



# Chemistry

IN NEW ZEALAND

ISSN 0110-5566

**Focus on Education, Training, Quality Systems,  
pH, Titration, Electrochemistry**

**EUTECH**  
INSTRUMENTS  
*Technology Made Easy ...*

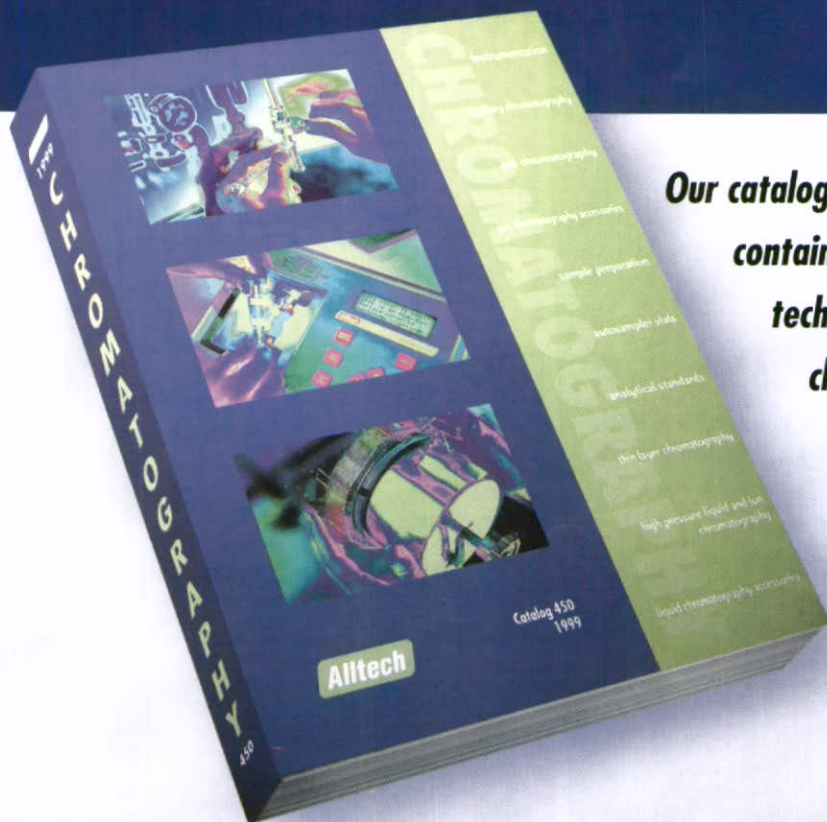
setting the standards in water testing

A collection of various EUTECH water testing instruments, including handheld meters, probes, and a benchtop unit, arranged on a blue surface.

**ALPHATECH**

The advertisement features a central image of a glass flask on a stand with a dark liquid being poured from a beaker into it. The background is a light blue gradient. The text 'EUTECH INSTRUMENTS' and 'Technology Made Easy ...' is in the top left. The slogan 'setting the standards in water testing' is in yellow at the bottom of the image area. The 'ALPHATECH' logo is at the very bottom.

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## UP FRONT ...

### EUTECH INSTRUMENTS

#### A Leader in the Field of Electrochemical Instrumentation

Eutech Instruments is a dynamic company rapidly positioning itself globally as a leading manufacturer of electrochemical instrumentation.



For further information see the cover story item on page 2

## Chemistry IN NEW ZEALAND

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#### The New Zealand Institute of Chemistry Incorporated

P O Box 39-283, Howick, Auckland, New Zealand

Phone: +64-9-5356495, Fax: +64-9-5353476

Email: [NZICOffice@nzic.org.nz](mailto:NZICOffice@nzic.org.nz)

WWW: <http://www.nzic.org.nz>

President: Dr A MacGibbon, Hon Treasurer: Dr R S Whitney

General Secretary/Executive Officer: G Boston

#### Advertising Sales & Publisher:

Robert B Lyon

Ancat Holdings Limited

32 Murvale Drive, Bucklands Beach, Auckland

P O Box 38-546, Howick, Auckland, New Zealand

Phone: +64-9-5353475, Fax: +64-9-5353476

Email: [chemistry@ancat.co.nz](mailto:chemistry@ancat.co.nz)

#### Editorial Board:

Dr L J Wright • PhD, MNZIC

Dr R Whiting • PhD, MNZIC

R B Lyon • BSc, MNZIC

#### Managing Editor:

Robert B Lyon

Ancat Holdings Limited

32 Murvale Drive, Bucklands Beach, Auckland

P O Box 38-546, Howick, Auckland, New Zealand

Phone: +64-9-5353475, Fax: +64-9-5353476

Email: [chemistry@ancat.co.nz](mailto:chemistry@ancat.co.nz)

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## COMING UP ...

**January 1999** - Environmental Control and Testing, GC, GC-MS

**March 1999** - Plastics, Resins, Paints, Coatings  
IR and Thermal Analysis

#### Deadline for material:

5th of the month of publication

#### Contributions and enquiries to:

The Editor,

*Chemistry in New Zealand*,

P O Box 38-546, Howick, Auckland, New Zealand

Phone: +64-9-5353475, Fax: +64-9-5353476

Email: [chemistry@ancat.co.nz](mailto:chemistry@ancat.co.nz)

# EUTECH INSTRUMENTS

## A Leader in the Field of Electrochemical Instrumentation

Eutech Instruments is a dynamic company rapidly positioning itself globally as a leading manufacturer of electrochemical instrumentation. A pioneer in developing ASIC-based (Application Specific Integrated Circuit) instruments, Eutech Instruments has gained international awards and recognition for its achievements in sensor technology, software programming and product design. Underlying its strong commitment to research and development, is the constant drive by Eutech engineers to apply new, emerging technologies to the design and manufacture of advanced electrochemical instruments.



Eutech offers a comprehensive range of laboratory and field instrumentation for water analysis and continuous online process instruments for monitoring and control of pH, conductivity, total dissolved solids, redox potential (ORP) and dissolved oxygen (DO). A full range of accessories including calibration buffers is also available.

Eutech's products are certified to comply with global standards for electromagnetic emission and interference. Eutech Instruments is dedicated to producing convenience products for water analysis.

Contact: Alphatech Systems  
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Email: sales@alphatech.co.nz  
circle number 1 on the reader reply card



## NZ Science Scene

### 'JUST ADD WATER' SEMINAR ON THE FUTURE OF ION CHROMATOGRAPHY

A.i. Scientific, in conjunction with Dionex (USA), will be holding a series of seminars in Australia and New Zealand entitled "The Future of Ion Chromatography - 'Just Add Water'". The programme will cover the latest developments in Ion Chromatography including the principles of eluent generation, how to choose the best column for your IC application, how to choose the right eluent and the basics of preventative maintenance and IC troubleshooting. The scheduled dates for the seminars are:

Brisbane	8th February 1999
Sydney	10th February 1999
Melbourne	12th February 1999
Auckland	16th February 1999

The seminars will be conducted by Peter Jackson from Dionex Corporation along with Dr Tim Williams and Karim Kassis from A.i. Scientific. Special guest speaker will be Professor Paul Hadad from the University of Tasmania. Attendance is free although attendees need to register in advance by calling (09) 4781351.

### FROM WAREHOUSE TO HIGH TECH RESEARCH CENTRE

What used to be a two-person branch operation in New Zealand is now gearing up to supply its parent company's 55 sites around the world with advanced ceramic products.

Pyrotek Products manufactures components for the metal smelting and casting industries. The company has invested \$2.5 million in a new high technology ceramic production facility in Auckland as the result of a long collaboration with Industrial Research's advanced ceramics specialists.

The New Zealand operation has grown from two people to 30 in six years and is expected to grow to a NZ\$6 million annual turnover in the next five years.

"We used to be just a small warehousing operation in New Zealand," Pyrotek technical director Michael Cooper says. "Instead of just bringing materials in, we're going to be a net exporter of materials worldwide. Now the New Zealand operation is likely to become the high technology research centre for the company's industrial ceramics operations internationally."

The investment confirms New Zealand's developing reputation as a specialist manufacturer of high technology, high value export

products, Pyrotek's Asia Pacific general manager, Bob Corrie says.

The ceramic products are made of sialon (silicon, aluminium, oxygen and nitrogen) which is harder, stronger and tougher than traditional ceramics. They have excellent heat resistance, wear resistance and chemical durability.

The components have applications in refractories, thermocouple protection tubes, furnaces and molten metal flow processes.

Ninety-five percent of the New Zealand production will be exported.

Industrial Research's contribution to the development of the new products was funded both by Pyrotek and the government's Technology for Business Growth (TBG) scheme.

"We needed Industrial Research because we just did not have the facilities or in some areas the expertise to undertake the research ourselves in the time we have," Mike Cooper says. "Over the course of the projects we've developed a special relationship with them."

The first three year TBG project developed an advanced ceramic product which is already in commercial production. In trials in local aluminium casting factories the new product lasted six months whereas traditional components last only up to 10 days.

The first project also resulted in a wholly new process for producing a sialon ceramic using a specialised clay as an ingredient. This process has been jointly patented by Pyrotek and Industrial Research and is being further developed in a second TBG project which is now running.

The presence of clay in the raw mix allows a greater variety and lower cost of forming techniques including extrusion and slip casting.

From the results of this latest research it is intended to go beyond the aluminium industry and look at producing components for the smelting and casting of other metals such as brass and copper, or glass.

Source: *Industrial Research Ltd, Innovate, Issue 29, September 1998*

### **NEW CODE FOR CHILD RESISTANT PACKAGING**

The Ministry of Health has released a new voluntary Code of Practice for Child Resistant Packaging (CRP) of Toxic Substances. The Code provides importers, manufacturers, packers and retailers of toxic and corrosive substances with guidance about packaging these substances.

An accompanying note to retailers explains the underlying rationale that all products which pose a risk to children should be in CRP. However, there is provision for exemptions for people with medical certificates.

There is no mandatory requirement to use CRP at present. It is however, proposed to amend the Toxic Substances Regulations

1983 to support the Code and the intent of the Code is expected to be recognised in the HSNO Regulations.

### **NATIONAL STRATEGY FOR ENVIRONMENTAL EDUCATION**

The Government's *National Strategy for Environmental Education* has recently been published. The *Strategy* outlines the Government's priorities for environmental education during the next three to five years and describes the actions to be undertaken, encouraged and supported during the implementation phase.

Priority Five in the *Strategy* refers to the promotion of environmental education in business education and training, and identifies actions to be undertaken and encouraged. The Ministry for the Environment is keen to discuss with industry how this might be achieved.

### **BAYER AND SCIENCE EDUCATION**

Bayer New Zealand Limited, the world's third largest chemical and pharmaceutical company, is concerned secondary schools are not submitting applications for grants targeting science studies and equipment. Managing Director, David Hope-Cross, questions whether enough teachers appreciated the importance of a science education and the value of science skills in achieving economic growth.

David believes too many New Zealand businesses and politicians appear to have forgotten that it was science-based innovation that stimulated this country's economic growth.

Each year Bayer awards ten secondary schools \$3,500 worth of scientific resource material and five senior pupils each receive a \$2,000 per annum scholarship for tertiary study. To date, 15 students and 60 schools have benefited from Bayer's initiative.

### **NEW SCIENCE BLOCK AT DIOCESAN REINFORCES TOP PERFORMANCES**

Diocesan School for Girls in Auckland is reinforcing a tradition of producing some of New Zealand's top chemistry and biology students by building a \$4 million science block. The school's chemistry students achieve a mean pass mark of 66%, compared to the national average of 56%.

### **TERTIARY EDUCATION REVIEW - WHITE PAPER**

The White Paper arising from the comprehensive review of Tertiary Education was released on Wednesday, 18 November by Hon. Wyatt Creech, Minister of Education.

*White paper delivers funding cut for universities*  
A funding cut for universities will result from the Tertiary Education White Paper decision to introduce capital charging by way of reduced tuition subsidies.

Professor Bryan Gould, chair of the New Zealand Vice-Chancellors' Committee, says the decision will see university students paying for the mistakes of previous governments in failing to adequately capitalise other tertiary institutions such as polytechnics and particularly, Wananga.

"The White Paper claims that the move to impose a capital charge on tertiary institution assets through cuts in tuition subsidies has been made in the interests of fairness. That notion is misguided and poses the immediate question of fairness to whom?"

"This policy will see a transfer of resourcing from universities to polytechnics and that means university students will foot the bill through increased tuition fees. That is hardly fair, especially when the White Paper claims that 'students will ultimately benefit from the more even-handed distribution of resources and greater efficiency in the use of assets'. The fact is some tertiary students will benefit at the expense of others."

Professor Gould says Government plans to differentiate subsidies to institutions depending on the level of their assets overlooks the fact that different mixes of teaching require different levels of capital intensity.

"For instance, the costs of teaching medicine, engineering and the sciences are much greater than other subjects, especially as expensive assets such as laboratories need to be deployed. It's not a question of creating a level playing field to redress historical inequities but rather looking at what institutions are doing, to determine their differing capital requirements.

"Then there is the issue of who is responsible for allowing capital inequity to develop in the first place. Clearly the responsibility rests with Government yet university students will have to pay. Some institutions need a capital injection to survive, but lacking the courage to take that course, Government proposes to find the money by taking it off universities."

For the duration of this decade universities had sustained annual per capita funding cuts and as a result had no alternative to passing on further cuts through increased tuition fees.

Professor Gould also took issue with the White Paper position that there would be no capital injections for tertiary education institutions and that they would have to fund any development from their own resources.

"The health and justice systems, for instance, receive regular capital injections so why should tertiary education be treated any differently? This point has been made in recent submissions to the Waitangi Tribunal on behalf of the specialist Maori tertiary education institutions known as wananga.

"Tertiary education experts told the tribunal that difficulties experienced by wananga in their capital development were much greater than those experienced by other institutions. Their submissions pointed out that it was impossible for a tertiary education institution to begin from nothing and grow without some capital injection."

Professor Gould says all other tertiary education institutions were established prior to 1990 and most of them inherited substantial capital assets.

"To quote from one submission to the tribunal, some were not as fortunate as others in their inheritance, but the disparity with nothing for wananga is grossly unfair. It seems extremely short-sighted to rule out capital grants as a means of addressing such disparities."

Also see the NZVCC research paper "The case for strengthening research in New Zealand universities" on website:  
<http://www.nzvcc.ac.nz/pubaffpol/uniresearch.html>

#### *CRI's welcome contestability in tertiary research funding*

Government moves to open up university research funding to contestability according to the quality of proposed post-graduate research projects was welcomed today by the Association of Crown Research Institutes (ACRI).

The President of the association, Dr Ian Warrington, said a more rigorous assessment of the value of proposed research would inevitably lead to better quality scholarship and relevance to current issues.

"This process will force a reassessment of research qualities within existing tertiary institutions and the development of a much more focused approach. Institutions will need to demonstrate to their students an impressive ability to achieve contestable grants in order to continue attracting new entrants.

"The pressures to do so will increase as more and more of the research funding pool becomes subject to contestability.

"The contestability factor will also mitigate against any blurring of the use of funds within tertiary institutions because the process will mean that funds achieved in such a manner must be devoted to research."

Dr Warrington said CRIs welcomed the higher commitment being made by the Government to tertiary education because it is essential that the country continues to expand its knowledge base with the aim of capitalising on enterprise opportunities available through research, science and technology.

"Publication of the review itself is also welcome because it removes uncertainty over the future direction of the tertiary education system."

#### *Adjustment to funding system welcomed*

The government's decision, announced in the White Paper, to adjust the present funding system in order to close the gap between rich and poor tertiary education institutions is strongly supported by the Association of Polytechnics in New Zealand (APNZ).

Polytechnic students are likely to benefit from the decision by government to redress the large disparity in resources available to students in different institutions. At present the average university student has access to \$29,000 in assets compared to just \$14,000 for a polytechnic student and less than \$3,000 for a student attending a wananga. In addition, the average polytechnic student receives a subsidy of \$1,100 less than the average university student does. This particular gap has actually been increasing over the past seven years.

#### **EUREKA! - NEW RADIO NEW ZEALAND SCIENCE PROGRAMME**

Beginning in January 1999, Radio New Zealand will broadcast a new weekly programme devoted to New Zealand science. The show, which will be called "Eureka!", will air on Mondays at 7.06 pm, and will be rebroadcast on Saturdays at 3.06 pm. It will cover science and technology from a New Zealand

perspective, and will focus on new findings and ongoing scientific research.

Production of the first programmes is beginning now. Eureka! will be produced and presented by Allan Coukell, who may be contacted by:

Email: science@ihug.co.nz, Phone/fax: (09) 483-7934

### JAMES COOK FELLOWSHIPS

The James Cook Research Fellowships are administered by the Royal Society of New Zealand on behalf of the New Zealand Government and are awarded to senior researchers who are recognised leaders in their respective fields, have the requisite qualifications and experience and are able to demonstrate that they have achieved national and international recognition in their area of scientific or technological research.

Applications are now being sought in the following research categories:

- \* Social Sciences interpreted in the broadest sense
- \* Engineering Sciences and Technologies

The primary intention for the award of fellowships is the recognition of sustained excellence in research. The normal term of a Fellowship is two years and the normal stipend is at a rate equivalent to an Associate Professor in a New Zealand university.

The closing date for applications is 22 January 1999 and the successful candidates must be able to take up their Fellowships no later than 1 July 1999.

For further information and an application form, please email: awards@rsnz.govt.nz

### ROYAL SOCIETY ACADEMY COUNCIL MEDALS AND AWARDS

Medals and awards for 1998, as awarded by the Academy Council, were announced at the Royal Society Fellows' Annual General Meeting held in Wellington last week.

*Hector Medal for outstanding contributions to the advancement of physical science:*

- Professor Paul T Callaghan FRSNZ,  
Institute of Fundamental Sciences  
- Physics, Massey University
- Dr Jeffery L Tallon FRSNZ, Industrial Research Ltd

*Hutton Medal for outstanding contributions to the advancement of animal sciences:*

- Dr Alan H Kirton MBE FRSNZ, AgResearch, Hamilton

*Sir Charles Hercus Medal in biomedical and health sciences for outstanding contributions to the advancement of biomedical sciences and technologies:*

- Professor Peter D Gluckman CNZM FRSNZ,  
Dean of the Faculty of Medicine and Human Biology,  
University of Auckland

*R J Scott Medal in engineering sciences and technologies for outstanding contributions to the advancement of agricultural, electrical, electronic, information and mechanical engineering:*

- Professor John T Boys FRSNZ,  
Department of Electrical and Electronic Engineering,  
University of Auckland.

