such as F.I.D. to gain increased information from a single separation.

With the new technique of Super Critical Fluid Chromatography (S.F.C.) Carlo Erba have again established themselves as technology leaders.

The SFC3000 is a completely integrated S.F. chromatograph comprising a high pressure programmable syringe pump, time controlled S.F. injector, cold-on-column injector, high temperature programmable GC oven, controller and F.I.D. detector. An autosampler to operate on both the S.F.C. injector and the cold-on-column injector is available as an option. Complete computer control is a further option for pressure/density and temp. programming, autosampler operation and data handling.

The Carlo Erba solution with uncompromising chromatography is available through sole New Zealand agents, Alphatech Systems.

For further information please circle no. 20 on reader reply card.

The Trio-1 Benchtop GC-MS From VG Masslab Limited

This year at the Pittsburg Conference in New Orleans, VG Instruments — already the world's largest manufacturer of mass spectrometers — announce a further expansion of their product line with the introduction of the VG Trio-1 Benchtop GC-MS System.

Following in the footsteps of the Trio-2 and Trio-3 instruments launched in the US at Pitcon '86 and '87, this entirely new instrument marks the completion of the Trio family of fully automated quadrupole mass spectrometers for organic applications.

The VG Trio-1 is equipped with the same high performance quadrupole analyser as is used in the top-of-the-range instrumentation. VG's well-proven pre-filter ensures that the inherently high sensitivity is maintained over extended periods. For the first time on a benchtop GC-MS, full differential pumping is available giving quality results in the chemical ionisation mode.

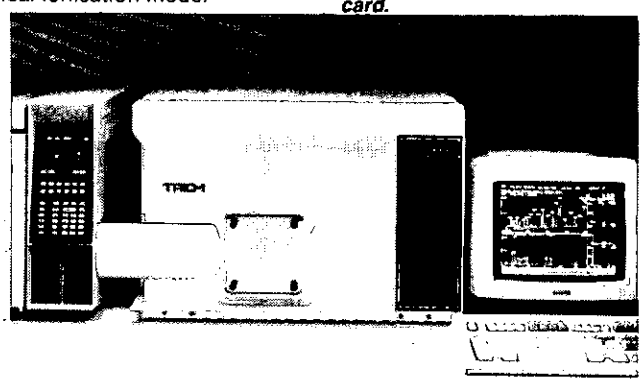
'Super-computer' technology, incorporating 32 bit RISC architecture processors operating at 10 MIPS, has been utilised to give the fastest data handling speeds yet achieved in GC-MS.

A new data system, LAB-BASE, has been developed for the Trio-1 by close co-operation between manufacturer and user, on both sides of the Atlantic. LAB-BASE incorporates a unique LEARN facility and an intelligent instrument control system, allowing total automation of all procedures including control of GC and MS peripherals.

Although small by previous GC-MS standards, the VG Trio-1 benchtop system offers no compromise in performance and has, in fact, many features not available on other larger, more costly instruments.

VG Instruments are represented in New Zealand by Advanced Analytical Ltd.

For further information please circle no. 19 on reader reply card.



Photovac Portable GC

Photovac make a range of portable gas chromatographs, based around the versatile photoionisation detector. The portability of these instruments, ease of use, and the high sensitivity of the detector make them ideal for a wide range of environmental measurements. Applications include the following:

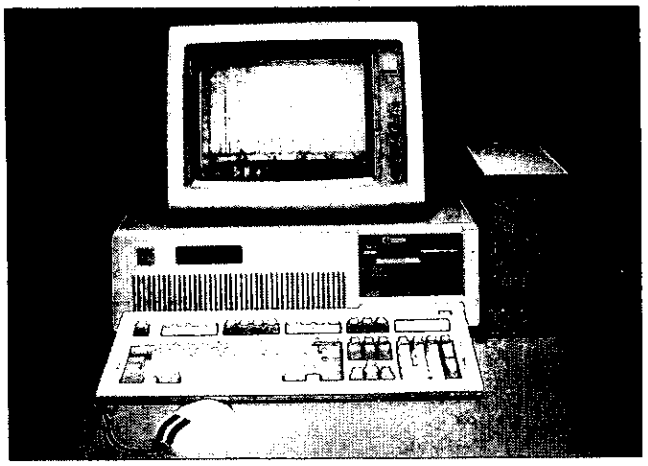
* Industrial solvents in air.
* Ethlylene oxide in air.
* Acrylonitrile in air.
* Arsine and phosphine.
* Ammonia in air.
* Sulphur gases.
* Chlorinated hydrocarbons in soil and water samples.
* Freon gases
* Aldehyde vapours.

Systems are available for packed or wide-bore capillary column operation. Sensitivity is typically over the range 0.1 to 10,000 ppm concentrations in air.

Photovac equipment is available in New Zealand through Alltech Associates.

For further information please circle no. 18 on reader reply card.

GC FEATURE



New Philips Analytical Chromatography Data Systems Bring Super-Fast Method Development And Analysis

The simplification of chromatography data handling has long been a key issue for the busy analytical laboratory. Another significant step forward is now provided in a new generation of Windows-based chromatography data systems announced by Philips Analytical.

The PU6000 integration system allows even the newcomer to tackle the complete procedure of data acquisition, integration and reporting with confidence. Complex sequences of key strokes are a thing of the past in a new, simplified and logical approach that guides the user through the software.

Operating in the IBM environment, the PU6000 bases its advanced capabilities on Windows technology, which offers the considerable benefits of multitasking and interactive data handling to the analyst. This means that it is now possible to collect data, develop a method and produce a report all at the same time.

The cause of high productivity is further supported by software and date capture hardware that can handle up to six asynchronous channels of chromatography, and because each channel is connected separately and independently, very high resolution data conversion is provided.

High resolution colour graphics are employed to view chromatograms in real time and post-run, with a white screen background that gives an extraordinarily clear display. Further refinements include a real-time scrolling display mode, enabling the user to see even his most complex chromatograms in fine detail.

By providing integration software operating in Windows, not only can a number of processes be running concurrently, but they can also be viewed on the screen at the same time. This gives the power of integration method development on a single screen. A parameter is input in one window and the user views the result in the other, assuring method development at truly impressive speed.

