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NZIC

Chemistry
IN NEW ZEALAND

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FOCUS ON FOOD & BEVERAGE MANUFACTURING

UP FRONT...

The demands made on the quality and efficiency of your laboratory regarding applied research, basic science and production are growing at an alarming rate. Thanks to decades of wide-ranging experience in the laboratory sector, METTLER TOLEDO and WATSON VICTOR LTD know your needs and wishes. We continually endeavour to develop better solutions to ensure greater satisfaction for our customers, and their continued success.

For further details see the cover story on page 2

NZIC Chemistry
IN NEW ZEALAND

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COMING UP ...

May 1996 - Focus on Forensics, Toxicology, Chemical Pathology, Clinical Chemistry

July 1996 - Focus on Forestry, Timber Treatment, Pulp & Paper

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COVER STORY

IT'S YOUR CHOICE..... NATURALLY IT'S METTLER TOLEDO

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This striving for excellence is reflected in the recent introduction of numerous new products to the already extensive METTLER TOLEDO analytical product range, all employing the very latest technology. Everything you want in an analytical instrument is available from METTLER TOLEDO, and much more.

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METTLER TOLEDO's advanced technology is clearly evident with the revolutionary METTLER TOLEDO memory card. This credit card sized memory card is incorporated into the new DL53 and DL55 titrators, opening endless possibilities for information transfer and storage, and upgradability of the instruments.

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METTLER TOLEDO guarantees dependable operation and reliable functioning of all instruments. All balances and analytical instruments are tested for proper functioning, ruggedness and accuracy in comprehensive inspection and testing procedures based on criteria such as CE certification and ISO 9001.

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LOCAL NEWS

CROWN SCIENTIFIC CONTINUES ITS EXPANSION

Crown Scientific Pty Ltd (Australia) has announced it has established a 100% owned company in New Zealand which is to be located in the North Harbour area of Auckland. Mr Gareth Pryme, born and bred in New Zealand, has been appointed the Manager and Gareth brings with him several years of experience in the laboratory distribution markets within both New Zealand and Australia. Crown Scientific Limited (New Zealand) will stock and sell a select range of products from the world's leading suppliers, which include Eppendorf, Braun, Sigma, Christ, ColorTec, Bibby, Sterilin, Azlon, Semco, Ohaus, Palintest and Medscand. The new office can be contacted on phone (09)415-4119 or fax (09)415-4120.

The Managing Director of Crown Scientific Pty Ltd, Mr Tony Van Staveren, issued the following statement:

"Crown Scientific has established itself as the premier supplier to the scientific community in Australia, and the new Auckland office is the beginning of our objective to establish Crown Scientific as the premier scientific supply company in the Pacific region. It is our intention to expand our New Zealand operation to other major centres over the ensuing years by reinvesting our returns. Similarly, other investment options in other countries in the region are being actively pursued.

New Zealand is the first overseas investment for Crown Scientific and our management believes in the opportunities that the Pacific region presents to companies in our industry who are willing to be innovative and make investments and commitments in the region."

HOECHST ACQUIRES SYVA COMPANY

Hoechst AG, Germany, acquired Syva Company worldwide in July 1995 to merge with Behring to form Behring Diagnostics, a division of Hoechst.

Locally in New Zealand, John Munro, former manager of Syva in New Zealand, was appointed manager of Behring Diagnostics. The new organisation is now based in the Pharmaco (NZ) Ltd premises at 49 George Street, Newmarket, Auckland.

Pharmaco (NZ) Ltd who previously handled distribution for Syva, are now handling distribution for Behring Diagnostics. Gary Ware remains the customer service contact and the company now has three sales/technical specialists.

Contact details are: Behring Diagnostics
49 George Street, Newmarket, Auckland 1001
C P O Box 4079, Auckland 1015
Telephone: (09) 3664784
Toll Free Phone: 0800 807982
Fax: (09) 3798308

RESEARCH AND DEVELOPMENT BARELY 1% OF GDP AND BUSINESS RESEARCH VERY LOW

Science and technology research spending was 0.98% of gross domestic product in 1992/1993, little changed from the previous two years according to recent Ministry of Research, Science and Technology figures. A total of $754 million was spent on research activity in the higher education, business and government sectors for 1992/93, the report *New Zealand Research and Experimental Development Statistics* published by the ministry says. The Government funded $443 million (0.57% of GDP) and the business sector $226 million (0.30% of GDP). Funding from other sources, including $47 million from universities, $19.4 million from overseas, and $19 million from private non-profit funds amounted to 0.11% of GDP.