*Thomson Medal in recognition of outstanding contributions in the fields of the organisation, administration or application of science and technology:*

- Associate Professor James H Johnston,  
School of Chemical and Physical Sciences,  
Victoria University of Wellington

*Hamilton Memorial Prize awarded for the encouragement of beginners in scientific or technological research in New Zealand:*

- Dr Timothy Naish,  
Institute of Geological and Nuclear Sciences Ltd

*Hatherton Award for the best scientific paper by a student registered for a PhD at any New Zealand University, published or accepted for publication either during their studies or within a year of the receipt of their PhD in physical sciences, earth sciences or mathematical and information sciences:*

- Dr Charles A Semple, Post-Doctoral Fellow in the  
Department of Mathematics and Statistics,  
University of Canterbury

### WHY AREN'T YOUNG MEN PARTICIPATING IN SCIENCE FAIRS?

The recent Otago ECNZ Science and Technology Fair highlights a developing trend in science in schools. Chief Judge Kay Wilson praised the depth and maturity of the winning entries in the fair but expressed alarm at the fact that all the entries from the senior secondary level were from young women.

One of the Fair's organisers, science adviser Alan Bennington, commented that this was an area requiring research into why young males were not participating and how they could be encouraged to do so.

### SCIENCE AND TECHNOLOGY PROMOTION FUND

This year the Science and Technology Promotion Fund Selection Panel considered 73 applications to a value of \$1.6 million. Funds available for allocation in 1998/99 total \$300,000 (GST inclusive), of which \$32,000 is committed from previous years.

Seven applications were received for the single large project (up to \$80,000) and this was awarded to the Rutherford Exhibition project being organised by the Association of Science-Technology Centres (NZ).

The panel expressed concern that it was unclear in many applications as to how the advertised criteria for the scheme were to be met. The production of a resource by itself could not be considered to satisfy the criteria. It was also noted that the criteria for the scheme were broader than the recognition or promotion of excellence, therefore applications for activities focusing on these aspects may not have fitted the stated criteria.

The following applicants were successful:

The Rutherford Exhibition	Association of Science-Technology Centres New Zealand	To create an interactive/multimedia exhibition based on the achievements and times of Lord Rutherford.
Quake Trackers	Victoria University	To promote the contribution that earth science and engineering make to New Zealand by involving secondary school children in recording and analysing earthquakes.
Science-Wise!	Discovery World, Otago Museum	To promote interest in and appreciation of science and technology through a science-based performance.
CREST	CREST	To promote science and technology to rural communities by increasing the rurally-focussed use of the first CREST scheme.
Student Mentors	University of Waikato	To promote science and technology through the use of university students as mentors and positive role models to school students.
Putting the Science into Computer Science	Department of Computer Science, Canterbury and Waikato Universities	To promote computer science to teachers and students.
Why are we learning this, Sir?	Tearaway Press	To use Tearaway magazine, web site and teacher resource to illustrate applications of science, mathematics, social science and technology in careers.
Little Country, Big Ideas	Big Ideas Productions	To produce a technology video for schools and a pilot programme for a television science documentary series.
Stream Monitoring	Lincoln University	To establish a stream monitoring programme in Christchurch intermediate and secondary schools.
Links between scientific principles and technological application	New Zealand Association of Science Educators	To produce a poster set that promotes and makes more explicit the links between technological applications of science and the actual scientific principles involved.
Science and Technology in the supermarket	Science-Technology Roadshow Trust Board	To produce a poster relating science and technology of the supermarket and its contents.
Science and Technology Interactive exhibits	Science Alive!	To provide learning opportunities to explore scientific principles through a series of table-top interactive exhibits.
Puzzling Things	Science Alive!	To encourage exploration, investigation and problem-solving of unusual aspects of a range of scientific topics.
Enrichment of science in Waimate	Waimate Teachers' Resource Centre	To raise children's and teachers' awareness of the work of scientists and promote science and technology as career options.
STARS: Space science teaching and resource site	Carter Observatory	To develop a unique national space sciences web site.
Chemical Milestones in New Zealand History	New Zealand Institute of Chemistry	To produce a record of the contribution that chemists have made to the development of New Zealand's industry and economy.

# CHEMICAL RESOURCE KIT

Alex Clark, Chemistry Department, University of Auckland, Private Bag 92019 Auckland  
Email: a.clark@auckland.ac.nz

The *Chemical Resource Kit* consists of a collection of computer software developed for research chemists, by a research chemist. The scope of the project currently ranges from the personal desktop PC of the working chemist, to a server hosting part of the World Wide Web.

Initially, the *Chemical Resource Kit* was inspired by the relative deficiencies of systematic cataloging methods for chemical compounds generally available. It has since been expanded to suit personal use and provide convenient presentation techniques, which will be discussed below.

Although the author is aware of a very large number of methods by which chemical compounds have been stored in databases, published on paper, electronically, or online, they tend to be designed by librarians or computer programmers, rather than chemists who wish to find answers to their questions based on limited information.

Most compendia of chemicals provide indexes based on the molecular formula and proper name. Many of the more advanced electronic databases make searching for particular structures, or fragments of structures, possible. While this is of great use when the specific compound sought is known, it far less useful when the searcher's information is limited. In practice, a synthetic chemist is often left with, at the end of an experiment, a flask containing one or more compounds, and only a few educated guesses as to what they might be. The only practical way to verify if any of the products of a reaction are already known is to examine characterisation data (experimental observations, colour, melting point, IR, NMR, mass spectral data, etc), consider compounds that would be consistent with the data, then look them up in the literature - a procedure that is tedious and, in the age of information technology, avoidable.

## Chemical Information Storage

The first part of the solution to the problem is to formulate a methodology for storing chemical information, one compound at a time, so that data can accurately be supplied for each in a logical, consistent format. The format used by the *Chemical Resource Kit* is straightforward, and can be understood by humans and computer programs without difficulty. The fields are shown in Figure 1, and are relatively self-explanatory. Each is optional, and need not necessarily be present for all compounds in the database.

## Data Editing Software

Probably the most important piece of software that makes up the *Chemical Resource Kit* is the local editor, which is a fully graphical user interface based program designed to make the entering of complex chemical data in a computer-friendly format as painless as possible.

Most aspects of the local editor are straightforward and require little detailed explanation; a sample screen-shot is shown in Figure 2. A list of compounds available is presented in the panel on the left, and the facility to organise compounds into groups is provided.

Figure 1: Main fields used by each compound

<i>Chemist</i>	The name of the chemist to whom the preparation is attributed.
<i>Name</i>	The "name" of the compound, in its abbreviated format.
<i>Formula</i>	The condensed molecular formula, which is usually able to be derived automatically from <i>Name</i> .
<i>Colour</i>	Self explanatory.
<i>Physical</i>	Physical properties, i.e. melting and boiling points.
<i>Elemental</i>	Elemental analysis results, including expected figures, experimentally found figures, and any solvent present.
<i>Literature</i>	Literature reference where the "official" information can be found.
<i>Experimental</i>	Preparative experimental details.
<i>IR</i>	Infrared absorptions.
<i>NMR</i>	Nuclear magnetic resonance peaks ( <sup>1</sup> H, <sup>13</sup> C, <sup>31</sup> P etc.)
<i>MassSpectrum</i>	Mass spectroscopy data.
<i>XRayStructure</i>	Atom positions from crystallographically determined structure.
<i>XRayData</i>	Bond lengths, angles etc. from crystal data.
<i>DiagramStructure</i>	Data for presenting the compound as a 2-dimensional picture, similar to <i>ChemWindow</i> , <i>ChemDraw</i> et al.

The panel shown on the right displays data depending on which particular view is requested. What is seen varies from a screenful of tabular text entry boxes (for fields such as *Chemist*, *Name*, *Formula* etc), to lists of peaks (such as *IR* and *NMR* fields) and more fanciful displays. The interactive view depicted in Figure 2 graphically shows the *XRayStructure* field for the compound and allows it to be rotated, bond lengths/angles queried, and the picture pasted to the clipboard for use in documents.

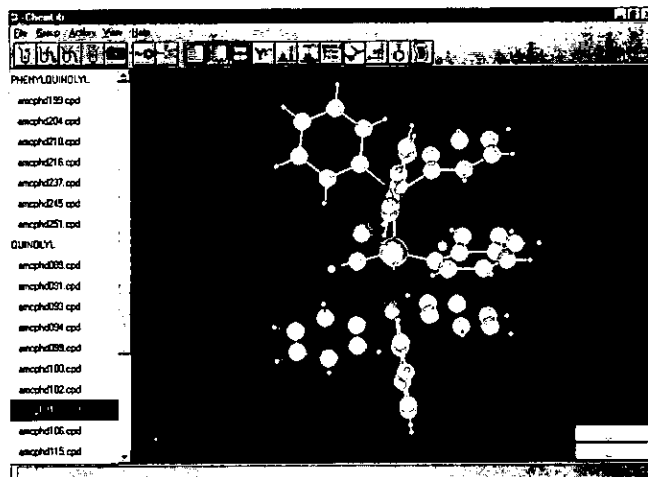


Figure 2: Screenshot of the local editor (Windows version)

Shown in Figure 3 is the same compound with a different view, displaying the *DiagramStructure*, the 2-dimensional schematic representation. A floating toolbar can also be seen, which provides features for editing the diagram. Although as yet nowhere near as sophisticated as various dedicated chemical drawing software packages, it is very close to being capable of generating publishable-quality output.

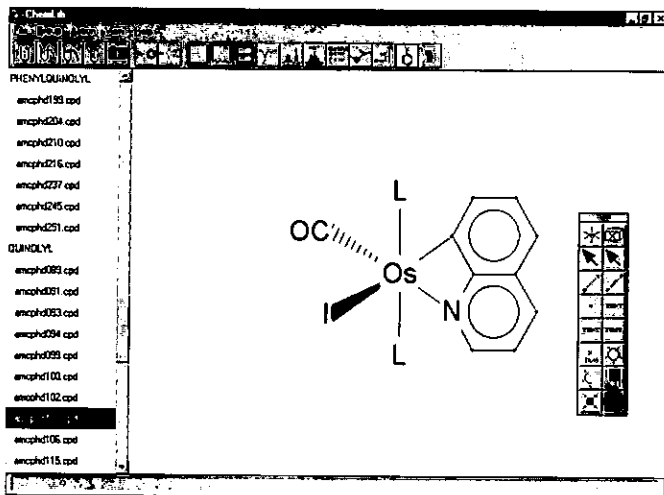


Figure 3: Editing a diagram structure

An example of the method of entry for a potentially complicated datum such as an NMR peak is shown in Figure 4. It is intended that the information stored, i.e. nucleus type, chemical shift, integral, assignment and all coupling information (multiplicity, coupling magnitude, source of coupling), be comprehensive. Of course, not all chemical information is so well behaved, and new methods of storing additional information will undoubtedly appear, and be incorporated into the format.

Edit NMR Peak		
Nucleus	1H	OK
Chemical Shift	6.77 ppm	Cancel
Integral	1	
Assignment	H5	
Coupling (multiplicity,magnitude,to)		
<input checked="" type="checkbox"/>	8.12	H6
<input type="checkbox"/>		
<input type="checkbox"/>		
<input type="checkbox"/>		
<input type="checkbox"/>		
<input type="checkbox"/>		
<input type="checkbox"/>		

Figure 4: Structured data entry

Unlike most of the tools that compose the *Chemical Resource Kit*, the local editor is currently only available for Windows. A UNIX version (X-Windows/Motif) is being developed for the Linux operating system, and is functional, but incomplete. It will be released as soon as its features are all operational. The source code will be made available immediately to facilitate porting to other UNIX platforms.

## Online Resource Tools

Having dealt briefly with the method of preparing and maintaining data files, it is now necessary to discuss what can be done with them. First and foremost is the ability to convert the compound data files into a highly useable collection of WWW pages. How this is done needs to be explained in several stages.

Several "static" web pages are first required. These are files that reside on the web server and have the extension .html, and do not vary of their own accord. Most important is the main menu, or title page, which provides links to the rest of the site. An example of a completely setup web site can be seen at <http://www.che.auckland.ac.nz/chemlib>

The next part is to generate a web page for each compound datafile. This is done with a small utility program called *publish.pl*. Like most of the small utilities that make up the *Chemical Resource Kit*, it is written in a language called Perl, which could be said to be a greatly more flexible and useful cousin of the batch files of DOS and Windows, and is available on most platforms.

*publish.pl* creates one HTML file (the primary format of the World Wide Web) for each compound, in addition to some extra files which contain indexes of links to these files. By and large, the HTML file that corresponds to a particular compound file shows a simple representation of the data, most of which is easy to present using normal text and formatted tables.

Two fields are somewhat more complicated, however: X-ray crystal structures and diagrams. While diagrams could optionally be created as static graphic files (such as GIFs), this is not ideal for several reasons. For crystal structures this approach would be even more limiting, since 3-dimensional pictures need to be interactive to allow them to be rotated, etc. Therefore, Java applets have been developed to display these two fields. Compounds which have crystal structure or diagram fields have applets embedded in their HTML pages.

In accordance with the major incentive to develop the *Chemical Resource Kit*, the web pages are setup with a powerful way of searching for particular compounds based on limited knowledge. This feature is performed with the online tools, and it requires another technology, CGI applications, which are a type of program which runs on the server in response to a request from the browsing user.

When first called into action, the CGI application, *search.cgi*, once again written in Perl, serves up a complicated looking page with lots of empty boxes that can be filled in, shown in Figure 5. The first box invites the user to enter a complex expression of boolean algebra, for which detailed help is available. Underneath this box are the "Pre-made Searches", which allow searching to be done for single criteria at a time. These simple sections include searching by IR peaks, NMR peaks, elemental analysis, melting/boiling point, and molecular fragments. As the range and complexity of the compound data files grows, so will the ability to search for features amongst this data.

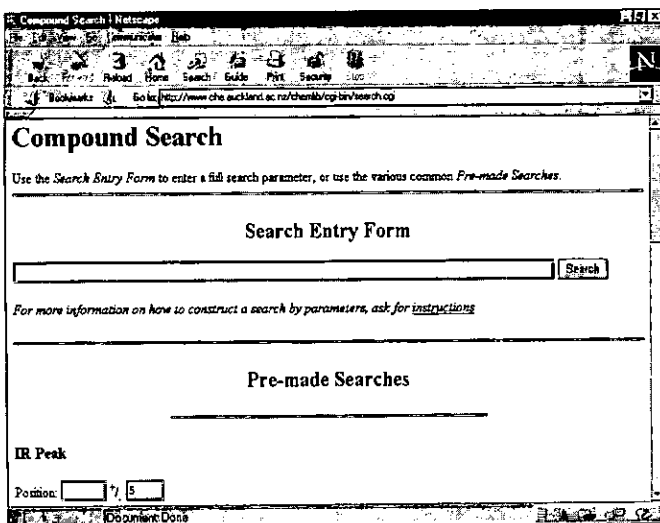


Figure 5: Searching for compounds

### Presentation Tools

Previously alluded to was the ability of the local editor to produce output for use in presentations. At present, quality images of X-ray structures can be pasted onto the "clipboard" as WMF (Windows MetaFile) format images, which are highly suitable for placing in wordprocessing documents. Work is currently nearing completion on features to export them as source files for POVray (Persistence Of Vision Raytracing) for very impressive quality output. Also nearing completion is a utility to create WPG (WordPerfect Graphic) files of the diagram structures.

This is useful, but it goes further. Another Perl utility, stylefmt.pl, is capable of taking a selection of compounds and outputting the contents as a single document. The format of the output document, and the way its contents are arranged, can be specified. There are several different ways to create output for personal use, with features such as grouping spectroscopic data in tables, which is highly suitable for generating overviews. Additionally, there are several pre-programmed journal formats. This makes it possible to create the entire experimental section of a publication with a few mouse clicks!

The output is in HTML, but converting this cleanly to a document format such as Word or WordPerfect is handled automatically by newer versions of these applications.

### Summary

The *Chemical Resource Kit* attempts to provide a simple, flexible and extensible format for storing chemical data. Software has been developed to make editing this data as straightforward and convenient as possible. Several methods for using presentation data in documents are available, including some high level formatting tools. A utility is provided for generating WWW pages from the compound data files, with a collection of other utilities for making them interactive and searchable.

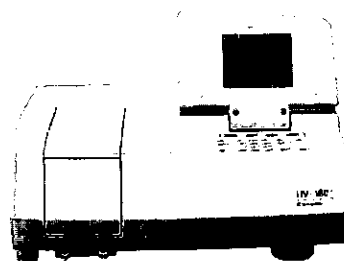
Anyone interested is invited to visit the website at <http://www.che.auckland.ac.nz/chemlib>

### Distribution Policy

The *Chemical Resource Kit* project was begun in 1996, and has since been undertaken entirely in what would otherwise have been the author's "spare time". The endeavour is entirely altruistic, and the author has no intention of trying to profit monetarily. All of the components considered ready for use or evaluation can be downloaded without restrictions from the website at <http://www.che.auckland.ac.nz/chemlib>, although the source code for some of the binaries is not yet available, primarily because of its "work in progress" status. As with most free software, permission is granted for virtually unlimited use, provided proper acknowledgment is given where appropriate.

Alex Clark is currently undertaking the latter stages of a PhD degree in Chemistry under the supervision of L J Wright and W R Roper at the University of Auckland. He can be contacted by email [a.clark@auckland.ac.nz](mailto:a.clark@auckland.ac.nz) and via the aforementioned website.

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## THERMOSPECTRA ACQUIRES TOPOMETRIX CORPORATION

ThermoSpectra Corporation (ASE-THS) announced today that it has acquired the assets of TopoMetrix Corporation for approximately US\$8 million in cash, subject to a post-closing adjustment, and the assumption of certain liabilities.

Based in Santa Clara, California, and with sales offices in Germany and the United Kingdom, TopoMetrix manufactures and sells computerised atomic force microscopes, near-field optical microscopes, and a host of other scanning probe microscopes for research and industrial applications. In 1997, the business had revenues of approximately US\$11 million.