The system incorporates an extremely powerful and flexible calibration procedure, uniquely offering the choice of automatic or manual running with true bracketing of standards at single or multi-level concentrations.

Further, professional report writing at last becomes a reality, because the system interacts fully with other s/w like word processor and painting packages which are included with the PU6000 system. Interaction with spreadsheets like Lotus 1-2-3 and Supercalc permit the analyst to break out of the traditional confines of chromatography data handling, into the wider world of custom calculations and reports, pie charts and histogram presentation, as well as trend analysis through database software.

Philips Analytical envisages the PU6000 Series as a rapidly evolving family of sophisticated data handling packages for chromatography, designed to fully complement the established power of the PU4100 liquid and PU4550 gas chromatographs, and the uniquely flexible PU4021 diode array detector.

For further information please circle no. 14 on reader reply card.

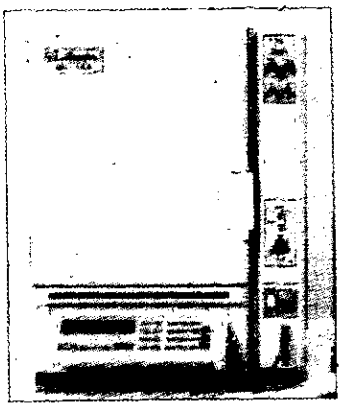
Shimadzu Gas Chromatographs

Shimadzu are the longest running manufacturer of G.C's in the Eastern Hemisphere, having produced their first model in 1956, and they have now produced more than 50,000 units. They currently offer a full range of models, starting with the GC8 series. The GC8's are of single detector design with either isothermal or single stage ramp temperature control and find a ready market for quality control, teaching and specific research projects.

The mainstay of the Shimadzu range is the GC14 which replaces the well known GC9 series. The GC14 series is designed for capillary use and features extremely accurate and reproducible temperature control — essential for repeatable retention times in capillary GC. Up to four cartridge style injectors can be mounted at a time for selective use, with independent temperature control for each. A choice of detectors is available with up to four being installed at one time.

Injectors, detectors and gas control modules can all be added to a basic system to increase its versatility at a later date.

Other features include heated couplings to interface to other instruments, control of a satellite oven for multi-dimensional GC, control of gas sampling, precut, back flushing valves, etc., and optional control by computer or master GC (GC16 series).



The GC15/16 series has all the features of the GC14's but is designed from the start as a dual flowline system. Programming is via menu-driven software displayed on a colour VDU. Other options include bar code readers, voice prompting, programming in basic, chromatogram storage and robot control.

In addition, a full range of integrators, auto samplers, head space analysers, etc., can be added to complete a system. Shimadzu Gas Chromatographs are available through their New Zealand agents, AWA New Zealand Limited.

For further information please circle no. 15 on reader reply card.

Baseline — The Best

Alphatech Systems announce the availability of the Waters Baseline 810 IBM-based chromatographic data station.

Baseline outperforms integrators and every other chromatographic software package anywhere near its price range, with unattended analysis, multitasking, sophisticated chromatogram graphics display, chromatogram archiving and batch reprocessing, automated methods development, and all the benefits of a general purpose microcomputer.

Baseline's powerful features are immensely practical, and equally suitable for HPLC or GC. Baseline's mouse-driven graphics interface makes sophisticated chromatogram operations surprisingly fast and easy to control.

Baseline's multitasking capabilities free your computer to perform other functions. Up to eight methods can be run in succession with up to 99 samples in each method. Chromatograms can be acquired and archived while other chromatograms are examined or analysed, or other software (word processing, database, etc) is running.

For further information please circle no. 16 on reader reply card.

FULL RANGE OF GAS CHROMATOGRAPHY INSTRUMENTS FROM PERKIN ELMER

Perkin Elmer's 8000 Series Gas Chromatographs have introduced a concept of chromotagraphic versatility, performance and ease of operation previously unavailable.

Column ovens have a front opening, sliding door providing a very compact design needing the minimum of bench space. Modular injector and detector systems allow unrestricted access to all components. A complete range of injector, detectors and accessory options allows almost any type of single or dual channel system to be configured.

All instruments are controlled from a simple keyboard and large visual display unit using 'soft key' user interaction. A powerful microprocessor not only looks after control of all chromatography parameters, but can also allow you to display the chromatogram on the screen and perform all the necessary data handling you require including reintegration.

Unique to the 8000 series is Automated Bleed Compensation (ABC) which allows the

GC FEATURE

user to compensate for bleed profiles obtained in temperature programmed runs.

The 8000 series consists of four separate models of instruments with full detector and injector options within each model group.

Model 8410

A range of routine single detector instruments giving exceptional precision, reliability and ease of use for packed column or 0.53 mm i.d. capillary chromatography. Within this model group are instruments designed for teaching purposes with a very low price tag to match.

Model 8420

Instruments dedicated to capillary chromatography with columns of 0.32 mm i.d. and smaller. These instruments represent the most cost effective systems available from Perkin Elmer using any of the range of specialised capillary injection systems. Optimised capillary pneumatics give direct screen readout of column head pressures.

Model 8500

Dual column oven size allows this model of instrument to be configured for single or dual injector and/or detector operation. Extensive ranges of all possible detector types are available and packed, capillary or combined injector systems can be simultaneously installed.

Automated Bleed Compensation is provided for both detector signals (if dual detectors are fitted) and a single channel optional on-board data handling system can switch between the two detector signals.

A wide range of pneumatics modules allows optimum control of carrier and detector gases. Specialised capillary column pneumatics provide exceptional ease of adjustment and resettability of column head pressure.

Model 8700

Perkin Elmer have recently released the model 8700 Gas Chromatograph, the latest and most powerful addition to the successful 8000 series GC's.

The new instrument maintains and extends the concept of interchangeable chromatographic hardware throughout the range but adds major new features in terms of data handling, graphics, computer communications and multidimensional chromatography.

Some of these features include simultaneous dual detector operation with integral dual channel graphics and data handling in full colour. In providing facilities for the enhanced data handling/graphics, the opportunity has also been taken to update the electronics design of the system. This redesign has provided major benefits in cost and reliability of the system.

