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IN NEW ZEALAND

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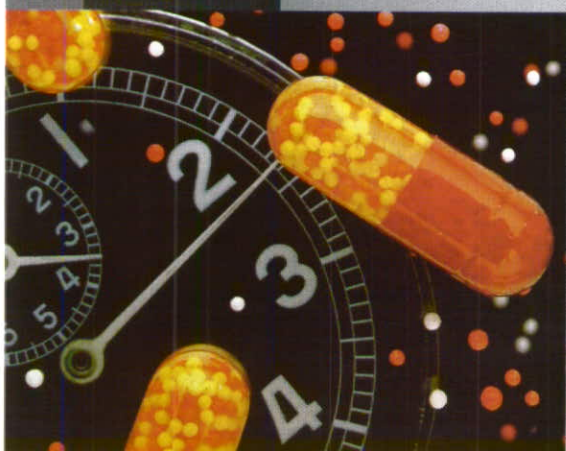
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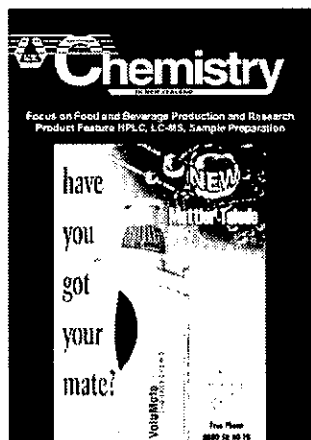
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## UP FRONT ...

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For further information see the cover story item on page 2



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## COMING UP ...

July 1999 - Timber, Forestry, Pulp & Paper  
Physical Testing, AAS, ICP-OES, ICP-MS

September 1999 - Dairy Industry Production and  
Research UV, VIS, NIR Spectroscopy, Microscopy

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<ul style="list-style-type: none"><li>• Calibration service.</li></ul>	<ul style="list-style-type: none"><li>• Medic Watson Victor has the tools and expertise to provide a repair/maintenance calibration service to our customers.</li></ul>
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# NZ SCIENCE SCENE

## INTERMED AND LABSUPPLY MERGE

Intermed Scientific and Labsupply Pierce (NZ) Ltd have merged to form the biggest New Zealand-owned company in the country's laboratory-based scientific industry. The new entity is called Global Science & Technology Ltd and will be known as Global Science.

Both Intermed Scientific and Labsupply Pierce were well established in New Zealand and were in operation for around 15 years. They have merged to gain an extended reach into every laboratory sector in anticipation of changing market needs in the face of the new millennium.

Key players remain the same. Former Intermed Scientific Managing Director, Paul Balchin will head the diagnostic and microbiology business unit and also head manufacturing operations. Former Labsupply Managing Director, Frank Spurway will head instrumentation (including microscopy) and life sciences. John Clark will be responsible for the laboratory products business unit, and Grant Kentell will be National Business Manager.

The integration is expected to be relatively seamless for customers. Expected benefits of the merger include an expanded and improved product range, reduced delivery times and higher service levels.

The particular strengths of the previous companies will be adopted resulting in a mix of world leading products, a manufacturing base and established international quality systems. To further enhance the infrastructure of Global Science, new computer hardware is being installed to meet the internet, e-mail and e-commerce demands of the future.

The current quality systems, ISO9002 and IANZ ISO Guide 25 of Intermed will be adopted into Global Science.

Christchurch warehousing facilities will be expanded to cater for same day delivery and for the first time, will carry prepared microbiological media stock for the laboratory industry.

"Our customers will see a significant increase in service levels which will change the way they have traditionally done business," says Frank Spurway.

Global Science will be a one-stop shop, meeting customer supply requirements accurately and on time. Its quality control standards will mean many laboratories will be able to dispense with the need to perform QC functions on manufactured media products themselves.

"Microbiology customers will have the choice of preparing their own media or adopting the added value, prepared media," says John Clark.

Distributorship agreements with many of the world's leading brands in key scientific areas, such as instrumentation, microbiology, and molecular biology, plus comprehensive stocking of consumables will mean that Global Science is positioned to be a preferred supplier for those customers who require this type of service.

Global Science is based in Glenfield, Auckland. It has service centres in Wellington and Christchurch. Comprehensive mechanical, electronic and optical technical service facilities will be based at 127 Sunnybrae Rd, Glenfield, while manufacturing will continue to be based at Marken Place, Glenfield.

For further information please contact John Clark at:  
Global Science, Phone: 09 443-5867, Fax: 09 444-7314  
Email: global@globalscience.co.nz

## TOXIC WASTE TIPPED TO HEAD FOR EUROPE

After urging councils to wait for a local disposal solution, the Government is ready to ship the problem.

The Government will not block the export of 120 tonnes of deadly farm chemicals to Europe, although it wants them destroyed here.

To the anger of environmentalists, six regional councils are expected to announce that the stockpile of chemicals and household poisons collected since 1992, will be disposed of in France or the Netherlands. Environmentalists regard overseas disposal as contrary to our obligations under an international convention on hazardous waste transportation.

The councils will pick a tenderer for the job estimated to cost ratepayers about \$1 million. The successful tenderer will require a licence from the Ministry of Commerce, which is responsible for authorising such exports under the convention.

One of the councils, the Auckland Regional Council, which collected half the stockpile, has blamed the need to export the chemicals on Government inaction in finding a national solution to the problem.

The Government's reliance on the market to deliver a disposal plant had also backfired, the council said.

The councils have given up waiting for a treatment facility to be built after being told by the Minister for the Environment, Simon Upton, in mid-1996 that he was opposed to any export of the chemicals.

In spite of concern over the safety of storing the chemicals, Mr Upton wanted the councils to wait for an investigation into the viability of building a disposal facility, saying he believed the Government had some responsibility for managing the chemicals.

In February, Mr Upton wrote to the councils stating a preference for the chemicals to be destroyed here so the Government could meet its obligations under the Basle Convention.

Waiting would allow a more coordinated and economical solution to the destruction of the country's toxic waste legacy, including contaminated timber treatment sites, chemical dumps and poisoned marine sediments from the Devonport naval dockyard in the Waitemata Harbour, he wrote.

But the Ministry of Commerce is expected to grant an export licence after various checks on the exporter and the chemicals' destination.

In a letter to Greenpeace, the Minister of Commerce, Max Bradford, said that while the Government would consider providing some funds for continued storage, "there does not appear to be a good cause to refuse the proposal to export the current consignment of waste pesticides."

Environment groups such as Greenpeace and the Royal Forest and Bird Protection Society as well as university scientists have called on the Government to stop the exportation.

*Sourced from: The New Zealand Herald*

### **NEW ZEALAND SCIENCE AND TECHNOLOGY MEDAL TO CREST DIRECTOR**

Christine Coles, the Palmerston North-based director of the Creativity in Science and Technology (CREST) awards scheme, has received a New Zealand Science and Technology Medal for her role in encouraging young people to undertake projects within the CREST activity programme.

Hundreds of primary and secondary students throughout New Zealand set out under the CREST scheme each year to tackle questions such as why some people sweat more than others, how a lemon could be used as a battery to power a clock, or why colder honey is stickier?

All projects are completed applying scientific and technological principles and processes, from drafting a hypothesis to designing the experiment and analysing the data, to reporting the results and conclusions.

Originating in Britain, CREST is in its eleventh year in New Zealand. Through its different categories, the programme has provided a launching pad for students of all ages keen to test their inquisitive minds on a project of their own choice.

Ms Coles has directed CREST since 1990. Over the years, the number of participating schools has grown steadily. Last year, more than 2000 students were working on CREST projects. The resource material is continually updated to fit curriculum requirements and to accommodate team projects as well as individual entries.

Royal Society president Sir John Scott FRSNZ presented Ms Coles with the medal as part of the Technology Education New Zealand (TENZ) conference held recently at King's College in Auckland. The New Zealand Science and Technology Medals, administered by the Royal Society, were instituted by the New

Zealand Government to recognise those who have made exceptional contributions to New Zealand society and culture through activities in science and technology.

### **FOOD ASSURANCE AUTHORITY**

The Prime Minister has announced the establishment of a new agency to operate within the Ministry of Agriculture and Forestry. To be called the Food Assurance Authority it will become, from 1 July 1999, the sole agency to focus on food safety.

Directing efforts to have the Food Assurance Authority up and running with about 80 staff by 1 July is Dr Andrew McKenzie, chief of MAF's Regulatory Authority. The proposed agency will integrate food administration and regulations, protect public health and help ease the access of food products to markets. Food administration is already a core business for MAF while about a dozen food safety staff from the Ministry of Health will shift to the new authority.

Dr McKenzie said the Food Assurance Authority, in implementing Government policy on genetically-modified (GM) food, would work closely with the Australia New Zealand Food Authority (ANZFA) and the Environmental Risk Management Authority (ERMA).

### **AWARDS TO HONOUR PASSION FOR SCIENCE**

Two science lecturers at the Dunedin College of Education were awarded a New Zealand Science and Technology Medal recently for their outstanding contributions to encouraging children's interest in science.

Barbara Benson, head of the College's science department, and Alan Bennington, senior lecturer and school adviser in science and technology, each received a bronze medal, presented by Professor George Petersen, the President of the Academy of the Royal Society of New Zealand, at the College's Education Centre.

Barbara Benson's award is an appreciation of her passion and enthusiasm for promoting excellence in science and technology education, says Peter Spratt, the Royal Society's executive officer for education. Through her long-standing involvement with the Otago Science Teachers' Association, her role as chief judge for the National Science Fair and her contribution to science educator conferences (Scicon), she has also become a career role model and mentor for teachers and students.

Alan Bennington's contribution to the promotion of science is equally outstanding, in particular his involvement with the BP Technology Challenge, says Peter Spratt.

"Alan is a strong advocate of science and technology education, especially for primary age children. He has recognised the potential of the BP Technology Challenge at an early stage and actively promoted its development not only in Otago but also throughout New Zealand. He has developed the programme in Otago from a single event in 1990 to its present level of 10 events each year spread throughout the region."

## STUDENTS SELECTED TO ATTEND SCIENCE SCHOOLS OVERSEAS

During April students were selected by the New Zealand Association of Science Educators (NZASE) to attend various science schools/programmes overseas during 1999. These programmes, administered by the Royal Society, provide a wonderful opportunity for students to work alongside scientists and young students from other parts of the world in a research environment. Specialist lectures, visits to research and industrial environments, excursions, planned activities as well as the chance to experience another culture are all part of the programmes.

There was a huge increase in the number of applicants this year and the standard was particularly high. Those successful were:

### London International Youth Science Forum

Kristen Baker                Waikato Diocesan School  
Bryn Fenwick                Riccarton High School

### Nanyang Technology & Engineering Research Programme - Singapore

Clint Thomas                Te Kauwhata College  
Christopher Garton        Manurewa High School

### USA International Space Camp

Gary Sparks (teacher)      Tamatea High School  
James Hutchinson        Glendowie College  
Clare Possenniskie        Hutt Valley High School

### Monbusho Science School - Japan

Michael Grant               John McGlashan College  
Hsiang Ning Tsao            Fiordland College

### Harry Messels International Science School - Sydney

Christina Robertson      St Cuthberts College  
Nicholas Gormack        Auckland Grammar School

### Australian International Space Camp

Steven Chrystall (teacher) Hillcrest High School  
Samuel Beachen            Central Hawkes Bay College  
Stijn Te Strake            Howick College  
Adrienne Wymer            Matamata College  
David Hutchison           Rangitoto College  
Andrea Stebbing           Glendowie College  
Yan Zeng                    Otago Girls' High School  
Tamsyn Bredenkamp        St Mary's College, Wellington

## BUDGET 1999/2000

The Government has announced increases in public investment in research, science and technology (RS&T) to help foster New Zealand's development as a knowledge society.

Two key features, announced in the 1999/2000 Budget, are:

- "New-economy" research fund - Creating Innovation Opportunities. This investment is for basic research in areas that support high technology business opportunities. Creating Innovation Opportunities is an investment of \$5.625 million in the current year to 30 June 1999. Indicative funding moves to \$11.25 million for each of 2000-2001 and 2001-2002. Creating Innovation Opportunities is a response to the consultation process of the Foresight Project.

- PGST increase - an increase of \$9.25 million for Public Good Science and Technology - made up of the Public Good Science Fund (PGSF), and the government's investment in health research.

Other key changes:

- The Marsden Fund receives an extra \$1 million.
- The budgeted appropriation for "Provision of National Measurement Standards" receives a 9.7% increase. This increase reflects the Government's on-going commitment to support New Zealand's technological infrastructure, particularly chemical standards.
- The increase in "Non-specific Output Funding" of \$635,000 reflects the increment in 1998-99 PGSF contracts that were awarded to CRIs for research in 1999-2000.

## NEW ZEALAND ASSOCIATION OF SCIENTISTS 1999 ANNUAL AWARDS

Nominations are invited for the following medals and awards, given annually by the New Zealand Association of Scientists to encourage public appreciation of scientific objectives, methods and achievements.

### *Marsden Medal*

The Marsden Medal is awarded for a lifetime of outstanding service to science in New Zealand, in recognition of services rendered to the cause or profession of science in the widest connotation of the phrase.

### *Shorland Medal*

The Shorland Medal is awarded for the significance and originality of a personal, lifetime contribution to basic or applied research in New Zealand.

### *Research Medal*

The Research Medal is awarded for outstanding fundamental or applied research work in the physical, natural or social sciences published during the year of the award or the preceding three calendar years.

### *Foundation for Research, Science and Technology Communicator Awards*

Three prizes of \$1200 are offered for communicating to the general public in any area of science through print, broadcast, public lectures, exhibitions or through organisation, management, and promotion of events and activities that communicate and publicise science, during the last two years.

Nominations for the medals and awards must be in writing. They should be forwarded to:

The Secretary, New Zealand Association of Scientists  
P O Box 1874, Wellington, by 31 July 1999.

For more information see <http://nzas.rsnz.govt.nz>

## AGRESEARCH CENTRE FOR PASTORAL FOODS RESEARCH

AgResearch and Massey University have joined forces to develop a research-based centre called "AgResearch Centre for Pastoral Foods Research".

The role of the Centre is to identify functional food, nutraceutical and related consumer product development opportunities, and then undertake research, aiming to deliver milks and meats with defined chemical, physical and biological compositions and characteristics. The Centre will draw upon the joint research and development capabilities of AgResearch and Massey's Institute of Food, Nutrition and Human Health.

For further information,

Contact: Director of Pastoral Foods Research  
Dr Grant Washington-Smith at Massey University  
Phone: (06) 3505066

## DISTINCTIVE FOCUS FOR NEW SECONDARY TEACHER PROGRAMMES

The University of Otago's School of Education is working with the teaching profession on developing new graduate-entry secondary teacher programmes for introduction in 2000.

University Director of Teacher Education Dr Ruth Ethell says the programmes will help meet changing demands in teaching by providing graduates with research-based teacher education rather than traditional teacher training. "The programmes will build on students' existing knowledge from their initial degrees and expose them to the latest thinking and practice from expert school teachers and University lecturers."

# International News

## HISTORIC CHEMICAL LANDMARKS TO BE HONOURED AROUND THE WORLD

A Noble laureate once observed that outstanding scientists "are claimed as nationals by one or another of many different countries. Yet in the truest sense, they belong to the whole world." The President of the American Chemical Society (ACS) recently said, "Although some applications of science are focused within national borders, the pursuit of science as an intellectual discipline is not contained in the same way. Research from a small laboratory, in a distant country, can have far-reaching effects throughout the world."

The Nobel laureate who spoke those words was

Sir C V Raman, and the ACS President who made those comments was Dr Edel Wasserman. In December 1998, Wasserman travelled to Calcutta, India, to honour Raman and to help designate the discovery of the Raman effect as an International Historic Chemical Landmark.

The Raman effect - the scattering of light by molecules in a liquid - is the basis for Raman spectroscopy.

Raman received the 1930 Nobel Prize in Physics for his work. Raman spectroscopy is a powerful tool that today is used worldwide for the nondestructive chemical analysis of organic and inorganic compounds.

Joining the ACS representatives at the ceremony in Calcutta were leading scientists from the Indian Association for the Cultivation of Science (IACS) and the Indian Chemical Society (ICS). Nearly 400 people attended the ceremony. It was the first in a series of historic chemical landmark designations that will be one of the legacies of the International Chemistry Celebration.

The International Historic Chemical Landmark program is an extension of ACS's National Historic Chemical Landmark (NHCL) program. The goal of the program, as outlined by Dr

Ned Heindel, former ACS President and Chairman of the ACS advisory committee on historic chemical landmarks, is "to ensure that the landmarks in the history of chemistry and chemical engineering are commemorated and that their physical remains are marked and, when possible preserved for future generations."

The NHCL program was first organised in 1992, and the first landmark designation - the Bakelizer - was made in 1993. Since then, 19 national landmarks in the United States have been honoured. The dedication ceremony typically involves the publication of a commemorative brochure and a public event featuring local and national leaders. Media coverage has been extensive.

The Raman effect is actually the second international landmark to be honoured. The first international designation was held in November 1997 and February 1998. The Royal Society of Chemistry and the American Chemical Society conducted events in Harlow (United Kingdom), and in Philadelphia (United States), to commemorate the discovery of histamine H<sub>2</sub>-receptor antagonists and the development of the drug cimetidine. This drug inhibits the secretion of acid in the stomach and is used in the treatment of peptic ulcers.

To coincide with the International Chemistry Celebration, a flurry of other international chemical landmarks will be designated in the coming months. Planning is under way for events in Canada, France, Germany, Mexico, and the United Kingdom.

## CHEMISTRY IN NEW ZEALAND

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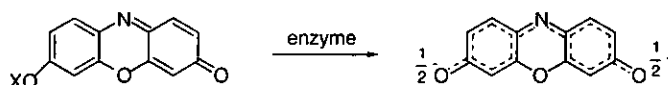
# A Colourful Journey Through the Chemistry of Resorufin-Enzyme Interactions

Trevor M Kitson, Institute of Fundamental Sciences, Massey University, Private Bag 11-222, Palmerston North, New Zealand

*Biographical note: Trevor Kitson was born in England in 1948 and graduated in chemistry from the University of Oxford in 1969. His doctoral research at Oxford was into the mechanism of action of pepsin and was carried out under the supervision of Jeremy Knowles (later of Harvard). Following emigration to New Zealand in 1972, he took up an academic position at Massey University where his research into chemical modification of enzymes (especially aldehyde dehydrogenase) led to the Watson-Victor award for biochemical research in 1990 and to the degree of DSc in 1991. He enjoys teaching organic chemistry to university students and is a dedicated cross-country runner and trampster in the New Zealand bush.*

## Introduction

"The beautiful colour and wonderful fluorescence of this substance, especially in alkaline solution, was bound to attract the interest of chemists to a high degree". This quotation [translated from German] is taken from one of the earliest papers<sup>1</sup> dealing with the chemistry of resorufin (7-hydroxy-3*H*-phenoxazin-3-one). History has shown that the statement could well have included 'biochemists' and 'enzymologists' as well as 'chemists'. A variety of enzymes (such as esterases, glycosidases, and cytochromes) have been assayed using derivatives of resorufin as chromogenic or fluorogenic substrates<sup>2-6</sup>. The cherry-red resorufin anion absorbs maximally at 571 nm with a high molar absorptivity (69,700)<sup>7</sup> making it very easily measured at low levels; it can be readily monitored in even more dilute solution using fluorimetry (with excitation at 530 nm and emission at 585 nm).<sup>3</sup>

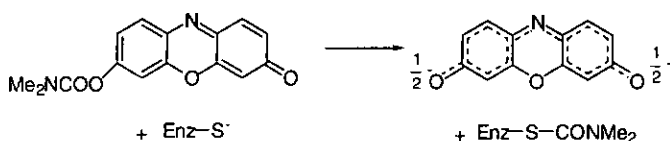


**Scheme 1.** The enzyme-catalysed release of the intensely coloured, fluorescent, resonance-stabilised resorufin anion from a variety of substrates. (X may be an alkyl group, an acyl group, a sugar moiety, etc.)

In all enzymological work with resorufin derivatives it has been implicitly assumed that the resorufin anion is catalytically released from some precursor substrate (see Scheme 1, where X represents an alkyl or acyl group or a sugar moiety) and that nothing else happens. The work to be discussed in the present article, however, shows that there is the potential for a variety of other interesting chemical interactions to occur between enzymes and compounds of resorufin, both covalent and non-covalent, and thus that the assumption referred to above is certainly not always tenable.

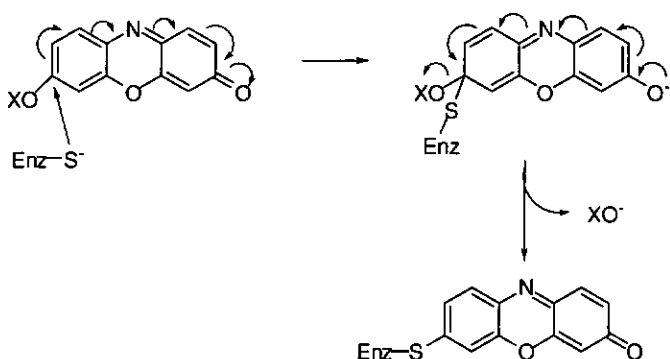
## Modification of aldehyde dehydrogenase by resorufin derivatives

Our 'colourful journey' starts with an attempt to find a sensitive chromogenic active-site-directed inactivator of mammalian aldehyde dehydrogenase (EC 1.2.1.3; all the work in this paper refers to the cytosolic or 'Class 1' isozyme).



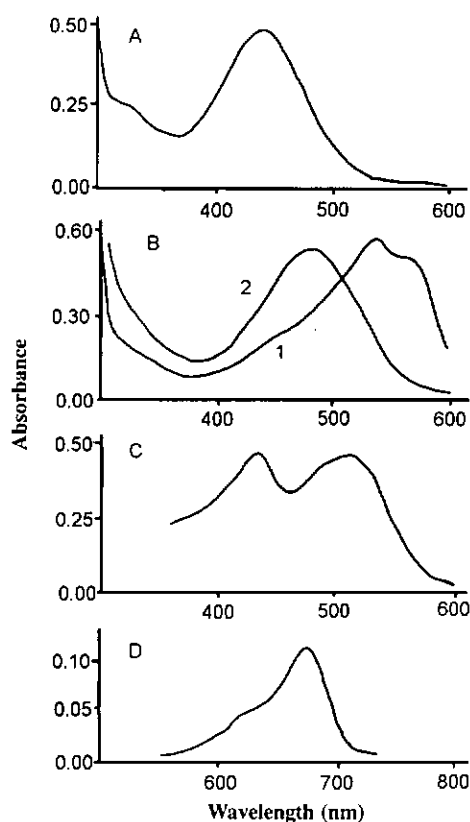
**Scheme 2.** 'Expected' reaction between resorufin dimethylcarbamate and aldehyde dehydrogenase.

Aldehyde dehydrogenase reacts with *p*-nitrophenyl dimethylcarbamate, liberating the yellow *p*-nitrophenoxide ion and resulting in an inactive enzyme in which the catalytically essential group carries a -CO-NMe<sub>2</sub> label.<sup>8,9</sup> This reaction relies on the exquisitely well-balanced 'push' and 'pull' that the carbonyl group in *p*-nitrophenyl dimethylcarbamate experiences from the electron-withdrawing *p*-nitrophenoxy group on one side and the electron-donating dimethylamino group on the other; the upshot is that the compound does acylate the enzyme, albeit slowly, but the resulting acyl-enzyme is then totally inert to hydrolysis, thus allowing the identification of the catalytic group (which was found to be Cys-302).<sup>10</sup> It was anticipated that resorufin dimethylcarbamate would react in exactly the same way (Scheme 2), but because of the 5.6-fold greater molar absorptivity of the resorufin anion over *p*-nitrophenoxide (at pH 7.4),<sup>7</sup> the reagent would constitute a much more sensitive active-site titrant. However, it was found that little or no liberation of the resorufin anion occurs when aldehyde dehydrogenase reacts with the dimethylcarbamate, although loss of enzyme activity ensues; clearly, a reaction happens, but not the expected one.<sup>11</sup>



**Scheme 3.** Hypothetical nucleophilic aromatic substitution mechanism for interaction of resorufin compounds with aldehyde dehydrogenase.