"We are very pleased to announce this acquisition and would like to welcome everyone at TopoMetrix to the ThermoSpectra family," said Barry S Howe, president and chief executive office at ThermoSpectra. "TopoMetrix's product line complements our existing products and provides us an even greater presence in the worldwide scanning probe microscopy market."

ThermoSpectra Corporation develops, manufactures, and markets precision imaging, inspection, measurement, and temperature control instrumentation. ThermoSpectra is a subsidiary of Thermo Instrument Systems Inc, a Thermo Electron company. More information is available at <http://www.thermo.com/subsid/ths1.html> on the internet.

## NEW CHEMICAL CONVENTION

New Zealand will be one of the first countries to sign an international convention aimed at controlling trade in particularly hazardous chemicals and pesticides. The Prior Informed Consent (PIC) Convention for Certain Hazardous Chemicals and Pesticides in International Trade (the 'Rotterdam Convention') will establish a formal information sharing agreement, whereby details about specified chemicals would be given to importing (essentially Third World) countries to help them decide whether to allow the chemical into the country and if so, how it should be managed.

The Convention targets the substances known as Persistent Organic Pollutants (POPs), which are either already banned or severely restricted, e.g. Aldrin, DDT, Dieldrin, PCBs, PBCs and PCTs. Details are available from the New Zealand Chemical Industry Council Secretariat.

The International Association of Chemical Associations (ICCA) representing 42 countries, including New Zealand, supports the extension of the voluntary PIC system into a legally binding instrument, reflecting the global chemical industry's commitment to *Responsible Care*<sup>™</sup>.

## UNCERTAINTY OVER CHEMICAL WEAPONS

This year's US missile strike against Sudan and revelations about a 1992 air crash have highlighted the uncertainties surrounding chemical weapon precursor compounds.

Evidence of precursor chemicals provided part of the reason for the US cruise missile attack on the Shifa pharmaceutical plant in Khartoum, Sudan, on 20 August 1998. The factory had links both with Iraq (supplying medicines to Iraq with UN permission) and with Usama bin Laden, the dissident Saudi millionaire believed to be behind the bomb attacks on US embassies in East Africa on 7 August 1998. Senior US intelligence officials said on 20 August 1998 that 'We know with high confidence that Shifa produces a precursor that is unique to the production of VX (nerve gas) ... The facility also has a secured perimeter and it's patrolled by the Sudanese military. It's an unusual pharmaceutical facility'.

Later briefings revealed that the precursor chemical in question was *O*-ethyl methylphosphonothioic acid (EMPTA), which can be used to make VX nerve gas (*O*-ethyl *S*-2-diisopropylamino ethyl methylphosphonothiolate). US State Department spokesman James Foley said that it 'is not used in commercial applications, does not occur naturally in the environment and is not a byproduct of another chemical process'.

The evidence came in the form of soil samples, allegedly from the site, obtained by agents working for the US. Pentagon officials later backtracked from claiming that these proved that the Shifa plant was making EMPTA to saying simply that EMPTA was present and that they believe that it was being used there.

The difficulty of pinning down the evidence of chemical weapons from traces has been highlighted by the inability of Swiss scientists to confirm a US lab's findings of VX on fragments of Scud missiles brought back from Iraq by the UN Special Commission. Iraq has always denied making enough VX to load it into weapons.

However, while EMPTA has no legitimate use, other chemical weapon precursors are openly traded and are therefore more difficult to control. A Dutch newspaper recently revealed that an El Al Boeing 747 cargo plane that crashed in an Amsterdam suburb in 1992 had been carrying some 190 litres of dimethyl methylphosphonate (DMMP), a precursor for the nerve gas sarin. According to the paperwork, the consignment was bound for the Israel Institute for Biological Research, a facility that is reportedly subject to military censorship.

The Dutch government and El Al confirmed to news agencies the accuracy of the information contained in a dangerous goods cargo manifest for the 747, which was supplied to Dutch authorities at the time of the crash.

DMMP is a Schedule 2 chemical under the 1993 Chemical Weapons Convention (CWC): export from one CWC member country to another is now controlled by export licences, and is banned to non-CWC member states. Plants making or using the chemical in quantities greater than 1 tonne are subject to inspection by teams from the Organisation for the Prohibition of Chemical Weapons (OPCW) in The Hague. DMMP has legitimate uses, e.g. in fire retardants, but the revelations have fuelled speculation that Israel has made chemical weapons.

Israel was one of the first countries to sign the CWC in January 1993, but has still not ratified it, which would require a declaration of past chemical weapon activities.

Newspaper reports quoting Dutch government sources suggest that last April the Netherlands blocked a shipment of chemicals to Sudan because of suspicions about their end use.

### **TECHNICIANS - AN ENDANGERED SPECIES IN BRITAIN?**

Technical support staff in British Universities and research council institutes need to be protected, according to a new report from the Royal Society.

Since the early 1980s, the number of 'core' technical support staff - long-term university-funded technicians and scientific support staff - has fallen by 28 per cent, while the number of university-funded academic staff has risen slightly and that of externally-funded academic staff (mostly on short-term contracts) has mushroomed. The result is that fewer technical staff are supporting many more researchers, while the research environment has changed - notably the increasing sophistication of equipment and the increased use of computerisation (sometimes partly replacing experimental work). At the same time, technical staff have borne the brunt of increased health and safety bureaucracy.

The Royal Society report, states that it is important for there to be continuity in certain skills:

- specialist design and manual skills to build research equipment that is not commercially available;
- advanced technical skills to operate and maintain complex equipment and facilities;
- local knowledge, which can save time and effort;
- assuming the role of the intelligent customer - especially when buying in products and services that were previously provided in house;
- effective laboratory and safety management.

The report says that institutions have reacted in various ways to financial tightness: they have obtained external funds (often time-limited); restructured to obtain benefits of scale, including sharing resources and technicians; and generally squeezed costs, 'there is some feeling that the technical support function has borne a disproportionate share of cost-saving initiatives'.

The report concludes that 'there must be no further reduction in technical and research support'. The university funding councils and charities should work out how to maintain existing funding for core technical staff, and the report commends the approach of the Medical Research Council, which provides more stability through grants to centres and groups as well as to individual projects.

The full report is available, price £12.50, from Royal Society Publication Sales, Tel: (+44-171)-4512645.

### **EUROPEAN-WIDE THEMATIC NETWORK**

The European Chemistry Thematic Network (ECTN), aimed at developing a common core of chemistry courses in European countries, has launched its website. The site <http://lagaffe.cpe.fr/ectn/>

gives details on the current work of the network, including details on the working groups for 1998 and 1999, meetings, and discussion boards. There are also details of how to join ECTN and become involved in working groups, discussing topics such as professional recognition and employment and the image of chemistry.

### **VIRTUAL TEACHERS CENTRE JOINS EUROPE**

The National Grid for Learning and the Virtual Teachers Centre are now part of the European SchoolNet (EUN). The EUN links national electronic networks of schools, teachers and pupils in 18 countries, and provides access to high quality resources and opportunities for professional development and collaboration.

The website ([www.eun.org](http://www.eun.org)) includes information on opportunities for funding, ICT and training areas, and various online conferences. Schools can also register their website on a searchable database and find partners in other countries.

### **LOOKING FORWARD INTO THE PAST**

During September 1998 the Royal Society of Chemistry officially launched the web version of the RSC's historical images database.

Over 2000 images from the Library and Information Centre's (LIC's) historical collections have been scanned into digital form. This will make them more accessible to those who might want to use them in multimedia encyclopaedias, publications and presentations.

At the same time, it will save the collection from deterioration by handling.

The LIC's full images collection comprises about 8000 images including original prints, individual photographs, glass lantern slides, photomicrographs and illustrations from books dating from the present day back to 1538, the mainstay of it being the 'Cribb Collection'. The items that have been digitised are the most noteworthy images in the collection, and hence the most used and in need of protection.

Access to the images collection is through the web address <http://www.rsc.org/lic/collections.htm>

Orders may be placed by email to [library@rsc.org](mailto:library@rsc.org) or via order forms on the LIC web pages.

## **CHEMISTRY IN NEW ZEALAND NOW AVAILABLE ONLINE**

*Chemistry in New Zealand* is now available online at <http://www.ancat.co.nz> in PDF format. Issues will be available online one week after the printed version is circulated.

# Investigating the Kinetics of Diacyl Peroxide Decomposition

Cassandra Hinton, Institute of Environmental Science and Research Ltd, P O Box 29-181, Christchurch\*

## Introduction

Organic peroxides are a group of compounds of general formula R-O-O-R', where R and R' may be H, an alkyl group, acyl group or various other substituents. The simplest and best known peroxide is hydrogen peroxide, H-O-O-H, an antiseptic agent and popular bleach. Peroxides are very unstable compounds, many are explosive to shock, and their sensitivity and power of explosion increases with increasing active oxygen content. The usefulness of most peroxides derives from their thermal decomposition. The first step in the thermal decomposition of an organic peroxide involves cleavage of the O-O bond. This homolysis may be followed by subsequent steps, depending on the nature of R and R'. This basic information is summarised in Scheme 1.

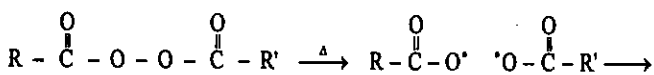


**Scheme 1.** Peroxide bond homolysis (R, R' = H, alkyl, aryl etc.).

Scheme 1 is a vast over-simplification of the chemistry of this decomposition, but it represents the most important, and, for the most part, the dominant process. Peroxides are thus a source of free radicals, either alkyl or acyl depending on the nature of R and R'.

The peroxide O-O linkage is relatively weak, and has an activation energy for homolysis in the range 100 to 165 kJ/mol. Because of this, peroxides can provide free radicals at the desired rates for many free radical polymerisation processes. Consequently they are among the most widely used initiators of free radical polymerisation. They are used industrially in the production of polymers such as polyethylene, polystyrene and polyvinyl chloride. Due to their instability, peroxide initiators are commonly prepared as 75% solutions in aromatic free mineral spirit, and stored at temperatures below 0 °C.

One class of peroxide initiators are diacyl peroxides, characterised by the functional group shown in Scheme 2, where adjacent to each peroxidic oxygen is a carbonyl group. Cleavage of the peroxidic bond yields two acyloxy radicals. Subsequent decarboxylation of one or both of the acyloxy radicals is often rapid depending on the nature of R and R'. In some cases the O-O and C-C bonds break in concert. Diacyl peroxides are used as initiators for the high pressure polymerisation of ethylene at pressures up to 3500 bar and temperatures up to 300 °C. They are also used to initiate lower temperature processes, such as the polymerisation of styrene and vinyl chloride below 100 °C.

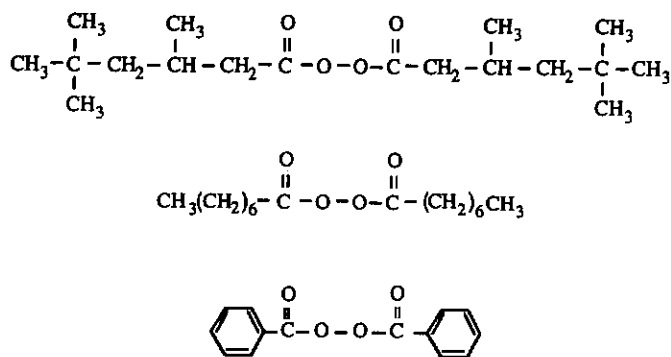


**Scheme 2.** Functional group and homolysis of diacyl peroxides (R, R' = alkyl or aryl).

Studying the rate of diacyl peroxide decomposition provides fundamental information on this free radical process as well as information of technical interest given their industrial use. Accurate rates of peroxide decomposition are invaluable for the modelling of polymerisation kinetics. By studying the effects of temperature and pressure on the decomposition kinetics, activation parameters are determined which bear mechanistic as well as practical information.

## Peroxides Considered

Determinations of the kinetics of three symmetric (R = R') diacyl peroxides, illustrated in Scheme 3, are presented in this paper. Bis(3,5,5-trimethylhexanoyl) peroxide (BTMHP) is a branched chain aliphatic peroxide used in the production of polyethylene and in the suspension polymerisation of vinyl chloride. Dioctanoyl peroxide (DOP) is a straight chain aliphatic diacyl peroxide often used for the same purposes, and dibenzoyl peroxide (BPO) is an aromatic diacyl peroxide used in styrene polymerisation. In these studies heptane is used as the solvent.

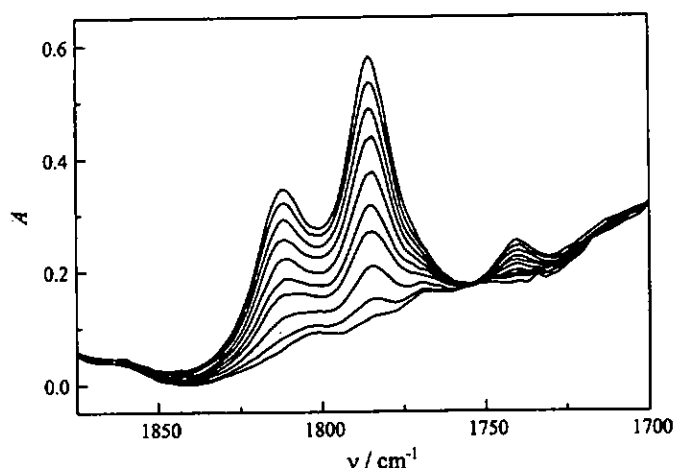


**Scheme 3.** The three symmetric diacyl peroxides considered: bis(3,5,5-trimethylhexanoyl) peroxide (BTMHP), dioctanoyl peroxide (DOP) and dibenzoyl peroxide (BPO).

## High Temperature, High Pressure Kinetic Investigations

As shown in Schemes 2 and 3, diacyl peroxides possess a carbonyl group, and this gives rise to a characteristic carbonyl absorbance in the infrared spectrum. The kinetics of the decomposition of diacyl peroxides can thus be monitored under conditions of high temperature and pressure "on-line" using fourier transform infrared (FTIR) spectroscopy. The peroxide solution is brought to reaction conditions in an optical high pressure cell, and the decomposition of the peroxide monitored as a function of time by the disappearance of its carbonyl absorbance. This is illustrated in Figure 1 for the decomposition of BTMHP in heptane at 80 °C and 1500 bar. The carbonyl absorbance, which diminishes with time, appears as a doublet due to coupling between the identical carbonyl groups in the symmetric molecule. To the low wavenumber side of the doublet appears the growing absorbance of a decomposition product.

\* The work described in this paper was conducted by the author as a student at the University of Göttingen, Göttingen, Germany.



**Figure 1.** The carbonyl region of the infrared absorbance spectra collected during the decomposition of BTMHP in heptane at 80 °C and 1500 bar.

From the Beer-Lambert law, the integrated absorbance of the peroxide is proportional to its concentration. By integrating each spectrum in the spectral series shown in Figure 1, the peroxide concentration  $c_t$  at each precise time  $t$  is obtained. By plotting  $\ln(c_t/c_0)$  against  $t$ , where  $c_0$  is the initial peroxide concentration, and taking the slope, the observed first order rate coefficient  $k$  is obtained.

#### Peroxide Decomposition Rate Coefficients

To compare the magnitude of the rate of decomposition of the three diacyl peroxides, the rate coefficient at 80 °C and 1500 bar for each peroxide in heptane is shown in Table 1.

Peroxide	Nature of R group	$k(10^{-5} \text{ s}^{-1})$
BTMHP	aliphatic branched chain $\beta$ to CO	8.24
DOP	aliphatic straight chain ( $n\text{-C}_8$ )	6.27
BPO	aromatic	1.94

**Table 1.** Rate coefficients for the decomposition of BTMHP, DOP and BPO in heptane at 80 °C and 1500 bar.

It is clear from Table 1 that at this condition of temperature and pressure:

$$k(\text{BTMHP}) > k(\text{DOP}) > k(\text{BPO})$$

This trend is true over a large range of temperature and pressure conditions [1]. The structure of the R group has an effect on the rate of diacyl peroxide decay. Comparing the two aliphatic diacyl peroxides, branching of the alkyl chain  $\beta$  to the carbonyl group (as in BTMHP) leads to faster decomposition than for the straight-chain peroxide (DOP). This is because the branched chain affords a more stable radical upon bond cleavage. Generally speaking, the more stable a radical R forms, the more facile the bond break for an aliphatic diacyl peroxide. The rate of decomposition of the aromatic BPO is 3 to 4 times slower than the two aliphatic diacyl peroxides. The rate of decomposition of diacyl peroxides increases in the series where R is:

tertiary alkyl  $\approx$  secondary alkyl  $>$  primary alkyl  $>$  aryl

and the results for the three peroxides of this study reflect this general trend [2].

For aliphatic diacyl peroxides such as BTMHP and DOP, peroxide bond cleavage is followed rapidly by decarboxylation of one or both of the acyloxy radicals, and in some cases the O-O and C-C bonds break in concert. Aliphatic diacyl peroxides are therefore a source of alkyl radicals for initiation purposes. On the other hand, when BPO decomposes the first formed benzoyloxy radical is very stable. Hence both benzoyloxy and phenyl radicals are important initiating species [3].

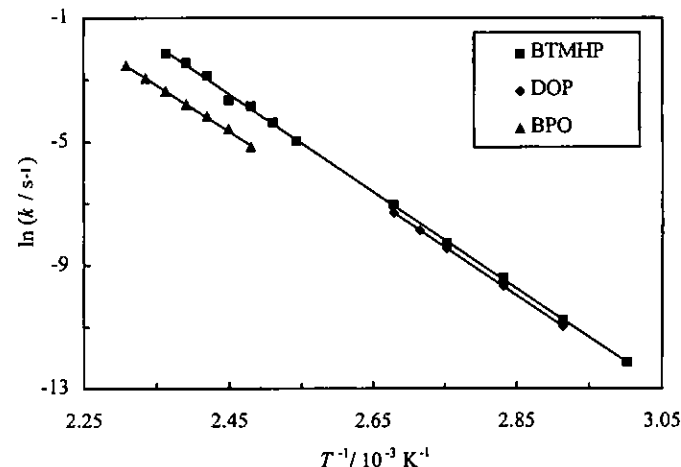
#### Effect of Temperature on Peroxide Decomposition Rate

The variation with temperature of most chemical reactions can be described by the empirically derived Arrhenius equation:

$$\ln k = \ln A - \frac{E_A}{RT}$$

in which  $k$  is the rate coefficient,  $T$  the temperature in Kelvin, and  $R$  the universal gas constant. The parameter  $A$  is the pre-exponential factor, and  $E_A$  the activation energy. The activation energy can be thought of as the energy required for bond cleavage. From the gradient and y-intercept of a plot of  $\ln k$  versus inverse temperature, the  $E_A$  and  $A$  respectively are derived.