Two new detectors are available with the 8700 model — the photo-ionisation detector (PID) and Hall detector. Dedicated and standard computer communications allow GC methods, reports, raw data and integrated data to be sent to the instrument and methods and integrated data to be received from an IBM PC or compatible.

Major developments in automation software coupled with the release of new accessories provide multidimensional options for backflushing, heart-cutting and capillary cryo-focussing.

The dual channel real time or post-run graphics allows either split screen or overlay of chromatograms giving full compare routines utilising internally acquired or externally stored data.

Further details on Perkin Elmer instruments for gas chromatography can be obtained from Sci-Med, exclusive distributors in New Zealand for Perkin.Elmer.

For further information please circle no. 5 on reader reply card.

Autosampler Vials

Alltech New Zealand announce their appointment as sole New Zealand distributors for Chromacol Ltd. of London, suppliers of glass vials, caps, plugs and seals for use with most autosamplers currently in use. Extensive stocks are now carried at Alltech's Auckland warehouse, and a fully descriptive catalogue and New Zealand price list are available on request.

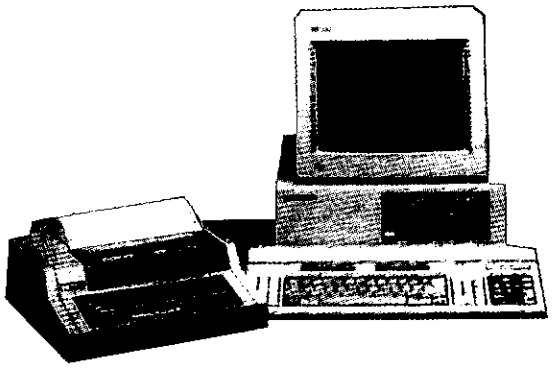
Of especial interest is the new vial design developed by Chromacol, with close co-operation with BSW Perkin-Elmer, of a 1.1ml tapered vial — a version of the industry standard 2ml (32 x 12mm) vial, and comes with either crimp or screw cap. This vial means that one vial size will cope with a wider range of work than ever before, and good constant precision between 1-50ul, plus being able to take 1ul from 15ul.

Chromacol co-operate with many instrument manufacturers, world wide, to help chromatographers get better results. Now, their complete range is available in New Zealand, only from Alltech.

GC FEATURE

Two New Low-Cost Integrators from Hewlett-Packard

Hewlett Packard introduced the world to electronic integration in 1968 and since then well over 50,000 HP integrators have been installed, and in each succeeding generation, performance has continued to outpace price. For example the introduction of the HP3390 series integrators in 1980 revolutionised the industry by making stand-alone integrators a powerful, cost-effective tool for all analytical laboratories. The new HP3394A and HP3396A continue in this strong tradition of excellence to establish themselves as the next industry standard.



Reliable and easy to use — the HP3394A Integrator — the economical choice

HP shatters the price barrier with an integrator designed to obsolete strip chart recorders. A strip chart recorder provides you with a chromatographic plot, nothing more. The HP3394A not only provides you with a full-scale plot, it also integrates the area and calculates the amount. Furthermore you have the advantage of an annotated report complete with retention times, time and date, a printout of parameters, and storage of up to nine methods.

The automatic start/stop feature means you'll never have to deal with mounds of wasted paper that collect after your analysis is finished. Another important feature of the HP3394A is "auto zero" at the start of the run, which helps control wandering baselines. If power fails, no problem. The HP3394A is equipped with 100% memory back-up to protect your data and methods.

Operational Simplicity

Each keystroke is automatically checked, and if an inappropriate keystroke is made, the integrator alerts you so that you can easily make a correction. A built-in sample chromatogram and self-test capability are additional features to ensure that the HP3394A is ready for analysis.

Weighing less than 10 pounds the HP3394A is both portable and flexible. Like a recorder, the integrator can easily be interfaced to virtually any GC/LC/IC or other chromatographic instrument.

Reproducibility You Can Count On

The HP3394A performs all standard chromatographic calculations you would expect:
— area percent
— normalisation
— external standard
— internal standard

And all calculations can be based on either peak area or heights. Its precision provides you with reproducible integration results and minimises operator bias and error common to manual calculations.

Integrator timed events give you control of peak integration to match your analytical procedures. Just specify the event, when you want to occur, then forget it. The HP3394A does the rest. By time programming attenuation, for example, very large and very small peaks are kept on scale during each run!

Built-in Permanent Ink-Printing — With No Mess

The technology of the popular HP Thinkjet Printer has been enhanced for the HP3394A to provide permanent plots that won't fade with time. Unlike plots done on thermal paper, Thinkjet printing eliminates the need to spend the time and money photocopying data for archival purposes. This is particularly important in laboratories subject to external and internal audits.

With inkjet printing the printhead never touches the paper. This printing technology is both quiet, and smear proof. It eliminates the possibility of smearing, a frequent problem with strip chart recorders.

HP3396A "The Integrator" — All The Capability You Need In One Easy-to-use Package

With the new HP3396A, "The Integrated Integrator", you get a level of capability and performance at a price that's unmatched in the industry. Most other integrators are anything but integrated; they require the addition of a multitude of expensive options to meet full data handling needs. Like a basic car that appears to be low-priced on the surface, other integrators end up being outrageously expensive when the "essential" options are tallied.

The HP3396A, on the other hand, provides you with a complete, integrated solution. It's an accumulation of the experience and technology we have gained during our 20 years in the business. That's why we call it "The Integrator" — all the capability you need at one low price!

With "The Integrator" Low Cost and High Performance Are An Integrated Part of Its Design And Manufacture

The use of CAD (computer-aided design) and CIM (computer integrated manufacturing) systems have allowed us to improve the reliability of the HP3396A by placing all of the electronics on one board. In fact, the overall parts count has been dramatically reduced from its predecessor, the HP3393A. Fewer parts and reduced labour — a savings we passed on to you.

All functions are clearly marked and can be accessed with simple, intuitive keystrokes. Unlike commonly used membrane keyboards, the HP3396A has raised keys with positive contact; in other words, there's feedback to the touch. The single piece of the keyboard construction is not only economical; it also prevents dust and spills from damaging the electronics.