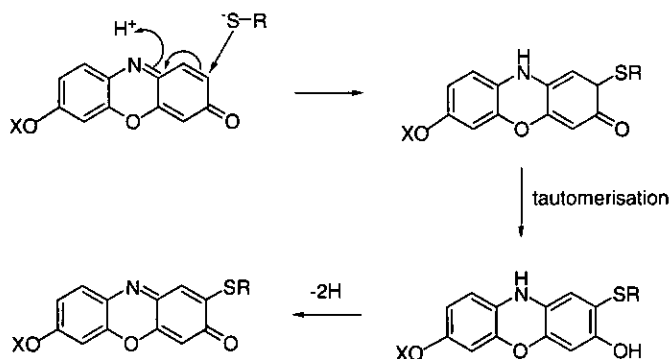
Resorufin methanesulfonate inactivates aldehyde dehydrogenase much more quickly than does the dimethylcarbamate, whereas resorufin ethyl ether inactivates more slowly, and again these reactions occur without release of the resorufin anion.<sup>11</sup> The relative rates of reaction correlate with the leaving group ability of the methanesulphonate, the dimethylcarbamate, and the ethoxy anions; this prompted the suggestion that nucleophilic aromatic substitution is occurring, as shown in Scheme 3. To an organic chemist, this would be a particularly nice reaction mechanism, involving as it does a cascade of electron movement right across the molecule and back. In the postulated intermediate, the left-hand ring has temporarily lost its aromaticity, but the right-hand ring has become aromatic in compensation; this would be consistent with the occurrence of a nucleophilic aromatic substitution mechanism under otherwise surprisingly mild conditions. However, this mechanism predicts that exactly the same modified form of the enzyme would be formed from all three reagents, since in each case the leaving group (the only point of difference) - leaves. Isolation of the chemically modified enzyme shows this is not the case; the  $\lambda_{\text{max}}$  of the coloured labelled enzyme is 437, 442 and 530 or 481 nm (depending on conditions, see below) for the methanesulfonate, the dimethylcarbamate and the ethyl ether, respectively (see Figure 1a and b). Thus regrettably the attractive mechanism shown in Scheme 3 does not operate, at least not under the conditions investigated. Elucidation of the actual chemistry involved here came about by using  $\beta$ -mercaptoethanol as a model for the Cys-302 residue of aldehyde dehydrogenase.



**Figure 1.** The visible absorption spectrum of aldehyde dehydrogenase after covalent modification by various coloured compounds. (A) resorufin dimethylcarbamate; (B) resorufin ethyl ether; (C) phenazine methosulfate; (D) methylene blue. In (B), spectrum 1 is of the modified but undenatured enzyme at pH 7.4, whereas spectrum 2 is that of the modified enzyme after denaturation and redissolution.

### Reaction of $\beta$ -mercaptoethanol with resorufin derivatives

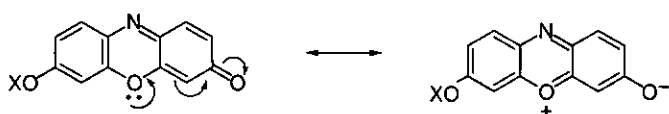
$\beta$ -mercaptoethanol reacts with the methanesulfonate, the dimethylcarbamate and the ethyl ether of resorufin (at 25 °C and pH 7.4)<sup>12</sup> with the same relative speeds and to give yellow to orange products of essentially the same  $\lambda_{\text{max}}$  (433, 442 and 481 nm, respectively) as does aldehyde dehydrogenase, supporting the assumption that Cys-302 is the attacking nucleophile in the latter case. With the small thiol, but not of course, with the enzyme, the products can be simply identified by NMR spectroscopy. To a first approximation we would expect the signals of protons at positions 1, 2 and 4 (numbering clockwise round the right-hand ring) of resorufin dimethylcarbamate or resorufin ethyl ether, for instance, to be a doublet, a doublet, and a singlet, respectively, but long-range interaction of protons 2 and 4 would result in their signals being further split into a doublet of doublets and a narrow doublet, respectively, and this is what is observed. After reaction with  $\beta$ -mercaptoethanol, however, the signal due to proton 2 is completely absent and those due to protons 1 and 4 have changed to simple singlets.<sup>12</sup> There are no new resonances apart from those accounted for by the mercaptoethanol moiety, and the peak due to the dimethylcarbamate or ethoxy group is still present. This shows unequivocally that in the product the hydrogen at position 2 has been replaced by the  $-\text{SCH}_2\text{CH}_2\text{OH}$  group with no other change to the resorufin structure. The pathway by which this must occur is shown in Scheme 4. Nucleophilic addition to the  $\alpha,\beta$ -unsaturated imine, followed by tautomerisation, would lead to the aminophenol shown in the Scheme. Evidently this then immediately undergoes spontaneous oxidation to re-form a resorufin derivative. Not only is this the final product demanded by the NMR spectrum, but it is also consistent with the observed yellow-orange colour; the intermediate aminophenol on the other hand would be essentially colourless. The whole pathway, although equivalent to a substitution, is termed 'oxidative addition'.



**Scheme 4.** Oxidative addition pathway for the reaction of resorufin compounds with a thiol. (RSH represents  $\beta$ -mercaptoethanol or the Cys-302 residue of aldehyde dehydrogenase.)

Scheme 4 raises several interesting chemical points. First, we can now see that the relative rates of reaction of the enzyme or the small thiol with the various resorufin compounds examined must be due to the variation in electron-withdrawing or electron-donating ability of the side-chains at position 7 of the resorufin ring system (and nothing to do with their leaving-group ability). Secondly, the facile and complete oxidation of the aminophenol shown in the Scheme shows that there is more stability associated with the resorufin structure (with its single formal benzene ring) than with the two (non-conjugated) benzene rings of the

aminophenol. This is perhaps less surprising if we consider the alternative resonance structure drawn in Scheme 5 which shows that the central ring of the resorufin derivative has some benzenoid (pyrylium) character, and that overall the resorufin structure has some resemblance to anthracene. Thirdly, the question arises as to why attack occurs at position 2 of the resorufin ring as opposed, for instance, to attack at position 1 or 4. (Position 1 might be considered to be most favourable as here the electron flow would be towards oxygen rather than to the less electronegative nitrogen.) Once again, consideration of Scheme 5 may be instructive. It shows that the oxygen atom of the central ring tends to supply electrons to the carbonyl group of the right-hand ring, leaving the  $\alpha,\beta$ -unsaturated imine grouping as the only unaffected electrophilic centre. After attack here and subsequent oxidation, the same consideration would still apply, explaining why there is no sign of further reaction with a second molecule of  $\beta$ -mercaptoethanol. With simple quinones or quinonimines that lack the oxygen substituent, several equivalents of a nucleophile can react through repetitions of the oxidative addition cycle.<sup>13-16</sup>

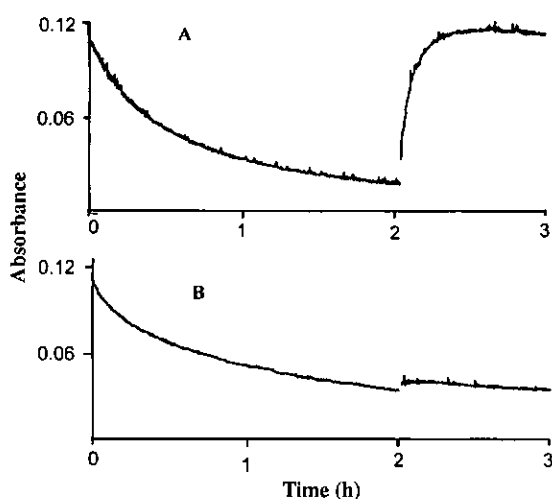


**Scheme 5.** Resonance interaction within resorufin compounds.

### Redox properties of the enzyme-bound resorufin label

To confirm that Scheme 4 applies to aldehyde dehydrogenase as well as  $\beta$ -mercaptoethanol, the redox properties of the enzyme-linked label were examined.<sup>11</sup>

As predicted by the Scheme, the aldehyde dehydrogenase/resorufin dimethylcarbamate adduct can be bleached by reduction with, for instance, ascorbic acid, but a high concentration is required and the reaction approaches a position of equilibrium rather than going to completion (Figure 2a). This confirms the strong preference of the resorufin structure to exist in the oxidised rather than the reduced form as mentioned above. The partially reduced label may then be quickly re-oxidised by excess hydrogen peroxide.

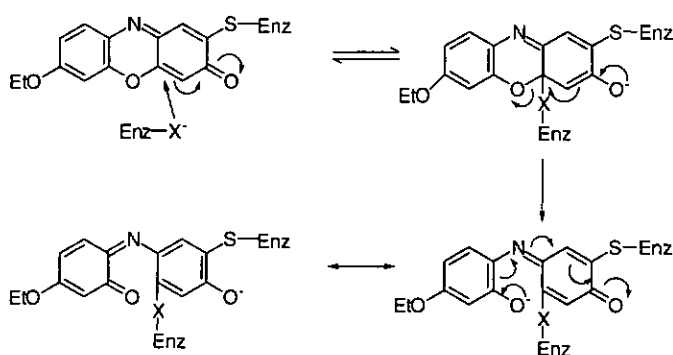


**Figure 2.** Changes in the maximal absorbance of the aldehyde dehydrogenase/resorufin dimethylcarbamate adduct upon reduction with (A) ascorbic acid and (B) NADH at pH 7.4 and 25 °C. In each case, excess hydrogen peroxide was added after two hours and the monitoring of the absorbance was continued.

A similar partial reduction of the label can be brought about by NADH (Figure 2b). This observation proves beyond doubt that the label must be within the active site of the enzyme and held in a suitably close position for the successful transfer of a hydride ion from bound NADH. (NADH does not reduce free resorufin dimethylcarbamate.) Interestingly, the reduced label is incapable of being re-oxidised by hydrogen peroxide in the presence of the cofactor. It seems that approach to the resorufin label by oxidising and reducing reagents must be through the nucleotide binding site since occupancy of this site by nucleotide appears to stop access completely. It may be relevant to this idea that the three-dimensional structure of Class 1 aldehyde dehydrogenase (which has recently been elucidated) shows that the nucleotide binding site and the capacious substrate binding pocket together constitute almost a complete tunnel through the whole molecule.<sup>17</sup>

### Aldehyde dehydrogenase and resorufin ethyl ether

After inactivation of aldehyde dehydrogenase by resorufin ethyl ether, the isolated enzyme is a delightful magenta colour (with  $\lambda_{\max}$  of 530 nm and a shoulder at 570 nm, as shown in Figure 1b);<sup>11</sup> this is a surprising observation in view of the fact that the oxidative addition reaction of resorufin ethyl ether and  $\beta$ -mercaptoethanol results in a yellow-orange product (of  $\lambda_{\max}$  481 nm).<sup>12</sup> The magenta colour is present over intermediate pH values. If the pH is lowered to 3.0, the colour changes to the 'expected' one (with  $\lambda_{\max}$  480-1 nm), but if the pH is subsequently raised back to 8 or 9 the colour slowly reverts to magenta. If the pH of the original labelled enzyme is raised to 10.6, the magenta colour changes over a period of about half an hour to the 'expected' yellow-orange (480-1 nm), and now on returning the pH to about 6.5 there is no reversion to magenta. Finally, if the labelled enzyme is precipitated with perchloric acid and then redissolved in concentrated urea solution it is observed to be unchangingly yellow-orange over the complete pH range 3 to 11.5; the spectrum is shown in Figure 1b.



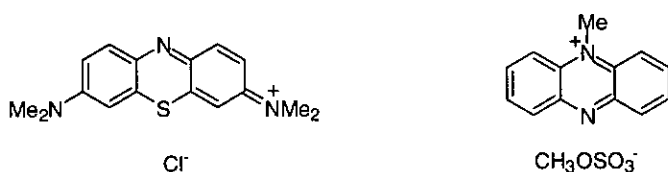
**Scheme 6.** Proposed further reaction that occurs after oxidative addition of resorufin ethyl ether to aldehyde dehydrogenase.

How are these fascinating colour changes explained? It is evident that the enzyme and resorufin ethyl ether react initially according to the expected oxidative addition pathway, but this is followed by some further reaction (producing the magenta colour), and a suggestion for this is put forward in Scheme 6. It envisages a freely reversible attack of some enzymic nucleophile (X) on the resorufin moiety resulting in opening of the central ring. Lowering the pH shifts the equilibrium shown to the left, as group X is effectively removed by protonation; raising the pH again shifts the equilibrium back to the right, showing the

enzyme survives being at pH 3 unscathed. However, pH 10.6 evidently causes the slow denaturation of the enzyme, and this time group X is irreversibly removed physically from the position in which it can attack the resorufin ring. (And of course treatment with perchloric acid also irreversibly denatures the enzyme, again permanently shifting the equilibrium to the left.) The proposed species responsible for the magenta colour has its negative charge resonance-delocalised over an extensive system and thus would be compatible with a relatively long-wavelength absorption, like the resorufin anion itself. Resorufin ethyl ether is reducible by ascorbic acid,<sup>12</sup> but the resorufin anion is not and neither is the enzyme-linked magenta label;<sup>18</sup> these observations support the proposal that the magenta species is negatively charged. The pathway also explains why the magenta colour is only evident with the (undenatured) enzyme and not with  $\beta$ -mercaptoethanol (which has no group X, of course). Intriguingly, however, there seems to be no obvious explanation yet as to why the further reaction occurs only with the ethyl ether of resorufin and not the dimethylcarbamate or the methanesulfonate.

Group X is currently hypothetical; possible nucleophiles at the active site of aldehyde dehydrogenase (other than the catalytic nucleophile, Cys-302) include Cys-301 and Glu-268 (which is known from other work with chemical modifying agents to be particularly reactive).<sup>19</sup>

#### Oxidative addition with other compounds



**Scheme 7.** Structures of methylene blue (left) and phenazine methosulfate (right).

Naturally, compounds with a close chemical similarity to derivatives of resorufin would also be expected to undergo the oxidative addition reaction, and this has been observed with the activity stain reagent phenazine methosulfate and the common dyestuff methylene blue (see Scheme 7).<sup>20</sup> Thus aldehyde dehydrogenase can be rendered pink-brown or blue, respectively, by these compounds (Figure 1c and d), further extending the veritable artist's palette of coloured forms of this enzyme that are possible. The covalent inactivation of aldehyde dehydrogenase by methylene blue is a potential complication of metabolic studies using this dye,<sup>21</sup> whereas the analogous reaction with phenazine methosulfate explains the phantom bands seen on polyacrylamide gels in the presence of the enzyme but without the need for its substrates or nitroblue tetrazolium.<sup>22</sup>

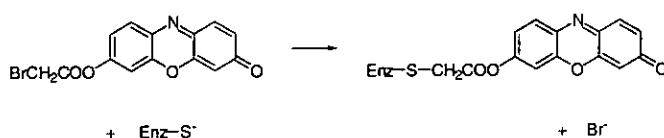
Recently, the quinone menadione has been shown to inactivate cdc25A phosphatase by oxidative addition to an enzymic thiol group, in an exactly analogous fashion to the observations with aldehyde dehydrogenase.<sup>23</sup>

#### Resorufin acetate and resorufin bromoacetate

Before the possibility of oxidative addition was discovered with resorufin compounds, resorufin acetate was extensively studied as a substrate for aldehyde dehydrogenase.<sup>24,25</sup> (It should be

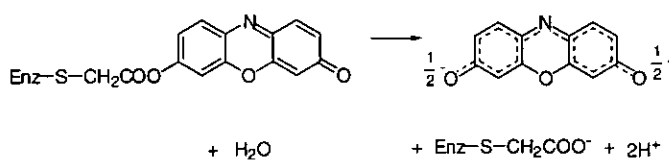
pointed out here that as well as catalysing the redox reaction between aldehydes and  $\text{NAD}^+$ , this enzyme also catalyses the hydrolysis of reactive esters.) In retrospect it appears that enzymic attack on the acetate group is exclusively preferred by the enzyme and there is no evidence that the oxidative addition pathway competes with this (which would lead to inactivation). In other words, with resorufin acetate the side-chain carbonyl group is much more electrophilic than the  $\alpha,\beta$ -unsaturated quinonimine group, whereas as we have seen, in the dimethylcarbamate the reverse is true.

Resorufin acetate is a more satisfying esterase substrate to use than the usual *p*-nitrophenyl acetate for a number of reasons. Its product anion is much more intensely coloured and can be conveniently monitored at lower pH values (the  $\text{pK}_a$  of resorufin being 5.8, whereas that of *p*-nitrophenol is 7.1).<sup>7</sup> This enables very precise measurement of pH-activity profiles; aldehyde dehydrogenase, for example, shows a  $\text{pK}_a$  of 8.27 in the presence of  $\text{NAD}^+$  and 8.09 in the presence of  $\text{NADH}$ ,<sup>24</sup> and chymotrypsin shows a  $\text{pK}_a$  of 7.25.<sup>26</sup> With aldehyde dehydrogenase, the rate of resorufin acetate hydrolysis is dramatically accelerated by physiological levels of  $\text{NAD}^+$  and  $\text{Mg}^{2+}$ , resulting in a  $k_{\text{cat}}$  value about a thousand-fold higher than that with its 'natural' aldehyde substrates.<sup>24</sup> In the latter case, the rate-limiting step is dissociation of  $\text{NADH}$  from the enzyme,<sup>27</sup> a process that is not of course involved in the esterase reaction. It seems that here we have the intriguing case of an enzyme that 'shoots itself in the foot' by its avidity for one of the natural reaction products, since clearly it has the potential to carry out the chemical steps of the reaction much more quickly than it actually manages to turn over when acting as a dehydrogenase.



**Scheme 8.** Inactivation of aldehyde dehydrogenase by resorufin bromoacetate.

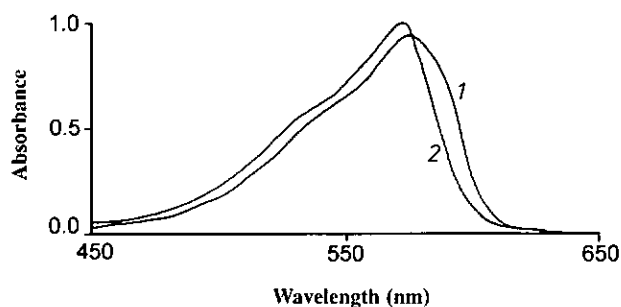
Resorufin bromoacetate is a much faster substrate for aldehyde dehydrogenase than the acetate, as expected, but simultaneously the enzyme also undergoes rapid inactivation in the presence of the bromoacetate.<sup>11</sup> Is this due to the oxidative addition pathway? It might be thought so, since the electron-withdrawing bromoacetate group would be expected to accelerate this pathway, in the same way as, for example, the methanesulfonate group discussed above. (The half-life for inactivation by resorufin methanesulfonate is less than a minute.<sup>20</sup>) However, we can rule out oxidative addition, since *p*-nitrophenyl bromoacetate is also both a substrate and a potent inactivator,<sup>11</sup> and for this compound the pathway is of course impossible. Instead, inactivation by these bromoacetates must be due to enzymic attack on the very electrophilic methylene carbon atom as shown in Scheme 8 (an  $\text{S}_{\text{N}}2$  mechanism), a reaction that has also been studied with a variety of bromoacetanilide compounds.<sup>28</sup> After inactivation by resorufin bromoacetate, the isolated modified enzyme (which is pale yellow-orange) slowly releases the intensely red resorufin anion (Scheme 9); this reaction is somewhat faster than the spontaneous rate of hydrolysis of free resorufin acetate, suggesting that hydrolysis of the bound label may be weakly catalysed by the same enzymic groups that mediate hydrolysis of the acyl-enzyme in the normal enzyme reaction.<sup>11</sup>



**Scheme 9.** Hydrolytic release of the resorufin anion after inactivation of aldehyde dehydrogenase by resorufin bromoacetate.

The acetate and bromoacetate of resorufin have also been profitably used as substrates to study the esterase action of chymotrypsin,<sup>26</sup> once again making use of the very favourable  $\text{pK}_a$  and chromophoric properties of resorufin. The  $k_{\text{cat}}$  for the bromoacetate is about 740 times larger than for the acetate, showing the impressive result of the bromine atom's inductive effect on the reactivity of the ester group. Interestingly, the bromoacetate is exclusively a substrate for chymotrypsin; unlike the case with aldehyde dehydrogenase, it does not inactivate at all. This difference may be rationalised in terms of the concept of 'hard and soft acids and bases' (or electrophiles and nucleophiles).<sup>29,30</sup> The essential nucleophilic group of aldehyde dehydrogenase is Cys-302; sulfur is a classically 'soft' nucleophile and therefore has a natural affinity for the soft electrophilic alkyl halide moiety of resorufin bromoacetate. On the other hand, both the catalytically essential nucleophile of chymotrypsin (the -OH group of Ser-195) and the carbonyl group in the bromoacetate side-chain are 'hard', explaining why the compound is an excellent substrate but not an inactivator.

#### Binding of the resorufin anion to aldehyde dehydrogenase



**Figure 3.** Visible spectrum of the resorufin anion in the presence of aldehyde dehydrogenase (spectrum 1). After addition of excess  $\text{NAD}^+$ , spectrum 2 was obtained; this is virtually indistinguishable from the spectrum of the resorufin anion alone.

If aldehyde dehydrogenase is mixed with a solution of the resorufin anion and then immediately passed down a gel filtration column, it is rather surprisingly observed that the eluted protein fraction is a distinct red colour;<sup>11</sup> the associated absorption spectrum is significantly different to that of the free ion and is shown in Figure 3. (The fluorescence of the resorufin ion is also different in the presence of the enzyme, exhibiting a marked quenching.<sup>18</sup>) Could this represent the product of the oxidative addition pathway between enzyme and the resorufin anion? No, for the following reasons.<sup>11</sup> First, the change to the spectrum of the anion happens virtually instantaneously on adding enzyme, and is not associated with loss of enzyme activity. Secondly, addition of excess  $\text{NAD}^+$  immediately restores the spectrum to that characteristic of the free anion. Thirdly, gel filtration in the presence of  $\text{NAD}^+$  results in much less colour being associated

with the enzyme fraction, and  $\text{NADH}$  similarly competes with the resorufin anion for binding to the enzyme. Clearly, therefore, the anion binds tenaciously but non-covalently in the enzyme's cofactor binding site. A shift in the absorbance spectrum of the resorufin anion shows that it also binds to bovine serum albumin, but this does not occur with chymotrypsin.<sup>31</sup> These observations parallel the way in which several relatively large planar dye molecules bind to the nucleotide binding fold of various dehydrogenases and to some other proteins, a phenomenon that is made use of in dye-ligand affinity chromatography.<sup>32</sup>

The question arises as to why aldehyde dehydrogenase does *not* undergo oxidative addition with the resorufin anion. This may simply reflect the unlikelihood of nucleophilic attack on a negatively charged species as opposed to a neutral one (such as resorufin dimethylcarbamate) or a positively charged one (such as methylene blue), but it may also indicate that the substrate binding site of aldehyde dehydrogenase specifically 'dislikes' anything with a negative charge. The best evidence for this comes from work with a cyclic carbamate reagent that furnishes a covalently linked *p*-nitrophenol reporter group to the active site; the  $\text{pK}_a$  of *p*-nitrophenol is normally 7.1, but when bound within the active site of aldehyde dehydrogenase it is grossly perturbed to approximately 10, showing the huge difficulty that the group has of becoming negative in this environment.<sup>33,34</sup> On the other hand, the nucleotide binding site is 'designed' to accommodate the negatively charged phosphate residues of the cofactor.

The tight binding of the resorufin anion to aldehyde dehydrogenase must be borne in mind when interpreting work on the action of this enzyme using resorufin esters. When monitoring the dehydrogenase activity, usually with a saturating concentration of  $\text{NAD}^+$ , competitive inhibition by the resorufin anion would be insignificant; however, assays of the esterase reaction inevitably will show the activity of the enzyme/resorufin anion complex (once the resorufin anion concentration becomes significant) rather than the activity of the free enzyme. Fortunately, the presence of the anion in the cofactor site seems not to affect the steady-state rate of ester hydrolysis; this is shown by the fact that  $k_{\text{cat}}$  for hydrolysis of resorufin acetate is essentially the same as that for *p*-nitrophenyl acetate.<sup>24</sup> The rate-determining step here is hydrolysis of the acetyl-enzyme intermediate (identical for both substrates), and in the case of the nitrophenyl ester this represents the activity of the 'free' enzyme since the *p*-nitrophenoxide ion has little or no tendency to bind in the cofactor site.

Aldehyde dehydrogenase does show a difference with resorufin acetate and *p*-nitrophenyl acetate as far as the pre-steady-state phase of the reaction is concerned.<sup>18,24</sup> In the case of *p*-nitrophenyl acetate, the burst of product release fits perfectly to a single exponential followed by a linear rate, but with resorufin acetate, the burst is not such a regular shape and fits somewhat better to a biphasic exponential before the linear rate becomes established. This may be because as the resorufin anion is rapidly released from the substrate site it starts to bind (perhaps equally rapidly) to the cofactor site. This could affect the burst rate constant and would definitely slightly alter the observed absorbance of the resorufin anion (see Figure 3); a combination of these effects may then account for the lack of simplicity of the burst profile.

## Concluding remarks

The work described herein has two main thrusts. First there is the fascination of elucidating the fundamental chemistry whereby compounds of resorufin interact with species of biological significance, and secondly there is the use to which this knowledge might be put in aspects of practical enzymology.