The effect of temperature on the rate of peroxide decomposition at a constant pressure of 1500 bar is illustrated in the Arrhenius plot of Figure 2. The derived activation energies for the three diacyl peroxides are presented in Table 2.



**Figure 2.** Temperature dependence of the observed first order rate coefficient for the decomposition of BTMHP, DOP and BPO in heptane at 1500 bar.

Peroxide	Temperature Range (°C)	$E_A$ (kJ/mol)
BTMHP	60 - 150	$131.2 \pm 1.1$
DOP	70 - 100	$130.7 \pm 0.2$
BPO	130 - 160	$123.9 \pm 2.3$

**Table 2.** Activation energies for the decomposition of BTMHP, DOP and BPO.

The activation energies observed for the three diacyl peroxides are in the range expected for bond homolysis. The activation energies for the two aliphatic diacyl peroxides, BTMHP and DOP, are identical. The branching of the alkyl chain  $\beta$  to the carbonyl group (and beyond) has no effect on the activation energy. An invariance of activation energy with alkyl chain length has often been observed for straight chain aliphatic diacyl peroxides. The activation energy for the aromatic diacyl peroxide is lower than that of the aliphatic peroxides.

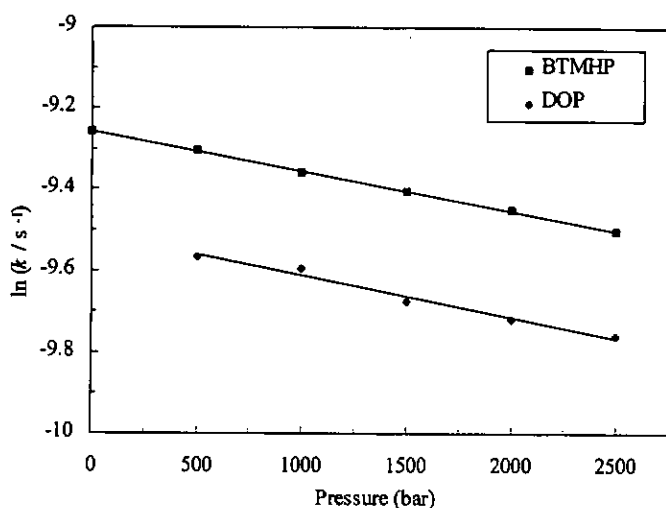
### Effect of Pressure on Peroxide Decomposition Rate

For constant temperature, the effect of pressure on reaction rate is described by the fundamental relationship:

$$\left[ \frac{\partial \ln k}{\partial p} \right]_T = \frac{-\Delta V^\ddagger}{RT}$$

The term  $\Delta V^\ddagger$  is the activation volume, which, if dynamic contributions are negligible, may be identified with the difference in partial molar volume between the reactant(s) and the activated complex. Reactions which are accelerated by the application of pressure have a negative activation volume, whilst a positive activation volume signifies a reaction which is pressure retarded. It is from the slope of a graph  $\ln k$  versus pressure that  $\Delta V^\ddagger$  is determined.

The effect of pressure on the rate of peroxide decomposition is illustrated in Figure 3 for BTMHP and DOP at 80 °C, and the activation volumes derived for the peroxides are presented in Table 3.



**Figure 3.** Pressure dependence of the observed first order rate coefficient for the decomposition of BTMHP and DOP in heptane at 80 °C.

Peroxide	$\Delta V^\ddagger$ (cm <sup>3</sup> /mol)
BTMHP	+ (2.9 ± 0.1)
DOP	+ (3.0 ± 0.2)

**Table 3.** Activation volumes  $\Delta V^\ddagger$  for the decomposition of BTMHP and DOP.

Figure 3 shows that the rate of decomposition of the peroxides is slowed by the application of pressure. Consequently the

activation volumes derived are positive (Table 3). Bond cleavage is characterised by a positive volume change, and so a positive  $\Delta V^\ddagger$  is expected for peroxide decomposition. Intuitively one can envisage the volume of the reactant diacyl peroxide being less than that of the product free radicals of Scheme 2. The effect of pressure on the kinetics of the decomposition is however not large, the  $\Delta V^\ddagger$  are small in magnitude. Bond homolysis of the type shown in Scheme 2 is normally characterised by a  $\Delta V^\ddagger$  of 10 cm<sup>3</sup>/mol. The lower values for these aliphatic diacyl peroxides actually suggest that decomposition involves the concerted cleavage of C-C bonds together with the O-O bond [4]. The values for the two symmetric diacyl peroxides are identical, so that branching of the alkyl chain in BTMHP has no effect on the activation volume.

### Implications for Initiation

The temperature determinations quantify the extent to which the rate of peroxide decomposition is increased with temperature. The pressure dependence shows the kinetics of diacyl peroxide decomposition to be retarded by the application of pressure, and that this effect of pressure is not large. More importantly, from these determinations, an exact expression for the rate coefficient  $k$  as a function of temperature and pressure can be derived. Given the exact temperature and pressure of the desired polymerisation process then, the expected rate of initiator decomposition can be calculated. This provides valuable information for the initiation of the polymerisation process. In the first instance it serves as a guide as to which peroxide is most appropriate to the process, and how much peroxide should be added to effect initiation. Gauging the amount of initiator is extremely important in a polymerisation process, because at the industrial level the optimisation of concentration may correspond to a saving of tons of material and so significant cost. More importantly however, too much initiator may inhibit the process, as peroxide decomposition products often serve as "poisons" to the polymerisation product, and having an indication of it from the peroxide rate of decay helps to fine tune the process to achieve the desired polymeric product.

### References

- [1] Buback, M, and Hinton, C, "The Kinetics and Selectivity of the Decomposition of Diacyl Peroxides Under High Pressure in Hydrocarbon Solutions", *Z. Phys. Chem.* **193** (1996) 61-85.
- [2] Fujimori, K, "Diacyl Peroxides" in *Organic Peroxides*, Ando, W, (Ed.), John Wiley and Sons, Chichester, 1992, 319-385.
- [3] Moad, G, and Solomon, D H, *The Chemistry of Free Radical Polymerisation*, Pergamon Press, Bath, 1995, 67-73.
- [4] van Eldik, R, Asno, T, and LeNoble, W J, "Activation and Reaction Volumes in Solution", *Chem. Rev.* **89** (1989) 646.

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# Patent Proze

by Jane Calvert and Greg Lynch

## PATENTABILITY AND MORALITY

New Zealand's Patents Act allows the Commissioner of Patents to refuse a patent application where the application is considered by the Commissioner to be "contrary to morality". This provision has been invoked rarely. Historically, gambling devices and contraception methods have been refused – reflecting accepted social views of the time. The question of "morality" is becoming more significant in the patent world as genetically manipulated products are being developed.

Recently there have been interesting Patent Office decisions in Europe dealing with such morality problems. Two biotechnology patent applications considered by the European Patent Office have involved Harvard University's "Oncomouse" and Upjohn's hairless mouse.

The Oncomouse patent application covered a process for producing a genetically engineered mouse that would develop cancer. The Oncomouse produced from the method could be used as a tool to study the effects of anticancer treatments and products.

The hairless mouse covered technology whereby a hairless or bald mouse was genetically engineered and bred for the primary purposes of testing hair restorative products and wool production techniques.

The European Patent Office considered oppositions to the grant of patents for both of these inventions on the grounds of morality. The Oncomouse patent was granted to Harvard University by the European Patent Office. However, Upjohn's hairless mouse application was refused.

In considering these oppositions, the European Patent Office adopted a morality test requiring a weighing of the benefits to humans against any other negative ethical issues, such as pain and suffering to the mouse and the risk to future gene pools of the genetic engineering.

It was argued throughout the opposition proceedings that the Oncomouse was a "moral" invention because it provided a powerful tool or aid in the fight against cancer. Additionally, it was argued that there was no alternative to animal testing for cancer. Experts in the biotechnology industry produced substantial evidence in support of these arguments. Against the

utilitarian aspect to the Oncomouse were balanced the negative consequences. These included the risk of damage to the environment by uncontrolled dissemination of unwanted genes, should the mice escape. The European Patent Office did not consider this a significant matter, as the mice would be strictly controlled. The European Patent Office therefore concluded that overall the positive consequences outweighed the negative consequences and granted the patent for the Oncomouse. They concluded that the Oncomouse was a moral invention.

On the other hand, when a similar test was applied to the hairless mouse the European Patent Office considered that the positive effects arising from the production of this mouse were outweighed by the negative consequences. The European Patent Office considered that the benefit to humans, namely the aid in studying hair growth and wool production, did not outweigh the ethical issues of the risk of pain and suffering to the mouse.

The decision to grant the Oncomouse patent has been subsequently challenged in Europe by animal rights campaigners, environmentalists and religious groups. A final decision on the outcome of the Oncomouse patent has not yet been made in Europe.

The European Patent Office has been criticised for indulging in weighing up the morality issues in terms of this type of invention. There has been some discussion about exactly what qualifies any Patent Office to weigh up such issues. In another case involving an opposition by Greenpeace to a patent application filed by Plant Genetics it was considered that questions of morality should only be looked at in extreme cases. The question here lies in what is extreme. Where can the line be drawn? It appears that some changes may need to be introduced into patent legislation throughout the world to clarify some of these morality issues which are beginning to arise.

As yet the Intellectual Property Office of New Zealand has not considered the issue of "morality" in relation to genetically engineered products. To our knowledge no patent application in New Zealand has been refused on the ground of morality.

Please forward any queries to:  
*Patent Proze*, Baldwin Shelston Waters  
P O Box 852, Wellington  
Email: email@bswip.co.nz, Internet: www.bswip.co.nz



Jane Calvert

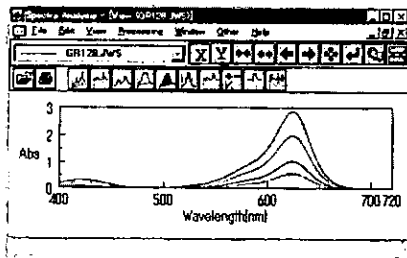
Jane Calvert and Greg Lynch are both employed in the patent department of Baldwin Shelston Waters, Patent and Trademark Attorneys and Solicitors, where they specialise in chemistry patents. Jane joined the firm after completing a PhD in chemistry at the University of Canterbury in 1994. Greg also joined 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

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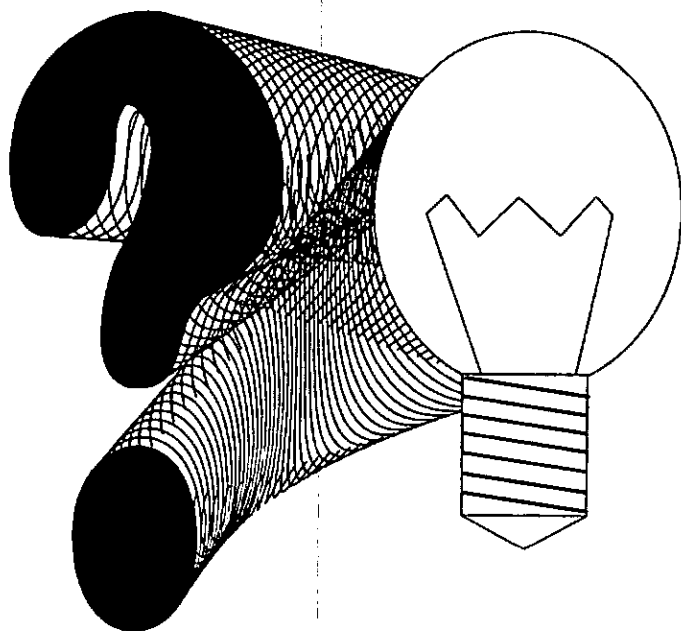
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We are pleased to offer you free training booklets and literature on pH or other applications to meet your needs in the laboratory, field or control room.

\* Please refer to the new Eutech products featured in the **NEW PRODUCTS** section of this issue of *Chemistry in New Zealand*.

### Contact:

Peter Hassan, Alphatech Systems Ltd  
Phone: (09) 3770392, Fax: (09) 3098514  
Email: [sales@alphatech.co.nz](mailto:sales@alphatech.co.nz)

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# NEW PRODUCTS

## J&W'S SEPARATION TIMES FEATURES ENVIRONMENTAL APPLICATIONS, TURPENTINE, PESTICIDES, EXPLOSIVES AND MORE!



J&W Scientific, the world's largest manufacturer of high resolution capillary GC columns, releases the latest *Separation Times* magazine featuring applications for the GC analysis of ozone precursors, turpentine, pesticides, explosives and more.

The article *Ozone Precursors and Valves* discusses the analysis of hydrocarbons, with an alternative method to cryogenic oven cooling by means of a porous layer open tubular (PLOT) GC column, in this case J&W's GS-GasPro. This column is further discussed in another article addressing demanding applications, such as the analysis of vinyl chloride impurities and electrical discharge by-products.

Also discussed in this issue are the specific analyses of turpentine using DB-WAX, DB-XLB and CycloSil-B; pesticide analysis on DB-35ms and DB-XLB; and the analysis of explosives with J&W's DB-1 and DB-210. Other articles feature the use of GC liners, septa and customised column needs.

For more information about J&W Scientific or for additional information about *Separation Times* (Vol. 12, No.2),

Contact: J&W Scientific  
91 Blue Ravine Road, Folsom, CA95630,  
Phone: (+1-916) 9857888 or contact your local J&W distributor.  
Web Site at <http://www.jandw.com>  
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### FREE SEPTA OFFER FROM J&W SCIENTIFIC!

J&W Scientific, the world's largest manufacturer of high resolution capillary GC columns, offers free septa samples. Scientists know to obtain accurate gas chromatographic results, choosing the right septa is important. Yet, this little consumable item is often over looked. J&W introduces three new septa to the GC accessory line, and to make sure everyone has a chance to give these a try, a sample septa package is free!

J&W's newest additions to the septa product line are:  
Ultimate Green: Compared to other manufacturer's green septa, J&W's value and price prove superior.

Premium Gold: This septum outlasts other manufacturers' - up to 400 injections per septum.

High Temp "ER" Septa: The "er" stands for higher temperatures and lower bleed for those demanding analyses.

A sample of all three of these septa can be obtained from J&W Scientific by calling (+1-916) 9857888, and just ask for the septa size you need. Or, visit J&W's Web Site for additional product information and request your sample at <http://www.jandw.com> circle number 22 on the reader reply card

## VARIAN 330 PHOTODIODE ARRAY DETECTOR PROVIDES BEST RESOLUTION TO DATE IN THE UV-RANGE



Varian Associates, Inc. announces the 330 Photodiode Array Detector (PDA), which provides the best resolution to date in the UV-range. The 330 PDA increases accuracy and resolution with state-of-the-art prism technology that maximises light throughput, giving the highest sensitivity as well as the lowest noise.

Of note are the 330 PDA's programmable slit widths, which optimise spectral resolution and signal-to-noise for even low concentration samples. By selecting smaller slit widths, resolution is optimised to achieve a true 1 nm resolution in the UV range.

Another unique feature is the use of a built-in mercury arc lamp for automated wavelength calibrations. The self-diagnostic program ensures reproducibility by monitoring the internal array to measure wavelength accuracy and performance, thus complying with GLP standards.

PolyView spectral software performs accurate and detailed library searches with the industry's most comprehensive purity determinations. Varian's unique multi-component analysis program (MCA) features: peak purity determinations calculated from peak start to end; up to 6 co-eluting substances graphically indicated on the peak; and accurate quantitation of co-eluting substances based on MCA libraries.

The 330 PDA is easy to maintain with accessible flow cells and pre-aligned deuterium lamp. The module maintains an electronic logbook of lamp energy and hours. Validation manuals are available for Standard Operational Procedures to comply with GLP and GMP requirements.

# NEW PRODUCTS

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 23 on the reader reply card

## NALGENE LAB ORGANISERS SAVE VALUABLE BENCH SPACE



The new Nalgene Lab Organiser is a modular organisation system that allows the design of a personal workstation while saving valuable laboratory space and increasing productivity. Used on the bench or easily mounted under shelves or on walls, the clear acrylic modules are sized for many common laboratory supplies.

Nalgene Lab Organisers provide separate, interchangeable storage areas on or next to your laboratory bench. Laboratory supplies can be kept within arm's reach. Clear acrylic modules are easy to clean and permit quick viewing of supply quantity. Twelve individual clear acrylic drawers, bins and boxes have covers to keep common laboratory supplies dust free: latex gloves, pipettes, pipette tips, Pasteur pipettes, microcentrifuge tubes, cryogenic vials, conical and culture tubes, syringe filters, Kimwipes<sup>1</sup> and Parafilm<sup>2</sup>.

Two designs exclusive to Nalgene International are the small and large Pivot Dispensing Bins. A protected pivoting inner compartment tips forward for easy access to small supplies. Modules attach firmly to each other with Velcro<sup>3</sup>. Rubber feet are provided for stability on the bench.

<sup>1</sup> Registered trademark of Kimberly Clark.

<sup>2</sup> Registered trademark of American National Can.

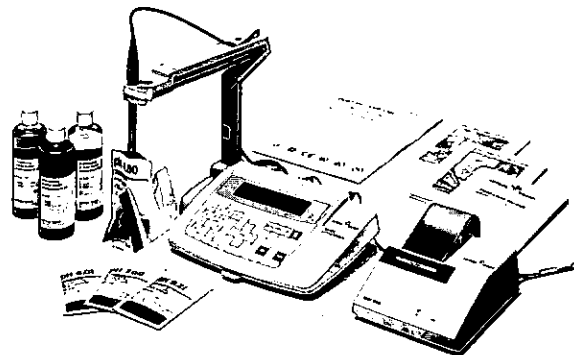
<sup>3</sup> Registered trademark of Velcro Industries.