Powerful HP Instrument Network (INET)

The HP3396A is a powerful integrator by any standard, but when you combine it with the HP5890 gas chromatograph, the HP7673A automatic sampler, or the HP1090L liquid chromatograph you'll benefit from a system designed to perform together. The INET communications link allows you to store, retrieve, and change GC/LC setpoints, change sample parameters and store all instrument setpoints in any number of methods.

The HP 3396A may also be used as a controller for the HP7673A barcode accessory. With the powerful INET control feature of the HP3396A, you can take full advantage of the totally automatic capability inherent in a complete HP chromatographic system — yet still maintain the flexibility to use the individual components separately.

Optional Basic Programming Designed For Chemists — Not Programmers

Not all integrator users have a need for extended calculations, but if you do, the HP3396A is available with BASIC programming that's powerful, easy-to-use and fast — about 10 times faster than the most commonly used BASIC interpreters. This means much faster calculations and a higher level of productivity for your lab.

When you select BASIC for the HP3396A, you can perform special post-run calculations, reformat the standard report and do time-of-day programming.

The convenient autocall BASIC feature allows programs to run automatically at the end of each analysis. You can easily modify the setpoints of the INET gas chromatograph and automatic sampler on a run-by-run basis. Program development is greatly simplified by the alphanumeric keyboard and easy-to-understand keywords. Simulated Distillation, including high temperature, Natural Gas Analysis, and PIANO are just a few of the applications available on the HP3396A.

Data From Your GC and LC Results To Your PC

Do you have a PC in your lab? If so, the HP3396A has a communications package available which allows the integrator to be linked to an MS-DOS PC for convenient storage of integrator results and processing by PC application software.

Use your integrator results with spreadsheet programs such as Lotus 1 2 3. Numeric and text data are easily imported into the spreadsheet without additional typing effort. You can combine your results with word processing software for unlimited customisation possibilities. Use of PC disc drive for storage and retrieval of all file types saves the expense of a separate drive for your integrator.

For further information please circle no. 13 on reader reply card.

Chemical Safety : PRODUCTS AND SERVICES

SAFETY SIGNING SYSTEMS FROM DENEEFE

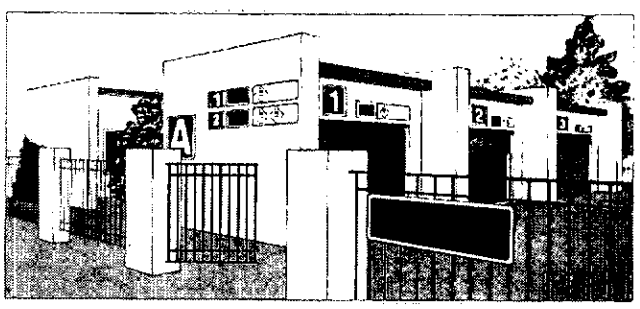
There are a variety of safety labelling systems now in use for the identification of hazardous materials. The following are amongst the more common systems currently in use in this country.

IMCO System

This system, recommended by the Inter-Governmental Maritime Consultative Organisation consists of the familiar coloured diamonds marked with an appropriate warning symbol (e.g. skull and crossbones: poison). The number of Dangerous Goods class is also usually included. Such labelling is specified in the New Zealand Dangerous Goods (Labelling) Regulations, and the Code of Practice for the Transport of Hazardous Substances on Land: NZS 5433; 1983.

HAZCHEM System

The HAZCHEM labelling system was first introduced by the London Fire Brigade. It is intended to provide initial information to deal with chemical incidents such as fires and spillages. Very simply the HAZCHEM code for individual chemicals can consist of up to three characters: a number from 1 to 4 which indicates the fire fighting medium to be used; a letter indicating the level of personal protection, risk of violent reaction or explosion, and spillage action; and the letter E which is added to indicate the possible requirement for evacuation of an area.



Use of HAZCHEM labelling in New Zealand is strongly recommended by the NZ Chemical Industry Council, and included in a Code of Practice produced by that organisation.

HMIS Identification System

The Hazardous Materials Identification System is an in-plant labelling system developed by the US National Paint and Coatings Association in conjunction with the Canadian Paint Manufacturers. The system uses a simple combination of colours, numbers and pictures to indicate the degree of hazard and necessary precautions required, for the handling of any material. Health, flammability and reactivity hazards are indicated by a number between 0 and 4 for the lowest to highest level of hazards, respectively. Personal protection requirements are indicated by a letter, from A to K, with the former indicating eye protection only, and the latter a supplied air respirator, full-body suit, gloves, and boots. The letter X is used to indicate the need for more specialised handling requirements.

Signing Systems

Signs and labels for any of the above systems are available from DeNeefe Signing Systems, Manukau City, Auckland. Made from rigid PVC or self-adhesive vinyl, the signs are available in a wide range of sizes and manufactured to a high level of quality. All signs and labels comply with the appropriate specifications or regulations.

For further information please circle no. 46 on reader reply card.

New Safety Labelling System

Those who work in the chemical industry and laboratories may benefit from a safety system developed by an Auckland-based pharmaceuticals and cosmetics manufacturing company which recently received a Designmark for its invention.

The ChemCare Material Safety Handling System was designed by StevensChem Industries of Pakuranga originally for its own use, but its inventor, Mr Graham Potter, recognised wider applications in industry.

Mr Potter, who is Special Projects and Training Officer for the company, identified a weak link in the safety chain where the handling of chemicals and toxic substances was concerned. "There are safety systems which apply to the delivery and transportation of dangerous substances, and the Fire Department has its own system it uses to identify chemicals involved in fires and toxic spills, but there are no standard safety procedures governing the handling of chemicals in plant," he said.

The ChemCare system is based on the use of a series of coloured labels to identify the relative dangers of different chemicals. Two highly visual charts denote the safety equipment and clothing to be used when handling chemicals in the various categories dictated by the labels.

"Each time a toxic substance is transferred from one container to another, the specified label must be applied to the new container and the appropriate safety equipment used in the transference," Mr Potter said. "We have noticed a high level of interest in the system in our own plant as employees realise this has been developed for their own welfare.

"In fact staff commitment to using the system has been near on universal and we have noticed a marked reduction in the amount of supervision they require when handling dangerous substances. This has meant a real saving in management time with the staff operating the system effectively."