With cytosolic aldehyde dehydrogenase, the oxidative addition pathway enables the easy preparation of modified forms of the enzyme carrying large coloured labels at the active site. With the recent publication of the enzyme's three-dimensional structure,<sup>17</sup> future work will doubtless show exactly how the resorufin labels are orientated within the substrate site, confirm the closeness to the nucleotide binding site (for the observed hydride transfer from NADH), and enable the proposal put forward in Scheme 6 for the case of resorufin ethyl ether to be tested. The three-dimensional structure of the mitochondrial (Class 2) form of aldehyde dehydrogenase<sup>35</sup> shows a smaller, more constricted, substrate-binding pocket than for the cytosolic isozyme (explaining, for instance, why the bulky aldehyde retinal is an excellent substrate for the latter but not the former); it will be interesting to see if the mitochondrial isozyme is similarly sterically incapable of effective reaction with the bulky resorufin derivatives. If this reasonable expectation is borne out (and it is supported by preliminary experiments with methylene blue<sup>31</sup>), then such compounds might provide specific inactivators of the cytosolic isozyme *in vivo*. The various active metabolites of disulfiram (widely used as an 'anti-alcohol drug') react non-specifically with both cytosolic and mitochondrial forms<sup>36</sup>; an exclusive inactivation of one of the isozymes would be experimentally useful.

With regard to the assay of activity of various enzymes using resorufin compounds, the present work clearly shows that the resorufin moiety is not necessarily just an inert chromophore waiting to be released and monitored. There is always the potential for the oxidative addition pathway to occur under physiological conditions with any suitable reactive nucleophile, be it on an enzyme or on a small molecule (such as glutathione, for instance). Further complications might arise after release of the resorufin anion; the binding of this to aldehyde dehydrogenase or presumably to many other proteins could affect its quantitative spectrophotometric or fluorimetric measurement, giving misleading results. Workers with resorufin-containing substrates should bear these possibilities in mind.

*I thank those who have helped in the work reviewed here, especially Dr Kathryn Kitson. I am grateful to Mr Kai Crow for assistance with the figures.*

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# Patent Proze

by Jane Calvert and Greg Lynch

## HAZARDOUS SUBSTANCES AND NEW ORGANISMS

While a patent provides a fixed term monopoly in respect of a patented invention, the proprietor of the patent (or his or her assignee) may also need to comply with other relevant legislation. For example, a pharmaceutical company may have a patent covering a new drug. However, that company must also satisfy the requirements of the Medicines Act 1981 before it can market the drug in New Zealand.

An additional regulatory regime that can be relevant to inventions requiring the use of a hazardous substance or a new organism is the Hazardous Substances and New Organisms Act 1996 (the HSNO Act). The HSNO Act came into force for new organisms on 29 July 1998 but is not expected to come into force for hazardous substances until later this year.

The purpose of the HSNO Act is stated as being:

... to protect the environment, and the health and safety of people and the communities, by preventing or managing the adverse effects of hazardous substances and new organisms.

The HSNO Act requires the justification of the release of a hazardous substance or new organism in relation to the risk posed to humans and the environment. That justification requires a number of factors to be considered, including:

- the sustainability of all native and valued introduced flora and fauna
- public health
- the relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, valued flora and fauna and other taonga
- New Zealand's international obligations.

The HSNO Act is administered by the Environmental Risk Management Authority (ERMA) and this body is responsible for the approval of all applications under the HSNO Act. ERMA is also required to publicly notify applications for release of a hazardous substance or new organism. The notification process is intended to allow the New Zealand public to present submissions on the application.

The term "hazardous substance" is defined in the HSNO Act. It includes substances which have one or more of the following intrinsic properties: explosiveness, flammability, a capacity to

oxidise, corrosiveness, toxicity, and ecotoxicity. It also includes substances, with any one or more of these properties, which are generated on contact with air or water.

The term "organism" is also defined in the HSNO Act. It includes a micro-organism, a genetic structure (other than derived from a human) that is capable of replicating itself, and a reproductive cell or developmental stage of an organism. It also includes a genetically-modified organism.

In relation to an organism, the HSNO Act applies when the organism was not present in New Zealand prior to the commencement of the HSNO Act. An organism already present in New Zealand but previously in a containment situation will also require ERMA approval.

In relation to the importation of a hazardous substance or a new organism, it is the importer who must initiate the process of obtaining approval from ERMA. It is therefore important that any person who obtains a hazardous substance or a new organism from a distributor in New Zealand ensures that approval has been obtained from ERMA.

An application to ERMA for approval for release of a hazardous substance or a new organism may entail the submission of commercially sensitive information. However, provided that information is clearly identified as being commercially sensitive, ERMA has stated it will not release the information, including when a person makes a request for the information under the Official Information Act.

The issue of enforcement of the HSNO Act is unclear at present, particularly in relation to which agency will be responsible for enforcement. However, a person who commits an offence under the HSNO Act could face imprisonment for a term not exceeding three months or a fine not exceeding \$500,000.

It has not been possible in this *Patent Proze* to cover in detail all the provisions of this new legislation. We strongly recommend seeking further advice if you are in the business of dealing with hazardous substances or new organisms.

A reminder: if you have any queries regarding patents, or indeed any form of intellectual property, please direct them to:

*Patent Proze*, Baldwin Shelston Waters

P O Box 852, Wellington

Email: email@bswip.co.nz, Internet: www.bswip.co.nz



Jane Calvert

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



Greg Lynch

# The Colour Of Food

by Roger Whiting, Auckland Institute of Technology, Private Bag 92006, Auckland

## Introduction

The colour of food products is a vital aspect of their market appeal. Colour strongly influences the consumers' preferences for the products they see before them. Sensory science can optimise the product's market appeal but this is no use unless the product can be made to a specified colour. Therefore the maintenance of quality standards requires control of colour.

## What is Colour?

Colour is our interpretation of the response of the retina to light of various spectral properties. The relationship of this response to the physical nature of the object is complex. The spectral properties of that light entering the eye are dependent on the reflectance spectrum of the object and the spectral composition of the illuminating light. Once the light strikes the retina the wavelength sensitivities of the cells in the retina and the way they interact result in the perception of colour.

The photoreceptor cells responsible for colour vision are cone shaped and are called cones to differentiate them from other photoreceptor cells called rods, which are sensitive to light of all wavelengths. The cone shaped photoreceptor cells are of three types, each displaying maximum sensitivity to different wavelengths of light. One type has maximum sensitivity to blue light (420 nm), one to red (560 nm) and one to green (530 nm). The various colours we see depend on the relative stimulation of the three different types of cones. Thus only three independent parameters are enough to specify any colour.

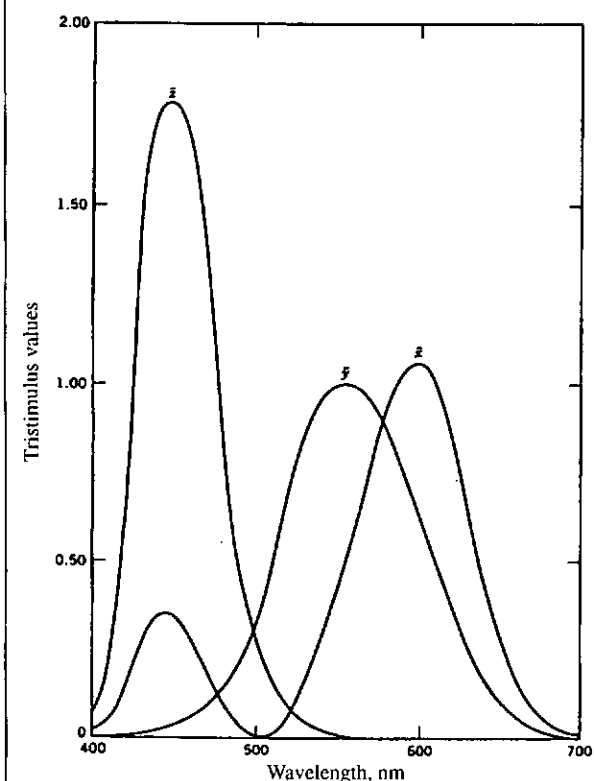
## How is it Described?

When describing colour in terms of three parameters, the question arises of what parameters to use. The obvious choice would seem to be the spectral sensitivities of the three types of cone. However the subtlety of the interactions between the cones is such that for some colours it is the difference in stimulation of the different receptors that gives the colour. Thus the optimum set of primary colours to describe the response of the eye is the CIE (Commission International de l'Eclairage) Standard Colorimetric Wave Functions  $x$ ,  $y$  and  $z$ . These can then be used to match any colour.

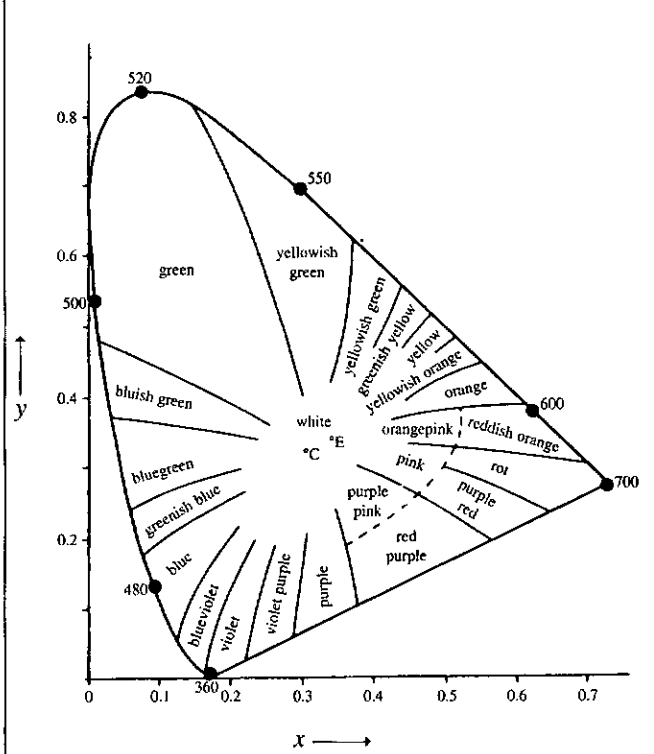
Three numbers  $X$ ,  $Y$  and  $Z$  give the relative amounts of wavefunctions  $x$ ,  $y$ ,  $z$  needed to describe a particular colour. Plotting  $X$ ,  $Y$  and  $Z$  on a three-dimensional graph produces a COLOUR SPACE. However describing colours by  $X$ ,  $Y$  and  $Z$  is not particularly useful as it mixes together CHROMATICITY and LIGHTNESS. These are two important aspects of the visual appearance of objects. Chromaticity is the colour of the object. Lightness is how much light is coming from the object.

Chromaticity and lightness can be separated. The length of the vector from the origin to  $X$ ,  $Y$  and  $Z$  describes lightness. It has the symbol  $Y$ . The ratio between  $X$ ,  $Y$  and  $Z$  describes chromaticity. This is constant along the vector so it can be described by the point the vector passes through the plane  $X+Y+Z = 1$ . The symbols  $y$  and  $x$  describe this point. This colour space is known as  $Yxy$ . All colours available to the human eye are within the  $xy$  plane and their lightness are described by a how far above (light) or below (dark) the colour is.

CIE colorimetric observer wavefunctions



CIE-chromaticity diagram



Some typical food items gave the following colours in the Yxy colour space.

Braeburn Apple (red side)	- Y = 12.5, x = 0.464, y = 0.340
Braeburn Apple (green side)	- Y = 27.2, x = 0.399, y = 0.422
Cookie	- Y = 17.0, x = 0.433, y = 0.396
Blueberries	- Y = 4.0, x = 0.316, y = 0.326

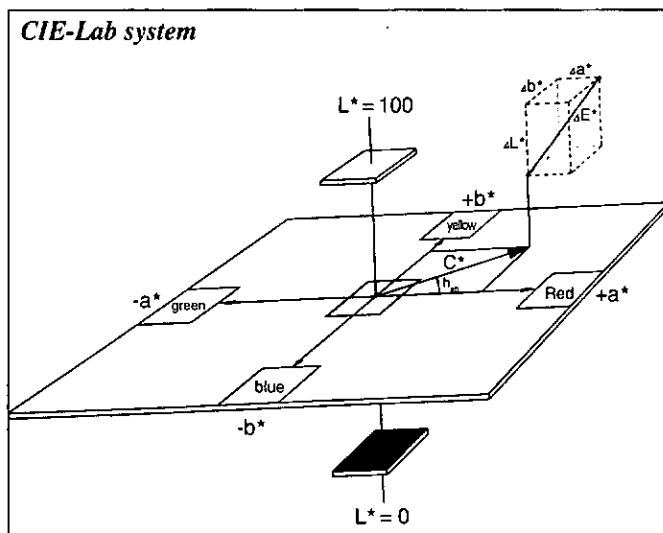
The Yxy colour space does not follow some intuitive ways we tend to think about colour. For example on the xy plane the point of no colour (white or grey) is around x=0.3, y=0.3 rather than a more intuitive 0,0. Also people who work a lot in colour matching tend to think in OPPONENT colours for example blue is the opposite of yellow. The Lab colour space describes colour in these terms.

### Lab Colour Space

In the Lab colour space the parameter L describes lightness and two parameters, a and b, describe the colour. The parameter a is a measure of how red (+ve) or green (-ve) the object is while b describes how blue (+ve) or yellow (-ve) it is. The same food items gave the following readings in the Lab colour space.

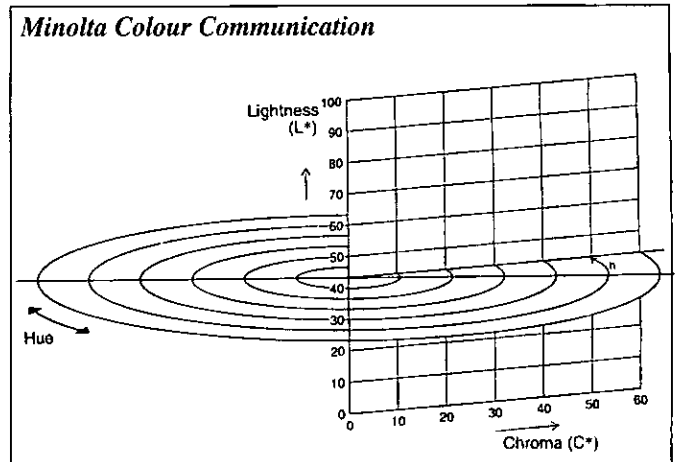
The same foods as before gave these readings in the Lab system

Braeburn Apple (red side)	- L = 40.5, a = 34.2, b = 16.4
Braeburn Apple (green side)	- L = 58.4, a = 0.00, b = 34.0
Cookie	- L = 49.1, a = 13.2, b = 29.8
Blueberries	- L = 23.9, a = 1.4, b = 0.00



### LCh Colour Space

The simple concept of a colour wheel that artists use is the basis for another way of thinking about colour. In this case, as before, three parameters can describe the colour of the object. These are the position on the colour wheel (HUE), how intense the colour is (CHROMA) and how light or dark the colour is (LIGHTNESS). Hue can be described as an angle between the object's position on the colour wheel and some arbitrary point on the wheel as measured at the centre. Chroma is the distance of the object colour from the centre of the wheel. The line vertically through centre of the wheel is the line of neutral greys running from white (+ve) to black (-ve). This gives the LCh colour space. This colour space is effectively the same as the Lab colour space but has some advantages when considering how people see differences in colour.



The same food items as before gave these readings in the LCh system

Braeburn Apple (red side)	- L = 40.5, C = 37.9, h = 51.2
Braeburn Apple (green side)	- L = 58.4, C = 0.00, h = 34.0
Cookie	- L = 49.1, C = 32.6, h = 132.3
Blueberries	- L = 23.9, C = 1.4, h = 0.0

### Measuring Colour

Over the last fifty years there have been a number of instruments developed to measure colour. Among the first of these was the HunterLab colour difference meter that really helped to establish the Lab colour system among non-specialists.

More recently there have appeared a number of TRISTIMULUS COLORIMETERS on the market. The most common instruments on the New Zealand market are those produced by Minolta. Another range of instruments available are those by Dr Lange. The operation of the instruments is similar. Reading the colour of the sample flashes a Xenon tube. The light from the Xenon lamp passes through a diffuser to illuminate the sample. Light then coming back from the sample passes up a fibre optic cable to three filters. These match the three CIE tristimulus wave functions and measuring the light through each filter gives X, Y, and Z for that object. The instrument then calculates from X, Y, and Z the colour of the object in terms of Yxy, Lab or LCh.

The on-board information processing allows the comparison of the colour to a standard and calculates the difference.

One option available on some instruments is the choice of illumination. The standard illuminant for most colour measurements is known as D65. This is a very close approximation to normal indirect daylight. However it is not uncommon for samples that match under one form of illumination to appear different under another. This phenomenon is known as METAMERISM. It occurs when the reflectance spectra of two samples are similar but different. Remember that the reflectance spectrum of the object and the spectrum of the illuminating light are important in the perceived colour of the object. Thus under one illuminant the differences in reflectance spectra may not be noticeable but under another they may become more apparent. By changing the illuminant to, say CIE C which approximates a tungsten filament lamp, it is possible to check for metamerism. In a number of situations, consumers will make their choice of purchase under incandescent lamps and hence it may be the more critical to match the colour under this illumination.

Both instrument manufacturers also produce a colour spectrophotometer. This type of instrument records the reflectance spectrum of the sample. It can then calculate the apparent colour of the sample under any standard illuminant.

### Measuring Food Colours

Food products are not easy items for colour measurement. Often the colour varies across the object. For example a Braeburn Apple is red on one side and green on the other and bread is dark on top and pale underneath. So the question arises "where is the colour measured". Food items have a structure and texture not easily presented to the instrument, for example blueberries. Thus inventive ways have to be found to measure and specify the colour of food items.

**Powders** - measuring the colour of powders can be difficult as the colour can vary with the particle size and the density of the packing. Fortunately powdered food products usually have well-controlled particle size distributions so the problem just remains one of packing. The simplest solution seems to be to pour the powder into petri dish and measure the colour from the bottom but ensuring that no stray light enters through the transparent bottom of the dish. Alternatively one can fill the petri dish and scrape off the excess with a straight edge. Then measure the colour of the powder from the top but ensuring that the powder does not push up into the measuring head of the instrument.

**Lump Products** - These are items with sizes about 1 cm to 2 cm for example dog pellets or blueberries. These are best measured using an instrument with a wide field of view. The product is placed in a container with a transparent bottom and then shaken gently to ensure the densest packing without damage. The colour is then measured through the transparent window in the bottom of the container.

**Liquids** - These can be transparent or opaque. The colour of opaque liquids such as paint can be measured by placing in a petri dish and measuring from underneath. Again stray light can be a problem. If the product is translucent it can seem darker due to light lost by reflections inside the petri dish. Using a wide view instrument can avoid this problem. Alternatively the liquid can be covered in cling film and the sample measured from the top. This is good for thick products such a Guacamole. Transparent liquids are more difficult and require an instrument that can measure the transmission of light through the product more in the nature of a spectrophotometer.

### Conclusion

The use of the tristimulus colorimeter has made routine determination of colours much easier. However the colour of food products is difficult to measure because of variable colour and the complex textures that are an integral part of their appeal. In spite of this the use of these instruments is growing. Therefore there will be a need for a more precise knowledge of how colour is perceived and communicated.

### Further Reading

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## International Chemistry Celebration 1999

The International Chemistry Celebration for 1999 is now well underway. In New Zealand, the celebration will focus on the week of 11-17 September 1999.

In addition to events that will be held locally (contact your local NZIC representative or the regional coordinator listed on the web site below), there will be a number of national events. The events will be coordinated with the assistance of the Science and Technology Promotion Programme of MoRST, FRST, HRC and RSNZ.

Details of all national events are available at the Chemistry Week Web Site ([www.chem.canterbury.ac.nz/ichc.htm](http://www.chem.canterbury.ac.nz/ichc.htm)) or by contacting the national coordinator:

Dr Owen J Curnow

Department of Chemistry

University of Canterbury, Private Bag 4800, Christchurch

Email: [o.curnow@chem.canterbury.ac.nz](mailto:o.curnow@chem.canterbury.ac.nz)

Phone: (03) 3642819, Fax: (03) 3642110

The major international focus is on polymers, probably the most important new class of materials that chemists have produced this century, and there is an international program entitled "A World of Colour: An International Search for Natural Dyes" in which young people will be encouraged to investigate indigenous natural dyes.

Other programs and events are:

(i) A competition for Form 1-4 students to use their natural dyes, found using the "World of Color" program, and create a new National flag.

(ii) The national short story competition will be run again this year with sponsorship from Baldwin Shelston Waters. See the Chemistry Week web site for details and last year's winning stories.

(iii) A National Chemistry Challenge for 6th and 7th formers will involve regional competitions throughout New Zealand with a final in Wellington during Chemistry Week.

(iv) A crystal growing competition is being organised by Dr Bill Henderson (University of Waikato).

(v) David Katz and John Nicholson will be touring New Zealand after the CHEM-ED 99 conference and will be speaking on "The Chemistry of Toys" and "Chemistry into the Community", respectively.

(vi) Local activities! Some of the activities in Canterbury, for example, will be a colourimetry competition and a "Crazy Chemistry Show".

# HPLC, IC AND LC-MS FEATURE

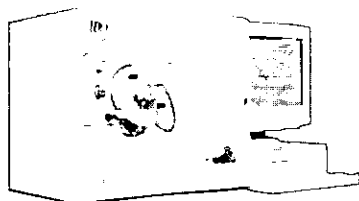
## NEW SUMMIT HPLC SYSTEM COMBINES INGENIOUS CHROMATOGRAPHY SOFTWARE WITH HIGH PERFORMANCE HARDWARE



A.i. Scientific announces the release of Dionex's new SUMMIT HPLC System and CHROMELEON software. A Summit HPLC system can be configured with a low pressure or high pressure gradient pump, a variety of detectors, including a diode array or four-channel UV-visible detector and a versatile autosampler. All components were designed using the latest technology and are reliable, rugged, easy to use and offer the best in performance. Chromeleon chromatography software runs the Summit HPLC system and can also monitor and control a number of other LC and GC systems. For managing data and sample information Chromeleon has an integrated SQL database. Chromeleon software uses a client/server architecture and can therefore be operated in a network environment, LAN, WAN or linked via ISDN or modem. A client assigned appropriate privileges can monitor and control instruments and access data on any server. In this way Chromeleon is more than a data system, it is a chromatography information management system.

Contact: Mark Albertson, A.i. Scientific (NZ) Ltd  
P O Box 35579, Browns Bay, Auckland  
Phone: (09) 4781351, Fax: (09) 4781360  
Email: aiscinz@ihug.co.nz  
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## INTRODUCING LCQ DUO: AFFORDABLE LC/MS/MS IN A NEW COMPACT FOOTPRINT



The new LCQ Duo is a compact benchtop ion trap LC/MS based on the LCQ mass spectrometer, the world's best selling LC/MS ever.

The LCQ Duo provides both MS and MS/MS at a price that is now comparable to single stage mass spectrometers.

Along with providing a full-scan spectrum, the LCQ Duo provides the analytical chemist with a full-scan MS/MS spectrum that may be searched against a commercial or customised library. A higher resolution (ZoomScan) may also be employed for unambiguous charge-state determination and molecular weight confirmation.

In addition, Photo Diode Array (PDA) data can also be acquired and processed along with the mass spectrometry data within the powerful Xcalibur software data system. The selectivity of MS/MS also provides for low level quantitative performance within complex matrices. A full-scan MS/MS spectrum acquired during the quantitation experiment guards against false-positives while providing a full "spectrum" of ions for greater quantitative flexibility.

The LCQ Duo offers the analytical chemist a low cost, compact, easy-to-use powerful LC mass spectrometer detector that retains the notable reliability of proven LCQ ion trap technology.

### *Quantitation on the LCQ Duo*

Among the best features of the classic LCQ maintained by the LCQ Duo is identical full-scan MS/MS quantitative sensitivity and dynamic range. Full-scan MS/MS gives the chemist the flexibility to quantitate on a variety of ions and provides a library searchable spectrum.

### *Peptide Sequencing*

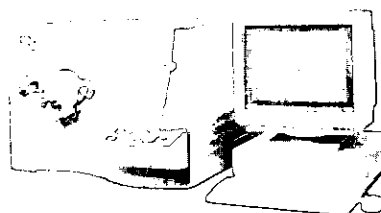
Since the introduction of the LCQ, the "triple play" combined with the SEQUEST library search has revolutionised the science of peptide sequencing.

The new and exciting LCQ Duo maintains most of the scanning functions and the identical sensitivity of the extremely successful LCQ and comes fully equipped with the powerful Xcalibur data software system. With a significantly smaller footprint and a simplified user interface, the LCQ Duo has been designed to put both MS and library searchable MS/MS within the arsenal of detectors available to the liquid chromatographer.

To find out if the LCQ Duo is the correct LCMS for your laboratory,

Contact: Stuart Tyler, Alphatech Systems Ltd  
Phone: (09) 3770392, Fax: (09) 3098514  
Email: sales@alphatech.co.nz  
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## INTRODUCING LCQ DECA: ULTIMATE HIGH SENSITIVITY, HIGH PERFORMANCE LC/MS



# HPLC, IC AND LC-MS FEATURE

The LCQ Deca is a high sensitivity, research grade LC/MS<sup>n</sup> ion trap mass spectrometer that sets new standards for high performance benchtop LC/MS.