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Kent TN14 5XA, England, United Kingdom  
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## METTLER TOLEDO - THE RIGHT ELECTRODE FOR THE RIGHT APPLICATION



Correct pH determination implies the use of a suitable electrode. The portfolio of InLab<sup>®</sup> Electrodes from Mettler Toledo offers the user a variety of possibilities for proper measurement under different conditions in different samples.

The form and construction of the electrode has been chosen according to its use. Puncture electrodes are available for fruit, cheese and meat samples, micro electrodes for samples of limited volume. Flat membrane electrodes even allow the pH measurement on surfaces such as paper, foil or skin.

Among the approximately thirty InLab<sup>®</sup> electrodes are also some types which allow the measurement of protein or sulfide containing media thanks to a special silver ion barrier. Movable sleeve frit electrodes are very convenient for low ionic strength and non-aqueous samples whereas rugged polymer sensors have proved very reliable in the demanding environment of field measurements.

Short response time at temperature changes (according to Equithal) is a feature all InLab<sup>®</sup> electrodes have in common. For temperature compensated pH measurements electrodes with integrated Pt1000 or NTC temperature sensors are available. Furthermore an individual quality certificate enclosed with each electrode enables the complete traceability of measuring results according to GLP or GMP.

In addition to electrodes Mettler Toledo offers a wide range of auxiliaries as well as electrolyte, calibration and cleaning solutions and literature on the basics of pH measurement. Together with 40 years of experience this offers the best possible support in the market.

Contact: John Small, Product Manager  
Medic Watson Victor, Medic Corporation Ltd  
Freephone: 0800 508070  
circle number 25 on the reader reply card

## FLUKA ION-SELECTIVE MINI-ELECTRODES

Fluka has introduced a new generation of electrodes. These electrodes with excellent selectivity and response behaviour, reflect the 'state-of-the-art' for electrodes of today. The small and handy form, together with a price you can afford, will

# NEW PRODUCTS

provide you with new opportunities in the laboratory and also for "on-site" analysis.

To start with this new generation of electrodes in your laboratory, we offer a basic kit with the mini-electrode, mini reference electrode, calibration solution, ion strength adjustment buffer, all cables (BNC plug, also available is the DIN plug), and adaptor for electrode holder.

*Some general features of Fluka Ion-Selective Mini-Electrodes are:*

- One piece electrode
- Rugged, unbreakable design
- Maintenance-free
- Diameter: 6.2 mm
- Length 100 mm
- Response time of a few seconds
- Low electrical membrane resistance
- Temperature range 10 °C to 40 °C
- Test certificate for each electrode

*Competitive highlights of particular Fluka Ion-selective Mini-Electrodes:*

pH-electrodes: Non-glass, low impedance

Sodium-Selective Mini-Electrode: Low detection limit in acidic solution

Magnesium-Selective Mini-Electrode: High selectivity over Ca<sup>2+</sup>

Lithium-Selective Mini-Electrode: High selectivity over Na<sup>+</sup>

For further information, request a copy of the Fluka Selectophore Catalogue.

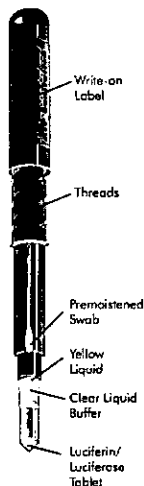
Contact: Anna Civadelic, Sigma-Aldrich Pty Ltd

Ph: 0800 936666, Fax: 0800 937 777

Email: sigmaa@ibm.net

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## SANITATION EFFECTIVENESS HAS NEVER BEEN EASIER OR FASTER



John Morris Scientific has been named as the new agents for Charm Sciences Inc products in New Zealand. Charm has a wide range of rapid test products for sanitation, pasteurisation, microbial quality, cooking efficiency, *E.coli* and coliforms, and somatic cells.

The PockeTswab is the fastest ATP sanitation monitoring test of its kind - only 30 seconds from start to finish. The PockeTswab is a self-contained single service test comprising a 6-inch swab which is premoistened with a biofilm breaking agent. Inside the PockeTswab is a breaking solution which releases and stabilises the ATP, and a buffering solution to neutralise any detergent which may be present in the sample, and a luciferin-luciferase tablet to extend shelf life and stability.

Collected samples are stable for up to 6 hours before reading, and the PockeTswab itself has a shelf life of 6 months (refrigerated). The PockeTswab is read on the LUMinator-T, a rugged, handheld, battery powered analyser (bench models available also). The LUM-T can store up to 5000 data points, has up to 6 channels set to individual limits, shows results in RLU and pass/fail and allows you to track retests on failed areas.

Because of the PockeTswab's speed and accuracy a plant can begin production knowing that cleaning and sanitising standards have been met.

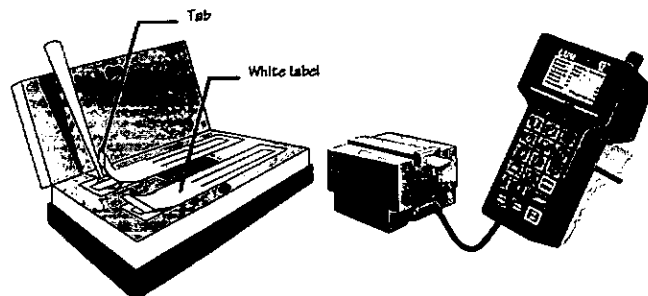
Contact: John Morris Scientific Ltd

P O Box 6348 Wellesley Street, Auckland

Ph: (09) 3663999, Email: sales@jms.co.nz

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## CHARM MRL BETA-LACTAM TEST



The charm MRL Beta-Lactam Test is a rapid receptor assay. The method detects beta-lactam drugs at or close to EU/Codex maximum residue limits. The test is designed for use by milk intake, laboratory, field, and regulatory personnel. The MRL procedure uses a Strip Incubator and Imager. The milk sample is introduced into the incubator and then incubated for 8-13 minutes before the test result can be interpreted. The results are visually interpreted by comparing the "test" line to the "control" line and are either beta-lactam positive or negative. Also available is an imager which digitally captures an image of the completed test strip. The image is then interpreted on the LUM-T.

Contact: John Morris Scientific Ltd

P O Box 6348 Wellesley Street, Auckland

Ph: (09) 3663999, Email: sales@jms.co.nz

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# NEW PRODUCTS

## SATURN 2000 GC/MS AND GC/MS/MS FEATURED IN BROCHURE

Varian's recently released brochure debuts the latest features of the Saturn 2000 product for benchtop Gas Chromatography/Mass Spectrometry and GC/MS/MS.

Varian has taken sophisticated technology and simplified it into an application that provides for ease-of-use and broad customer acceptance. Detailed screen shots highlight the newest enhancements to the Saturn software. The updated Windows protocol allows for flexible instrument control, provides an intuitive method builder, and delivers easy data analysis. And for reports, the Windows software can generate a wide array of quantitative and qualitative summaries to meet a diverse set of customer needs.

Other Saturn 2000 GC/MS and GC/MS/MS features and benefits cited by Varian in the brochure are:

- Dependable chromatography and spectra guaranteed with electronic pneumatics control;
- 1079 Universal Capillary Injector with 5 modes of operation: split, splitless, temperature ramp splitless, on-column and large volumes;
- Sensitive benchtop MS in all modes of operation from EI full scan to CI-MS/MS;
- Liquid CI option for 1 reagent and CI Manifold for up to 3 gas or liquid reagents;
- SilChrom inert electrodes to ensure sensitivity and ideal peak shape of polar analytes; and
- ChromatoProbe for a simple, inexpensive approach to the MS analysis of solids, liquids, and slurries.

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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## VISTA CCD SIMULTANEOUS ICP-AES FEATURED IN BROCHURE

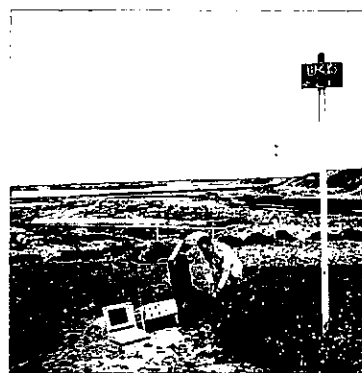
Varian's recently released Vista CCD Simultaneous Inductively Coupled Plasma Atomic Emission Spectrometer (ICP-AES) is featured in a new 20-page colour brochure.

The brochure highlights the key features of the world's fastest ICP-AES system. Detailed illustrations display the patented VistaChip, a Charge Coupled Device (CCD) detector which measures samples with impressive speed. Screen shots exhibit the award-winning worksheet software interface complete with extensive online help and multi-media support. Additionally, performance data demonstrates that Vista's rugged RF system can analyse even the toughest samples, such as organic solvents, sludges, and fusions.

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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## VARIAN ADDS FAST, ACCURATE MICRO GCs TO ITS GC PRODUCT LINE



Varian recently expanded its gas chromatography product line to include two micro gas chromatographs. A fraction of the size of traditional laboratory GCs, the Varian 2002 benchtop and 2002P portable Micro GCs provide fast, reliable analysis of most gases. The 2002 series is designed for a variety of gas applications, including natural gas - BTU measurements, landfill gas, monitoring of air for toxic compounds, and stack gas or other industrial emissions analysis.

Suitable for many traditional gas analysis applications, the Varian 2002 and 2002P come equipped with a micro thermal conductivity detector that allows for fast sample turnaround and improved sensitivity. The Micro GCs analyse most gas samples in less than 60 seconds, eliminating the 8-10 minute wait for results with laboratory GCs. They perform reliable and accurate analysis of gas mixtures ranging from 1 ppm to percent level concentrations.

"These versatile Micro GCs have been highly successful in Europe since their introduction five years ago", said James Pachthofer, business manager for Varian's Micro GC products. "Varian is pleased to offer the 2002 series to enable our customers to capitalise on the growing field and on-site analytical markets".

The 2002P portable version rapidly analyses sensitive samples on-site and eliminates the problems involved with sample transfers. Complete with a self-contained gas supply tank and battery, the 2002P weighs approximately 25 pounds and is easily carried from one site to another. The 2002 benchtop model delivers the same quick, accurate results, and includes built-in front panel controls for easy method access.

Varian provides users with a variety of ways to configure the Micro GC to their specific applications. The 2002 series is available with a powerful multi-tasking PC-based software package that produces customised reports. Varian also offers specialised software additions for customised applications, including natural gas physical properties, sample stream selection, and special calculations for automated data handling.

# NEW PRODUCTS

In addition, the 2002 and 2002P are available with heated injector modules, accommodating applications requiring higher temperatures due to the gas component's sample temperature or boiling point. Customised columns are also available, allowing users to create application-specific Micro GCs.

These new additions to Varian's GC product line were developed by a Varian subsidiary, Chrompack International B V. Acquired by Varian earlier this year, Chrompack is a Netherlands-based manufacturer of chromatography instruments and consumables.

Additional information about Chrompack and its products is available at <http://www.chrompack.com>

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](mailto:aiscinz@ihug.co.nz)  
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## LATEST ATOMIC SPECTROSCOPY JOURNAL FOCUSES ON THE ANALYSIS OF BIOLOGICAL FLUIDS AND SEAWATER

The latest issue of Perkin-Elmer's peer-reviewed *Atomic Spectroscopy* journal focuses on the analysis of biological fluids and seawater using inductively coupled plasma-mass spectrometry (ICP-MS), atomic absorption spectroscopy (AA), and microwave sample digestion.

The articles on the analysis of biological fluids are entitled: "Simultaneous Multielement AAS Determination of Trace Elements in Human Body Fluids to Establish Reference Values for European Population" and "Determination of Hg in Urine by On-Line Digestion with a Flow Injection Mercury System". The analysis of seawater is discussed in: "Determination of Cu, Ni, Zn, Mn, Co, Pb, Cd and V in Seawater Using Flow Injection ICP-MS" and "Iridium-Coated Graphite Tubes for the Direct Determination of As, Cd, Hg, and Pb in Seawater by Vapour Generation ETAAS".

Other applications include: "Microwave Oven Digestion of Power Plant Emissions and ICP-MS Determination of Trace Elements", "Study of Interferences from Na and Cl Using Electrothermal Vapourisation (ETV) ICP-MS" and "Application of Polyaniline as Anion Exchanger for the Separation of Bi and its Determination by Graphite Furnace AAS".

*Atomic Spectroscopy* regularly features applications and research papers submitted by authors from around the world in the field of atomic spectroscopy and its related techniques of ICP-OES, atomic emission, flow injection, hydride generation and ICP-MS.

New Perkin-Elmer AA, ICP-OES, and ICP-MS instrument users are offered a free 12-month subscription to the publication. To submit an article, obtain subscription information or request a complimentary copy,

Contact: Peter Hall, Perkin-Elmer Pty Ltd  
Free Phone: 0800 776767, Free Fax: 0800 776000  
Email: [perkin-elmer@clear.net.nz](mailto:perkin-elmer@clear.net.nz)  
Website: <http://www.perkin-elmer.com>  
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## TURBOCHROM CLIENT/SERVER AND TURBOCHROM WORKSTATION CHROMATOGRAPHY DATA SYSTEMS CONTROL MORE INSTRUMENTS

New digital instrument control features have been added to PE Nelson's 32-bit Chromatography Data Systems. Control of Perkin-Elmer's HS40 Automatic Headspace Sampler, Series 200 Diode Array Detector, and Hewlett Packard's 6890 Plus GC and associated liquid autosampler are now available in the second major release of Turbochrom Client Server and Turbochrom Workstation Chromatography Data Systems. Both multi-instrument chromatography data systems take full advantage of Microsoft's 32-bit Windows NT operating system, and provide advanced data handling for commercial gas chromatography (GC) and liquid chromatography (LC) instruments.

This second release also includes enhancements to the connectivity option for PE Nelson's SQL\*LIMS® system to the Turbochrom system as well as additional features suggested by over 3500 users of earlier versions of the company's 32-bit chromatography data systems.

The Turbochrom Client/Server Data System enables multiple users to collect chromatographic data in a completely secure networked environment, while the Turbochrom Workstation system is designed as a single PC application. Since all system base features and file structures are the same within both versions of the Turbochrom package, it is an easy process to migrate from Turbochrom Workstation to Turbochrom Client/Server. Both products are well suited for Good Automated Laboratory Practice (GALP) and Good Manufacturing Practice (GMP) environments.

Introduced in 1997 and used in approximately 200 laboratories, the Turbochrom Client/Server Chromatography Data System utilises a distributed computing architecture allowing users to view real-time chromatography data anywhere on the network, setup/control instruments, and graphically view and reprocess data. Turbochrom Client/Server software is configured in a highly scalable format allowing users to configure systems based on the number of users and instruments in their environment. Follow-on additions are as simple as incrementing the software license to accommodate additional users and/or instruments.

The Turbochrom Client/Server and Turbochrom Workstation System are both compliant with the ISO 9001 and TickIT quality plans. The software is also certified for Year 2000 compliancy.

Contact: Peter Hall, Perkin-Elmer Pty Ltd  
Free Phone: 0800 776767, Free Fax: 0800 776000  
Email: [perkin-elmer@clear.net.nz](mailto:perkin-elmer@clear.net.nz)  
Website: <http://www.perkin-elmer.com>  
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# NEW PRODUCTS

## PERKIN-ELMER OFFERS HIGH PERFORMANCE LIQUID CHROMATOGRAPHY (HPLC) CD-ROM USERS GUIDE

Perkin-Elmer is offering a new Liquid Chromatography (LC) ChromAssist™ CD-ROM training guide and multi-media manual. The CD training manual aids users with the operation, maintenance, and applications of Perkin-Elmer's high performance liquid chromatography (HPLC) instrumentation systems. The manual includes information on solvent reservoirs, LC pumps, detector data system, autosampler injector, and columns.

Helpful to users of most HPLC systems, the Perkin-Elmer CD-ROM consists of four sections: HPLC Basics and Operation, PE Maintenance, Columns/Applications, and References. All of the Perkin-Elmer Brownlee's applications notes, column data sheets, column selection guide, and column catalogue have been included as well as a listing of Perkin-Elmer HPLC spares, accessories, brochures, literature, and three operational manuals.

The CD-ROM training guide is compatible with the Windows 95/NT operating environment. Minimum requirements for the CD-ROM include a personal computer with at least a 486-66 microprocessor with 4 x CD-ROM drive and 256 colours, though Pentium 100+PCs with >6 x CD-ROM and 64 K colours are highly recommended.

To receive a copy, please request via the Internet at <http://www.perkin-elmer.com> reference order number D-5460.

Contact: Peter Hall, Perkin-Elmer Pty Ltd  
Free Phone: 0800 776767, Free Fax: 0800 776000  
Email: [perkin-elmer@clear.net.nz](mailto:perkin-elmer@clear.net.nz)  
Website: <http://www.perkin-elmer.com>  
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## INTERACTIVE GUIDES FOR SAMPLING ACCESSORIES WITH THE ELAN 600 ICP MASS SPECTROMETER

CETAC Technologies and Perkin-Elmer SCIEX Instruments have produced a series of interactive CD-ROM's to show the benefits of sampling accessories with inductively coupled plasma (ICP) mass spectrometry. The CD-ROM's describe installation, setup, optimisation and typical applications for CETAC's major sampling accessories used with the PE SCIEX ELAN® 6000 inductively coupled plasma mass spectrometer (ICP-MS).

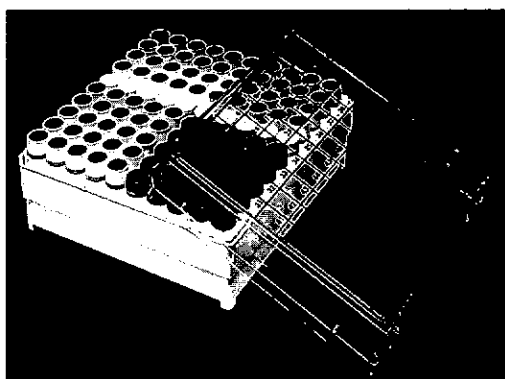
The first CD-ROM highlights the use of the MCN-600 Desolvating Microconcentric Nebuliser, and the second CD-ROM highlights the LSX-200 Laser Sampling System with the ELAN 6000 ICP-MS. The CD-ROM's incorporate test, audio and video clips, are compatible with Macintosh Mac® OS 7.5 and Microsoft Windows 95/NT® operating systems, and are best used with a 486/68040 or Pentium® computer chip with at least a 4 X CD drive.