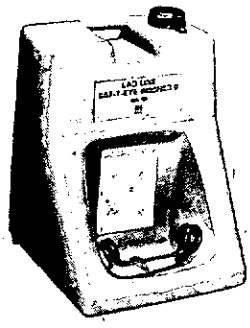
For further information please circle no. 47 on reader reply card.

Lab-Line Saf-T Eye Washer

The Lab-Line Saf-T Eye Washer II 16 gallon (60.5 liter) water reservoir will wash both eyes and face simultaneously for over 15 minutes (ordinary tap water can be used, but distilled water is preferred).

Only one hand is necessary to operate this unit — no handles or bars to push up or down to start water flow. With no hoses to hold, the worker's hands remain free to hold his/her eyelids open so water can reach and cleanse out impurities. A uniform, gentle, room temperature flow of water will prevent shock to the eyes. Due to its weight when filled, it cannot be accidentally knocked down when setting into operation.

A specially designed lock cap protects the water reservoir and prevents vandalism or contamination. The Saf-T Eye Washer



II is constructed of weather-resistant high impact visible green polyethylene. Water can be stored for over 2 years in polythylene chambers with no bacterial growth or change in odor. This unit can be hung on pillars, walls, etc. or be set up on any counter or lab bench. It comes complete with hanging bracket so it can be adapted to any situation. The Lab-Line Saf-T Eye Washer II is where you need it when you need it.

For further information please circle no. 48 on reader reply card.

Saf-T-Manager* Software From J T Baker

Saf-T-Manager* is a software system designed for us with IBM compatible PC's, and covers all the necessary aspects required for safe handling of chemicals.

The software system includes over 1,500 J.T.Baker Material Safety Data Sheets (MSDS) for ready access by your employees. Software system features include:

* MSDS's: Store retrieve, and print over 1,500 J.T.Baker Material Safety Data Sheets.
* Right-to-know Documentation: Document employee requests for MSDS information with hard copy receipts. Archive request information for reporting purposes.
* Chemical Emergency Response: Quickly identify spill response procedures, health hazards, and recommended protective clothing and equipment.
* Chemical Inventory: Maintain chemical inventory by location within your facility.

Continued next page

SAFETY PRODUCTS

Cont. from previous page

* Lab Checklist: Develop laboratory safety checklists and document results of periodic inspections.
* Training Tracker: Develop laboratory safety checklists and document results of periodic inspections.
* Emergency Services: Quickly access telephone number and location of key emergency service contacts.
* Customization: Add additional MSDS's and other site specific information.

For further information please circle no. 9 on reader reply card.

Formaldehyde Monitors

A complete line of formaldehyde in air monitoring instruments is announced by Interscan Corporation.

Using a recently developed high-performance electrochemical voltammetric sensor, reliable detection of formaldehyde at levels from 0,05 ppm to 10 ppm — and higher — can be accomplished readily, it is claimed. The new formaldehyde analyzers are available in both the company's popular portable, battery operated and line-powered (fixed system) configurations.

All of the instruments are provided with a direct meter readout in ppm, integral sampling pump, and can be equipped with adjustable alarms, the manufacturer stated.

Calibration of the units is said to be straightforward, using either permeation tubes or Interscan's Electronic Calibration Service.

Interferences with the formaldehyde measurement by other gases are minimal, with full details available for disclosure prior to instrument selection.

Interscan also manufactures a complete line of gas detection instrumentation, for a wide range of applications. The new formaldehyde analyzers and other Interscan products, are available in New Zealand through Associated Process Controls Ltd, PO Box 13-492, Onehunga, Auckland 6, Interscan Corporation's Sole NZ Agents.

For further information please circle no. 10 on reader reply card.

International Safety Rating System

The International Safety Rating System is a product of the International Loss Control Institute of Atalanta, Georgia, United States of America. The system was devised to consistently measure the effectiveness of safety programmes. It is used in excess of thirty countries throughout the world. The **Accident Compensation Corporation** is the licensee in New Zealand for the comprehensive programme.

The purpose of the programme is to critically analyse systems that can determine loss or the potential for loss whether by injury to people or damage to equipment, materials or the environment. Peter Drucker states, "The first duty of business is to survive and the guiding principal of business economics is not maximization of profit — it is the avoidance of loss". Similarly, Louis Allen declared, "Minimizing loss is as much improvement as maximization of profit."

The programme provides a consistent measurement of performance aimed to eliminate administrative oversights. Most managers unfortunately do not include as one of their main objectives the prevention of loss. The system is a means of eliminating imperfect performance that could lead to accidental loss. In the past we have aimed our energies at post-event loss, which means only taking action after a loss has occured, and then measuring failures.

We aim to identify deficiencies in the "systems" in place so that the gaps can be eliminated. We also check that those "Systems" in place and "rules" are working and being enforced. No system method or rule is of any use in itself. It must be complied with and if necessary enforced to ensure that accidental loss of any sort does not occur.

The main objective is to determine the loss control effectiveness of a company's safety programme. We aim to:-
1) Carry out a systematic critical evaluation of all elements of the safety programme.
2) Analyse and critically apraise the company's efforts to identify, evaluate and control, potential accidental loss.
3) Critically evaluate the level of compliance with occupational health and safety legislation and the rules established by the company.

Any company that accepts this challenge will as a result provide the best utilization of manpower and property.

Many companies who have embarked on this programme have not only derived benefits from reduced losses but also obtained side benefits in personnel development, better communication, efficiency and energy conservation. The system has a value beyond the initial expectation.

For further information please circle no. 11 on reader reply card.

Laboratory Spill Control Centres

When a chemical is spilled, laboratory staff must decide immediately what clean-up procedure to use. Many laboratories do not have a "Standard Procedure", for controlling hazardous chemical spills.

Because of the need for fast action and the lack of necessary materials and instructions, the person involved may resort to "Home Remedies", which could be ineffective and could actually increase the hazard.

The Laboratory Spill Control Center, provides the user with proprietary chemicals that have been test proven to be effective in treating hazardous spills. With the center, spills are properly treated by simply opening one or more designated packages of neutralizing agents and pouring directly onto the spill.