University sector research and development spending is considerably higher than previous surveys at $232 million because of new survey methods (no previous year comparisons are given). This is the first survey carried out according to OECD recommendations which include university medical faculties, all of the humanities, support staff, external funding, and overheads such as libraries and computers. Of the nine university research and development spending areas, social sciences was the biggest with $58.6 million and second was medical sciences with $49.8 million. The biggest source of funding for university research and development was general university funds at $120.5 million, followed by the universities' own funds of $47 million, and government-sourced funding (such as Foundation for Research, Science and Technology, and Health Research Council) of $30.7 million.

Research provided by business in New Zealand in 1992/93 was just one-fifth the level of the average OECD country, the *New Zealand Research and Experimental Development Statistics* report shows. Business provided $213 million worth of research in 1992/93—equivalent to 0.28% of gross domestic product. The OECD average is almost five times greater at 1.3% of GDP. Total spending on research in the business sector in the latest year was up $8 million on 1991/92. With comprehensive research and development figures collected only for the past four years, trends show that only primary processing and primary products sectors have shown a consistent increase. Together these two sectors comprised 46% of business enterprise research and development in 1992/93. The electronics and appliances sector showed a 56% rise in research and development over the previous year. The report also shows New Zealand is becoming an effective exporter of technological know-how. The business sector received $ 15.1 million more from its overseas sales than it spent on purchasing, and the government sector had a net surplus of $2.6 million. The report is available from MoRST, P O Box 5336. Wellington.

MORE JOBS FOR SCIENCE GRADUATES

Job opportunities for science graduates have doubled in the Auckland region in the last two years according to a survey of job advertisements where a science degree is required. The survey of two months of the *New Zealand Herald's* situations vacant advertisements — or a total of 35,000 jobs — was carried out by Dr John Seakins of the University of Auckland's science faculty and Dean of Science Professor Ralph Cooney. A similar survey was carried out in 1993, when 16,000 vacancies were advertised. While the news for science graduates is good, it is in keeping with trends in the overall job market. Most in demand were computer science graduates followed by chemistry, electronics, psychology and biological science.

MARSDEN FUND TO DOUBLE

The decision of the Minister of Research, Science and Technology, Hon. Simon Upton, to transfer the administration of the Marsden Fund and the Marsden Fund Committee from the Foundation for Research, Science and Technology to the Royal Society, became effective from 1 December 1995. The Marsden Fund Committee, chaired by Dr Ian Axford FRS, will function as an independent entity and be accountable to the Minister under delegated authority for the purchase of research outputs which support and encourage excellence in science, enhance the underpinning scientific knowledge-base, and broaden and deepen the research skill base in New Zealand, regardless of whether or not the research contributes to the Government's socio-economic priorities.

The Marsden Fund will have $11 million available for funding qualifying research in 1996/97, double the $5.5 million allocated in 1995/96. A further doubling to $22 million is forecast in 1997/98. Marsden Fund preliminary applications for 1996/97 were due on 19 February 1996. After considering the preliminary proposals, the Marsden Fund Committee will invite selected researchers to submit full proposals before the final selections are made. Paulette Ell, formerly finance and planning manager with the Ministry of Research, Science and Technology, has been appointed by the Society as acting manager for the Marsden Fund until a full-time manager is appointed early in the new year. The Marsden Fund's email address is: marsden@rsnz.govt.nz

NEW AWARDS FOR OVERSEAS TRAVEL

The Prince and Princess of Wales Science Awards and Young Scientists' Fund are to be replaced by a new scheme, The Royal Society of New Zealand Science Awards. The Society has agreed to the restructuring of its awards for short-term overseas scientific visits following a review. The new Royal Society of New Zealand Science Awards will have three categories: (1) For beginning scientists to attend their first international scientific conference to present the results of their research; (2) For New Zealand scientists and technicians to travel overseas for up to two months to gain expertise and to use facilities not available in New Zealand; (3) For scientists and technicians with skills, expertise and new ideas to visit New Zealand for no more than two months.