The ELAN 6000 ICP-MS is fully automated and computer-controlled. It provides routine determination of trace elements in a wide variety of sample matrices found in the environmental, clinical, geochemical, semiconductor, nuclear, food, and metallurgical application areas.

To order "Using the MCN-6000 Desolvating Microconcentric Nebuliser with the ELAN 6000 ICP Mass Spectrometer" reference order number D-5523. To order "Using the LSX-200 Laser Ablation System with the ELAN 6000 ICP Mass Spectrometer" reference order number D-5681.

Contact: Peter Hall, Perkin-Elmer Pty Ltd  
Free Phone: 0800 776767, Free Fax: 0800 776000  
Email: [perkin-elmer@clear.net.nz](mailto:perkin-elmer@clear.net.nz)  
Website: <http://www.perkin-elmer.com>  
circle number 35 on the reader reply card

## STACKABLE, DURABLE STORAGE BOX SECURELY STORES UP TO 100 NALGENE MICRO PACKAGING VIALS



Nalge Nunc International announces the new Nalgene Micro Packaging Vial Storage Box, designed for securely storing up to 100 vials per box.

Manufactured of durable polycarbonate, each Storage Box has a 10 x 10 tube array that can securely accommodate 0.5 mL, 1.5 mL, and 2.0 mL Nalgene Micro Packaging Vials. The clear, see-through lid of each box allows fast identification of vials particularly those capped with colour-coded Nalgene Micro Packaging Vial Closures. Lid and box are notched and keyed so boxes can be interlocked and securely stacked. Both lid and box will accept marker writing for identification, and an available print grid can be customised to meet individual specifications.

Nalgene Micro Packaging Vial Storage Boxes are autoclavable and freezable (but may not be immersed in liquid N<sub>2</sub>), and include a removable inner tray for added storage versatility. Nalgene Micro Packaging Vial Storage Boxes measure: (L x W x H) 146 mm x 145 mm x 63.5 mm.

Contact: NNI Documentation Centre,  
Sevenoaks, Kent TN14 5XA, England, United Kingdom  
Fax: (+44-1732)-453166  
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# NEW PRODUCTS

## NALGENE UNWIRE RACKS - EXCELLENT REPLACEMENTS FOR CORRODED AND EXPENSIVE WIRE TEST TUBE RACKS



Unwire™ Racks are an excellent replacement for worn wire racks. Moulded of durable polyketone or economical polypropylene, these corrosion-resistant racks have no coating, eliminating the problem of chipping or peeling.

Nalgene Unwire Racks do not float in water baths and can withstand most chemicals. They have excellent thermal properties and won't get brittle in freezers. The grid design allows tubes to be tipped from side to side, allowing a clear marking place. The racks are easily stackable when empty to conserve valuable laboratory space.

Available in a selection of colours, these autoclavable polyketone half- and full-size racks and full-size polypropylene racks securely hold up to 72 test tubes or centrifuge tubes in sizes from 13 mm to 30 mm. The racks have moulded-in numbers and letters for positive test tube identification. The large end-plates may be labelled with PolyPaper labels - no tags or hangers to lose, misread or misplace. Also available are autoclavable test tube retainers that securely hold the tubes in place.

Contact: NNI Documentation Centre,  
Sevenoaks, Kent TN14 5XA, England, United Kingdom  
Fax: (+44-1732)-453166  
circle number 37 on the reader reply card

## EUTECH INSTRUMENT'S NEW OAKTRON TEMPTESTR IR

The economical TempTestr IR provides a new price breakthrough in non-contact temperature measurement!

This practical instrument uses infrared technology to take temperature readings, so you can take measurements from a safe distance. The TempTestr IR has hundreds of uses: quickly troubleshoot electrical equipment before problem areas create hazards, measure objects too hot to touch, check substances that need to remain contaminant free, test moving objects ... the possibilities are endless!

Taking temperature measurements has never been easier:

- Just push one button and point the thermometer at your target!

- It's fast 500 ms response time makes viewing correct readings practically instantaneous.
- And, the display holds for 7 seconds after you release the button, which gives you time to record the reading.

Choose from the standard model, or the laser sighting model. The laser sighting model emits a visible red laser spot that pinpoints your exact target area.

Contact: Alphatech Systems  
P O Box 37-583, Parnell, Auckland  
Phone: (09) 3770392, Fax: (09) 3098514,  
Email: sales@alphatech.co.nz  
circle number 38 on the reader reply card

## EUTECH'S NEW TDSCAN 10, 20, 30, 40 SERIES OF POCKET CONDUCTIVITY AND TDS TESTERS.

Eutechs TDScan 10 Series of pocket conductivity and Total Dissolved Solids (TDS) testers are built with advanced ASIC-based technology ... the first in the world. The Application Specific Integrated Circuit (ASIC) provides a high level of sophistication with several advanced features, while maintaining a user-friendly interface.

### Applications:

The TDScan 10 and 20 are suitable for general purpose measurements in water and wastewater treatment, agriculture and hydroponics, boilers and cooling towers, paper and pulp and chemical process industries. The TDScan 30 and 40 are especially suited for low range measurements typically found in pure, ultrapure and drinking water applications.

### Specifications: TDScan 10, 20, 30 and 40

TDScan 10	TDS Range	0-1999 ppm; 2.00-9.90 ppt
	Resolution	10 ppm; 0.10 ppt
TDScan 20	Conductivity Range	0-1999 µS/cm; 2.00-19.90 mS/cm
	Resolution	10 µS/cm; 0.10 mS/cm
TDScan 30	TDS Range	0.0-99.9 ppm; 100-999 ppm
	Resolution	0.1, 1 ppm
TDScan 40	Conductivity Range	0.0-199.0 µS/cm; 200-199 µS/cm
	Resolution	0.1 µS/cm; 1 µS/cm

Contact: Alphatech Systems  
P O Box 37-583, Parnell, Auckland  
Phone: (09) 3770392, Fax: (09) 3098514,  
Email: sales@alphatech.co.nz  
circle number 39 on the reader reply card

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APPLICATIONS DATA THE COMPLETE INFORMATION  
RESOURCE TOOL FOR THE LABORATORY

<http://www.labspec.co.nz>

# The Origin of the Elements

Richard M Hartshorn, Chemistry Department, University of Canterbury

## The Big Bang, Stars and Cosmic Rays

*Nucleosynthesis* is the name given to the process by which the elements are built up from their elementary particles and smaller elements. There are three major ways in which it is believed to occur. A burst of nucleosynthesis occurred during the short period of extremely high temperature and pressure that was part of the 'big bang'. The high temperatures and pressures in stars means that it also happens there, and finally, cosmic rays (high energy sub-atomic particles and atomic nuclei that are emitted by stars and bombard all objects in space) can also interact with nuclei of one element to produce a new one.

The 'big bang' is at the heart of the currently accepted theory for the birth of the universe. Astronomical evidence and theoretical calculations point to the universe having begun some 15 billion years ago when a super-dense mass exploded to give an immensely hot fireball of elemental particles. The universe is still expanding as a consequence, and the background radiation expected to result from such an event has been observed. Immediately after the explosion the fireball contained quarks, mesons, gluons and other types of particles. After about 1 second the temperature is thought to have dropped to about  $10^{10}$  K, and the quarks had combined to give protons, neutrons and other particles. These combined at the very high pressures to give atomic nuclei, but the temperature was so high that the nuclei immediately dissociated.

As the fireball expanded it cooled, and when the temperature dropped below about  $10^9$  K the nuclei became stable. After 3 seconds the temperature was too low to allow further nuclear reactions. In this short time the only nuclei formed were isotopes of hydrogen, helium, lithium and beryllium. As the universe continued to expand and cool, electrons joined with nuclei to give atoms, and chemistry began.

Gravitational attraction between masses eventually led to the formation of stars and galaxies. Compression due to gravity forces resulted in the material at the centre of large masses becoming very hot. More precisely, the outermost particles were drawn to the centre by the gravitational force. This converted the potential energy into kinetic energy, which was then converted to heat by collisions with other particles. The hottest part of a star will therefore be at the centre.

At this temperature, the electrons are 'boiled' off the nuclei and, once the temperature reached  $10^7$  K, further nuclear reactions can occur. Protons combine to form deuterium nuclei, a heavier isotope of hydrogen with a neutron as well as a proton in the nucleus. The deuterium nuclei can combine with protons to give an isotope of helium. Two of these helium nuclei then combined to give a heavier isotope of helium and two protons, which can undergo further fusion reactions. These reactions produce a great deal of energy, and can be represented by the following equations and Figure 1. The principles stated in notes 2 and 3 can be used to balance equations of nuclear reactions.

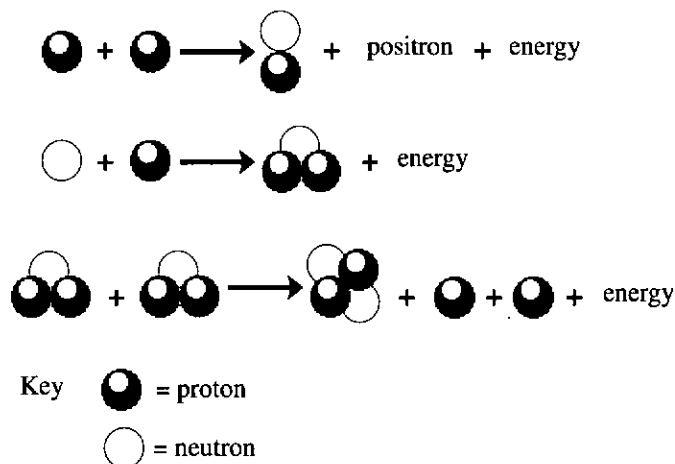


Figure 1. Nuclear fusion reactions.

Notes:

- 1) At the temperatures that these reactions occur there are no electrons associated with the nuclei. That is, the nuclei all carry charges, which have been omitted for simplicity.  $^1\text{H}$  and  $^2\text{H}$  are  $1+$  ions and  $^3\text{He}$  and  $^4\text{He}$  are  $2+$  ions under these conditions.
- 2) The total number of nucleons (protons and neutrons) is the same on each side of the equation.
- 3) The charge on each side of the equation is balanced.

The net result is that hydrogen nuclei (protons) are converted to helium nuclei, and some protons are converted into neutrons. During these reactions a small amount of mass is lost. That is, the total mass of the product particles is less than that of the combined mass of the reactant particles. The lost mass is converted to energy ( $E = mc^2$ ) which is released as heat. This process, known as 'hydrogen burning', gives out a great deal of energy, helping to maintain the extremely high temperatures in the stellar core. The heat that is produced results in particles with such high kinetic energy that their pressure balances the gravitational forces. So while a star is burning hydrogen its size is stable.

Very high temperatures are required before fusion will occur. The reason for this is that in order to create a new nucleus two positively charged nuclei must be forced very close together. A large amount of energy is required in order to overcome the electrostatic repulsion. Once the nuclei are close enough the strong nuclear force (which holds nuclei together) overcomes the electrostatic force and the energy that was used to force them together is released, along with a great deal more energy which results from the loss of mass. The graph of potential energy against proton-proton distance in Figure 2 shows this. As the separation between protons gets smaller, the energy of the system increases to a maximum and is then released as the separation decreases further. The hump is the activation barrier due to electrostatic repulsion, and the deep valley is indicative of the stability of the new nucleus. The protons must get over

the hump in order to gain this stability, and this requires energy, which is why the temperature and pressure have to be so high.

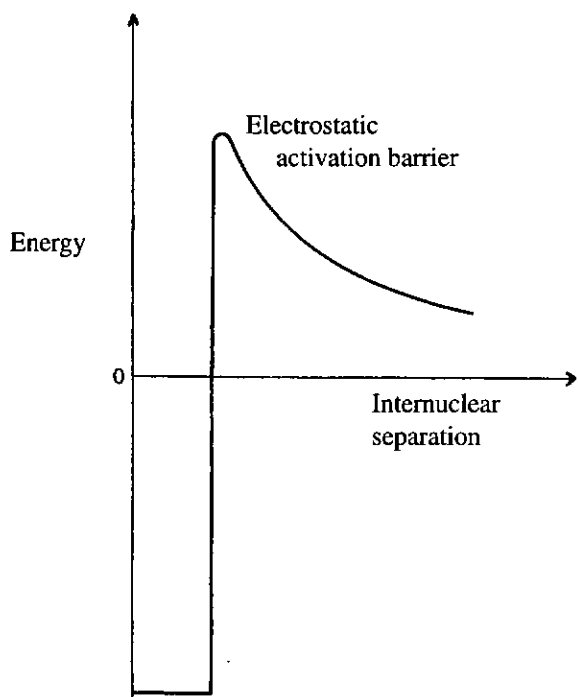


Figure 2. Potential energy as a function of internuclear separation of two nuclei.

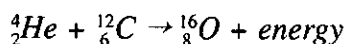
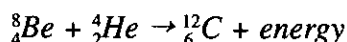
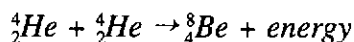
### The Energy from Nuclear Reactions

The energy produced by fusion of nuclei (and also from fission, or splitting, of nuclei such as uranium) results from the destruction of mass. According to Einstein's theory of relativity the energy ( $E$ ) produced will be equal to the mass ( $m$ ) that is lost, times the square of the speed of light ( $c$ ):

$$E = mc^2$$

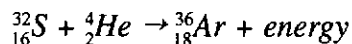
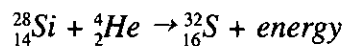
Huge amounts of energy are produced in this way in the sun and other stars, which explains why they radiate so much energy.

When hydrogen in the core of the star begins to run out, the energy output is reduced and gravity takes over, further compressing the core. If the star has enough mass the resulting increase of temperature sets off a new series of nuclear reactions in the inner core. The hydrogen further out then becomes sufficiently hot that it burns and the star appears to become much larger. At this time it is known as a red giant. In the core of a red giant, carbon and oxygen nuclei are formed (along with more energy) in a process known as 'helium burning', while more helium is produced outside the core. Our sun is not massive enough for this to occur.



Once the helium has been used, the fate of the star once more depends on its mass. A small star becomes a white dwarf, in

which the force of gravity has further compressed the core, but the temperature is not high enough for additional reactions to occur. In larger stars the core becomes enriched in carbon and oxygen nuclei, and gravitational compression raises the temperature about  $5 \times 10^8$  K. At these temperatures neon, silicon and magnesium nuclei are produced from combinations of carbon and oxygen nuclei. The core becomes rich in silicon nuclei,  ${}^{28}_{14}\text{Si}^{4+}$ , which are so highly charged that they don't react with each other under the prevailing conditions. Instead, heavier nuclei are made by reaction with helium nuclei ( $\alpha$ -particles):



These processes lead to elements with even atomic numbers and mass numbers that are multiples of four atomic mass units (e.g. 32, 36, 40, 44, 48, 52 and 56) being more common than other elements (and isotopes) as shown in Figure 3. Notice the vertical scale in Figure 3 is logarithmic so, for example, oxygen is roughly 10 times as abundant as nitrogen. Nuclear fusion reactions stop when  ${}^{56}_{26}\text{Fe}$  is reached as this iron nucleus is the most stable, having the greatest mass loss per nucleon.

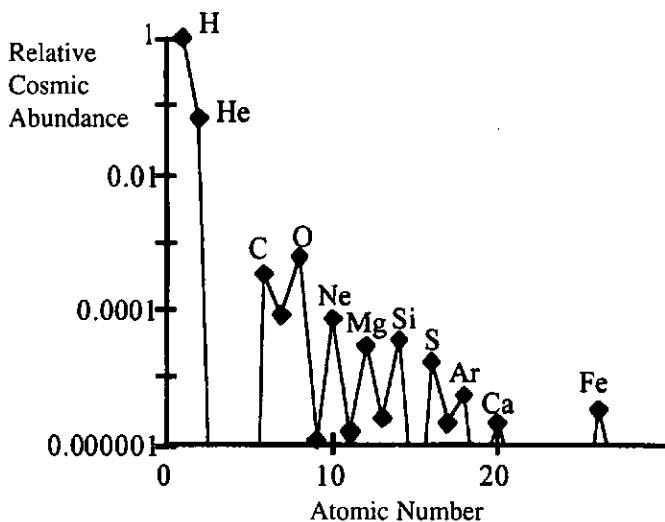


Figure 3. Relative cosmic abundances of lighter elements.

Once the nuclear reactions stop, there is nothing opposing the gravitational forces in a star. An implosion occurs and the heat generated causes an explosion of the outer matter in what is known as a supernova. The inner core remaining after the supernova will often form a pulsar, an object which is a strong source of pulsing radio waves. Sometimes, it is believed, a black hole is produced. It is under violent conditions of the implosion and the supernova that elements heavier than iron and lighter nuclei are formed.

### Formation of Planets - The Solar System

During a supernova a huge amount of material is blasted into space. This consists of a mixture of all elements made during the star's lifetime and those heavier elements made during the explosion. After expansion and cooling, the particles of this material are attracted to one another by gravity, and slowly form aggregates that eventually grow to the size of planets. Gases may also coalesce to form atmospheres around larger aggregates or, if there is enough hydrogen, new stars. Lighter gases, such as hydrogen and helium, only contribute to an atmosphere when

the gravitational force is sufficiently large, so smaller planets (such as the Earth) have atmospheres of heavier gases such as oxygen, nitrogen, carbon dioxide. The planets, stars, comets and asteroids orbit around one another, held together by gravity, to give reasonably stable solar systems.

All nuclei larger than  ${}^1\text{H}$  were formed from the *fusion* in stars, so at some stage most of the material of the Earth and that each of us is made of was once part of a star. The most stable nucleus is  ${}^{56}\text{Fe}$ , so it is not surprising that iron is the fourth most abundant

element in the earth's crust and a major component of the earth's core. Larger nuclei, which may have been formed in supernova, are less stable and can split to give two or more smaller ones, releasing energy in the process. This *nuclear fission*, and other decompositions of unstable nuclei, are known by the term *radioactivity*. The energy produced often gives the particles a great deal of kinetic energy, which can be used to generate power but can also be very dangerous.