Once treated, a spill should be cleaned up rapidly and completely. Each kit includes all materials for the efficient clean-up of the neutralized spill.

All kits are complete with leak proof disposal bags, bag ties and spill waste labels for collection of the entire neutralized spill.

For further information please circle no. 12 on reader reply card.

PRODUCT NEWS

Valuable Time Lost Washing Laboratory Glass?

Gallay Lab 901 laboratory glassware washing machines are designed specifically for the laboratory. All parts in contact with water are constructed in stainless steel and the patented spray-head gives superlative results. the basic programme cycle of the Lab 901 comprises cold pre-wash, wash at selected temperature, two cold rinses and final rinse at selected temperature.

Push-button control will extend the cycle to include hot water fill, hot water pre-wash, continuous flushing on pre-wash, extended wash, two additional rinses (making five in all) distilled/de-ionised rinses and hot air drying. Ancillary equipment includes a full range of baskets that satisfy most laboratory requirements, and specialist accessories for pipette or volumetric flask washing are also available.

All that is needed is water and electricity supply — there are no hidden extras.

Gallay washes are available from Kempthorne Medical Supplies Ltd, PO Box 1234, Auckland, Phone 781-160, Freephone 370-426.

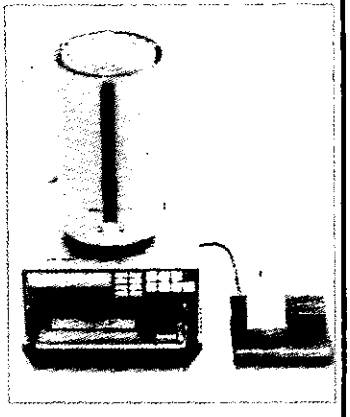
For further information please circle no. 6 on reader reply card.

New Fully Automatic Moisture Determination from Sartorius

The "MA 50 Moisture Analyser", "the latest instrument hot off the production line at Sartorius, is designed for both moisture analysis in the laboratory and for quality control in the industrial laboratory or directly next to the production line. Parameters and settings for running up to 10 programs can be entered and stored for a variety of samples. These basic settings can be protected by a password from unauthorised access or accidental changes. The MA 50's built-in printer automatically and reliably records the entire analytical sequence. For traceability, it is possible to obtain a second set of complete hard copy printouts of the last 20 analyses. Since the MA 50 analyses moisture content with the precision of an analytical balance, small sample quantities merely weighing fractions of a single gram — as little as 200 mg — are all it takes for this unit to provide highly accurate moisture readings.

Its 0.1mg accuracy now makes it possible for the first time to reproducibly and quickly determine minimum moisture levels of 0.1% or even less, for instance, in plastic granules, foil or wrap. This also applies to a few tenths of a percent of solids present in a liquid.

As far as time requirements are concerned, the MA drastically cuts them down to a few minutes instead of a few hours necessary for a drying oven or the good 10 minutes conventional analysers take. And whoever is in a real hurry can use the automatic feature for ultrafast trend analysis to obtain the computed trend results well before the end of a dryng routine.



For further information please circle no. 7 on reader reply card.

Major Advance in Filtration Technology

Anopore™ inorganic membranes are now available from Alltech New Zealand.

The key to this exception filtration media is the unique capillary pore structure.

Anopore™ inorganic membranes exhibit high porosity and exceptional permeability, resulting in virtually complete elimination of particles larger than the rated pore size. The ultrathin membranes allow higher through-put than conventional organic membranes.

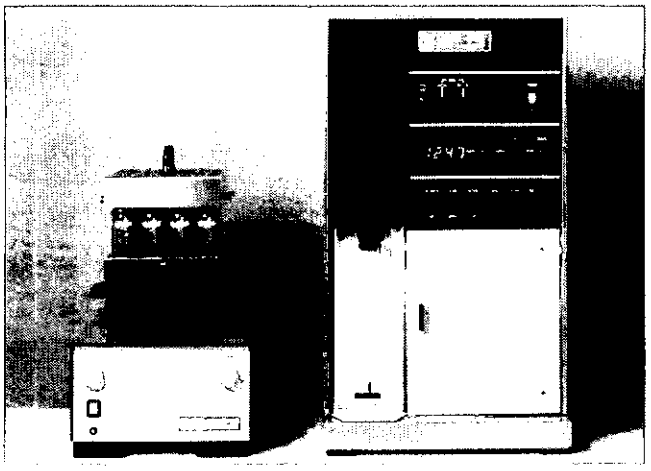
The Anopore™ inorganic membranes are currently available in two pore sizes: 0.2 microns and 0.02 microns and are ideally suited for use in HPLC systems. Extended column life, reduced pump wear and improved analytical results could be expected.

Anotop™ syringe filters are also available in 10mm and 25mm sizes for 0.2 and 0.02 micron applications.

Alltech has published a brochure with details on this new range, explaining their unique structure, chemical compatibility, and the general benefits of using Anopore™ filters in HPLC systems — Anotop™ syringe filters are also featured.

For further information please circle no. 8 on reader reply card.

PRODUCT NEWS



Improved Distilling Unit For Kjeldahl Analysis

The Kjeltec Auto 1030 Analyzer from Tecator of Sweden is now equipped with a new type of steam generator. It can be fed with either distilled/deionized or tap water by a built-in pump. The water level is automatically controlled in the patent pending steam generator, which heats up and is ready to use in a couple of minutes.

The Analyzer performs automatic distillation, titration and calculation of the result in 2 - 3 minutes. A delay function is integrated in the programme of the microprocessor, to facilitate nitrate analysis when using Devarda's alloy.

For further information please circle no. 1 on reader reply card.

Automatic System From Tecator For Water Analysis

Tecator introduces a completely new analysis system for routine water analysis.

The system, called Aquatec, comprises a sampler that feeds in the samples: an analyzer in which the sample and reagent are mixed, allowed to react, and measured: and a controller that registers the samples, calculates the results in the desired units of concentration, and prints them out on a built-in printer/plotter. The controller can also store several calibration curves in the memory.