Conditions of the awards include: no retrospective funding for travel; awards will not be available to scientists travelling overseas on sabbatical leave; two closing dates of 1 March and 1 October each year. Changes will be effective from 1 January 1996. In the second category of award the Society anticipates sending up to two career scientists to the United Kingdom each year under a scientific agreement with The Royal Society, London.

NEW MoRST POLICY HEAD APPOINTED

The Ministry of Research, Science and Technology has appointed Dr James Buwalda as its new chief policy adviser to replace Mike Doig. Dr Buwalda, previously manager of science strategy with HortResearch, Hamilton, took up his new position in early December 1995. In his position at HortResearch he was responsible for developing strategic and operational plans for the science business of HortResearch. After completing a Bachelor of Agricultural Science with Honours, from Lincoln College, Dr Buwalda became a scientist with the Ministry of Agriculture and Fisheries in Hamilton in 1979. Dr Buwalda's career also included three years of research at the University of London, where he completed his PhD, and one year at the University of Bonn, where he was an Alexander von Humboldt fellow.

TRAVEL GRANTS TO 14 YOUNG SCIENTISTS

Fourteen university postgraduate scientists have recently been awarded travel grants to overseas conferences under the Young Scientists' Fund of The Royal Society of New Zealand. 121 young scientists have received funding from the Society to attend their first international scientific conference since the fund was established. Funding has largely gone to postgraduate students nearing completion of their PhDs. Recipients report the awards to be a great stimulus at the beginning of a scientific career. The successful candidates this year (with departments and universities in brackets) are: Christine V Stephens (Psychology, Massey), John D Pritchard (Physics and Astronomy, Canterbury), Robert E Lieffering (Earth Sciences, Waikato), Hailong Wang (Soil Sciences, Massey), Craig J Whittington (Psychology, Massey), Ross Adamson (Chemistry, Massey), Paul T Qualtrough (Computer Sciences, Auckland), Carol A Stewart (Entomology, Lincoln), David W Hawkins (Electrical and Electronic Engineering, Canterbury), Gavin A Manderson (Biochemistry, Massey), Helen S Toogood (Thermophile Research Unit, Waikato), Rachel M Williamson (Chemistry, Massey), Gretel S Roberts (School of Biological Sciences, Auckland).

SCIENCE COMMUNICATORS FOR 1995

Dr John Clearwater of HortResearch, Auckland, and Associate Professor Ross Grimmett of the Department of Chemistry, University of Otago, have won the Science Communicator Awards for 1995 organised by the New Zealand Association of Scientists. Dr Clearwater was the winner of the scientific issues section of the award for his radio and television programmes about pheromones and codling moths. Associate Professor Grimmett won the principles, achievements and education section through his communication of chemistry by way of lectures for school children and television programmes.

1996 TEACHER FELLOWSHIPS AWARDED

Thirteen science/technology teachers have been awarded New Zealand Science and Technology Teacher Fellowships for 1996 by The Royal Society of New Zealand on behalf of the Government. At a function to announce the fellowships, the Minister of Research, Science and Technology, Hon. Simon Upton, said he regarded the fellowships as one of the most successful initiatives of his term as Science Minister. This year the scheme will receive an additional $195,000 from Government.

The 13 fellows are:
Rex Bartholomew, Viard College, to work with Victoria University and Karori Sanctuary Trust on an integrated ecological database for the Karori Sanctuary. Graeme Bloomfield, Nayland College, to work with the Cawthron Institute on environmental factors affecting juvenile scallop survival. Brett Clark, Porirua East Primary, to work with a number of companies and organisations to encourage an interactive relationship between education and industry practices. Peter Fergusson, Whakatane High School, to work with the Department of Conservation on freshwater wetlands in the Te Teko Ecological District. Jenny Hughes, St Andrews College, Christchurch, to work with the Department of Plant and Microbial Sciences, University of Canterbury, on algae. Bridget Jones, Parua Bay School, Whangarei, to work with the Department of Mathematics, University of Auckland, on information about technologies which are advantageous in primary mathematics education. Beryl Lee, Dunedin North Intermediate, to work with Discovery World, Otago Museum. Mary Mason, Remuera Intermediate, to work with Happy Valley Honey Ltd on beekeeping and the honey industry. Sue Michelsen-Heath, Otago Girls High, to work with the Zoology Department, University of Otago and New Zealand Antarctic Division, Christchurch, to satellite track penguin foraging-group movements, carry out DNA studies of Adelie kinship groups and make behavioural observations of penguin groups. Berys Spratt, Mangaroa School, Upper Hutt, to work with Mel-O-Rich Icecream, The Blood Centre, Dominion Salt and AgResearch Wallaceville, to investigate the science and technology in these industries. Jeremy Tizard, Hamilton Boys High School, to work with Environment Waikato on environmental education activities in Waikato schools. Van-Long Truong, Wainuiomata College, to work with the Institute of Geological and Nuclear Sciences, Lower Hutt, on nuclear physics in industry and to demonstrate low cost radiation detection equipment suitable for schools. Gregory Walker, Ellesmere College, Christchurch, to work with South Pacific Information Services Ltd with special focus on the *NZ Science Monthly* bimonthly Discovery science education page.