## New Generation Performance

With the proven reliability of more than 1,000 LCQ systems installed worldwide, LCQ Deca extends its reach to surpass all other sophisticated MS systems.

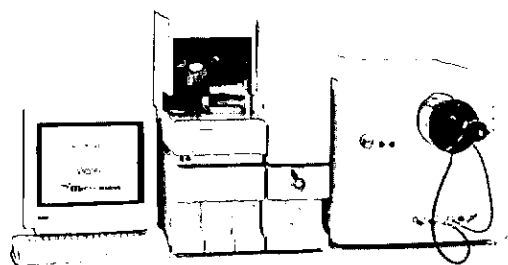
The LCQ Deca is more sensitive in acquiring full-scan LC/MS/MS data than all other quadrupole mass spectrometers, and in the analysis and identification of oligomers (peptides, proteins, oligonucleotides, carbohydrates, etc.), there is simply no more sensitive instrument available.

For the LC/MS researcher who needs high flexibility and ultra-high sensitivity in a problem-solving environment, LCQ Deca is a research grade mass spectrometer that can tackle the most complex of chemical structure elucidation and mixture analysis problems.

Find out how the LCQ Deca can make a difference in your laboratory,

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## ALPHATECH SYSTEMS LTD INTRODUCES THE NEW WATERS LIQUID CHROMATOGRAPHY SYSTEM

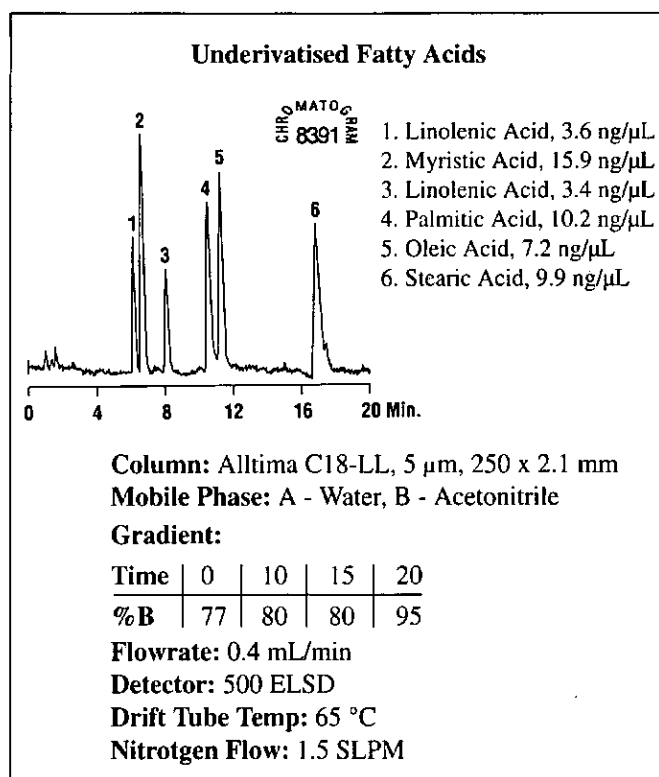


Waters' CapLC System is a fully automated, integrated capillary LC system designed to perform reliable, accurate and exceptionally reproducible analyses for researchers performing proteomic studies, such as target identification, and pharmacokinetics. The Waters CapLC/MS System seamlessly combines binary gradient solvent delivery (with ternary option), automated XYZ sample management, column heating, PDA detection and MS interfacing capabilities, plus Micromass MassLynx system control software.

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Alphatech Systems Ltd  
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## FATTY ACID ANALYSIS

Evaporative light scattering detection (ELSD) from Alltech is a powerful tool for the HPLC analysis of poor UV chromophores, such as fatty acids. The versatile ELSD detects any sample less volatile than the mobile phase, eliminating common problems with RI and UV detection. The ELSD's response does not depend on the sample's optical characteristics. It detects any compound in the sample, regardless of its functional groups. Non-chromophoric compounds are detected even at low concentrations. Unlike RI and low wavelength UV, the ELSD is compatible with multi-solvent gradients for improved resolution and faster separations.



The ELSD nebulises the column effluent into a fine mist which then passes through a heated drift tube where the mobile phase is evaporated. Remaining sample particles scatter laser light which is detected by a silicon photodiode. Sensitive and universal ELSD makes any HPLC system more useful.

Contact: Alltech Associates  
Toll Free: 0800 255832  
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## FROM COMPONENTS TO SYSTEMS, MORE CHOICES FROM VARIAN OFFER BETTER HPLC SOLUTIONS

A.i. Scientific announces the release of Varian's innovative ProStar HPLC System and Star software. ProStar modules can be fully integrated and fully automated or operated as intelligent stand-alone units. ProStar pump heads are easily changed for flow-range flexibility and minimal pulsation ensures flat

# HPLC, IC AND LC-MS FEATURE

baselines at high sensitivities. ProStar detectors provide optimal performance with a wide range of flow cells for diverse applications. For quick maintenance the autosampler needle, injector valve and syringe are all easily accessible. ProStar modules can be upgraded to meet your every-changing demands.

Because not all applications are the same, ProStar modules are designed to fit your specific need. To get the right HPLC system for your laboratory, you can choose a preconfigured system or choose each module individually to configure the system for your specific needs. And because each module can be specialised with options for your particular application, any separation need can be covered.

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Email: aiscinz@ihug.co.nz  
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## NEW HP 1100 SERIES REFRACTIVE INDEX DETECTOR OFFERS UNPRECEDENTED THERMAL STABILITY

Hewlett-Packard Company has introduced the HP 1100 Series refractive index detector (RID) for high-performance liquid chromatography, which offers unrivalled sensitivity, reproducibility and productivity, and is ideal for the routine analysis of non-UV absorbing substances in food and polymer industries.

### *High Sensitivity and Reproducible Results*

This detector breaks new ground in RID sensitivity. In carbohydrate analysis, for example, sucrose amounts as low as 10 nanograms can be detected. Low limits of detection allow the injection of small amounts of sample, saving sample preparation time and extending column life.

The detector's design is based on electronic temperature control and countercurrent heat exchangers, enabling the device to maintain a steady temperature of up to 55° C in the optical unit and the flow cells. As a result, the unmatched thermal and electronic stability ensure consistent and reproducible results, which are required when polymers are analysed by gel-permeation chromatography (GPC).

### *Warmup in Less Than an Hour for High Productivity*

The thermal design of the detector typically allows initial setup in less than two hours. For fast startup, the warmup of the module generally takes less than an hour. In order to avoid warmup time at all, a solvent-recycle valve can be switched on to keep the detector ready to start at the proper operating conditions and to save on solvent costs.

### *Complete Solutions*

For easy startup, HP offers complete solutions configured for specific HPLC applications. Each system comes with a startup kit containing an application-specific column, reference

standards and an application note describing the setup procedure and performance data. With the HP1100 Series RID, this includes a HP 1100 Series GPC analysis system and a HP 1100 Series carbohydrate analysis system.

Contact: Medtec Products Ltd  
P O Box 34-241, Birkenhead, Auckland  
Freephone: 0800 2 MEDTEC (0800 263383)  
Phone: (09) 4791068, Fax: (09) 4791450  
Email: phermans@medtec.co.nz  
Website: www.medtec.co.nz  
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## NEW HP 1100 SERIES CARBOHYDRATE ANALYSIS SYSTEM PROVIDES SENSITIVE AND RELIABLE FOOD ANALYSIS

Hewlett-Packard Company has introduced the HP 1100 Series carbohydrate analysis system, designed for sensitive and reliable food analysis. The system is based on the robust HP 1100 Series high performance liquid chromatography (HPLC) modules and the easy-to-use HP ChemStation.

It comes with a start-up kit consisting of start-up procedure, calibration standards and an application-specific column. Alternative kits for separation of monosaccharides, disaccharides and oligosaccharides and sugar alcohols by ion exchange or reverse-phase chromatography are available. These complete systems allow detection limits as low as 10 ng sucrose.

The thermal stability of the new HP 1100 Series refractive index detector ensures low short- and long-term noise. Therefore, low limits of detection can be achieved. The excellent flow precision of the HP 1100 Series solvent delivery system ensures retention time precision below 0.1 percent relative standard deviation (RSD). Peak area repeatability depends on concentration levels. HP ChemStation Plus software's intuitive user interface makes it easy to set up methods and automatically obtain reports. Results and reports can be stored and retrieved in an optional database.

A complete system includes the following:

- HP 1100 Series degasser;
- HP 1100 Series isocratic pump;
- HP 1100 Series autosampler;
- HP 1100 Series thermostatted column compartment;
- HP 1100 Series refractive index detector; and
- HP ChemStation Plus.

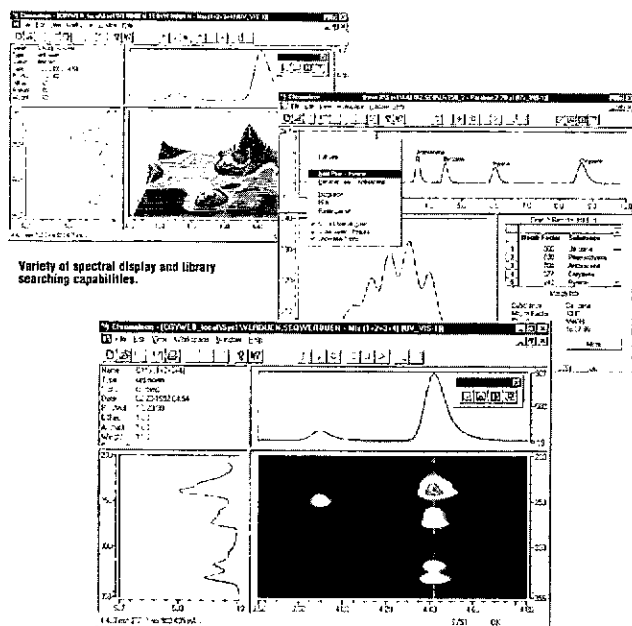
The HP 1100 Series carbohydrate analysis system offers users the following benefits:

- low limits of detection for carbohydrates
- proven and reliable hardware
- easy-to-use HP ChemStation Plus
- a complete set of documentation on the analysis procedure for minimal training needs and
- complete post-sales support for high uptime.

# HPLC, IC AND LC-MS FEATURE

Contact: Medtec Products Ltd  
P O Box 34-241, Birkenhead, Auckland  
Freephone: 0800 2 MEDTEC (0800 263383)  
Phone: (09) 4791068, Fax: (09) 4791450  
Email: phermans@medtec.co.nz  
Website: www.medtec.co.nz  
circle number 28 on the reader reply card

## NEW CHROMELEON CHROMATOGRAPHY DATA SYSTEM - A MASTER OF ADAPTABILITY



A.i. Scientific is proud to introduce the Chromeleon™ chromatography data system, building on their established leadership in chromatography data management. With a built-in SQL database, an easy-to-use browser and client/server architecture, Chromeleon adapts itself to the wants and needs of the user. All data pertinent to a sample or group of samples is automatically indexed and stored in the database and can be easily queried.

Chromeleon adapts easily to the existing computing and laboratory environment. The software not only runs the Dionex Summit HPLC system but can also monitor and control a number of different LC and GC systems. Chromeleon uses client/server architecture and can therefore be operated in a network environment for large, multi-user installations. For easy automated validation Chromeleon has built-in software installation qualifications and instrument performance qualification.

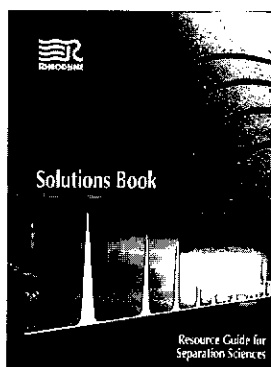
A real-time audit trail monitors and stores all GLP relevant operations. Sample protocol audit trails track any recorded change to individual samples, sequences or even entire data sources.

When used with the Summit HPLC, Chromeleon has the most comprehensive and easy-to-use PDA software support of any

system. Fast and simple purity criteria for every peak is provided by the PPI (peak purity index) in an easy to interpret graphical form. Using the spectral library search routine, positive peak identification is fast and easy. The results of a spectral library search can even be used to generate the peak table. Flexible display capabilities for spectra, isoabsorbance plots and 3D chromatograms make it easy to view data and compare the results from different samples. A powerful report publisher lets the user create their own or edit a variety of default report designs. For more customised result reporting, the Chromeleon report publisher has all the functions of a sophisticated spreadsheet program. Summary reports can also be generated automatically or on demand.

Contact: Mark Albertson, A.i. Scientific (NZ) Ltd  
P O Box 35579, Browns Bay, Auckland  
Phone: (09) 4781351, Fax: (09) 4781360  
Email: aiscinz@ihug.co.nz  
circle number 29 on the reader reply card

## NEW SOLUTIONS BOOK FROM RHEODYNE "RESOURCE GUIDE FOR SEPARATION SCIENCES"



Rheodyne, has just published a new *Solutions Book*, a guide for all analysts in separation sciences. This free, full-colour, 72-page volume contains Rheodyne's fluidics solutions for running common laboratory applications.

Rheodyne's *Solutions Book* provides much more than traditional product catalogues. The *Solutions Book* now equips analysts with clear system

illustrations of their most commonly used laboratory applications outlining the fastest and best system set-up using Rheodyne's suggested products. The additional product section details all of Rheodyne's solution-providing automated and manual products.

Contact: Rheodyne, L P  
P O Box 1909, Rohnert Park, CA 94927-1909, USA  
Phone: (+1-707) 5882000, Fax: (+1-707) 5882020  
Website: www.rheodyne.com  
circle number 30 on the reader reply card

## NEW HYDROXIDE SELECTIVE ANION EXCHANGE COLUMN FOR INORGANIC ANIONS

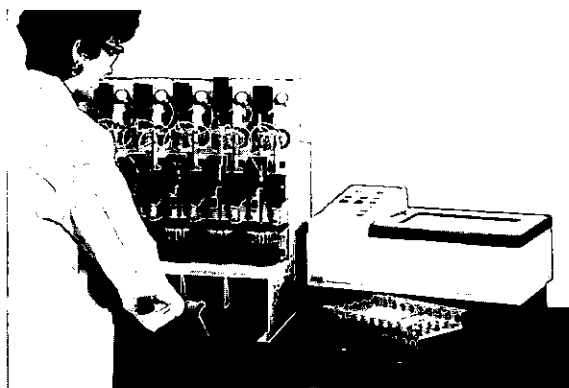
A.i. Scientific announces the release of Dionex's new IonPac AS17 column designed for 10 minute gradient separation and suppressed conductivity detection of inorganic anions. The AS17 separates faster, more selectively and more reliably than other columns on the market. It is optimised for use with the EG40 Eluent Generator, which automatically generates potassium hydroxide eluents from water, making gradient

# HPLC, IC AND LC-MS FEATURE

separations as easy as isocratic runs. The AS17 column can be used to analyse fluoride, acetate, chloride, nitrite, bromide, nitrate, carbonate, sulfate and phosphate in diverse sample matrices such as drinking water, wastewater, industrial cooling waters, power plant waters, scrubber solutions, food, beverages, polymers and pharmaceutical preparations. The selectivity of the AS17 provides excellent column retention of fluoride from the water dip and baseline resolution of fluoride, acetate, propionate and formate. Also the column is solvent compatible, allowing easy column clean-up after the analysis of complex matrices.

Contact: Mark Albertson, A.i. Scientific (NZ) Ltd  
P O Box 35579, Browns Bay, Auckland  
Phone: (09) 4781351, Fax: (09) 4781360  
Email: aiscinz@ihug.co.nz  
circle number 31 on the reader reply card

## ZYMARK'S RAPIDTRACE



Zymark's RapidTrace offers a way to tailor an automated SPE system to fit to your laboratory demand(s).

Developments in SPE allow for better sample preparation but without automation of SPE these methods can be time consuming, expensive and difficult to reproduce.

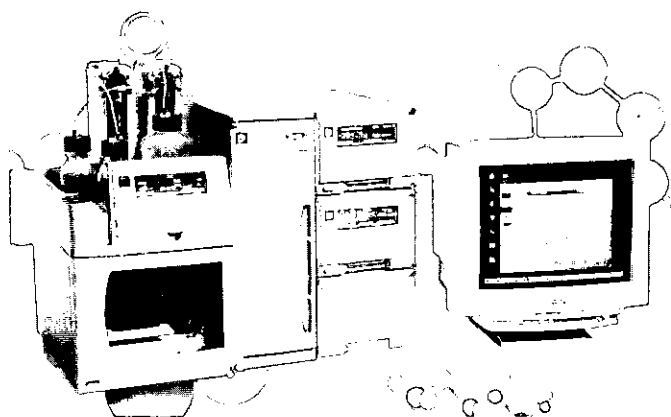
Zymark's RapidTrace is a truly modular system that allows you to match the number of modules you need to your laboratory requirements. RapidTrace modules are attached to a PC or laptop for methods development and programme running and up to 10 modules run simultaneously off the same computer and software.

Combined with the RapidTrace is the Turbovap LV Workstation for automated evaporation and concentration. This combination of RapidTrace and Turbovap LV allows your laboratory to keep up with the rapid analytical instruments, enabling faster sample turnaround and lower laboratory operating costs.

To find out if Zymark's automated technology for sample preparation will help your laboratory,

Contact: Stuart Tyler, Alphatech Systems Ltd  
Phone: (09) 3770392, Fax: (09) 3098514  
Email: sales@alphatech.co.nz  
circle number 32 on the reader reply card

## A REVOLUTIONARY APPROACH TO AMINO ACID DETERMINATION



A.i. Scientific is proud to announce the introduction of Dionex's new AAA-Direct Amino Acid Analysis System. Unlike existing techniques, amino acids can now be separated by high performance anion exchange chromatography and detected by pulsed electrochemical detection without requiring pre- or postcolumn derivatisation.

Common amino acids can be determined directly along with amino sugars, phospho-amino acids and simple sugars in one run. This is a unique capability that is not feasible using other systems. The AAA-Direct system incorporates a high performance microbore (2 mm id) anion exchange column, the Dionex AminoPac PA10, which has been designed specifically for high resolution anion exchange separations of amino acids.

Detection sensitivity is comparable with precolumn derivatisation techniques and is about 50-fold better than ninhydrin-based analysers. Response is linear over 3.0 orders of magnitude in most cases. Quantitative results show good agreement with cation exchange/ninhydrin-based amino acid analysis.

Excellent run-to-run reproducibility and stability of detector response and retention times has been demonstrated for both amino acid standards and real-world samples, including protein and peptide hydrolysates, soil extracts and a variety of food and beverage samples. The AAA-Direct system is also ideal for monitoring large scale cell cultures and fermentation broths used in the production of protein and peptide-based therapeutics, since amino acids and carbohydrate nutrients can be determined simultaneously.

Contact: Mark Albertson, A.i. Scientific (NZ) Ltd  
P O Box 35579, Browns Bay, Auckland  
Phone: (09) 4781351, Fax: (09) 4781360  
Email: aiscinz@ihug.co.nz  
circle number 33 on the reader reply card

# Exemptions From The Provisions Of The HSNO Act For Small-Scale Chemistry

## Introduction

Section 33 of the HSNO Act enables small-scale chemistry to be exempt from the provisions of the Act.

**33. Exemptions from the provisions of the Act for small-scale chemistry** - Nothing in this Act shall apply to any small-scale use of hazardous substances in scientific investigations or teaching if:

- a The experiment is carried out in a laboratory which meets the prescribed requirements; and
- b The experiment does not create or use a substance for which any application for approval has been declined under this Act.

This following information outlines a number of the issues that arise from this section.

## Synthesis of Hazardous Substances

Substances synthesised in research or teaching laboratories and which have hazardous properties are exempt from the requirement to make application under the HSNO Act when the experiment is being carried out in a laboratory that meets the requirement prescribed in regulations set under section 140 (1) (g) of the Act.

An example of this is a toxic substance which is synthesised and used by a researcher in a university laboratory, that meets the prescribed requirements, as part of a study on the development of control agents for possums.

## Small-Scale Use

There is no statutory interpretation of "small-scale" use. The determination of this will be a judgement by the Authority based on risks posed by the substance. However, applicants are referred to *AS2243:10 (1993) Safety in Laboratories: Storage of Chemicals* as a means of interpreting "small-scale". Section 4.3.1 of this standard refers to the size of individual packages for hazardous substances kept for use in a laboratory. Over time more detailed guidance on small-scale use will be provided.

## Scientific Investigation or Teaching

"Scientific investigation" is interpreted in its broadest sense to mean investigations carried out according to scientific rules for performing observations and testing the soundness of conclusions, in a systematic, accurate manner assisted by expert knowledge. Such investigations need not be carried out only in scientific institutions but by other organisations and individuals provided they meet the meaning above and are carried out in a laboratory which meets the prescribed requirements.

Teaching means, in its primary sense, the transfer of knowledge or understanding from one party to another by means of instruction, training or lessons. In addition, in a secondary sense, teaching can also have an applications to include commercial activities where information on products and processes are transferred to staff, suppliers or clients.

The obvious examples of teaching are the activities of schools, universities, polytechnics and other institutions carrying out laboratory classes or workshops.

## Suppliers of Specialist Hazardous Substances

Many scientific investigations and teaching activities require the use of specialist laboratory chemicals that are hazardous substances. These are not usually manufactured in New Zealand and must be imported, often in quite small quantities. Where the import is made directly by the laboratory or institution carrying out the investigation or teaching activity the exemption from the provisions of the Act apply. Importation may be made without an approval to import from the Authority provided the laboratory meets the prescribed requirements.

However, few institutions undertake such importation directly and most order these substances from specialist suppliers. Where a specialist supplier is in receipt of a purchase order for a hazardous substance from an institution or laboratory that meets the prescribed requirements, the supplier can import that substance (in the amount specified in the purchase order) without having to obtain an approval to import from the Authority. The supplier, through the purchase order, is regarded as being an agent of the laboratory.

This means that importation of hazardous substance for uses other than those that qualify for exemption requires an approval from the Authority prior to the importation.

## Prescribed Laboratory Requirements Regulation

ERMA New Zealand has received advice from the Ministry for the Environment that the prescribed laboratory requirements regulation will be a performance-based regulation and will reflect the main elements of the 3rd Schedule (Part III) of the Act "Matters to be addressed by containment controls for contained Hazardous Substances". The likely consequence of this is that any laboratory that operates a quality system such as:

- ISO9002
- ISO Guide25
- AS/NZS2243 Safety in Laboratories
- Code of Practice on the management of substances hazardous to health

will be able to readily meet the prescribed requirements.

# CONFERENCES & SEMINARS

31 May - 4 June 1999

## **4th International Symposium on Functional Dyes**

**Venue:** Osaka, Japan  
**Contact:** Professor Yasuhiko Shirota  
Faculty of Engineering, Osaka University  
Yamadaoka, Suita, Osaka 565-0871, Japan  
Tel: (+81-6)-8797364  
Fax: (+81-6)-8777367  
Email: isfd@chem.eng.osaka-u.ac.jp

3-6 June 1999

## **Heleco '99**

A conference and exhibition focusing on environmental technology for the 21st century, Heleco '99 will be divided into five topic areas - water, atmosphere, solid waste, environmental management, and urban design and the environment.

**Venue:** Thessaloniki, Greece  
**Contact:** Horizon  
14 Nikis Street, 105 57 Athens, Greece

7-10 June 1999

## **3rd International Symposium on Molecular Mobility and Order in Polymer Systems**

**Venue:** St Petersburg, Russia  
**Contact:** Symposium Chairman  
Professor A A Dariskii  
Mrs I Kovalenko  
Institute of Macromolecular Compounds  
Bolshoy pr. 31, St Petersburg, 199004 Russia  
Tel: (+7-812)-2132907  
Fax: (+7-812)-2186869  
Email: IMC@macro.spb.su

8-10 June 1999

## **ET'99**

Integrated event covering management, technology and services in the water, waste and environmental sectors.