The Aquatec system is based on the well-known Flow Injection Analysis (FIA) technique. Aquatec has been designed to analyse ammonium, nitrites, nitrates, and phosphates. It is possible to switch rapidly from one kind of analysis to another by simply exchanging the method cassette in the analyzer. There is also a special cassette that transforms Aquatec into a spectrophotometer that can be used conventionally for analyzing other kinds of ions.

The new system carries out analyses in accordance with standardized methods. The detector's sensitivity extends down to ppb levels. The rate of analysis is 30 to 40 seconds per sample, and the sample carousel holds either 40 or 100 samples.

For further information please circle no. 2 on reader reply card.

Explosion Protection Covering a Range from the Laboratory to the Factory Series

The West German company, Sartorius GmbH, has substantially expanded its line of explosion-proof precision balances and scales to include high-capacity Factory series models. These scales for hazardous locations give the user access to a number of totally new industrial applications. Their specifications are as follows:
model F 150 S XD2: 151-Kg capacity; readable to 1 g, and
model F 300 S XD2: 303-Kg capacity; readable to 20 g.

On the outside alone, these third generation explosion-proof scales cannot be distinguished from standard industrial scales. All requirements for explosion protection are met inside the scales by the intrinsically safe electronic circuitry. Now the user no longer has to do without the convenience and high accuracy of electronic precision scales when he works with explosive media. IP 65 protection against dust and wash-down environments including reliable overload protection are also part of the safety features of these scales.

Both models can be supplied with a raised display on request.

Sartorius scales are sold and serviced in New Zealand by the Wilton Instruments Division of Salmond Smith Biolab Ltd.

For further information please circle no. 3 on reader reply card.

Struers Release New Computer-Based Expert Systems for Materialographers

An expert system is a computer-disk, which by means of questions from the computer and the replies of the operator leads to a suggestion for a solution or an explanation to a certain problem. In reality, it means systematising the logic which any specialist is using when he/she is evaluating a situation or a case. Expert systems are known already, e.g. within medical science.

In the field of materialography there are also many possibilities of utilising the idea. Struers A/S is now marketing the first three programs for metallographers in English: Frac-X-pert, Wear-X-pert and Exam-X-pert, all on PC disc.

Quality control laboratories and damage analysis laboratories can use the X-pert systems to systematise evaluation and reporting. They can also use them to train new staff members.

Technical schools and universities can use the X-pert systems to give students more firm and objective (logic) teaching in a shorter time.

Frac-X-pert is an expert program from analysis of fracture and it has a menu which comprises types of fracture, causes of fracture and methods of examination, which can or should be used for fracture analysis.

Wear-X-pert is built-up as above but it is used to find types of wear and possible solutions to avoid problems.

Exam-X-pert is a combination of Frac- and Wear-X-pert. The diagnosing considers both wear and fracture conditions, and has special information concerning corrosion.

For further information please circle no. 17 on reader reply card.

Thermal Analysis Equipment from AWA

AWA are pleased to announce their appointment as the New Zealand representatives of Polymer Laboratories. Polymer are well known for their development of the dynamic mechanical thermal analyser and dielectric thermal analysers. These instruments are particularly useful for quantifying the mechanical properties of laminates such as sampling and flexing movements, curing properties of composite, compatibilities of polymer blends etc.

The DMTA is fully software-controlled with a choice of head in the temperature ranges — 150 to 300 degrees celcius, with ambient to 500 or 800 degrees celcius, as options. Heating rates ae from 0.1 degrees celcius/min to 20 degrees celcius/min. The mechanical frequencies available are in the range from 0.1 to 200Hz.

The DETA extends the range of frequencies available from of frequencies available from 20Hz to 100kHz with a maximum temperature range of -150 to 300 degrees celcius.

For further information please circle no. 4 on reader reply card.

RELOCATIONS

Readers should note the following changes of address.

Associated Process Controls Ltd

From Monday 7 March 1988 our new address is:
Unit 4/18 Clark Street New Lynn Auckland
PO Box 13-492 Onehunga Auckland 6
Telephone: Auckland (09) 876-001 Telex: NZ 63523 APC Ltd
Fax: Auckland (09) 877-897

Kempthorne Medical Supplies Limited

New Zealand's largest single supplier of Medical, Scientific and Pharmaceutical products is making a move. A move designed to provide you with an unbeatable level of service, supplying world renowned quality products.

Consider what our shift will mean to you:

* The very latest in communication technology giving superb access to K.M.S. for information and ordering — 22 phone lines, toll free line, facsimile, telex.
* One centralised warehouse designed for the most efficient stock handling, resulting in faster, more accurate order delivery.
* Powerful computer systems allow improved stock and information control to maximise ex stock availability of your critical needs.
* Close to major arterial routes to deliver products with utmost speed and efficiency.

We take this opportunity to advise our new location details. The 'Smart Move' occurred, February 1988.

PO Box 1234, Auckland 318 Richmond Road, Grey Lynn, Auckland Telephone: Auckland 781-160 Outside Auckland Freephone (09)370-426 Telex: NZ2958, Facsimile:(09)781-158

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(New-Nylon Membranes, Disposable Filtration Units — Vacuflo)