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# Book Review



## C J Wilkins: An 80th Birthday Tribute

Edited by Denis J Hogan and Bryce E Williamson

*Published by the Canterbury Branch of the New Zealand Institute of Chemistry*

*Price: \$27 for NZIC members, \$36 for non-members.*

The years following World War II saw the beginning of the transformation of New Zealand university colleges from teaching institutions to true universities. By the late 1940s there was a nucleus of enthusiastic, vigorous people in the chemistry department at Canterbury College transmitting both their knowledge and the joy of the study of chemistry to a growing band of students. That this sense of excitement has endured is demonstrated in the tribute to one of those pioneers recorded in this volume.

The fifteen articles by Cuth Wilkins' former students and co-workers from as far afield as London and Los Angeles are an interesting mixture covering a wide range of topics. Some are direct tributes to Wilkins himself and others are accounts of the work of their authors related to his own interests in silicon and metal-organic chemistry.

These essays demonstrate the ways in which inorganic chemistry has expanded from the simple ionic solution and mineral chemistry of fifty years ago to the complex organo-metallic chemistry of today and the way that chemistry in general has changed from a "bulk" to a "molecular" science with much of

our understanding now being drawn from crystallographic and spectroscopic studies of various kinds. The articles also serve to illustrate the power and subtlety of the instrumental methods. How else for example would one have elucidated the phase change in the zinc iodide dimethylformamide complex described by Gainsford and Robinson?

On the other hand there are the articles on the effects of atomic size by Fergusson which brings us back to some of the simplicities underlying many of the things we observe, and that by Rodley which invites us to stretch our imaginations beyond their normal limits.

The accounts of chemistry are spiced with recollections of Cuth Wilkins the man, which will delight his associates and which emphasise the fact that science is indeed a human activity.

While many volumes of this kind are of interest only to those who know the person involved, this one is stimulating reading in its own right and deserves a wider audience than simply those who take pride in the fact they know, or worked with, Cuth Wilkins.

*A G Williamson*

### C J Wilkins - An 80th Birthday Tribute

Professor Cuth Wilkins retired from the Department of Chemistry, University of Canterbury in 1981. Since then he has remained active in his research and is still to be seen regularly in the Department.

To mark his 80th birthday, a group of his former students and colleagues, now widely dispersed, agreed to contribute to a book honouring his achievements. Fifteen papers in the general field of structural inorganic chemistry and a biography by David Buckingham has been collected into a 136 page book. This has been published jointly by the Department of Chemistry, University of Canterbury and the Canterbury Branch, New Zealand Institute of Chemistry. It has been edited by Denis Hogan and Bryce Williamson.

The book is available to NZIC members for \$27, or to non-members for \$36, including GST and postage from:

Dr Bryce Williamson  
Department of Chemistry  
University of Canterbury  
Private Bag 4800, Christchurch, New Zealand  
Email: b.williamson@chem.canterbury.ac.nz

# CONFERENCES & SEMINARS

7-9 December 1998

## **8th Australian Coal Science Conference. Coal Use: Present and Future**

**Venue:** Sydney, Australia

7-9 December 1998

## **First Singapore Chemical Conference**

**Venue:** Singapore

This conference will be a major event hosted by the National University of Singapore and will provide a broad forum for researchers to share experiences and exchange ideas in fundamental and industrial chemical research. Emphasis will be made to link chemical research to industrial applications. Another key objective of the conference is to foster better interactions and dialogue among researchers in chemistry or related areas in this region.

**Contact:** The NZIC Secretariat  
P O Box 39-283, Howick  
Auckland, New Zealand  
Tel: (+64-9)-5356495  
Fax: (+64-9)-5353476  
Email: NZICOffice@NZIC.org.nz

**Web Site:** <http://www.science.nus.sg/~chem/scc.htm>

17-19 December 1998

## **Oxygen, Free Radicals and Oxidative Stress in Plants**

**Venue:** Granada, Spain

**Contact:** L del Rio  
Estacion Experimental del Zaidin, CSIC  
Departamento de Bioquimica  
Biologia Celular y Molecular de Plantas  
Apartado 419, E-18080 Granada, Spain  
Tel: (+34-58)-121011  
Fax: (+34-58)-129600  
Email: ladelrio@eez.csic.es

24-28 January 1999

## **Organometallic Chemistry in the South Pacific - A Celebration**

This conference is being organised to honour Professor Warren Roper of The University of Auckland on the occasion of his 60th birthday. The scope of the conference will include organometallic and coordination chemistry. The meeting will have a strong international flavour with approximately 35 high profile, invited speakers from around the world. Poster presentations contributed by attendees will be welcomed.

**Venue:** University of Auckland Conference Centre  
Auckland, New Zealand

**Contact:** Dr P J Brothers or Dr L J Wright  
Department of Chemistry, University of Auckland  
Private Bag 92019, Auckland, New Zealand  
Tel: (+64-9)-3737599  
Fax: (+64-9)-3737422  
Email: P.Brothers@auckland.ac.nz  
or L.J.Wright@auckland.ac.nz

**Web Site:** <http://www.che.auckland.ac.nz/conf.htm>

25-27 January 1999

## **Fluorine in Coatings III**

**Venue:** Orlando, Florida, USA

This conference is organised by the Paint Research Association, posters are invited and titles should be submitted by 10 January 1999.

**Contact:** Janet Saraty  
Conference Secretary  
Paint Research Association  
8 Waldegrave Road,  
Teddington, Middlesex TW11 8LD, England

27-29 January 1999

## **Chemi Chromics USA**

A symposium and exhibition on leading edge topics in high-tech colours and functional materials.

**Venue:** New Orleans, USA

**Contact:** Spring Innovations  
185A Moss Lane, Biamhall, Stockport  
Cheshire SK7 1BA, England, United Kingdom  
Tel: (+44-161)-4400082  
Fax: (+44-161)-4409127

30 January - 3 February 1999

## **LabAutomation '99**

Aimed at exploring the newest technological advances for the clinical, pharmaceutical and biotechnology laboratory.

**Venue:** San Diego, USA

**Contact:** LabAutomation '99  
#572 Health Sciences Centre  
Charlottesville, VA 22908, USA

31 January - 4 February 1999

## **IC '99 Joint Meeting of Inorganic Division of the Royal Australian Chemical Institute and Inorganic Specialist Group of the New Zealand Institute of Chemistry**

**Venue:** Wellington, New Zealand

**Contact:** Rhyl Singleton  
School of Chemical and Physical Sciences  
Victoria University of Wellington  
P O Box 600, Wellington, New Zealand  
Tel: (+64-4)-4715335  
Fax: (+64-4)-4955241  
Email: chemistry@vuw.ac.nz

**Web Site:** <http://www.vuw.ac.nz/chemistry/conf/index.htm>

7-10 February 1999

## **EnviroTox '99 International Conference**

**Venue:** Deakin University Woolstores Campus, Geelong  
Victoria, Australia

**Contact:** PR Conference Consultants Pty Ltd  
P O Box 2954, Fitzroy Delivery Centre, 3065  
Australia  
Tel: (+61-3)-94196199  
Facsimile: (+61-3)-94196400  
Email: prcc@mail.austasia.net

**Website:** <http://www.labyrinth.net.au/~prcc/envirotox/>

# CONFERENCES & SEMINARS

8-12 February 1999

## **10th International Congress on Marine Corrosion and Fouling Incorporating The 2nd US-Pacific Rim Workshop on Emerging Non-Metallic Materials for the Marine Environment**

**Venue:** University of Melbourne, Melbourne, Australia  
The International Congress on Marine Corrosion and Fouling brings together scientists from academia, industry, defence and other government organisations to present and discuss recent scientific developments in understanding and combating the degradation of materials, structures and the performance of vessels in the marine environment. The Tenth Congress will be the first congress held outside the northern hemisphere and the first in the Asia-Pacific region. The inaugural US-Pacific Rim Workshop on Emerging Non-Metallic Materials in the Marine Environment held in Hawaii in 1997 addressed the needs of government, industrial and academia scientists, and engineers interested in reducing the costs of building and operating ships against a background of increasing efforts to reduce or eliminate materials potentially toxic to shipbuilders, ship crews and the environment. The second workshop will permit an assessment of progress and a review of developments.

**Contact:** Dr Patricia Shaw  
DOTSE, New Zealand Defence Force  
Private Bag 32901  
Auckland Naval Base  
Auckland, New Zealand  
Tel: (+64-9)-4455844  
Fax: (+64-9)-4455890  
Email: trishs@dotse.mil.nz

2-5 March 1999

## **Chemexpo**

An international trade exhibition for the chemical industry, which will specifically focus on the plastic, rubber, corrosion protection and pharmaceutical industries.

**Venue:** Budapest, Hungary  
**Contact:** Szilvia Rozsa  
Project Director, Hungexpo Co,  
Chemexpo Project  
H-1441, Budapest, P O Box 44, Hungary

4-5 March 1999

## **Industrial Biocatalysts**

Industrial Biocatalysts in pharmaceutical and fine chemicals.

**Venue:** Amsterdam, The Netherlands  
**Contact:** Spring Innovations  
185A Moss Lane, Biamhall, Stockport  
Cheshire SK7 1BA, England, United Kingdom  
Tel: (+44-161)-4400082  
Fax: (+44-161)-4409127

15-17 March 1999

## **Advanced Methods of Polymer Characterisation: New Developments and Applications in Industry**

**Venue:** Mainz, Germany  
**Contact:** Deutsche Bunsen-Gesellschaft  
für Physikalische Chemie

Varrentrappstrasse 40-42  
D-60486 Frankfurt am Main, Germany

7-15 April 1999

## **BCA/CCG Seventh Intensive Course in X-Ray Structural Analysis**

**Venue:** Durham, England, United Kingdom  
**Contact:** J A K Howard  
'BCA/CCG Intensive Course'  
Department of Chemistry  
University of Durham  
Durham, Durham DH1 3LE, United Kingdom  
Fax: (+44-191)-3743745  
Email: j.a.k.howard@durham.ac.uk

14-16 April 1999

## **TiO<sub>2</sub> 99 - New Strategies In An Era of Industry Rationalisation**

**Venue:** Padova, Italy  
**Contact:** Melanie Searle  
Intertech Conferences  
411 US Route One, Portland, Maine 04105, USA  
Tel: (+1-207)-7819800  
Fax: (+1-207)-7812150

19-21 April 1999

## **Carbon Black World 99**

**Venue:** Venice, Italy  
**Contact:** Karen Zacharias  
Intertech Conferences  
411 US Route One, Portland, Maine 04105, USA  
Tel: (+1-207)-7819800  
Fax: (+1-207)-7812150

26-28 April 1999

## **Drug Discovery Technologies '99 - Selecting and Shaping the Winning Compounds**

**Venue:** Amsterdam, The Netherlands  
**Contact:** Alison Singhal  
IBC Global Conferences  
Gilmora House  
57-61 Mortimer Street, London W1N 8JX,  
England, United Kingdom  
Tel: (+44-171)-4535491  
Fax: (+44-171)-6366858

3-4 May 1999

## **Chiral USA**

Covering chiral technology as applied to the pharmaceutical, agrochemical and fine chemical industries.

**Venue:** San Francisco, USA  
**Contact:** Spring Innovations  
185A Moss Lane, Biamhall, Stockport  
Cheshire SK7 1BA, England, United Kingdom  
Tel: (+44-161)-4400082  
Fax: (+44-161)-4409127

# CONFERENCES & SEMINARS

5-7 May 1999

**The 1999 British Association of Research Quality Assurance (BARQA) International Congress on The Changing Face Of Quality Assurance**

**Venue:** Dublin, Ireland  
**Contact:** Veronica Fernando  
Veritus Consulting  
Box Cottage, Church Road,  
North Waltham, Hants RG25 2BL  
England, United Kingdom

12-23 May 1999

**Crystal Engineering: From Molecules and Crystals to Materials**

**Venue:** Erice, Italy  
**Contact:** P Spadon  
Email: paola@pdchor.unipd.it  
**Web Site:** www.geomin.unibo.it/orgv/erice/crysteng.htm

17-21 May 1999

**The 2nd International Conference on Microplate Technology, Laboratory Automation and Robotics (MipTech-ICAR'99)**

**Venue:** Montreux, Switzerland  
**Contact:** Bureco  
Postfach, CH-4310 Rheinfelden, Switzerland

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  
or  
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  
**Contact:** Jim Hughes  
Reed Exhibition Companies  
Oriol House, 26 The Quadrant, Richmond  
Surrey TW9 1DL

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@cgnet.com

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  
Borskov 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, Spain  
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

# CONFERENCES & SEMINARS

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>

5-9 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

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: ferna@dedalus.lcc.ufmg.br

12-15 July 1999

**39th Microsymposium, Advances in Polymerisation Methods: Controlled Synthesis of Functionised 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  
Tel: (+420-2)-360341  
Fax: (+420-2)-367981  
Email: sympo@imc.cas.cz

15-17 July 1999

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

**Venue:** Hong Kong  
**Contact:** Professor M A El-Sayed

School of Chemistry and Biochemistry  
Georgia Institute of Technology, Atlanta  
GA 303320400, USA

Tel: (+1-404)-8940292

Fax: (+1-404)-8940294

Email: mostafa.el-sayed@chemistry.gatech.edu

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 Synthese 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

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

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

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

# CONFERENCES & SEMINARS

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](http://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.ritsumeai.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](http://www.aml.arizona.edu/aacg)

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/](http://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

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

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>

6-10 September 1999

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

**Venue:** Tokyo, Japan  
**Contact:** Professor Eishun Tsuchida  
Waseda University  
Tokyo 169-50, Japan  
Tel: (+81-3)-52863120  
Fax: (+81-3)-32095522  
Email: w169988@mn.waseda.ac.jp

December 1999

**23rd Australian Polymer Symposium**

**Venue:** Geelong, Victoria, Australia  
**Contact:** Dr W D Cook  
Department of Materials Engineering  
Monash University  
Clayton, VIC 3168, Australia  
Tel: (+61-3)-99054926  
Fax: (+61-3)-99054940  
Email: WDCOOK@eng2.monash.edu.au

13-17 December 1999

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

**Venue:** Taipei International Convention Centre, Taipei, Taiwan, R.O.C.

# CONFERENCES & SEMINARS

**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, R.O.C.  
Tel: (886-2-27376621)  
Fax: (886-2-27376644)  
Email: ku@ch.ntust.edu.tw

## 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: (+91-474)-490186

## 6-11 February 2000

### **RACI 11th National Convention**

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

## 17-25 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 15-974, New Lynn  
Auckland, New Zealand  
Tel: (+64-9)-8275757  
Fax: (+64-9)-8272003

## 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

## 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

## 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

# CONFERENCES & SEMINARS

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

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@tcc.co.nz

## CHEM-ED 99

### BIENNIAL CONFERENCE OF NZ 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** (Cabrera 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

# NEW ZEALAND INSTITUTE OF CHEMISTRY



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## NZIC COUNCIL NEWS

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### NOTICE OF AGM

The Annual General Meeting of the New Zealand Institute of Chemistry will be held at 6:00 pm on Wednesday 10 February 1999 at the New Zealand Dairy Research Institute, Palmerston North. The sole agenda item is the presentation of the 1997 accounts.

G Boston  
Honorary General Secretary

The council met on Tuesday 20 October 1998 at Victoria University of Wellington.

#### *Membership Report*

The following new members were welcomed to the NZIC:

Auckland	Devendra Raj Pyakuryal, unwaged Steven Tyrrell, post-graduate student Jonathan K O Ting, student
Waikato	Gwion James Harfoot, student Jon Harris, R J Hill Laboratories Syed Shamsul Hoque, student
Manawatu	Shamus Husheer, student Lawrence Kennedy, AgResearch Karen Whiteside, Contact Energy
Wellington	Chaohong Shen, PhD student
Canterbury	Steve Leftly, WRONZ Julian Adams, student

Only 65% of the members had paid their annual subscriptions by the end of September. The Secretariat will send reminder notices to all members who are in arrears. The council approved payment of the remaining capitation fee to branches. The capitation fee will be calculated based on the paid up membership of each branch at the end of September

The council agreed to again offer a reduced annual subscription to teachers who are members of the New Zealand Association of Science Educators. The Honorary General Secretary will publicise this offer early in 1999.

#### *Financial*

The Treasurer presented the draft 1997 accounts and the year-to-date accounts for 1998.

The accounting and financial control for some NZIC supported events has been confused between branches and the Secretariat. Members and branches need to be aware of correct accounting procedures and should contact the Treasurer or Secretariat if they need advice.

Over the next few years the council plans to move away from grant-based funding of branches and to funding of branches, specialist groups, and other NZIC events based on the presentation of a budget to the Council.

To start the process the Council will budget \$10,000 to be made available for special projects in 1999. Branches are invited to submit a plan and budget to the March council meeting, this is not a capitation fee and a branch with a suitably exciting project could, in principle, capture all the money. This fund is available only to branches next year and in subsequent years will be extended to specialist groups.

#### *Ethics report*

B Graham has completed an examination of the NZIC Code of Ethics and presented six statements for discussion.

*Statement 1: general responsibilities of a professional chemist*  
Members have a general responsibility to uphold, and promote the dignity, standing and reputation of the chemical science professions.

#### *Statement 2: illegal activities*

Members shall not knowingly engage in illegal work, or cooperate with those who are so engaged, and shall refrain from associating with or allowing the use of their names in connection with any enterprise of a questionable character.

#### *Statement 3: responsibilities to fellow professionals*

Members shall act in a spirit of personal helpfulness and fraternity towards their colleagues and do nothing to malign or impugn the work of others. Members shall accept responsibility for their own actions and acknowledge the contributions of others, give and receive criticism in an objective manner, and acknowledge and support the career aspirations of others.

#### *Statement 4: responsibilities to employers and/or clients*

Members shall act in a strict spirit of fairness and openness to their employer and/or clients. This includes only undertaking work within their professional competence and doing all that is necessary to avoid potential conflicts of interest.

#### *Statement 5: responsibilities to society*

Members shall take all reasonable steps to ensure that they are aware of the potential effects of their activities on people and the environment, and shall take all practicable steps to ensure that these are either avoided, prevented or minimised.

#### *Statement 6: presentation of results, and information*

All reports, statements, or opinions issued by members while acting in a professional capacity, shall be honest, objective and factual. In addition, members shall do all that they can to ensure that such reports, statements or opinions are not misused by others.