**Venue:** Birmingham, England, United Kingdom  
**Contact:** Jim Hughes  
Reed Exhibition Companies  
Oriel House, 26 The Quadrant, Richmond  
Surrey TW9 1DL, England, United Kingdom

8-11 June 1999

## **International Food Machinery & Technology Exhibition (FOOMA Japan '99)**

**Venue:** Tokyo International Exhibition Center,  
Tokyo, Japan  
**Contact:** Secretariat of the International Food Machinery  
& Technology Exhibition (FOOMA Japan)  
Kasumigaseki Bldg. 12F, 3-2-5, Chiyoda-ku  
Tokyo 100-6012, Japan  
Tel: +81-3-35037661  
Fax: +81-3-35037620

10-11 June 1999

## **Environmental Risk Management Authority New Zealand Annual Conference**

**Venue:** Wellington, New Zealand  
**Contact:** Karen Cronin  
ERMA New Zealand  
Tel: (+64-4)-4964826

11-14 June 1999

## **21st International Exhibition on Environmental Technologies**

**Venue:** Seoul, Korea  
**Contact:** Korea Environmental Preservation Association  
Seoul CCI Bldg, 497-66, Tapshimni 5 Dong  
Dongdaemun-Ku, Seoul, Korea  
Tel: (+82-2)-22495265 (ext 3)  
Fax: (+82-2)-22495267  
Email: kepa@hitel.net

20-25 June 1999

## **CHEMRAWN XII - African Food Security and Natural Resource Management: The New Scientific Frontiers**

**Venue:** Nairobi, Kenya  
**Contact:** Dr Pedro Sanchez  
International Centre for Research in Agroforestry  
P O Box 30677, Nairobi, Kenya  
Tel: (+254-2)-521003  
Fax: (+254-2)-520023  
Email: p.sanchez@cghnet.com

26 June - 1 July 1999

## **World Conference on Science**

**Venue:** Budapest, Hungary

27-30 June 1999

## **CHEM-ED 99. Biennial Conference of New Zealand Chemistry Educators - Chemistry: Unravelling Mysteries**

**Venue:** University of Waikato, Hamilton, New Zealand  
**Contact:** Bev Cooper  
c/- School of Education, University of Waikato  
Private Bag 3105, Hamilton  
Tel: (+64-7)-8384382  
Fax: (+64-7)-8384555  
Email: bcooper@waikato.ac.nz

28 June - 2 July 1999

## **International Memorial K I Zamaraev Conference on Physical Methods for Catalytic Research at the Molecular Level**

**Venue:** Novosibirsk, Russia  
**Contact:** Professor V N Parmon  
Boreskov Institute of Catalysis  
5, Prosp. Akad. Lavrentieva  
Novosibirsk, 630090, Russia  
Tel: (+7-383)-2343269  
Fax: (+7-383)-234056  
Email: parmon@catalysis.nsk.su

3-7 July 1999

## **IV Liquid Matter Conference**

**Venue:** University of Granada, Granada, Spain

# CONFERENCES & SEMINARS

The Conference is sponsored by the European Physical Society and the University of Granada. The scope of the IV Liquid Matter Conference is rather broad and the program is based on the following twelve Symposia, entitled: simple liquids and solutions, classical and quantum; molecular liquids and reaction dynamics; ionic liquids and liquid metals; liquid crystals; polymers, polyelectrolytes and gels; colloids, surfactants, emulsions and foams; membranes and biological liquids; fluids in confined geometries, films and interfacial phenomena; supercooled liquids and glasses; phase transitions and nucleation phenomena; rheological properties of liquids; and powder and other granular matter.

**Contact:** Professor Dr Roque Hidalgo-Álvarez  
Departamento de Física Aplicada  
Universidad de Granada  
Campus de Fuentenueva  
E-18071 Granada, Spain  
Tel: (+34-58)-243213  
Fax: (+34-58)-243214  
Email: liquid99@ugr.es

**Web Site:** <http://www.ugr.es/~liquid99>

## 4-9 July 1999

### **"Science for Pacific Posterity: Environments, Resources and Welfare of the Pacific People"**

**Venue:** This Congress, to be held from 4 to 9 July 1999, will open at the Sydney Opera House on Sunday 4 July and then shift to the Kensington campus of the University of New South Wales for the remainder of the week.

The following themes are being developed for the Congress:

- Theme 1 Public Health in the Asia-Pacific Region
  - Theme 2 Global Environmental Change and the Pacific
  - Theme 3 Lessons from the Past: Messages for the Future  
"Unveiling the Scroll of Prophecy: Vital Key to Sustainability"
  - Theme 4 Natural Disasters: Reduction and Mitigation
  - Theme 5 Urbanisation and the Environment
  - Theme 6 Communication in the 21st Century
  - Theme 7 Alternative and Renewable Energy
  - Theme 8 Biodiversity
  - Theme 9 Environmental Management
  - Theme 10 Coral Reefs of the Pacific Region, Past, Present and Future
  - Theme 11 Science and Community Knowledge: Partners for Sustainability
  - Theme 12 Science Education and Communication
  - Theme 13 "Learning from Nature - The Search for Drugs and Other Bioactives from the Sea"
  - Theme 14 History of Pacific Science
  - Theme 15 Heritage Conservation
  - Theme 16 Peoples of the Pacific
- Contact:** Email: W.Osullivan@unsw.edu.au  
**Website:** <http://www.icmsaust.com.au/PacificScience>

## 4-9 July 1999

### **Australian International Symposium on Analytical Sciences**

**Venue:** Melbourne Exhibition and Convention Centre  
Melbourne, Victoria, Australia

AISAS 99 promises to offer a scientific program of the highest quality with general analytical and chromatography/separation science streams featuring key international speakers and local experts, while at the same time providing an extensive trade exhibition and commercial workshops. Make sure you are part of this historic event. Start thinking about your paper/poster abstract now.

**Contact:** Associate Professor Philip Marriott  
Chair Organising Committee  
Tel: (+61-3)-99251786  
Fax: (+61-3)-96391321  
Email: AISAS@rmit.edu.au

**Website:** <http://www.chem.monash.edu.au/raci/index.html>

## 5-7 July 1999

### **The New Zealand Statistical Association 50th Anniversary Conference**

**Venue:** Victoria University, Wellington

**Contact:** [nzsa99@mcs.vuw.ac.nz](mailto:nzsa99@mcs.vuw.ac.nz)

Possible sections include history, medical statistics, statistics education, data mining, and risk management. Papers in these and other areas will be welcome. The main source of information will be a conference web page that will be running from December 1998 via the web page belonging to the School of Mathematical and Computing Sciences, at Victoria University of Wellington.

**Website:** <http://www.mcs.vuw.ac.nz/>

Information and facilities available will include:

- \* A listing of accommodation options and approximate prices - it will be the responsibility of registrants to find their own accommodation.
- \* Procedure for registering and submitting abstracts.
- \* Timetable and listings of invited and contributed talks, which will be updated as the programme develops.

## 5-8 July 1999

### **Membrane Separations and Protein Processing Technologies: Industry Short Course and One Day Symposium**

**Venue:** University of Waikato, Hamilton, New Zealand

**Contact:** Rob McGowan

Centre for Continuing Education  
University of Waikato

Private Bag 3105, Hamilton, New Zealand  
Email: [r.mcgowan@waikato.ac.nz](mailto:r.mcgowan@waikato.ac.nz)

**Website:** <http://www.tech.waikato.ac.nz/bicourse2/>

## 5-9 July 1999

### **VIII SCAR International Symposium on Antarctic Earth Sciences**

**Venue:** Wellington, New Zealand

**Contact:** Dr Fred Davey

Institute of Geological and Nuclear Sciences  
P O Box 1320, Wellington, New Zealand  
Tel: (+64-4)-5701444  
Fax: (+64-4)-4710977  
Email: [ISAES@qns.cri.nz](mailto:ISAES@qns.cri.nz)

# CONFERENCES & SEMINARS

6-9 July 1999

**1999 New Zealand Mathematics Colloquium**

**Venue:** Christchurch  
**Contact:** Email: nzmc99@math.canterbury.ac.nz  
**Website:** <http://www.math.canterbury.ac.nz/colloq.html>

Tel: (+420-2)-360341  
Fax: (+420-2)-367981  
Email: sympo@imc.cas.cz

11-13 July 1999

**Australasian Environmental Engineering Conference**

**Venue:** Auckland, New Zealand  
**Contact:** Conference Secretariat  
Northern Regional Office  
IPENZ, P O Box 6748, Auckland  
Email: aeec99@ipenz.org.nz

14-18 July 1999

**1st IUPAC Workshop on New Directions in Chemistry. Workshop on Advanced Materials: Nanostructure Systems**

**Venue:** Hong Kong  
**Contact:** Professor M A El-Sayed  
School of Chemistry and Biochemistry  
Georgia Institute of Technology  
Atlanta, GA 30332-400, USA  
Tel: (+1-404)-8940292  
Fax: (+1-404)-8940294  
Email: mostafa.el-sayed@chemistry.gatech.edu

11-15 July 1999

**2nd International Conference on Biodiversity and Bioresources - Conservation and Utilisation**

**Venue:** Belo Horizonte, Minas Gerais, Brazil  
**Contact:** Professor Alaide Braga de Oliveira  
Faculdade de Farmacia - UFMG  
Av. Olegario Maciel 2360  
30.180112 Belo Horizonte, Brazil  
Fax: (+55-31)-3379076  
Email: fernaio@dedalus.lcc.ufmg.br

14-16 July 1999

**Biomarkers in Environmental Toxicology**

**Venue:** Christchurch, New Zealand  
**Contact:** Louise Tremblay  
Landcare Research, Lincoln  
Email: tremblayl@landcare.cri.nz

12-14 July 1999

**International Conference on Ageing Studies and Lifetime Extension of Materials**

**Venue:** Oxford, England, United Kingdom  
**Contact:** Dr L G Mallinson  
International Conference on Ageing Studies and Lifetime Extension of Materials  
AWE Aldermaston  
Reading RG7 4PR, England, United Kingdom  
Tel: (+44-118)-9827993  
Fax: (+44-118)-9824739  
Email: lmallinson@awe.co.uk

18-22 July 1999

**10th International Symposium on Organo-Metallic Chemistry Directed Towards Organic Synthesis (OMCOS 10)**

**Venue:** Versailles, France  
**Contact:** Professor J P Genet  
Laboratoire de Synthèse Selective Organique et Produits Naturels  
E N S C P - UMR CNRS 7573  
11 rue Pierre et Marie Curie  
75231 Paris Cedex 05, France  
Tel: (+33-1)-44276743  
Fax: (+33-1)-44071062  
Email: genet@ext.jussieu.fr

12-14 July 1999

**The 16th New Zealand Geochemical Group Conference**

**Venue:** Lower Hutt, New Zealand  
**Contact:** Dave Grant-Taylor  
Email: d.granttaylor@irl.cri.nz  
Tel: (+64-4)-5690000  
or  
Doug Sheppard  
Email: d.sheppard@gns.cri.nz  
Tel: (+64-4)-5704637  
Fax: (+64-4)-5704657

18-23 July 1999

**12th International Symposium on Carotenoids**

**Venue:** Cairns, Australia  
**Contact:** Professor George Britton  
School of Biological Sciences  
The University of Liverpool  
Crown Street, Liverpool, L69 3BX  
England, United Kingdom  
Fax: (+44-151)-7944349

12-15 July 1999

**39th Microsymposium, Advances in Polymerisation Methods: Controlled Synthesis of Functionalised Polymers**

**Venue:** Prague, Czech Republic  
**Contact:** Dr Jaromir Lukas  
Institute of Macromolecular Chemistry  
Academy of Sciences of the Czech Republic  
Heyovskeho na. 2, 162 06 Praha 6  
Czech Republic

19-22 July 1999

**19th Discussion Conference on the Rheology of Polymer Systems**

**Venue:** Prague, Czech Republic  
**Contact:** Dr Jaromir Lukas  
Institute of Macromolecular Chemistry  
Academy of Sciences of the Czech Republic  
Heyovskeho na. 2, 162 06 Praha 6  
Czech Republic  
Tel: (+420-2)-360341  
Fax: (+420-2)-367981  
Email: sympo@imc.cas.cz

# CONFERENCES & SEMINARS

19-23 July 1999

**International Symposium on Ionic Polymerisation**

**Venue:** Kyoto, Japan  
**Contact:** Dr Shiro Kobayashi  
Department of Materials Chemistry  
Graduate School of Engineering  
Kyoto University, Kyoto 606-01, Japan  
Tel: (+81-75)-7535608  
Fax: (+81-75)-7534911  
Email: kobayashi@mat.polym.kyoto-u.ac.jp

25-30 July 1999

**14th International Conference on the Chemistry of the Organic Solid State**

**Venue:** Cambridge, England, United Kingdom  
**Contact:** Email: ICCOSSXIV@ch.cam.ac.uk

25-30 July 1999

**Analytical Science into the Next Millenium (SAC 99)**

**Venue:** Dublin, Ireland  
**Contact:** Professor Malcolm R Smyth  
Faculty of Science  
Dublin City University, Dublin 9, Ireland  
Tel: (+353-1)-7045308  
Fax: (+353-1)-7045503  
Email: smythm@dcu.ie

26-30 July 1999

**6th International Conference on the Structure of Surfaces**

**Venue:** Vancouver, Canada  
**Contact:** K A R Mitchell  
Department of Chemistry  
University of British Columbia  
Vancouver, BC V6T 1Z1, Canada  
Email: karm@chem.ubc.ca  
**Web Site:** www.conferences.ubc.ca/icsos.htm

26-31 July 1999

**XXVI International Conference on Solution Chemistry**

**Venue:** Fukuoka City, Kyushu, Japan  
**Contact:** Professor Hitoshi Ohtaki  
Department of Chemistry  
Faculty of Science and Engineering  
Ritsumeikan University, 1-1-1 Noji-Higashi  
Kusatsu 525, Japan  
Tel: (+81-775)-612777  
Fax: (+81-775)-612659  
Email: ohtaki@bkc.ritsumei.ac.jp

1-6 August 1999

**Eleventh American Conference on Crystal Growth and Epitaxy**

**Venue:** Tucson, Arizona, USA  
**Contact:** T Gentile  
ACCGE-11 Sec.  
P O Box 3233, Thousand Oaks  
CA 91359-0233, USA  
Fax: (+1-805)-4924062

Email: aacg@lafn.org

**Web Site:** www.aml.arizona.edu/aacg

2-6 August 1999

**14th International Symposium on Plasma Chemistry**

**Venue:** Prague, Czech Republic  
**Contact:** Professor M Hrabovsky  
Institute of Plasma Physics  
Za Slovankou 3, P O Box 17, 182 21 Praha 8  
Czech Republic  
Tel: (+42-2)-824751  
Fax: (+42-2)-8586389  
Email: hrabov@ipp.cas.cz

4-13 August 1999

**18th IUCr General Assembly and International Congress of Crystallography**

**Venue:** Glasgow, Scotland, United Kingdom  
**Web Site:** www.chem.gla.ac.uk/iucr99/

6-13 August 1999

**Frontiers in Chemistry: Molecular Basis of the Life Sciences**

**Venue:** Berlin, Germany  
**Contact:** IUPAC Secretariat  
Tel: (+1-919)-4858700  
Fax: (+1-919)-4858706  
Email: secretariat@iupac.org

7-13 August 1999

**IUPAC General Assembly**

**Contact:** IUPAC Secretariat  
Tel: (+1-919)-4858700  
Fax: (+1-919)-4858706  
Email: secretariat@iupac.org

14-19 August 1999

**IUPAC Congress**

**Venue:** Berlin, Germany  
**Contact:** Gesellschaft Deutscher Chemiker - GDCh  
P O Box 90 04 40  
60444 Frankfurt Am Main, Germany  
Tel: (+49-69)-7917 358/360/366  
Fax: (+49-69)-7917475  
Email: tg@gdch.de

22-26 August 1999

**ACS National Meeting: Block Copolymers - Designing Molecules for Applications**

**Venue:** New Orleans, Louisiana, USA  
**Contact:** Nikos Hadjichristidis  
Department of Chemistry  
University of Athens  
Tel/Fax: (+30-1)-7249103  
Email: nhadjich@atlas.uoa.gr  
Jimmy Mays, Department of Chemistry  
Tel: (205)-9348101  
Fax: (205)-9342543  
Email: jmays@uab.edu

or

# CONFERENCES & SEMINARS

22-26 August 1999

**218th ACS National Meeting: Optical Polymers - Advances in Optical Fibres and Wave Guides**

**Venue:** New Orleans, USA  
**Contact:** Associate Professor Julie P Harmon  
Department of Chemistry  
University of South Florida  
Tel: (813)-9743397  
Fax: (813)-9741733  
Email: harmon@chuma.cas.usf.edu

or

Dr Raja Mani  
Optical Polymer Research  
Tel: (352)-3781027  
Fax: (352)-3737712  
Email: maniraja@hotmail.com

26 August 1999

**ACS Fall Meeting: Hydrogen Bonding for Macromolecular Self-Assembly**

**Venue:** New Orleans, USA  
**Contact:** Professor Andy Griffen  
Chemistry and Biochemistry  
University of Southern Mississippi  
Tel: (601)-2664715  
Fax: (601)-2665138  
Email: anselm.griffen@gradsch.ccain.usm.edu

or

Professor Dr Reimund Stadler  
Macromolecular Chemistry II  
University of Bayreuth/Building NW II  
Tel: (+49-921)-553399  
Fax: (+49-921)-553393  
Email: stadler@akstadler.che.uni-bayreuth.de

22-27 August 1999

**Flavour Release: Linking Experiments, Theory and Reality. A Joint American Chemical Society/Royal Society of Chemistry Symposium**

**Venue:** New Orleans, Louisiana, USA  
**Contact:** Andy Taylor  
Tel: +44-115-9516144  
Fax: +44-115-9516154  
Email: andy.taylor@nottingham.ac.uk

31 August - 4 September 1999

**Solid Phase Synthesis and Combinatorial Chemical Libraries**

**Venue:** York, United Kingdom  
**Website:** <http://www.biocom.co.uk/york99.htm>

1-5 September 1999

**The 5th International Symposium on Polymers for Advanced Technologies (PAT'99)**

**Venue:** Tokyo, Japan  
**Contact:** Secretariat, PAT'99-Tokyo  
Waseda University, Tokyo, Japan  
Tel: (+81-3)-52863120  
Fax: (+81-3)-32054740  
Email: oyaizu@mn.waseda.ac.jp

**Website:** [www.rise.waseda.ac.jp/sympo/pat.html](http://www.rise.waseda.ac.jp/sympo/pat.html)

1-30 September 1999

**ECSOC-3 - 3rd Electronic Conference on Synthetic Organic Chemistry**

Organised by Molecular Diversity Preservation International  
**Contact:** Dr Esteban Pombo-Villar  
ECSOC-3 Chairman  
Preclinical Research, Novartis Pharma AG  
CH-4002 Basel, Switzerland  
Tel: (+41-61)-3249865  
Fax: (+41-61)-3249794  
Email: esteban.pombo@pharma.novartis.com

or

Dr Shu-Kun Lin  
ECSOC-3 Secretary  
Molecular Diversity Preservation International  
Saengergasse 24  
CH-4054 Basel, Switzerland  
Tel: (+41-79)-3223379  
Fax: (+41-61)-3028918  
Email: lin@mdpi.org

**Website:** <http://www.mdpi.org/ecsoc-3.htm>

5-9 September 1999

**Macromolecules '99: Polymers in the New Millennium**

**Venue:** Bath, England, United Kingdom  
**Contact:** Dr A J Amass, Macromolecules '99  
CEAC, Aston University, Aston Triangle  
Birmingham B4 7ET, United Kingdom  
Tel: (+44-121)-3593611  
Fax: (+44-121)-3594094  
Email: a.j.amass@aston.ac.uk

5-10 September 1999

**31st Colloquium Spectroscopicum Internationale 1999**

**Venue:** Ankara, Turkey  
**Contact:** Professor Dr O Yavuz Ataman  
Department of Chemistry  
Middle East Technical University  
TR-06531 Ankara, Turkey  
Tel: (+90-312)-2103232  
Fax: (+90-312)-2101280  
Email: xxxicsi@rorqual.cc.metu.edu.tr

6-10 September 1999

**1999 Royal Society of Chemistry Annual Conference**

**Venue:** Heriot-Watt University, Edinburgh  
United Kingdom  
**Contact:** Nicole Morgan  
1999 RSC Annual Conference  
Royal Society of Chemistry  
Burlington House, London  
United Kingdom, W1V 0BN  
Fax: (+44-171)-7341227  
Email: conferences@rsc.org

6-10 September 1999

**8th International Symposium on Macromolecule-Metal Complexes (MMC-VIII)**

**Venue:** Tokyo, Japan  
**Contact:** Symposium Secretariat, MMC-8

# CONFERENCES & SEMINARS

Waseda University, Tokyo, Japan  
Tel: (+81-3)-52863120  
Fax: (+81-3)-32054740  
Email: macro@mn.waseda.ac.jp

7-11 September 1999

**Horizons of Organic and Organoelement Chemistry, to the Memory of Professor A N Nesmeyanov, on the 100th Anniversary of His Birth**

**Venue:** Moscow, Russia  
**Contact:** Professor Y N Bibnov, INEOS  
Vavilov str. 28, Moscow  
Tel: (+7-095)-1356165  
Fax: (+7-095)-1355085  
Email: dir@ineos.ac.ru

20-21 October 1999

**8th New Zealand Coal Conference**

**Venue:** Park Royal Hotel, Wellington, New Zealand  
**Contact:** Conference Secretariat  
Eighth New Zealand Coal Conference  
P O Box 31-244, Lower Hutt, Wellington  
Tel: (+64-4)-5703700  
Fax: (+64-4)-5703701

6-10 November 1999

**4th Congress of Toxicology in Developing Countries**

**Venue:** Antalya, Turkey  
**Contact:** Professor Semra Sardas  
Gazi University  
Faculty of Pharmacy Toxicology Department  
TR 06330 Ankara Turkey  
(+90-312)-2123009  
Email: ek03-k@tr-net.net.tr

14-17 November 1999

**Concepts and Needs for Dielectric Constant <0.15 mm Interconnect Materials: Now and the Next Millenium**

**Venue:** Monterey, California, USA  
**Contact:** Dr Kenneth Carter  
IBM Almaden Research Centre  
Tel: (408)-9272617  
Fax: (408)-9273310  
Email: kcarter@almaden.ibm.com  
or  
Dr Devendra Kumar, Novellus Systems  
Tel: (408)-9534057  
Fax: (408)-9433450  
Email: devendra.kumar@novellus.com

17-19 November 1999

**International Conference on Thermophysical Properties of Materials (TTPM99)**

**Venue:** Singapore  
**Contact:** Ms Goh Bee Dee/Ms Merlin Toh  
Nanyang Technological University  
Tel: (+65)-7994723  
Fax: (+65)-7930997  
Email: TPPM99@ntu.edu.sg  
**Website:** www.ntu.edu.sg/sas/events/tppm99.html

21-24 November 1999

**1999 NZIC Conference: Chemistry in New Zealand - A Showcase of Activities and Opportunities**

**Venue:** Victoria University of Wellington, Wellington  
**Contact:** Associate Professor Jim Johnston  
Victoria University of Wellington  
Conference Office  
or  
School of Chemical and Physical Sciences  
Victoria University of Wellington  
Email: Margaret.Brown@vuw.ac.nz  
**Website:** www.vuw.ac.nz/chemistry/nzic99

27 November - 2 December 1999

**23rd RACI Australian Polymer Symposium**

**Venue:** Geelong, Victoria, Australia  
**Contact:** Associate Professor W D Cook  
Department of Materials Engineering  
Monash University  
Clayton, VIC 3168, Australia  
Tel: (+61-3)-99054926  
Fax: (+61-3)-99054940  
Email: wayne.cook@eng.monash.edu.au

13-17 December 1999

**International Conference on Cleaner Production and Sustainable Development '99**

**Venue:** Taipei International Convention Centre, Taipei  
Taiwan, Republic of China  
**Contact:** Dr Young Ku, Professor  
Chairman of Academic Committee  
Department of Chemical Engineering  
National Taiwan University of  
Science and Technology  
43, Sec.4, Keelung Road, Taipei, Taiwan  
Republic of China  
Tel: (886-2)-27376621  
Fax: (886-2)-27376644  
Email: ku@ch.ntust.edu.tw

30 January - 4 February 2000

**5th IUPAC Symposium on Bio-Organic Chemistry**

**Venue:** New Delhi, India  
**Contact:** Professor S Ranganathan  
Biomolecular Research Unit  
Regional Research Laboratory  
Trivandrum 695 019, India  
Tel: (+91-471)-491459  
Fax: (+91-471)-490186

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FREEPOST READER REPLY CARD**

# CONFERENCES & SEMINARS

6-11 February 2000

**RACI 11th National Convention**

**Venue:** Canberra, ACT, Australia  
**Contact:** Dr Graeme Moad  
Molecular Science, CSIRO  
Private Bag 10 Clayton South MDC  
Clayton, VIC 3169, Australia  
Tel: (+61-3)-95452509  
Fax: (+61-3)-95452446  
Email: graeme.moad@molsci.csiro.au

19-23 March 2000

**Water 2000 Conference and Expo - "Guarding the Global Resource"**

**Venue:** Auckland, New Zealand  
**Contact:** New Zealand Water and Wastes Association  
P O Box 13880  
Onehunga, Auckland, New Zealand  
Tel: (+64-9)-6363636  
Fax: (+64-9)-6361234  
Email: water@nzwwa.co.nz  
**Website:** <http://www.nzwwa.org.nz>

22-25 March 2000

**Chain Growth Polymerisation - New Chemistry for the New Millennium**

**Venue:** Santa Rosa, California, USA  
**Contact:** Professor Bruce Novak  
University of Massachusetts  
Tel: (413)-5452160  
Fax: (413)-5450764  
or  
Kris Matyjaszewski  
Carnegie Mellon University  
Department of Chemistry  
Tel: (412)-2683209  
Fax: (412)-2686897  
Email: km3b@andrew.cmu.edu