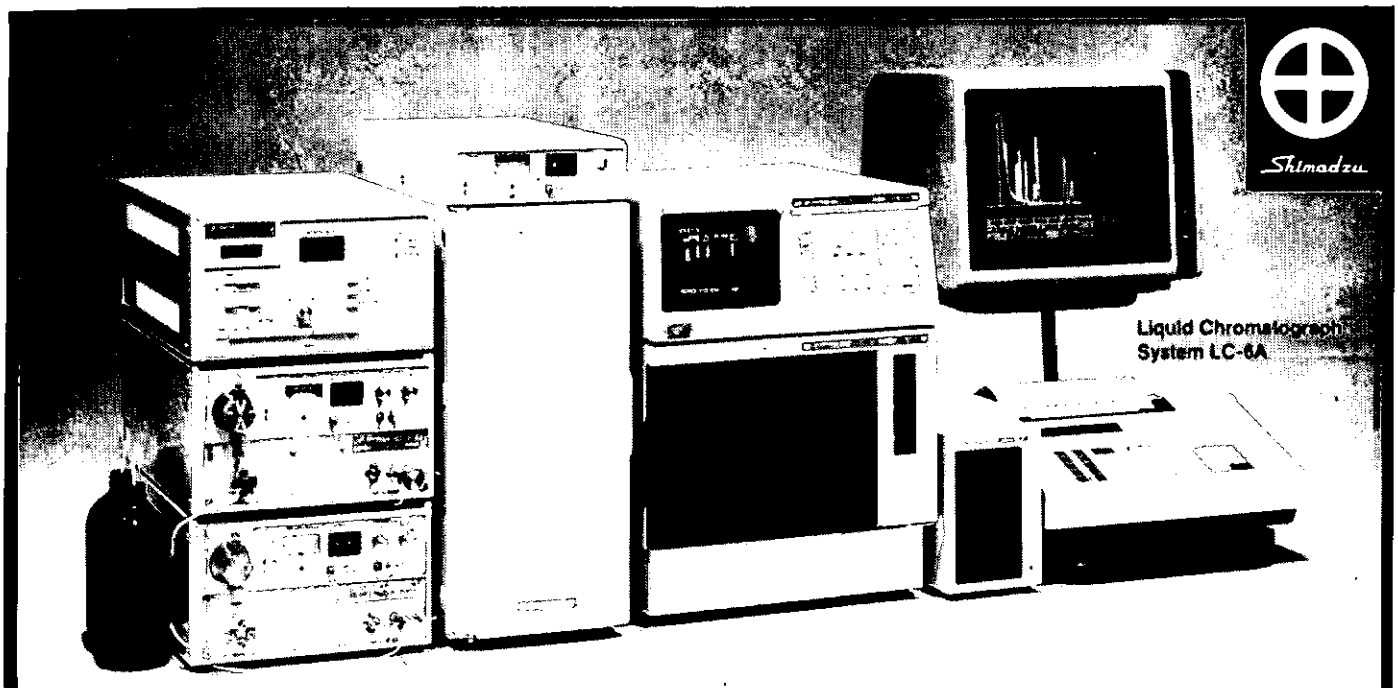
FOR FURTHER INFORMATION CONTACT NEW ZEALAND DISTRIBUTORS:-

BEHRING DIAGNOSTICS SECTION

C/o- Hoechst New Zealand Limited,
21-39 Jellicoe Road,
Panmure, Auckland 6.

P.O. Box 67, Auckland 1.
Phone (09) 578-068
Telex 2338.

For further information please circle no. 13 on reader reply card.



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Shimadzu has been a top manufacturer of analytical and measuring instruments since 1875. Advanced technologies in electronics, biotechnology and other fields are incorporated into the development of new products and applications technologies from a world-wide viewpoint.

AWA with twelve years experience marketing Shimadzu x-ray equipment are now proud to bring you the Shimadzu range of Scientific Instruments.

MAIN PRODUCT LINES —
ANALYTICAL & MEASURING INSTRUMENTS

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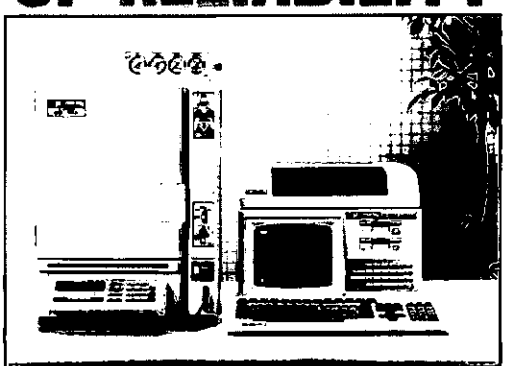
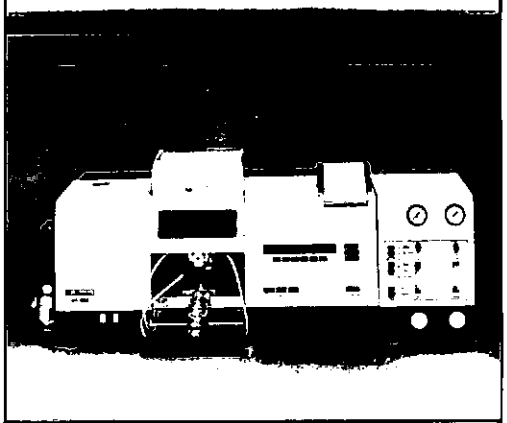
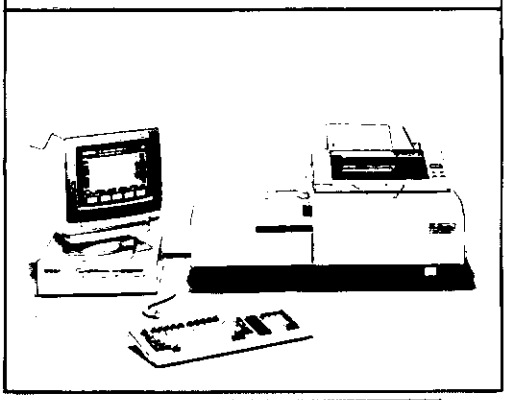
- Electromagnetic Analytical Apparatus
- Chromatographs
- Thermal Analysis Instruments
- Environmental Pollution Analyzers
- Balances and Balance Appliances
- Powder and Particle Property Analyzers
- Magnetometers
- Biotechnology Instruments
- Other Analytical and Measuring Instruments







AWA SCIENTIFIC & MEDICAL
A DIVISION OF AWA NEW ZEALAND LIMITED

Auckland Box 1363 Ph: 760-129
Wellington Box 830 Ph: 851-279
Christchurch Box 32-054 Ph: 890-449
Dunedin Box 5070 Ph: 777-485

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..... Phone No.....

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36 37 38 39 40 41 42 43 44 45 46 47 48 49 50

R = Rep To Call

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Classification Data

Indicate total employed:

☐ Under 20 ☐ 20-49 ☐ 50-99

☐ 100-199 ☐ 200-499 ☐ 500 +

What is your organisation's principal activity:

.....

What is your principal classification?

- ☐ MANUFACTURER
- ☐ SUPPLIER CHEMICALS
- ☐ SUPPLIER INSTRUMENTS
- ☐ SUPPLIER LAB. EQUIPMENT
- ☐ RESEARCH
- ☐ OTHER

SPECIFY

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