Could members please look at these statements and send their comments Bruce Graham, c/o NZIC, PO Box 39-283, Howick, Auckland by 28/2/99.

### Rule Changes

The council changed a number of rules so that they reflected the recent change of financial year.

The NZIC has only three grades of membership; Honorary Fellow, Fellow, and Member. A range of subscriptions are paid by the members. To reflect this structure Rule 11 "Life Membership" was deleted.

Rule 7.3 "Cessation of Membership" was changed to:

On omission to pay their subscription within the financial year it is due, members shall cease to be financial, provided notification has been given to their last known address. Members who are not financial shall not receive any benefits of the Institute and on omission to pay their subscription and any arrears owing within one year from the end of the financial year for which such subscription was due shall automatically cease to be members.

This change means that members who are in arrears for two years are automatically removed from the membership list. Council no longer needs to pass a resolution to remove them.

## REPORTS OF ACTIVITIES

### Year 13 exam

Richard Rendle has produced a model Year 13 Chemistry exam with model answers and has sold it to many schools. The Council thanked him for his efforts.

### Prizes and Awards - Date of AGM

An AGM to accept the 1997 accounts needs to be held. R Whitney, G Boston and A MacGibbon will organize.

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# NZIC BRANCH NEWS

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## WAIKATO

### CHEMQUEST™ 98



Left to Right: Professor Richard Price, Dean of Science & Technology, Associate Professor Lyndsay Main, Chairperson of Chemistry, and the winning team from St. Paul's Collegiate School (Caleb Ward, Daniel Wilson, William Han).

On the evening of Wednesday 28th October, Waikato University's Chemistry Department hosted the second ChemQuest, a chemistry quiz for 6th form students. A total of 48 teams (each of three students) participated in the highly successful event, which was held in the Coopers & Lybrand Lecture Theatre. The students represented a total of 23 schools from the greater Waikato region. The overall aim of the event was to provide a fun, chemistry-based evening for the students, while informing them about Chemistry and the University.

The questions (a total of 40) were divided into 4 sections, and covered a wide range of areas. The first section focussed on the Periodic Table, and each student was provided with a New Zealand Institute of Chemistry Periodic Table poster, as part of an information pack, which also contained general University of Waikato and Chemistry information. Additional materials, displaying the theme "Wow - it's Science" were provided by the Ministry of Research Science & Technology (MoRST). Other types of questions included identifying smells and famous chemists, writing chemical equations for various demonstrations, and chemistry-related music questions.

The overall standard was very high, and the close-run competition resulted in a sudden-death playoff for 3rd, 4th and 5th prizes. The Dean of Science & Technology, Professor Richard Price, presented the various prizes: First prize winners were the team from St. Paul's Collegiate School, Hamilton, who received a cash prize of \$150, gold medals, together with the James & Wells trophy and School of Science & Technology calendars designed by Nick Kim. Second Prize (silver medals, calendars and \$90) went to a team from St. John's College (Hamilton), third prize (bronze medals, calendars and \$60) to Hillcrest High School (Hamilton) and 4th and 5th prizes going to teams from last year's winning school, Tauranga Boys' College. Random prize draws at the end of each 10 questions, for Exscite tickets, calendars and T-shirts, ensured that many teams went away with prizes.

The organisers are very grateful to the sponsors: James & Wells (for the trophy and medals), the New Zealand Institute of Chemistry, MoRST, McDonalds and the Exscite Science Centre. The input of the following Chemistry Department staff who helped make the event a success is greatly appreciated: Annie Barker, Jenny Chapman, Amu Uprèti, Nick Kim, Natalie Curnow, Pat Gread, Wendy Jackson, Jannine Sims, and Michele Prinsep. Thanks also go to Anne Hume (Hamilton Girls' High School) and Duncan Smith (St. John's College) for their invaluable input and for asking the questions on the night. Thanks also go to Chief Judge Tony Cartner and his team of markers (Lyndsay Main, Angela Taylor, Wendy Jackson, and Wayne Gribble).

Bill Henderson and Richard Coll  
Chemistry Department, Waikato University

## MANAWATU

Robin Garnett, newly appointed Head of Interactive Exhibitions to The Manawatu Science Centre & Museum and Manawatu Art Gallery, spoke to the Branch on Wednesday 7 October 1998 at the New Zealand Dairy Research Institute Seminar Rooms. Robin has a zoology degree from ANU and has come to Palmerston North from Questacon (national science centre) in

Canberra where she has had a long-standing research interest in the learning that goes on in science centres. She had just returned from the inaugural conference of the Asia-Pacific Network of Science Centres in Beijing where she presented an overview of research in Australasia on learning science in informal settings. Her talk to the Branch "Computer Chemistry and Body Batteries - Learning Science in Unconventional Ways" combined descriptions of various studies based on interviews with science centre visitors with reflections based on her current position. The key feature in current research was studying the interaction of visitors with exhibits. Robin pointed out that there was a need to look for indicators of learning and to take a broad view of what is meant by learning. She concluded her talk with reference to worldwide trends in science centres, for example the use of internet sites to link up with scientists for answers to questions and the integration of science centres with museums to provide the historical aspect of science as well as the interactive aspect.

Dr Paul Anastas, Chief of the Industrial Chemistry Branch, US Environmental Protection Agency, and Director of the Green Chemistry programme, addressed a joint meeting of the Branch with the Manawatu Branch of the Royal Society of New Zealand on Thursday 29 October, 1998. His topic was "Green Chemistry: Theory and Practice". The meeting was held in the Manawatu Art Gallery and attracted a substantial audience of about fifty people. Dr Anastas began by pointing out that chemistry and chemical products had revolutionised the quality of life in the twentieth century by extending lifespan through pharmaceuticals, increasing food supply through the use of pesticides and fertilisers and providing materials that make electronics and communication equipment possible. However, at the same time, many of these same innovations had resulted in pronounced problems for human health and the environment through degradation of air, water and land. For example, in the USA approximately one billion kilograms of about 300 "toxic release inventory" chemicals are released each year into air, water, and land by industry. Historically, these issues have been dealt with through costly regulations which try to protect people from being exposed to these chemicals by waste treatment, control and disposal. All regulations try to reduce the exposure term in the equation "Risk = hazard x exposure", but there has been phenomenal growth in the number and scope of environmental regulations in the last 30 years. The cost of the "command and control" approach to industry was \$US115 billion in 1992 and it has been estimated that it would cost \$US700 billion to clean up existing industrial hazardous waste sites. Inventory controls, process controls, in-process recycling, and housekeeping changes are useful in controlling pollution but can be taken only so far and it is clear that current environmental protection practices cannot be sustained. A new approach to environmental protection and innovation is called "Green Chemistry". This is defined as chemistry that involves designing chemical products and processes that reduce or eliminate the use and/or generation of hazardous substances. This new technique uses the skills of scientists to manipulate molecules and design chemical products and processes so they are intrinsically less hazardous (the hazard term in the risk equation). By changing both the way chemical products are made as well as the end product themselves, green chemistry ensures that chemistry can be designed to be inherently safer. Dr Anastas gave several examples where green chemistry has been used in the production of everyday products. Two of these in basic

research and commercialised processes were the synthesis of adipic acid (the fundamental building block of nylon66), and the synthesis of polycarbonates. The adipic acid synthesis normally starts with benzene, a known carcinogen. The green chemistry alternative method starts with glucose. For polycarbonate synthesis phosgene, a deadly gas, is normally used in the reaction sequence but can now be replaced by diphenylcarbonate. Several other green chemistry initiatives were also described in what was a most interesting presentation.

The second chemistry graduate student seminar day organised by the Institute of Fundamental Sciences - Chemistry, Massey University was held at Massey University on Wednesday 2 September, 1998 (the first was reported in the July/August issue of the Journal). Professor Andrew Brodie reports that presentations were made by PhD students and completing MSc students on a wide range of topics, which is a reflection of the exciting research going on in chemistry. The audience heard about research on zinc electrodes in secondary alkaline batteries, NMR experiments to determine the droplet size distribution in butter, the use of porphyrins for surface modification, the structure of a high nuclearity ruthenium sulfur cluster, the synthesis of isoflavenoid glucuronides, the effects of manganese on mammalian mitochondria, and the use of computers for improving the learning of 100-level chemistry. A special treat was a talk from Puck Knipscher, who is working with Geoff Jameson in the Centre for Structural Biology. Puck is visiting from the Agricultural University of Wageningen, The Netherlands, and spoke on some of her project work there by describing her use of kinetic experiments and combined QM/MM calculations to get information about the glutathione delta-transferase reaction.

Congratulations to Professor Sylvia Rumball who has been honoured by the University of Canterbury in its inaugural distinguished alumni awards. She gained one of five awards announced to coincide with the University's 125th anniversary. She was honoured for an outstanding contribution to science, specifically for her research into human milk and lactation. Professor Rumball was the first woman Executive Dean of Science in New Zealand and is currently Assistant (Equity) to the Vice-Chancellor of Massey University, Director of the Science Education and Policy unit, and Chair of the Research Projects and Funding Committee.

Further congratulations to Dr Tony Burrell, Institute of Fundamental Sciences - Chemistry, Massey University, who has been awarded the New Zealand Association of Scientists' prestigious 1998 Research Medal for his ground-breaking work in solar energy. The medal is second only to the Marsden Medal in status and establishes Dr Burrell as one of New Zealand's top young research scientists. Dr Burrell has over 50 publications in international journals. His research on synthetic porphyrin arrays aimed at developing a dye capable of imitating photosynthesis for commercial use in producing a cheap electricity source has received major international attention through being highlighted in *Chemical and Engineering News* which is read worldwide.

*Harry Percival*

## WELLINGTON

Dr Joan Cameron (né Mattingly) recently addressed some 100 members of the Kapiti Coast Probus Club on the subject of genetic engineering. Her simple explanation, and her warning of possible consequences, was appreciated, as was the revelation of the ignorance of many of those who make pronouncements on the subject. It was also a surprise to learn that there were public laboratories that could distinguish between genetically altered and non-altered substances.

Other Branches might like to spread the word about the importance by addressing some of the other 375 Probus Clubs in New Zealand!

*Lester Stonyer*

## OTAGO

### *September Meeting*

September's meeting was held jointly with the local branch of the Pharmaceutical Society and featured a talk by Dr Ken Taylor of Roche Products (NZ) Ltd on "The global pharmaceutical industry - a prescription for the future". Ken described how the cost of innovation is now so high that pharmaceutical companies have to enter into alliances of one sort or another to get what they do not have. Thus innovation comes by acquisition or merger with other large companies thereby freeing up funds for research or by forming alliances with small research-oriented companies and acting as the development partner. Ken indicated that in trying to get the best drug for the cheapest price, a potential drug must combine good chemistry (simple synthesis, feasible formulation) with good biology (minimal toxicity, an objective measure of efficacy) and preferably enjoy patent protection of the intellectual property. In the final analysis however, the decision as to whether a drug will get funding for development is based entirely on the US market.

Ken devoted much of his talk to discussing the hype and the reality of the biotechnology industry. Despite the enormous venture capital tied up in biotechnology (US\$27.5 billion in California alone), very few compounds have made it to the market place. Similarly, whilst some 650 small biotechnology companies have been set up by US universities, only 10 are profitable at the present time. Despite these disappointing results, the pharmaceutical industry continues to pin its hopes of future profitability on the products of biotechnology. Ken's brief for Roche is to look for collaboration with universities throughout Asia and find inventions that could become products. So far Ken has forged 12 alliances, two in Korea, two in New Zealand and the rest in Australia.

## CHEMISTRY DEPARTMENT NEWS

### *Robinson at Robinson*

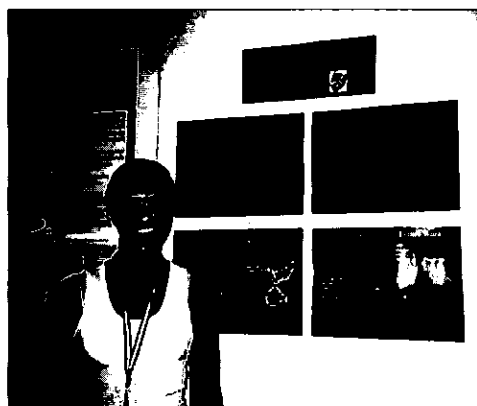
Professor Brian Robinson recently returned from sabbatical leave at the University of Cambridge where he took up a Bye Fellowship attached to Robinson College, one of the newer colleges. Apart from the onerous academic duties of a fellow such as eating at the High Table and attending musical recitals in the Chapel, he was able to make trips to most of the countries of Europe as well as do a lot of work. Besides getting eight

academic papers either written or ready for publication, he wrote a couple of articles on "The Demise of Science Culture and Rise of Research Culture" and "Schrodinger's Cats and Political Reality". He also began work on new research themes of 'water soluble clusters' and 'the coupling of fluorescent and electroactive centres'. He was attached to a group in the Department of Chemistry involved in multidisciplinary work on new inorganic and organometallic materials through collaboration with a team of physicists (who understand chemists!), electronic engineers, theoreticians, synthetic and surface chemists and spectroscopists have achieved spectacular results in regard to mesopores, molecular switches and surface attached materials.

Brian noted that science research in the United Kingdom recently received a £1.5 billion boost. Although at least one third is earmarked for biomedical work, he felt there would be a flow-on to the better universities. United Kingdom industry funding of chemical research is increasing but the majority of the funds are for multidisciplinary research. He hoped funding for his research at Otago would continue to benefit from the largesse of Johnson Matthey and be able to tap into other sources via collaboration with Cambridge. He noted that postdocs are becoming more difficult to find in the United Kingdom but that a number of academic jobs in inorganic chemistry were unfilled. Unfortunately, the 'ranking' of Universities reflects this difficulty, a problem he felt we in New Zealand may well face in the future.



*Andrea Clarkson - Bioinorganic Chemistry Section*



*Julia Turnbull - Other Topics in Coordination Chemistry Section*

## ICCC CONFERENCE

In August this year, chemistry PhD students Andrea Clarkson, Julia Turnbull, Kitty Lee, Matthew Polson and Joy Kerr attended

their first International Conference on Coordination Chemistry (ICCC) in Florence, Italy. They were accompanied by Chemistry Department Staff Jim Simpson, Brian Robinson, Keith Gordon and Sally Brooker. The ICCC was a huge conference catering for approximately 2000 participants with about 250 invited speakers and 1100 posters presenting all aspects of current research.

From the enormous range of topics covered, only a few of the more memorable lectures can be mentioned. V Balzani, gave an overview entitled "Machines and Logic Gates at the Molecular Level" and A P de Silva, an organic chemist, captured the imagination of many by crossing the boundaries of information theory and analytical chemistry in a seminar on molecular logic gates. Paul Beer gave an excellent lecture on cation and anion recognition by transition metal-based receptors including a receptor site for both an alkali metal cation and an iodide ion. Allan Hill lectured on scanning probe microscopy of modified electrodes and metalloproteins and included a most entertaining video of the absorption of proteins onto a gold electrode surface. Kim Dunbar focussed on extended arrays of transition metals coordinated to organic donors and pointed out how copper(I) compounds of tetracyanoquinone are particularly interesting as the products from two different synthetic routes have entirely different solid state structures.

A magical moment in the conference came courtesy of Alex von Zelewsky of the University of Fribourg, Switzerland in his plenary lecture on "Stereoselective Synthesis of Coordination Compounds". He utilised a computer projection unit to send a plethora of compounds dancing across the screen to the music of Carl Orff's 'Carmina Burana'. Another enlightening feature of the conference was to see inorganic chemistry being applied to everyday life. Professor D Williams gave a fascinating seminar on metal speciation using zinc in toothpaste as an example. Zinc is an essential nutrient for 'good' bacteria in the mouth but trace metal speciation is important to control zinc species present in toothpaste. Professor Williams also talked about the therapeutic value of zinc in treating the common cold and of seaweed as a source of trace metals for wound healing.

The poster sessions were very informative and a chance to meet a host of fellow chemists. Overall Florence offered a beautiful background to an extremely exciting conference.

*Paul Fawcett*

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*Christchurch  
14 - 16 July 1999*

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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

Abstracts for oral and poster presentations (up to 300 words) should be submitted and forwarded to:  
Louis Tremblay, Landcare Research, Lincoln  
Email: tremblayl@landcare.cri.nz by 15 February 1999

### **Advance Notice**

## **1999 NZIC Conference**

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

### **Note Changed Date**

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

# 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. While sessions have been allocated for general papers in each area (see below) *proposals for new symposia are needed - can you assist by organising a symposium for the congress?* Two co-organisers each from a different Pacific Basin country are needed to enable the proposal to be considered and it must fall within one of the ten broad areas of chemical science listed below.

**Deadlines for proposal submission have been revised and are:**

**1 July 1998** for consideration in the second round, and  
**15 January 1999** as the last date for receipt of a symposium proposal for any of the ten 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 and symposium proposal application forms are available from:

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

# ORGANOMETALLIC CHEMISTRY IN THE SOUTH PACIFIC - A CELEBRATION

An international  
organometallic and  
coordination chemistry  
conference at  
**The University of Auckland**  
January 24 - 28, 1999

This meeting will be held in honour of Professor Warren Roper's 60<sup>th</sup> birthday and will feature talks from 40 outstanding chemists from around the world. There will also be the opportunity for registrants to present contributions in poster format. The programme promises a wealth of outstanding chemistry. Social events will include activities for accompanying persons.

Please register expressions of interest either through the conference web site or by contacting the organisers directly (details below). Poster abstracts and registration will be due in October.

For further information please contact Dr Penny Brothers or Dr James Wright at the address below, or visit our web site. Updated information will be added to the web site throughout 1998.

<http://www.che.auckland.ac.nz/conf.htm>  
Department of Chemistry  
The University of Auckland  
Private Bag 92019, Auckland, New Zealand  
Telephone: 64-9-3737599, Fax: 64-9-3737422  
Email: p.brothers@auckland.ac.nz,  
Email: L.J.Wright@auckland.ac.nz

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- *The laboratory purchasing manager wants to check out the monthly specials from his/her preferred chemical and glassware supplier.*
- *The research director wants to find out who the local distributor of a brand of instrument that he/she saw at a recent conference is.*
- *The chromatographer wants to get a sample chromatogram for a new column he/she is thinking of using.*

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