2-5 April 2000

**Foods - Nutraceuticals - Confectionery - Beverages and Cosmetics**

**Venue:** Doubletree Mission Valley Hotel, San Diego  
California, USA  
**Contact:** Mr P C Hereld  
Managing Director  
The Hereld Organisation  
200 Leeder Hill Drive  
Hamden CT 06517, USA  
Tel/Fax: +1-203-2816766

4-10 April 2000

**10th International Conference on High Temperature Materials Chemistry**

**Venue:** Aachen, Germany  
**Contact:** Professor K Hilpert  
Forschungszentrum Julich GmbH  
Institut für Werkstoffe der Energietechnik (IWE 1)  
52425 Julich, Germany

Tel: (+49-2461)-613280  
Fax: (+49-2461)-613699  
Email: k.hilpert@fz-juelich.de

21-25 May 2000

**10th International IUPAC Symposium on Mycotoxins and Phycotoxins**

**Venue:** Sao Paulo, Brazil  
**Contact:** Dr Myrna Sabino  
Instituto Adolfa Lutz  
AV Dr. Arnaldo 355  
Sao Paulo, Brazil, 01246-902  
Fax: (+455-11)-8533505  
Email: myrna@sti.com.br

1-5 July 2000

**13th International Conference on Organic Synthesis**

**Venue:** Warsaw, Poland  
**Contact:** Professor M Chmielewski  
Institute of Organic Chemistry  
Kasprzaka 44, 01-224 Warsaw 42  
P O Box 58, Poland  
Tel: (+48-22)-6318788  
Fax: (+48-22)-6326681  
Email: ichos@ichf.edu.pl

9-14 July 2000

**38th International Symposium on Macromolecules**

**Venue:** Warsaw, Poland  
**Contact:** Professor Stanislaw Penczek  
Polish Academy of Sciences  
ul. Sienkiewicza 112, 90363 Lodz, Poland  
Tel: (+48-42)-6819815  
Fax: (+48-42)-6847126  
Email: spenczek@bilbo.cbmm.lodz.pl

9-14 July 2000

**34th International Conference on Coordination Chemistry**

**Venue:** Edinburgh, Scotland, United Kingdom  
**Contact:** Professor P Tasker, Chairman  
Dr John F Gibson, Secretary  
The Royal Society of Chemistry  
Burlington House, London W1V 0BN  
England, United Kingdom  
Tel: (+44-171)-4403321  
Fax: (+44-171)-7341227  
Email: gibsonj@rsc.org

17-20 July 2000

**40th Microsymposium on Polymers In Medicine**

**Venue:** Prague, Czech Republic  
**Contact:** Dr Jaromir Lukas  
Institute of Macromolecular Chemistry  
Academy of Sciences of the Czech Republic  
Heyovskeho na. 2, 162 06 Praha 6  
Czech Republic  
Tel: (+420-2)-360341  
Fax: (+420-2)-367981  
Email: sympo@imc.cas.cz

# CONFERENCES & SEMINARS

6-11 August 2000

**16th IUPAC Conference on Chemical Thermodynamics**

**Venue:** Halifax, Nova Scotia, Canada  
**Contact:** Dr Peter G Kusalik  
Department of Chemistry  
Dalhousie University  
Halifax, Nova Scotia B3H 4J3, Canada  
Tel: (+1-902)-4943627  
Fax: (+1-902)-4941310  
Email: kusalik@is.dal.ca

14-18 August 2000

**12th International Conference on Thermal Analysis and Calorimetry**

**Venue:** Copenhagen, Denmark  
**Contact:** Dr O Toft Sorensen  
Risoe National Laboratory  
Fax: (+45)-46351173

20-25 August 2000

**XIIIth International Congress on Rheology**

**Venue:** Cambridge, England, United Kingdom  
**Contact:** Dr D M Binding  
Fax: (+45-1970)-622777  
Email: rheology2000@aber.ac.uk

1 September 2000

**22nd International Symposium on the Chemistry of Natural Products**

**Venue:** Sao Paulo, Brazil  
**Contact:** Dr M Fatima das G F da Silva  
Universidade Federal de Sao Carlos  
Depto. de Quimica, Via Washington Luiz  
km 235, CP676, Sao Carlos, Brazil  
Tel: (+55-16)-2748208  
Fax: (+55-16)-2748350  
Email: dmfs@power.ufscar.br

3-8 September 2000

**11th International Biotechnology Symposium**

**Venue:** Berlin, Germany  
**Contact:** Professor G Kreysa  
DECHEMA eV  
c/o 11th IBS, Theodor-Heuss-Allee 25  
60486 Frankfurt/Main, Germany  
Tel: (+49-69)-7564205  
Fax: (+49-69)-7564201  
Email: info@dechema.de

8-10 November 2000

**2nd International Symposium on Food Packaging - Ensuring the Safety and Quality of Food**

**Venue:** Vienna, Australia  
**Contact:** Dr L Contor  
ILSI Europe, 83, Avenue E. Mounier, Box 6  
B-1200, Brussels, Belgium  
Tel: (+32-2)-7620044  
Fax: (+32-2)-7710014  
Email: laura@ilsieurope.be

9-13 December 2000

**Poly Millennium 2000**

**Venue:** Hilton Waikoloa Village, Waikoloa, Hawaii  
**Contact:** William H Daly  
Department of Chemistry  
Louisiana State University  
Email: bill.daly@chem.lsu.edu

14-19 December 2000

**Pacificchem 2000**

**Venue:** Waikiki, Honolulu, Hawaii  
**Contact:** Professor B Halton  
Department of Chemistry  
Victoria University of Wellington  
P O Box 600  
Wellington, New Zealand  
Fax: (+64-4)-4955241  
Email: brian.halton@vuw.ac.nz

26 August - 1 September 2001

**XXXIV International Congress of Physiological Sciences  
"From Molecule to Malody"**

**Venue:** Christchurch, New Zealand  
**Contact:** The Conference Company  
P O Box 90-040, Auckland, New Zealand  
Tel: (+64-9)-3601240  
Fax: (+64-9)-3601242  
Email: info@tec.co.nz

## BIOMARKERS IN ENVIRONMENTAL TOXICOLOGY

*Christchurch  
14 - 16 July 1999*

The focus of this scientific meeting, will be to critically evaluate the development of biomarkers and identify areas of research that need to be addressed in order to facilitate the application of these tools in risk assessment, screening and environmental monitoring protocols.

Internationally recognised keynote speakers will include:

Dr L Earl Gray Jr, US-EPA, USA  
Dr Michael Hooper, TTIEHH, USA  
Dr Michael Moore, NRCET, Australia  
Dr Jason Weeks, ITE, United Kingdom  
Dr Philippe Garrigues, Universite de Bordeaux 1,  
France

For more information contact:

Louis Tremblay, Landcare Research, Lincoln  
Email: tremblayl@landcare.cri.nz

# NEW PRODUCTS

## NEW GAS ANALYSER ANALYSES COMPLEX REFINERY GAS SAMPLES IN UNDER EIGHT MINUTES

The new Refinery/Light Hydrocarbon Gas Analyser (RGA) Model 1150 from Perkin-Elmer analyses refinery gas samples and similar gaseous mixtures in less than eight minutes with separations of: H<sub>2</sub>, O<sub>2</sub>, N<sub>2</sub>, CO, CO<sub>2</sub>, H<sub>2</sub>S and C<sub>1</sub> through C<sub>5</sub> and C<sub>6</sub>+ hydrocarbons. The Analyser consists of a Perkin-Elmer AutoSystem XL Gas Chromatograph (GC) with four advancing seal valves, multiple packed columns, two thermal conductivity detectors and one flame ionisation detector.

An entire family of Refinery/Light Hydrocarbon Gas Analysers is available through a marketing/engineering partnership between Perkin-Elmer and Arnel Inc. Each analyser is designed to meet the specific requirements of quality control and process laboratories in the petroleum and petrochemical industries.

The unique system uses Arnel's Ultratorr column packing technology and Arnel's new valve technology for quick analysis. Two carrier gases are utilised: nitrogen to provide full range sensitivity for hydrogen, and helium for all other analysed components.

Contact: Perkin-Elmer Pty Ltd  
Free Phone: 0800 776767, Free Fax: 0800 776000  
Email: perkin-elmer@clear.net.nz  
Website: <http://www.perkin-elmer.com>  
circle number 34 on the reader reply card

## VARIAN'S NEW CP-3800 GAS CHROMATOGRAPH - RUGGED, TIME-TESTED ELEMENTS PLUS SOPHISTICATED ELECTRONICS

Varian is introducing the CP-3800 gas chromatograph (GC), which the company believes is the most automated GC available, and also offers more options and configurations than any other GC.

The CP-3800 is an all-electronic GC marrying the time-tested, successful elements of Varian's 3600, 3400, and 3800 GCs with Chrompack International's Micro-TCD, a detector with sensitivity proved by hundreds of Micro-GC users.

"It's a prime example of Varian's innovation leadership," said John Mills, GC marketing manager. "We aren't afraid of the 'not-invented-here' stigma. If we can acquire innovative technology faster than we can develop it in-house, we do it, as last year's acquisition of Chrompack in The Netherlands attests. It's the customer who benefits," continues Mills.

One of the key customer benefits of the new CP-3800 instrument is economy of operation. For example, non-specialist operators can single-handedly perform analyses by virtue of the most intuitive set-up screens and keyboard on the market. All instrument functions, including gas flows, are electronically controlled. As a result, operation entails merely injecting the sample.

Another money-saver is the CP-3800's electronic flow control (EFC) for reducing carrier gas consumption. The miserly EFC can save enough helium over three years' laboratory usage to pay for another GC.

Yet another cost-saver is the ability to use a single operator to control an array of instruments via Ethernet connections. The CP-3800 also works with a single PC or over the Internet to increase productivity and reduce costs.

Sample preparation for the CP-3800 can be reduced to placing the sample in a vial. For example, both "purge and trap" and "headspace" sampling is available for volatiles in solid or aqueous samples. Varian's Solid Phase Microextraction (SPME) is a patented technique for both volatiles and semi-volatiles.

When analysing gas mixtures such as volatiles in air or industrial gas streams, the CP-3800's automation power lets the user select sample streams and conduct on-line concentration with no operator involvement.

Varian offers an enormous range of customised hardware configurations and software solutions for the CP-3800, as well as providing worldwide user support.

Contact: Mark Albertson, A.i. Scientific (NZ) Ltd  
P O Box 35579, Browns Bay, Auckland  
Phone: (09) 4781351, Fax: (09) 4781360  
Email: aiscinz@ihug.co.nz  
circle number 35 on the reader reply card

## IT'S COMING ... PIPETTING WITH LIQUISYSTEMS BY METTLER TOLEDO - VOLUME RANGE FROM 0.1 µL TO 5000 µL



Mettler Toledo have taken a long hard look at conventional pipettes — and have adopted their best tried-and-tested components in the new Mettler Toledo pipette system.

# NEW PRODUCTS

VoluMate is based on proven technology, but Mettler Toledo have improved many of its elements without making compromises.

All components in Mettler Toledo LiquiSystems match one another perfectly. In addition to VoluMate single-channel pipettes and MultiMate multi-channel pipettes, the system offers a complete range of standard tips and filter tips, supplied in user-friendly, environmentally acceptable packaging.

### *A Firm Grip*

And that with one hand. The volume setting dial is located away from the hand grip to avoid inadvertently changing the setting.

### *All Very Personal*

Thanks to the protected identification window incorporated in the pipette.

### *Slim Line*

Pipetting through thick and thin. Even in narrow containers such as centrifuge tubes this is child's play — without removing the ejector sleeve.

### *Work Single Handed*

VoluMate and MultiMate sit ideally in the hand, thanks to their moulded grips and finger guards.

Contact: John Small, Product Manager  
Medic Watson Victor, Free Phone: 0800 508070  
circle number 36 on the reader reply card

## APPLICATION NOTE DESCRIBES PRODUCTIVITY AND THROUGHPUT GAINS USING INFRARED ANALYSIS FOR OIL CONDITION MONITORING

An application note from Perkin-Elmer describes the productivity and throughput gains from infrared (IR) analysis on oil condition monitoring using the Spectrum Used Oil Analyser to avoid engine failure and downtime for heavy industrial equipment and machinery in areas such as defence, construction, power plants and trucking fleets.

The note explains how to automate monitoring using the Spectrum Used Oil Analyser and discusses the procedures for calculating and reporting oil parameters. The Analyser is a complete, easy-to-use system optimised specifically for oil analysis.

The use of IR for the analysis of used oils provides enough accurate information on the condition of the oil and the engine to determine when an oil change is needed. This will save time by preventing engine failure, or when an oil change is not necessary, saving time by continuing productivity.

Outlined in the note are indicators of chemical degradation, including the degree of oxidation, high nitration value, increasing sulfate value, ester breakdown, and anti-wear additive depletion. Types of contamination such as soot, water and glycol and unburned fuel are also discussed.

Contact: Perkin-Elmer Pty Ltd  
Free Phone: 0800 776767, Free Fax: 0800 776000  
Email: perkin-elmer@clear.net.nz  
Website: <http://www.perkin-elmer.com>  
circle number 37 on the reader reply card

## NEW WIN UV SOFTWARE FOR CARY SPECTROPHOTOMETERS



Varian, Inc, is offering a substantial upgrade to its Win UV software for Cary UV-Vis-NMR spectrophotometers. Version 2 features a suite of new applications: enzyme kinetics, RNA/DNA estimation, scanning kinetics, advanced reads, fabric protection (UPF) measurement, and sunglass lens measurements.

Win UV Version 2 also embodies the Applications Development Language (ADL) for easy-to-write customised programs plus free downloads of ADL applications from Varian, Inc's, vast library. Another inclusion is support for the Cary 50 18-cell thermostated multicell holder.

Other features include autoscaling and graphics enhancements, such as font changing and graphics pasting in the report area; automated peak labelling for scanning; automated instrument testing using the multicell holder accessories; an improved online help system with videos; a troubleshooting guide; and step-by-step instructions for common operations.

Win UV Version 2 operates under Windows 95, 98, and NT. The software is available immediately.

Contact: Mark Albertson, A.i. Scientific (NZ) Ltd  
P O Box 35579, Browns Bay, Auckland  
Phone: (09) 4781351, Fax: (09) 4781360  
Email: aiscinz@ihug.co.nz  
circle number 38 on the reader reply card

## NEW APPLICATIONS OF ASE FOR FOOD, FEED, POLYMER AND ENVIRONMENTAL SAMPLES

A.i. Scientific announces the release of more time and labour saving applications of Accelerated Solvent Extraction (ASE), the breakthrough sample preparation technology from Dionex. New applications have been developed to extract a variety of

# NEW PRODUCTS

key analytes from complex matrices associated with food, feed, polymer and environmental analysis. These new methods include the extraction of:

- Pharmaceuticals from animal feeds (AN326)
- Total fat from infant formulas (AN329)
- Pesticide residues from foods (AN332)
- Polychlorinated biphenyls (PCBs) from air sample cartridges (AN333)
- Total fat in meat (AN334)
- Active ingredients from natural products/herbals (AN335)
- Additives from poly (vinyl chloride) polymer (AN336)
- PCBs and total lipids from fish tissue (AN337)

Each of these methods has significant advantages over traditional extraction techniques in terms of time and solvent use. For example ASE extraction of PCBs from air sampling cartridges requires only 12 min and 30 mL of solvent per sample compared to the traditional Soxhlet method requiring 12-14 hours and 350 mL of solvent sample.

Contact: Mark Albertson, A.i. Scientific (NZ) Ltd  
P O Box 35579, Browns Bay, Auckland  
Phone: (09) 4781351, Fax: (09) 4781360  
Email: aiscinz@ihug.co.nz  
circle number 39 on the reader reply card

## **AANALYST 800 AA SPECTROMETER TECHNICAL NOTES HIGHLIGHTING INSTRUMENT DETECTION LIMITS ON VARIOUS ELEMENTS NOW AVAILABLE FROM PERKIN-ELMER**

A series of new technical notes detailing instrument detection limits (IDL) for Perkin-Elmer's AAnalyst 800 atomic absorption (AA) spectrometer is now available from Perkin-Elmer. The series of technical notes describes elemental analysis for the following: cadmium (Order No D-5733); palladium (Order No D-5731); selenium (Order No D-5732); chromium (Order No D-5733); copper (Order No D-5734); manganese (Order No D-5735); molybdenum (Order No D-5736); nickel (Order No D-5737A); and arsenic (Order No D-5743).

The technical notes provide support data for the instrument detection limits produced on the AA800 system. This includes the experimental details, typical graphite furnace atomic absorption signals and other data used to calculate the IDL, precision at low concentrations and the characteristic mass data. Further information is provided to allow an experimental user to repeat these measurements.

The AAnalyst 800 atomic absorption (AA) spectrometer is equipped with a unique solid-state detector for unmatched analytical performance over the entire AA wavelength range. High performance, single path optics provides the AAnalyst 800 spectrometer with maximum light throughput and an exceptional signal-to-noise ratio for superior detection limits and precision. In addition, the spectrometer features an easily accessible eight-lamp holder with built-in power supplies for hollow cathode and electrodeless discharge lamps. Automatic

lamp selection and alignment provide enhanced convenience and productivity.

The AAnalyst 800 spectrometer's state-of-the-art detector and high-performance optical system are combined with a Transversely Heated Graphite Atomiser (THGA) furnace assembly, longitudinal Zeeman-effect background correction, enhanced STPF technology and True Temperature Control (TTC) for unmatched graphite furnace AA performance.

Contact: Perkin-Elmer Pty Ltd  
Free Phone: 0800 776767, Free Fax: 0800 776000  
Email: perkin-elmer@clear.net.nz  
Website: <http://www.perkin-elmer.com>  
circle number 40 on the reader reply card

## **PERKIN-ELMER'S MBA 2000 INTERACTIVE PRODUCT DEMONSTRATION NOW AVAILABLE ON CD-ROM**

Perkin-Elmer now offers a CD-ROM user guide for its Molecular Biology Assistant (MBA) 2000 system, a productivity tool for genetic analysis, biotechnology and pharmaceutical drug discovery research laboratories.

The MBA 2000 CD-ROM (Order No 5763) highlights the system's capabilities as a dedicated problem solver, precise analyst and accurate scheduler. With an easy to follow format, the CD-ROM guides users through the system's key features as an ultraviolet/visible spectrophotometer that also includes a multi-functional bio-calculator, laboratory time and unit converter.

The MBA 2000 instrument is a truly innovative, compact computational and measurement system that consolidates and organises routine and customised functions used in virtually all protocols employing biochemicals. The MBA 2000 system employs a completely intuitive touch-screen/display, and features a robust design with no moving parts, all in a nine-inch wide, low profile package. Choices are made simply with a friendly touch-to-select action, and a crisp colour graphics display prompts the user as needed to complete the tasks.

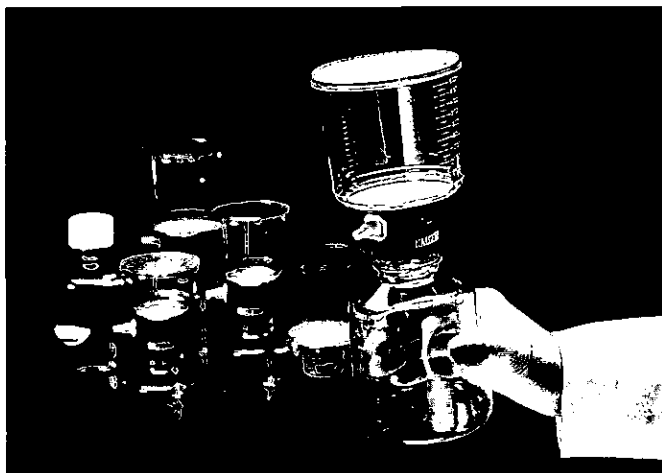
From estimating reagent usage to checking OD's from calculating serial dilutions and PCR master mixes to designing new oligos for PCR and DNA sequencing, to quantitating biomolecules, the MBA 2000 system serves the laboratory researcher every hour of the day making computations and quantitation extremely accessible and rapid.

The MBA 2000 system completes most tasks in a matter of seconds. It is as easy to use as a pipette or an electronic balance, yet customisable for specific analyses and determinations.

Contact: Perkin-Elmer Pty Ltd  
Free Phone: 0800 776767, Free Fax: 0800 776000  
Email: perkin-elmer@clear.net.nz  
Website: <http://www.perkin-elmer.com>  
circle number 41 on the reader reply card

# NEW PRODUCTS

## NEW NALGENE MF75 SERIES FILTRATION PRODUCTS OFFER SPEEDY THROUGHPUT AND CONVENIENT HANDLING



New Nalgene MF75 Series Filtration Products offer all Nalgene membranes in larger 75 mm diameter sizes that speed up filtration. The matching receivers feature a new, tapered shape with dual indents that make them easier to handle, even for small hands.

Compared to 50 mm diameter membrane products, Nalgene MF75 units can filter the same volume in half the time. The 500 mL and 1 litre units offer a choice of membranes: polyethersulfone (PES) - the faster tissue culture membrane; Nylon (NYL) - the best membrane for specialised applications; surfactant-free cellulose acetate (SFCA) - the cleaner CA membrane for tissue culture applications; cellulose nitrate (CN) - the proven standby for general-purpose filtration.

The Nalgene guaranteed leakproof closure design prevents spilling, evaporation and reduces pH shift. The redesigned closure covers receiver threads to minimise chance of contamination.

Every lot of MF75 product is Nalgene certified with documentation for product sterility, and is non-pyrogenic, non-cytotoxic and has passed strict integrity tests. Sterile shelf life is now extended to 5 years. Receivers have at least 20% extra head space for addition of serum or other additives to the filtrate.

Contact: NNI Documentation Centre, Sevenoaks  
Kent TN14 5XA, England, United Kingdom  
Fax: (+44-1732)-453166  
Website: [www.nalgenunc.com/MF75](http://www.nalgenunc.com/MF75)  
circle number 42 on the reader reply card

## THE ONE CHOICE FOR SAMPLE SCREENING THE HP 4440A CHEMICAL SENSOR

In less than a minute, the HP 4440A chemical sensor gives a clear and reliable answer on product or process quality. There is no need for interpretation. And in about three minutes, the HP sensor is ready to run another sample. Even non-scientists will

make quick, confident, and correct pass/fail decisions or grade classifications.

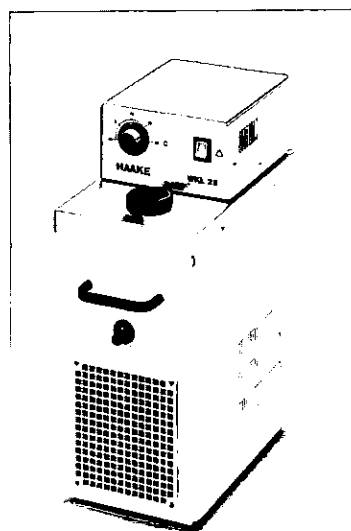
This rugged and simple-to-use screening and classification tool offers:

- Improved product consistency, quality, and yields
- Increased process efficiency
- High throughput at low cost per analysis
- Decreased workload
- Unsurpassed repeatability

Furthermore, the short cycle time lets you train the system in only a few hours—rather than days. And once the system is trained, it automatically provides unambiguous answers—a sample is either good or bad.

Contact: Medtec Products Ltd  
P O Box 34-241, Birkenhead, Auckland  
Freephone: 0800 2 MEDTEC (0800 263383)  
Phone: (09) 4791068, Fax: (09) 4791450  
Email: [phermans@medtec.co.nz](mailto:phermans@medtec.co.nz)  
Website: [www.medtec.co.nz](http://www.medtec.co.nz)  
circle number 43 on the reader reply card

## HAAKE WATER RECIRCULATOR WKL26 - A SMALL UNIT WITH BIG POWER



The new WKL26 water recirculator is the direct successor to the WKL25. It has the same miniature size as its predecessor but has an extended temperature range of -10 °C to +30 °C. The WKL26, with a cooling capacity of 240 watts at 20 °C is thus ideal for cooling tasks below the tap water temperature, e.g. to remove heat from connected analysis instruments, units or thermal processes. A low-noise compressor in a CFC-free cooling circuit prevents annoying noise disturbance.

The WKL26 is intended for use with water and a small quantity of anti-freeze as the heat transfer liquid. Its excellent value for money makes it the ideal partner for industrial and research applications.

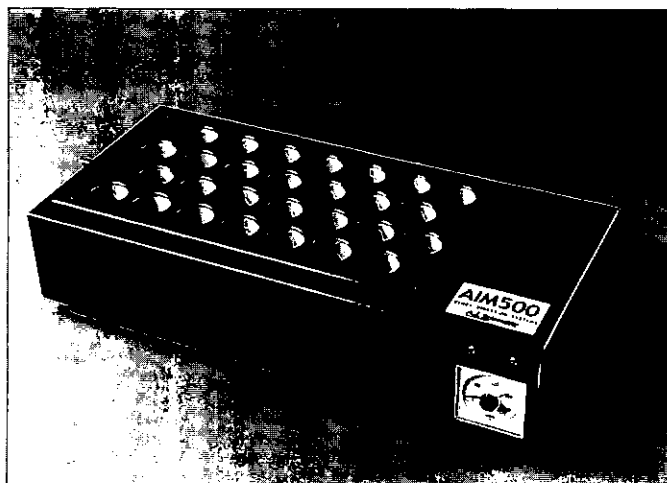
# NEW PRODUCTS

A combined temperature and filling level indicator is available as an optional accessory.

Contact: John Small

Medic Watson Victor, Free Phone: 0800 508070  
circle number 44 on the reader reply card

## NEW TEFLON COATED DIGESTION SYSTEM PREVENTS TRACE METAL CONTAMINATION



A.i. Scientific is proud to announce the release of its new Teflon-coated block digestion systems. Analytical techniques with

extreme sensitivity, such as ICP/MS and axial ICP, are causing nanogram detection (ppt) to become a common detection limit in trace analysis. When samples are prepared using heating block digestion there is a risk of contaminating the sample with aluminium, iron, copper or other metals coming from the block itself. A.i. Scientific's Teflon-coated digestion systems prevent this trace metal contamination, resulting in lower system blanks and providing better analysis results.

Teflon-coated digestion systems are also more resistant to damage and contamination from aggressive acids such as hydrofluoric acid. The Teflon coating is available on A.i. Scientific's AIM500 manual and programmable digestion systems and the fully automated AutoDigest digestion system.

Contact: Mark Albertson, A.i. Scientific (NZ) Ltd  
P O Box 35579, Browns Bay, Auckland  
Phone: (09) 4781351, Fax: (09) 4781360  
Email: aiscinz@ihug.co.nz  
circle number 45 on the reader reply card

## HP ADDS HIGH SENSITIVITY MULTI-WAVELENGTH DETECTOR TO HP 1100 SERIES MODULES AND SYSTEMS FOR HIGH PERFORMANCE LIQUID CHROMATOGRAPHY

Hewlett-Packard Company has introduced the HP 1100 Series multi-wavelength detector, which provides chemical and

## CHEM-ED 99 BIENNIAL CONFERENCE OF NEW ZEALAND CHEMISTRY EDUCATORS

### Advance Notice

**Dates:** 27-30 June 1999 **Venue:** University of Waikato, Hamilton **Theme:** Chemistry: Unravelling Mysteries

This is a conference for all chemistry educators at primary, secondary and tertiary levels hosted by Waikato members of the New Zealand Association of Science Educators and the New Zealand Institute of Chemistry.

The conference will offer delegates the opportunity to hear about current developments in chemistry, both in New Zealand and overseas and to be introduced to contexts in which chemistry has an important role to play.

#### Keynote speakers include:

- **John Emsley** (Cambridge University Science Writer in Residence) "Communicating Science to the Public"
- **Mary Virginia Orna** (University of New Rochelle) "The Shroud of Turin and Other Mysteries"
- **David Katz** (Cabrana College) "The Chemistry of Toys"
- **Malcolm Carr** (University of Waikato) "Chemistry in Context - A Retrospective View"

A range of workshops and seminars are also offered, including sessions on special effects (the secrets behind Xena, Warrior Princess), Forensic Chemistry and Carbon Dating, plus the usual array of field trips, displays and social events.

#### For further information or to be put on the mailing list please contact:

Bev Cooper, c/- School of Education, University of Waikato, Private Bag 3105, Hamilton  
Phone: (07) 8384382, Fax: (07) 8384555, Email: bcooper@waikato.ac.nz

pharmaceutical analysts with a high-sensitivity instrument for UV-visible detection in high performance liquid chromatography (HPLC) — including simultaneous measurement of up to five signals.

The HP 1100 Series multi-wavelength detector allows a wide range of wavelengths, from low UV to the visible range. The diode array based optical design provides high sensitivity for trace level quantification. Simultaneous detection of multiple signals improves selectivity as well as sensitivity. The sensitivity of the detector does not differ in single- or multi-wavelength mode. The detector is well suited for quantifying compounds and simultaneously monitoring impurities at various wavelengths, for example in a QA/QC environment.

To protect its investment value, the multi-wavelength detector can be upgraded to a HP 1100 Series diode array detector with

full spectral capabilities. This addition to the HP 1100 Series HPLC system can be controlled by an HP ChemStation or by the HP 1100 Series handheld control module. The multi-wavelength detector fits neatly in an HP 1100 Series tower and includes standard HP 1100 Series features such as early maintenance feedback (EMF) and diagnostics tools. Further, it uses the same leak handling channel for ease of use and complete system safety.

Contact: Medtec Products Ltd  
P O Box 34-241, Birkenhead, Auckland  
Freephone: 0800 2 MEDTEC (0800 263383)  
Phone: (09) 4791068, Fax: (09) 4791450  
Email: phermans@medtec.co.nz  
Website: www.medtec.co.nz  
circle number 46 on the reader reply card

## *Obituary*

*Percy James Comfort Clark*  
*MSc(NZ), Hon. FNZIC 81, (1909-1999)*

Percy Clark died on the 12 March 1999, shortly before his ninetieth birthday, after a life of public service in the finest sense. Not only was he a scientist employed by the DSIR for 44 years, but he was a dedicated churchman (and Lay preacher) and a highly respected local body politician as Tawa Borough Council's works committee chairman during the borough's formative years. His contributions did not cease on his retirement in 1970, he continued to work as a voluntary counsellor for his church, while remaining as Chairman of the Agricultural Chemical Board for several years, as anybody involved in the 245T controversy will be aware. In 1973 he was also appointed a member of the Commission of Inquiry into The Parnell Civil Defence Emergency. On 23 August 1981 he was elected an Honorary Fellow of the NZIC.

Percy Clark joined the Dominion Laboratory as a cadet in 1926 and studied part-time at Victoria University College where he qualified BSc and then, after 6 months leave on half pay, as a Master of Science. Although by now a branch of the newly formed DSIR (October 1926), the Dominion Laboratory continued to provide scientific services for a range of Government departments, particularly Health, so it is not surprising that as a graduate Percy was first employed as a food and water analyst. Divisions such as Plant Diseases and Fruit Research were established within DSIR and these needed chemical support. This led to very important collaborations between chemists and biologists first by establishing the quality of the pesticides proposed and then by determining the residual chemical levels after the recommended treatment regimes. Some of my earliest recollections were of Percy meticulously weighing aqueous powder suspensions to calculate sedimentation rates and thus the particle sizes of copper sprays, and using crude methods to analyse lead residues on apples sprayed to lessen codlin moth infestation. Percy Clark was the pioneer in this

field in New Zealand and he had an important role in protecting the public by allaying their fears and controlling the indiscriminant use of pesticides.

In 1960 the Director, Mr F J T Grigg, retired and his successor, Dr I K Walker, decided to separate the traditional positions, Director and Dominion Analyst. Percy Clark was then appointed Dominion Analyst, a position he filled with distinction until his retirement.

While still maintaining his interest in residue analysis Percy was now responsible for the Government Analyst laboratories at Auckland, Christchurch and Dunedin. Thus he had the general oversight of the work for the Police and Transport Departments, and forensic services as we now understand them, owe much to the direction and standards Percy Clark established. Those were the days when criminals were less sophisticated and I recall Percy Clark comparing tool marks, scratches and paint fragments. Mudguards were frequently damaged and repainted so it was not unusual to find as many as six paint layers on fragments at an accident site. This made identifications relatively straight forward and certain. Criminals used their own well worn tools for break-ins and these usually had unique features, which also simplified comparisons. Percy regularly gave evidence in court and I recall a case in which he identified a sliver of glass taken from a vehicle, with the bi-focal glasses worn by the victim of a hit and run accident.

The chemical laboratories in which Percy Clark worked had little instrumentation, but made great demands on the ability of the analyst. It is thanks to the skill and dedication of Percy Clark and his colleagues that the laboratories did succeed in their primary aim of protecting the health of New Zealanders.

*Ian MacDonald*



### NONLINEAR SPECTROSCOPY FOR MOLECULAR STRUCTURE DETERMINATION

*Edited by R W Field, E Hirota, J P Maier and S Tsuchiya;  
Blackwell Science, Oxford, 1998; ISBN 0-632-04217-6*

Nonlinear spectroscopy, which has developed rapidly with the advent of lasers as excitation sources, has become an important tool in the study of molecular structure and dynamics. A large variety of nonlinear spectroscopic methods have been developed, and this book (published under the auspices of the IUPAC Commission on Molecular Structure and Spectroscopy) was written in order to provide an introduction to these methods for non-specialists.

The book consists of ten chapters, each by a different author. The first chapter is an introduction to the basic principles of interaction of molecules with radiation, including higher order nonlinear effects. The remaining nine chapters each deal with a different kind of nonlinear spectroscopic method. The multi-author approach is very appropriate here, as the techniques involved cover a wide range of experimental methods (involving radiation from the microwave to the ultraviolet regions), and a wide variety of applications (the structure and dynamics of excited molecules, chemically reactive species, molecules in liquids or on surfaces, etc). Each chapter describes the underlying principles and the typical experimental setup for the method concerned, and then goes on to discuss specific examples of its application. The authors are all practising experts in (and in some cases the discoverers of) the methods described, and the discussions that they give are accurate and authoritative. The theory is at a fairly advanced level, and requires some prior knowledge of molecular spectroscopy (quantum mechanics, molecular energies, etc).

I think that the book succeeds very well in its aim. The theory is given at a level that allows rapid understanding of the principles involved, and the reader is quickly in a position to appreciate the many well-chosen examples of applications that are given. Space does not permit a review of all the methods described in the book, but a selection of two may suffice to illustrate its contents. The chapter on Zero Kinetic Energy (ZEKE) Photoelectron spectroscopy provides a very clear description of the principles of this method, which has produced spectacular improvements in the resolution that can be attained in photoelectron spectroscopy. The chapter on Sum Frequency Generation (SFG) spectroscopy describes several examples of how this remarkably surface-specific technique can be used to study molecular structure, phase transitions, catalysis, etc. at interfaces. I thoroughly recommend the book to anyone who wishes to dispel some of the mystery engendered by the bewildering array of acronyms (MODR, OODR, SEP, DFWM, MPI, SRS, CARS, SFT, etc.) associated with nonlinear spectroscopy, and to discover the fascinating range of applications of these methods.

*Graham A Bowmaker  
Department of Chemistry, University of Auckland*

### RESIDUAL SOLVENT RETENTION DATA RELEASED BY J&W SCIENTIFIC

J&W Scientific, the world's largest manufacturer of high resolution capillary GC columns, has just released valuable resource data for chromatographers analysing residual solvents. This extensive list of solvents is an ideal reference for method development. Compiled over years of analysis by J&W's applications chemists, this data is the most comprehensive list of its type in the industry. It is sorted alphabetically and by retention time for ease of use, and includes GC columns specified in USP Methods including Method 467. Contact J&W Scientific to get a free copy of this valuable publication.

Contact: Barbara Bogue, J&W Scientific  
91 Blue Ravine Road, Folsom, CA 95630, USA  
Phone: (+1-916) 9857888, Fax: (+1-916) 9851101  
Website: [www.jandw.com](http://www.jandw.com)

### NEW FOOD AND BEVERAGE INFORMATION ONLINE

Two vital resources for anyone wanting to keep current with food markets and legislation are now available online.

STN International, the online service for scientific and technical information, has enhanced its range of databases to include FOMAD and FOREGE. FOMAD offers more than 100,000 detailed analyses (since 1985) of international food and drink markets. The FOREGE database contains records, with full-text interpretations, to the worldwide literature on additive standards in the food and beverage industry. Both databases are produced by the Leatherhead Food Research Association (LFRA) in Leatherhead, Surrey, United Kingdom.

FOMAD (International Food Market Data) provides detailed analyses of international food and beverage markets, identifying key market players, highlighting new product launches, assessing consumer attitudes and retail trends, and tracking company news. The international markets covered comprise Western Europe, North America, Australia, and the Pacific Rim, as well as emerging markets in South America, Eastern Europe, and the Far East. All food and drink product groups are covered, including both branded and own label products, as well as reports on specialty food sectors, alcoholic beverages, pet foods, fresh produce, and food additives. A key strength of the database is its currency. FOMAD is updated twice weekly. 99% of the records contain abstracts. Sources include approximately 250 journals, statistical publications, and market reports. The database corresponds in part to *Food Market Abstracts*. As from May 1999, FOMAD will be available for worldwide online access.

FOREGE (Current Food Legislation) is a unique and authoritative source for anyone wanting to keep up-to-date on food legislation. The database contains records, with full-text interpretations, to the worldwide literature on additive standards in the food and beverage industry worldwide. The precise foods and drinks are

specified together with permitted additives, maximum levels of use, specific labelling requirements, and conditions of use. FOREGE is thus ideal for checking the legality of specific additives in specific foods and countries. The database contains records representing two distinct types of documents: Additives and Standards. Documents on additives provide information on the legal status of food additives used throughout the world. Documents on standards contain composition and labelling requirements currently in force in seven EU countries (Belgium, Germany, France, Ireland, Luxembourg, The Netherlands, United Kingdom), and the USA, and Canada. Users of FOREGE can search by countries, additives, food categories, ingredients, and labelling parameters. The database is updated weekly with information from the original text of the laws or from other official sources.

The food industry will use this source in product development to ensure that new products comply with the current legislation; exporters can use it to check the legal status of their products in other countries; and ingredients suppliers can use it to identify new export opportunities. FOREGE's strength is that it interprets the legislation and presents it in an easily understandable way.

Loaded on STN International in February this year, FROSTI is a complementary database to FOMAD and FOREGE. FROSTI contains more than 426,000 records to articles on food science and technology drawn from over 500 international scientific and technical journals.

The three databases round up perfectly STN's offering of files in the area of agriculture and food science. Among the most important databases in this field are AGRICOLA and CABA with more than 7 million records on agricultural aspects, FSTA with over 520,000 documents on all aspects of food science, and CROPU with more than 140,000 references to all aspects of pesticides. Further renowned international databases comprise, for example, BIOSIS (biosciences) and the Chemical Abstracts file (chemistry, biochemistry).

STN databases are accessible via commercial and academic networks (Datex-P, BT CONCERT X.25, etc.) and via the Internet (<http://stnweb.fiz-karlsruhe.de>).

Leatherhead Food RA is an independent organisation, based in the United Kingdom, serving the technical and information needs of the international food and drinks industry. With over 800 member companies, drawn from more than 35 countries, Leatherhead Food RA is recognised as the leading research centre for the industry. An essential function of the Leatherhead Food RA is the collection, processing, storage and dissemination of information on all aspects of food science and technology, market and product intelligence and food legislation.

A worldwide scientific service institution, FIZ Karlsruhe produces, provides and markets scientific and technical information services in printed and electronic form. FIZ Karlsruhe operates the European Service Centre of STN International, The Scientific & Technical Information Network. STN International is one of the world's premier online services offering access to bibliographic, factual and full-text databases in science and technology (more than 210 at present).

STN International is jointly operated by FIZ Karlsruhe, Germany; Chemical Abstracts Service (CAS), Columbus OH, USA, and the Japan Science and Technology Corporation, Information Centre of Science and Technology (JICST), Tokyo.

For further information please contact:  
FIZ Karlsruhe, STN Service Centre Europe  
P O Box 24 65, D-76012 Karlsruhe, Germany  
Phone: (+49-7247) 808555, Fax: (+49-7247) 808259  
Email: [hlpdesk@fiz-karlsruhe.de](mailto:hlpdesk@fiz-karlsruhe.de)  
Website: <http://www.fiz-karlsruhe.de>

## PACIFICHEM 2000 UPDATE

**Pacificchem 2000** will be held in Honolulu, Hawaii, between December 14 and 19, 2000. It will follow a similar format to the highly successful meeting held in 1995. The organising committee met in mid-December 1997 to assess the many proposals received in the first round. About 135 proposals were accepted and these will take up about 60% of the available time.

Sessions have been allocated for general papers in the following areas:

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

Further information is available from:

Professor B Halton  
Chemistry Department, Victoria University  
P O Box 600  
Wellington

# NEW ZEALAND INSTITUTE OF CHEMISTRY



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## NZIC COUNCIL NEWS

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### MESSAGE FROM THE PRESIDENT

As I write this column I have nearly completed my round of visits to the Branches. My Presidential address, entitled "Serendipity and the Research Chemist" contained a blend of basic science, serendipitous discoveries that have changed our lives, and comments on the state of funding of basic research in New Zealand. I enjoyed meeting many keen and committed members throughout the country, especially a number of younger chemists who have made a positive commitment to furthering the profile of the Institute.

At every venue I visited, members expressed concerns, which mirrored those expressed in my talk, about the downturn in chemistry enrolments in tertiary education. It is clear that the perceived lack of job security for scientists, the low salaries earned by chemistry graduates, and rising student debt, have driven many potential chemistry students into other more lucrative professions. Members also expressed their considerable apprehension at the uncertainties of funding for basic research. There is widespread concern that the politicians and funding providers may have overlooked the human aspects of their "knowledge society" in focussing too heavily on the wealth creation objectives of the Foresight Project. It is the scientists and technologists who will lead the way forward in expanding fundamental knowledge, developing innovative ideas, and implementing new technologies. Yet no-one appears to be taking notice of the decrease in the number of students studying science subjects such as chemistry, nor making any serious attempt to identify and rectify the causes of this downturn. Without a deliberate policy of encouraging New Zealand's brightest and most capable young students to enter into careers in science, the knowledge society and wealth creation models are surely doomed to fail. The country must address the major problem of science education from the lower school through to tertiary institutions, before New Zealand will be able to produce the numbers of highly trained scientists and technologists which will be necessary to deliver the Foresight target outcomes.

It is extremely disappointing that the Minister and MoRST decided to cease giving financial support for the Chemistry, Maths and Physics Olympiads in 1999. Those chosen to represent New Zealand on the basis of their intellect surely deserve just as much national recognition as our top sports people!

Congratulations to John Packer, John Robertson and Heather Wansbrough for successfully completing the Second Edition of *Chemical Processes in New Zealand*. This was a tremendous effort, and the attractive 2-volume set will be a valuable resource for science teachers, school pupils, university academics and all practising chemists. Well done!

Special congratulations to Denis Hogan, Roger Reeves and Doug Wright for their awards of Royal Society of New Zealand Science and Technology Medals. The awards give due recognition to the outstanding contributions they have made to the promotion of chemistry in New Zealand over many years.

I am pleased to advise that SGS (NZ) Ltd have agreed to continue their sponsorship of the research prize for a further year. Shell (NZ) Ltd have decided to withdraw their funding of the Shell Prize, and we thank them for their sponsorship over recent years. I was delighted when Kerry Hoggard, Chief Executive of FERNZ Corporation Ltd, agreed that his company would take over the funding for this prize in 1999. Hence, we now have the FERNZ Prize for Industrial and Applied Chemistry. Council is now calling for nominations for these prizes, and the deadline has been extended to 31 July 1999.

Professor Graeme George, President of the Royal Australian Chemical Institute, RACI, visited Auckland recently, and Graham Bowmaker (Chairman of the Auckland Branch), Bruce Graham (Auckland Branch Council Deleat) and I were able to meet with him and have a useful discussion about ways we might achieve closer cooperation and linkages between the activities of NZIC and RACI.

Best wishes to all Members,

*George Clark*  
NZIC President

### REPORT ON THE NZIC COUNCIL MEETING HELD ON 13 APRIL 1999



*NZIC Council Meeting: Left to Right: Andrew Brodie, Leon Phillips, Pat Holland, George Clark, Rob Whitney, Bruce Graham, Rowena Holder, Rod Tilbury, Grant Boston and Keith Hunter.*

### SGS and FERNZ Prizes

SGS and FERNZ have agreed to sponsor the SGS Prize and the FERNZ Prize for Industrial and Applied Chemistry (formerly the Shell Prize) for this year. The deadline for prize applications was extended to 31 July 1999.

## RSNZ Science & Technology Medals and RSNZ Awards for Beginning Students

Council congratulated the winners of these awards (see the list below in this issue).

### Financial Report

The Treasurer presented the provisional report for 1998 and discussed the budget for 1999. Provided that the NZIC continued to exercise good financial management it is in a good position to support planned activities.

### 2000 Business Plan

1st Vice President Keith Hunter presented the draft Business Plan. The overall theme of the plan was to move away from a list of desirable outcomes and to concentrate on self analysis. We would then develop a clear idea of what NZIC is doing and if that is what the members want. The business plan will be published in *Chemistry in New Zealand*.

### Code of Ethics

Bruce Graham presented the revised code of ethics and it will be published in *Chemistry in New Zealand*.

### Membership Report

The Council formally admitted and welcomed Alastair James Nielson and Eric William Ainscough as new Fellows of the Institute.

The following new members were welcomed to the Institute:

A M Turner	HOD Chemistry & Physics, Edgewater College, Auckland
Chris Beal	Rosehill College, Auckland
Gavin Robinson	R J Hill Laboratories, Waikato
Wayne B Severn	AgResearch, Wellington
Rebecca Cowling	Wellington
Philip Lock	Wellington
Katie Robinson	Baldwin Shelston Waters, Wellington
Suzanne M Boniface	St Oran's College, Wellington
Rebecca Officer	PhD Student, Canterbury
Simon Hay	Student, Canterbury
Anthony Butcher	Otago
Sigurd Wilbanks	Biochemistry Department, University of Otago
Rachel Sutton	Kavanagh College, Otago
Wendy Carseldine	Student, Otago
Robyn Schofield	Student, Otago

### Branch Funding Requests

The Council approved the following requests for funds from the pool established at the last Council meeting:

Waikato branch - \$1000 to support the National Crystal Growing Competition.

Otago branch - \$3000 to support the visit of Professor A Glazer.

Otago branch - \$300 to support the Senior Science Competition.

Manawatu branch - \$2000 to run a Salary Survey of NZIC members.

Manawatu - \$1000 to print new certificates for the Manawatu Schools Chemistry Quiz.

### Conferences and Other Funding Requests

The Council approved the following requests for funds:

Pacificchem 2000 -The NZIC will sponsor a student to attend this conference in 2000. The winning student will be selected at

the poster competition at the 1999 NZIC Conference.

ChemEd 99 - \$500.

Chem Olympiad - \$3000. Government funding for the Chemical Olympiad team was lost for 1999 and the NZIC will support the team this year.

Living Science AWIS Conference - \$500.

International Chemistry Celebration - \$3000.

### 2000/01 NZIC Conference

The Manawatu branch and the NZSBMB were asked to develop a proposal for a joint conference in 2000 or 2001.

### IUPAC Representative

Pat Holland was nominated as the liaison person between IUPAC, RSNZ and NZIC.

## ROYAL SOCIETY OF NEW ZEALAND AWARDS

### The New Zealand Science and Technology Medals

These were instituted by the Royal Society of New Zealand at the request of the Government to recognise and honour those who have made exceptional contributions to New Zealand society and culture through activities in the broad fields of science and technology:

Science and Technology Medals were awarded to three NZIC members:

Mr Denis Hogan Hon FNZIC, Editor, *Chem NZ*

Associate Professor Roger Reeves FNZIC, Institute of Fundamental Sciences, Massey University

Dr Douglas Wright Hon FNZIC, retired of Hamilton (formerly Director, MIRINZ).

**The Royal Society of New Zealand Science and Technology Awards for Beginning Scientists;** to enable PhD students at New Zealand universities to attend their first international scientific conference overseas.

Of the successful applicants, 16 were chemistry students and 10 are members of the NZIC. They are:

Anna Barlow, Department of Chemistry, University of Otago; 2000 Years of Natural Product Research - Past, present and future, 26 - 30 July 1999, Amsterdam, The Netherlands.

Andrea Clarkson, Department of Chemistry, University of Otago; 33rd International Conference on Coordination Chemistry, 30 August - 4 September 1998, Florence, Italy.

Anthony Fake, Department of Chemistry, Victoria University of Wellington; 9th International Symposium on Marine Natural Products, 5 - 10 July 1998, Townsville, Australia.

Paul Harris, Department of Chemistry, University of Auckland; RACI 16th National Organic Chemistry Conference, 12 - 17 July 1998, New South Wales, Australia.

Kitty Lee, Department of Chemistry, University of Otago; 33rd International Conference on Coordination Chemistry, 30 August-4 September 1998, Florence, Italy.

Simon Page, Chemistry Department, University of Otago; International Symposium on Photochemistry and Photophysics of Coordination Compounds, 26 June - 1 July 1999, Lipari, Italy.

Paul Pilotto, Chemistry Department, Victoria University of Wellington; 33rd International Conference on Organometallic Chemistry, 16 - 21 August 1998, Munich, Germany.

Matthew Polson, Department of Chemistry, University of Otago; 33rd International Conference on Coordination Chemistry, 30 August - 4 September 1998, Florence, Italy.

Julia Turnbull, Department of Chemistry, University of Otago; 33rd International Conference on Coordination Chemistry, 30 August - 4 September 1998, Florence, Italy.

Keri Wellington, Department of Chemistry, University of Auckland; RACI 16th National Organic Chemistry Conference, 12 - 17 July 1998, New South Wales, Australia.

### IUPAC AFFILIATE MEMBERSHIP

The International Union of Pure and Applied Chemistry (IUPAC) serves to advance the worldwide aspects of the chemical sciences and to contribute to the application of chemistry in the service of mankind. As a scientific, international, non-governmental and objective body, IUPAC can address many global issues involving the chemical sciences.

IUPAC was formed in 1919 by chemists from industry and academia. Over nearly eight decades, the Union has succeeded in fostering worldwide communications in the chemical sciences and in uniting academic, industrial and public sector chemistry in a common language. IUPAC is undergoing a period of change (much as the NZIC is doing) in order to enhance its relevance to chemistry and industry and to increase the speed of its responses to important issues.

Over a 1000 chemists worldwide serve on seven divisions, among them eight New Zealand chemists. Each Division consists of a committee and 4-6 commissions on particular sub-areas from which most of the scientific work of IUPAC emanates as projects. The results are reported in the Union journal, *Pure and Applied Chemistry*. Many commissions also organise international conferences or workshops. IUPAC news is published bimonthly in "*Chemistry International*". See the IUPAC website at <http://www.iupac.org> for further information.

Chemists who are interested in the activities of IUPAC can join as Affiliate Members. The benefits of Affiliate Membership are:

- Visibility as a potential recruit for the scientific work of IUPAC.
- Six copies per year of the IUPAC news magazine *Chemistry International*.
- Entitlement to communicate directly on scientific matters with the officers of IUPAC commissions.
- Entitlement to communicate with IUPAC's division and commission members and other affiliates through the correspondence column of *Chemistry International*.
- A minimum 25% reduction on the cost of all IUPAC publications published by Blackwell Scientific, except the scientific journal *Pure and Applied Chemistry*.
- A 10% reduction on the registration fees of IUPAC-sponsored conferences.
- The opportunity to purchase and wear an IUPAC tie or scarf.

Affiliate Membership runs from June 1 to May 31 annually and costs only \$40. If you want to become an IUPAC Affiliate Member please contact Grant Boston, Honorary General Secretary as soon as possible.

### 1999 EASTERFIELD AWARD

The Medal was donated by the Royal Institute of Chemistry (now the Royal Society of Chemistry) in honour of the late Sir Thomas Hill Easterfield KBE MSc(Cantab) PhD(Wutzburg) FRSNZ FRIC HonFNZIC the first chairman of the New Zealand section of the Royal Institute of Chemistry and one of the early Presidents of the NZIC.

- The medal shall be awarded to chemists in New Zealand in recognition of the quality and originality of their research work.
- Candidates must be under 35 years of age at 30th April in the year of their application for consideration for the award.
- The award will be open to all chemists whether or not they are members of the Royal Society of Chemistry or the New Zealand Institute of Chemistry.
- The major portion of the candidate's research work submitted must have been carried out in New Zealand.
- No person may be awarded the Easterfield Medal more than once.

The successful candidate will be requested to deliver a lecture on the subject of his/her research at the Annual Conference of the New Zealand Institute of Chemistry or on some other suitable occasion. Expenses necessarily incurred by the Medalist in connection with the delivery of his/her lecture will be defrayed.



## 1999 NZIC Conference

**"Chemistry in New Zealand - a Showcase of Activities and Opportunities"**

**21 November - 24 November 1999**

at

Victoria University of Wellington

A Special Carbohydrate Symposium in honour of Emeritus Professor Robin Ferrier will be held during the Conference on Tuesday 23 and Wednesday 24 November.

### Contacts:

#### Chairman Of Organising Committee:

Associate Professor Jim Johnston,  
Victoria University of Wellington

#### Conference Office:

School of Chemical and Physical Sciences,  
Victoria University of Wellington

**Email:** [Margaret.Brown@vuw.ac.nz](mailto:Margaret.Brown@vuw.ac.nz)

**Web Site:** [www.vuw.ac.nz/chemistry/nzic99](http://www.vuw.ac.nz/chemistry/nzic99)

Applications by or on behalf of candidates for this award must be received by the General Secretary, Freepost 96, New Zealand Institute of Chemistry, P O Box 39 283, Howick, Auckland, by the 31st July 1999 and must be fully supported by all relevant papers (either published or unpublished).

#### 1999 SGS PRIZE

This prize of \$1,000 and a plaque has been donated by SGS (New Zealand) Ltd.

The prize shall be awarded to a member of the NZIC who, in the opinion of the Council, has made a significant contribution to some branch of chemical science, the contribution to be judged by research work published during the five years immediately preceding 30th April in the year of the award.

Applications by members or nominations which may be submitted by Branch Committees or individual members must be received by the General Secretary, Freepost 96, New Zealand Institute of Chemistry, P O Box 39 283, Howick, Auckland, by 31st July 1999 and must be accompanied by copies of papers presented in support of the entry. The Council itself may nominate candidates for the award.

#### 1999 FERNZ PRIZE FOR INDUSTRIAL AND APPLIED CHEMISTRY

A prize of \$1,000 and a certificate will be awarded annually by FERNZ New Zealand to further the recipient's studies in Industrial Chemistry and to commemorate the achievement.

The prize will be awarded for meritorious achievement in the field of industrial or applied chemistry.

The prize will be restricted to financial members of the New Zealand Institute of Chemistry of any grade of membership. In the case of joint work, the prize may be shared between two or more members.

Applications should include a written statement of the industrial or applied chemistry activities or achievements of the candidate(s) and their significance in terms of improved technology, new products or other benefits to industry or the community. Supporting documents and publications may be submitted with the application and will be held to be confidential to the assessors. If possible, the value of the work should be attested by an accompanying statement from the manager or directors or head of the organisation. There is no limit on the period of time over which the work was carried out.

Applications or nominations must be received by the Honorary General Secretary, Freepost 96, New Zealand Institute of Chemistry, P O Box 39 283, Howick, Auckland, by 31st July 1999.

#### 1999 AWARD FOR CHEMICAL EDUCATION

Council of the NZIC has established an award for chemical education consisting of a certificate and a prize of \$250.

The award shall be made to a person who, in the opinion of Council, has made an important contribution to Chemical Education in New Zealand. (Note: The award will normally be made to a secondary teacher actively involved in teaching chemistry.)

The award shall consist of a certificate and a prize of \$250.

The award is not restricted to financial members of the NZIC.

Application for the award may be made by individuals, or nominations may be made by any Branch Committee or by any individual financial member of the NZIC.

Applications or nominations must be received by the Honorary General Secretary, Freepost 96, New Zealand Institute of Chemistry, P O Box 39 283, Howick, Auckland, by 31st July 1999. Each application or nomination must include a full curriculum vitae and two independent supporting statements from referees commenting on the educational activities of the candidate and their significance to chemical education.

#### 1999 ARTHUR C KENNETT MEMORIAL AWARD

An award sponsored by the Australian Corrosion Association and the New Zealand Institute of Chemistry as a memorial to Mr A C Kennett, a very active member of both organisations.

The subject matter of any paper to be considered for the Award must cover the key aspects of "corrosion" and "non-metallics", and should materially add to the knowledge of corrosion mitigation for non-metallics, and/or the use of non-metallics in corrosion mitigation. This implies that the paper should have scientific value.

For a paper to be eligible for consideration it must have been presented at a technical meeting, seminar, symposium or conference run under the auspices of either of the sponsors of the Award, solely or jointly with another learned organisation, or published in either of the journals of the sponsoring bodies during the 12 months ending June 30 of the year in which the Award is made.

Application forms are available from the Corrosion Prevention Centre, Melbourne, or through Branch Secretaries of ACA and NZIC.

The completed application form, together with the text of the paper and a synopsis, is to be sent to the Corrosion Prevention Centre, P O Box 2340, Mount Waverley, Victoria 3149, Australia no later than 30 September 1999.

The author(s) does (do) not necessarily have to be a member of either of the sponsoring organisations but should be a citizen of either Australia or New Zealand.

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## BRANCH NEWS

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### WAIKATO

The Waikato branch of the NZIC was the first port of call for Associate Professor George Clark on his meet-the-Nation tour as President of NZIC. George spoke to a good sized group about "Serendipity and the Research Chemist". In an interesting and thought-provoking talk, he managed to show the part serendipity plays in the research activities of practising research chemists and George illustrated his talk liberally with examples

from his own research. As well as stimulating valuable discussion on the state of basic science research George's talk was particularly interesting in that it provided a fascinating insight into the structure elucidation of macromolecular crystalline compounds and drug research. In fact interest in George's research tended to dominate the discussion in some ways detracting from the purpose; that is how we as practising chemists can influence Government bodies into providing adequate support for the funding of basic scientific research. Some members felt the Institute should take a more assertive pro-active role acting as a lobby group to Government, other suggestions included trying to form useful working relationships with local MPs. It is probably true to say that members were not particularly optimistic about the value of these suggestions, and George undertook to consider Waikato branch members views as well as canvassing views from other branches.

George also took the opportunity to notify members of the recently updated *Chemical Processes in New Zealand*, published by the Institute. A number of members took order forms and the book was widely praised and clearly represents a valuable teaching resource. The Waikato Branch of NZIC wishes to thank George for a stimulating talk and wishes him well for the remainder of his travels around New Zealand.

In May we were treated to a fascinating talk by Mike Fitzpatrick of Kingett Mitchell & Associates, Environmental Consultants. Mike's talk was about phytoestrogens, entitled the "Other Side of the Story" Mike detailed research carried out by him and colleagues that found inordinately high levels of phytoestrogens in a variety of soy-based foodstuffs such as infant foods and pet-foods. Mike pointed out that there were several misconceptions about the value of phytoestrogens based mostly on perceptions of the role they played in the Asian diet. In fact as Mike revealed Asian infants have comparatively little soy-based food in their diet; rather less than their Western counterparts. Mike's talk was very much food for thought, and as he said "watch this space". The Waikato Branch is very grateful to Mike for taking the trouble to visit and deliver such a stimulating and interesting seminar.

University of Waikato, Chemistry Department, news centred around two recent PhD completions and staff study leave; Craig Gribble has completed his PhD working with Alistair Wilkins and Alan Langdon and is working at the Waikato Polytechnic as a tutor. Mark Dines similarly has successfully completed his oral, having returned from his post-doc at Sheffield to do so. Alistair Wilkins is heading off to Oslo for a period of study leave at the Vet Institute (if he ever completes his study leave application) and Derek Smith is taking leave in the UK at Leeds University. Ken Mackay, recently retired Dean of the School, has been installed as Emeritus Professor and now haunts the upper echelons of the Chemistry Department.

*Richard Coll*

## MANAWATU

The Manawatu Branch started its 1999 activities with a social dinner for members and partners at "The Loaded Hog" in George Street, Palmerston North on the evening of Tuesday 23 March 1999. The Loaded Hog is a relative newcomer to the Palmerston

North cafe bar scene. It's boutique beers and good bar meals sustained the group of about 15 participants while they enjoyed the company of chemical friends.

The second event on the Branch calendar was a visit on Friday 30 April to New Zealand Pharmaceuticals Ltd (NZP) near Linton in the Manawatu. One year ago the staff of NZP bought the company and visitors were invited to find out what a difference it had made. The large group of about 45 visitors included many chemistry teachers. Selwyn Yorke, Research Manager, talked on the chemistry and business at NZP, and several staff guided sub-groups of visitors around the plant. In his talk, Selwyn explained that NZP was a natural products company supplying chemicals of animal and plant origin to the pharmaceutical and dietary supplement industries. NZP exports about 95% of its production and imports about 80% of its raw materials. There are 66 staff of which 9 are in R&D with a budget of 5% of sales (way above the New Zealand industrial average). The current products that NZP produces include steroids from bile acids (about 80% of total business), proteins/amino acids (ferritin, thymus peptides, peptones, taurine), glycosaminoglycans (e.g., chondroitin sulfate, and heparin), and plant products (e.g., pinitol and echinacea extracts). Selwyn described the core strengths of NZP as being in downstream processing (extraction and purification), good manufacturing practice to defined standards, and broad scientific and technical skills (including organic-, physical-, analytical-, and bio-chemistry, as well as separation science and technology). NZP are aiming to obtain more products from marine and plant sources. The visitor groups were shown the various processing plants involved in the extraction and purification of some of the natural products described by Selwyn Yorke, several pilot plants, and the main laboratory where HPLC instrumentation used by the current chairman of the Manawatu Branch (Stephen Van Eyk) was of particular interest. Most of the visitors then returned to Massey University to enjoy a Dinner at "Wharerata", the University Staff Club.

### Massey University

The Centre for Structural Biology has moved into a refurbished laboratory at Massey University. This Centre, which spans the Institutes of Fundamental Sciences and Molecular BioSciences, held a lab-warming party on Friday afternoon 26 March 1999 to celebrate near-completion of renovations to the 'wet' laboratory on the fourth floor of Science Tower C. The aesthetically pleasing and functional layout owe much to the design efforts of Jo Mudford and Gill Norris. Professor Pat Sullivan, Head of the Institute of Molecular BioSciences, cut the ceremonial ribbon. Centre staff were pleased that many people turned up to help celebrate.

The 1998 NZIC Chemistry Prize for 300 level chemistry has been awarded to Kylie Keene (Institute of Fundamental Sciences - Chemistry), and the 1998 NZIC Biochemistry Prize for 300 level biochemistry has been awarded to Elisabeth Shaw (Institute of Molecular Biosciences).

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Branch member Professor Sylvia Rumball of Massey University has recently been in Paris as a member of an UNESCO International Bioethics Committee working party on the implementation of the Universal Declaration on the Human Genome and Human Rights. The Declaration encompasses issues concerning human dignity and forbids actions such as the reproductive cloning of humans. Sylvia was reported as saying "I am very interested in the Declaration because of what is happening in New Zealand now with applications to the Environmental Risk Management Authority".

Congratulations to the following Massey University students who were awarded The Royal Society of New Zealand Science and Technology Awards for Beginning Scientists, to enable PhD students at New Zealand universities to attend their first international scientific conference overseas:

Fleur Francois, Institute of Molecular Biosciences; to attend the 38th Annual Meeting of the American Society for Cell Biology, 12 - 16 December 1998, San Francisco, California, USA.

Rebecca Gardiner, Institute of Molecular Biosciences; to attend the 20th Asilomar Fungal Genetics Conference, 23 - 29 March 1999, Asilomar, California, USA.

Steven Kennedy and Andrew Steedman, Institute of Fundamental Sciences - Chemistry; to attend the 33rd International Conference on Coordination Chemistry, 30 August - 4 September 1998, Florence, Italy.

*Harry Percival*

## WELLINGTON

Attendance at our Branch meetings has significantly increased over the last couple of years, most likely due to our affiliation to Science Wellington (formerly the Wellington Branch of the Royal Society), whereby our meetings are advertised in their monthly newsletter to a wider and more general audience. We also distribute their newsletter to all our members, thus offering a much wider range of talks, tours and visits, etc. of general science interest.

So far we have had three meetings this year, the first featured Dr Owen Curnow from the University of Canterbury. Owen presented a very interesting lecture on his recent research into hydrodesulfurisation. This process is of tremendous environmental and economic importance, since it is used to remove the sulfur-containing organics from crude oil. These compounds would otherwise poison the catalysts used in the refining process or be a major pollutant to the environment. Owen is also the New Zealand representative for the International Year of Chemistry, and spent some time after the above presentation discussing some of the various initiatives planned for New Zealand this year and inspiring our Branch to get involved.

The March meeting of the Branch was a special meeting for secondary school chemistry teachers of the region held at Victoria University. We began with a tour of the new state-of-the-art chemistry teaching and research facilities of the School of Chemical and Physical Sciences. Although the laboratories are now fully functional and have been operating since the

beginning of 1999, they will not be officially 'opened' until the Science Centennial Week in July. Some of the first year chemistry experiments were also on display for the teachers. After the tour there was a discussion led by our Branch Chairman, Graham Murray, on some aspects of the curriculum and teaching of secondary school chemistry, including a reference to White Island exhaust as an equilibrium mixture, to use as an introduction to equilibrium that students find quite stimulating.

The April meeting was a visit to the Gracefield laboratories of Opus International Consultants, and was held jointly with ACA and IPENZ. After refreshments and a brief introduction from Peter Thorby of Opus, the large group was divided into six parties for the guided tour of the research facilities. In each laboratory Opus staff were on hand to explain the research being undertaken. This included work on corrosion in concrete, the effect of wind in city streets, the reflective properties of road marking paint, the origins of road noise, the resistance of different chip materials to polishing (which affects braking efficiency) and the rheology of bitumen mixtures. Of course the state of the roads is a subject on which everyone has an opinion and each presentation elicited spirited discussion. Inevitably the time was too short to have them all fully answered. Nevertheless, it is likely that everyone leaving Opus that night thought a little differently about the roads they drove over on their way home.

*Rod Tilbury*



## 1999 NZIC Conference

**"Chemistry in New Zealand - a Showcase of Activities and Opportunities"**

**21 November - 24 November 1999**

at

Victoria University of Wellington

A Special Carbohydrate Symposium in honour of Emeritus Professor Robin Ferrier will be held during the Conference on Tuesday 23 and Wednesday 24 November.

### **Contacts:**

#### **Chairman Of Organising Committee:**

Associate Professor Jim Johnston,  
Victoria University of Wellington

#### **Conference Office:**

School of Chemical and Physical Sciences,  
Victoria University of Wellington

**Email:** Margaret.Brown@vuw.ac.nz

**Web Site:** www.vuw.ac.nz/chemistry/nzic99

## Tentative Programme

Sunday 21	pm	Registration	
	evg	Intellectual property issues	
	evg	Social function	
Monday 22	am	Welcome/Opening Plenary lectures	
	pm	Parallel specialist sessions Posters Mixer and food	
	evg	Chemistry in the 21st century	
	Tuesday 23	am	Plenary lectures Parallel specialist sessions
		pm	Parallel specialist sessions
	evg	The future of science policy (Public lecture)	
Wednesday 24	am	Plenary lectures Parallel specialist sessions Carbohydrate symposium	
	pm	Parallel specialist sessions Carbohydrate symposium	
	evg	Conference dinner	

### Registration Costs

Approximate Registration Costs	
NZIC Member	\$350
Non-Member	\$450
Student	\$90

**Abstract submissions and registrations  
due by August 1999.**

## Plenary Lecturers

**Professor Ronald Breslow** - Samuel Latham Mitchell Professor of Chemistry at the University of Columbia, NY, USA. Past President American Chemical Society. Topic: *The chelate effect in binding, catalysis, and chemotherapy.*

**Professor Margaret Brimble** - Chemistry Department, University of Auckland (Organic Chemistry). Topic: *Strategies for organic synthesis.*

**Dr Ian Brown** - Industrial Research Ltd (Ceramics). Topic: *Ceramic chemistry - gateway to new technologies.*

**Sir John Cadogan** - Formerly Director General of Research Councils UK. Topic: *Chemistry for the 21st century.*

**Dr Bill Henderson** - University of Waikato. (Inorganic Chemistry). Recipient of the 1997 Easterfield Award. Topic: *Bugs, metals and weighing machines.*

**Professor Ole Hindsgaul** - University of Alberta, Canada. Topic: *Advances in carbohydrate synthesis and biological evaluation.*

**Assoc Professor Jim Johnston** - Head, School of Chemical and Physical Sciences, Victoria University of Wellington (Industrial Chemistry). Topic: *Adding value using chemistry - New process and product development.*

**Professor Douglas Russell** - Head, Chemistry Department, University of Auckland (Physical Chemistry). Topic: *Looking at lasers in a different light - Application of lasers in fundamental and applied chemistry.*

**Professor Vern Schramm** - Chairman, Dept of Biochemistry, Albert Einstein College of Medicine, NY, USA. Topic: *Transition state inhibitors of nucleoside processing enzymes.*

## Specialist Sessions

Abstracts are invited on a wide range of topics including:

- Analytical chemistry
- Chemistry education
- Environmental chemistry
- Industrial applications of chemistry
- Inorganic chemistry
- Materials science
- Natural products
- Organic chemistry
- Physical chemistry
- Polysaccharide chemistry
- Polymer chemistry

The papers will be allocated to specialist sessions once the number of abstracts and range of topics is known.

### International Carbohydrate Symposium

An international carbohydrate symposium featuring invited speakers will run as one of the specialist sessions on Wednesday 24<sup>th</sup>. The symposium is in honour of Emeritus Professor Robin Ferrier. Information on this symposium will be circulated as part of the NZIC 1999 material. Specific questions can be addressed to Dr Richard Furneaux by email at: r.furneaux@irl.cri.nz

### Natural Products Workshop

The third NZ Natural Products Workshop will be run as one of the parallel specialist sessions on Monday and Tuesday, and will feature sessions on polysaccharide chemistry and biologically active compounds. For more information contact Dr Stephen Bloor at IRL, email s.bloor@irl.cri.nz

### Emulsion Polymer Workshop

Symposium and Workshop with speakers from Forest Research, Universities of Auckland and Canterbury and Polymer technology companies will also run as one of the parallel sessions. For more information contact Dr Robert Franich at FRI, email franichr@fri.cri.nz

## Venue

Victoria University of Wellington Maclaurin Lecture Theatre Complex.

## Accommodation and Meals

Hotels and hostel accommodation will be available within walking distance of the campus. Motels are also available. Lunches will be available on campus and restaurants are within easy walking distance.

## Conference Dinner

The conference dinner will be held at Te Papa.

### Registration of Interest

Return this form to: Margaret Brown

School of Chemical and Physical Sciences

Victoria University of Wellington

P O Box 600

Wellington

New Zealand

Fax (04) 495 5237 or (04) 463 5237

or send details by email to [margaret.brown@vuw.ac.nz](mailto:margaret.brown@vuw.ac.nz).

A second circular, with further details about the conference will be sent to those who respond.

Name: \_\_\_\_\_

Address: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Fax No.: \_\_\_\_\_

Email: \_\_\_\_\_

**I am considering presenting a paper:**

Oral  Poster

Student poster competition

Tentative title: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## Conference Chairman

Associate Professor Jim Johnston  
Head, School of Chemical and Physical  
Sciences, Victoria University of Wellington

## Committee

Adrian Bennett, BRANZ  
Dr David Bibby, Industrial Research  
Dr Stephen Bloor, Industrial Research  
Dr Richard Furneaux, Industrial Research  
Professor John Spencer, Victoria University of Wellington

## Correspondence

Margaret Brown:  
School of Chemical and Physical Sciences:  
Victoria University of Wellington  
P O Box 600  
Wellington  
New Zealand  
email: [margaret.brown@vuw.ac.nz](mailto:margaret.brown@vuw.ac.nz)

## Trade Display

There will be a trade display by various scientific suppliers. For details on display opportunities, contact:  
Dr Stephen Bloor  
Industrial Research  
PO Box 31310  
Lower Hutt  
email: [s.bloor@irl.cri.nz](mailto:s.bloor@irl.cri.nz)

## **Student Poster Session**

*(Win a trip to Hawaii)*

Up to 4 Student Poster Prizes are available to registered students. In addition, the NZIC will provide sponsorship (travel, accommodation and registration) for one PhD student who is registered at a New Zealand university and is a NZIC student member to attend and present a student poster at the Pacificchem 2000 conference in Hawaii, December 2000. The winner will be selected from the student posters at this NZIC conference.



## **NZIC Conference**

**1999**

**Chemistry in New Zealand - a  
Showcase of Activities and  
Opportunities**

**Sunday Wednesday  
November 21 - November 24**

**School of Chemical and Physical  
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Victoria University of Wellington  
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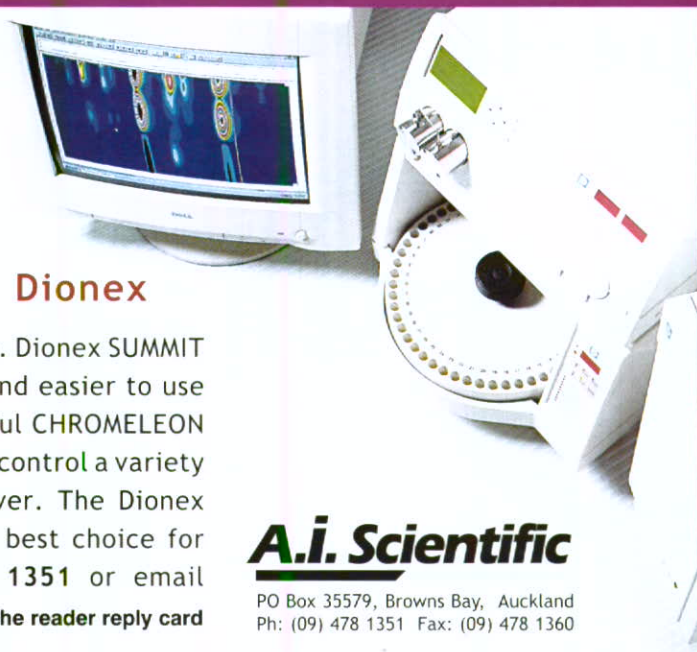
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