23% BOOST FOR HEALTH RESEARCH

The Health Research Council is to receive a 23% funding increase, the Government has announced. In 1996/97 the council's funding will be $25.2 million, topped up by a further $1.62 million in 1997/98 to take its funding to $26.8 million, Health Under-Secretary Bill English said. The council received $19.3 million in 1995/96. He said funding for health research had been under significant pressure for many years despite increases in financial support for both health and science in the past few years. "Health research has missed out due to the pressure to spend health money on more immediate needs."

ZONTA AWARD FOR WOMEN SCIENTISTS

Women scientists are being invited to apply for the 1996 Zonta Science Award. Applications are now open for the biennial award, which was established by the Zonta Club of Wellington to further the status of women in scientific fields. The award recognises women who contribute significantly to New Zealand scientific research and promote science as a career for women. Applications close March 1996. Winners receive a round-the-world air ticket, a gold and silver medal and $5000 cash.

OTAGO FORMS NEW SCHOOL OF MEDICAL SCIENCES

The University of Otago has established a new School of Medical Sciences at Dunedin separate from the three clinical schools of Medicine at Dunedin, Christchurch and Wellington. Professor David Jones has been appointed Dean of the new school. He is currently head of the University's Department of Microbiology.

The new school will be made up of the five departments: anatomy and structural biology, biochemistry, microbiology, pharmacology and physiology. The five departments were established initially to provide basic preclinical training in the biomedical sciences for medical students.

CRIs MAKE $15M PROFIT

Crown research institutes recorded a provisional surplus after tax of $ 15.7 million in the June 1995 year, a rise of $1.4 million or 9.6% on 1994. During the year, total income rose $13.1 million to $367.3 million, with nearly 40% of the rise due to increased government funding. Expenditure rose 13.2%, with more than half that increase due to a 3.8%, or $7 million, rise in employee costs. At June 1995, CRIs had $95.1 million in debt, down $8.4 million on the preceding year. Total assets stood at $287.7 million, up $7.7 million.

COAL INDUSTRY TAKES INITIATIVE ON GREENHOUSE PROGRAMME

Prompted by the Minister for the Environment, Simon Upton, the coal industry has taken the initiative in forming a New Zealand consortium to help fund the IEA Greenhouse Gas R&D programme. CRANZ has agreed to meet 20% of the $40,000 membership cost.

The international collaborative programme was established in 1991 to investigate methods for the reduction and disposal of gases which might lead ultimately to an increase in global warming. This programme is supported by all the major industrialized nations of the world. Several national science and energy supply organizations support various individual projects. New Zealand has not contributed so far.

During the first phase of the programme most attention was paid to the emission, capture and storage of carbon dioxide produced by the combustion of fossil fuels for power generation.

The second phase of the programme is designed to address major questions about the costs of capture of carbon dioxide and the risks of storage.

INTERNATIONAL NEWS

TOPOMETRIX CORPORATION PROVIDES GRANT (TOGETHER WITH THE NATIONAL SCIENCE FOUNDATION) TO "NANOMANIPULATOR PROJECT AT THE UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL

The Nanomanipulator is a virtual-reality interface to scanning probe microscopes.

TopoMetrix Corporation has announced that it has provided a grant, together with the National Science Foundation, to the University of North Carolina (UNC) at Chapel Hill's computer science and physics and astronomy departments in support of the "Nanomanipulator Project." This project is aimed at the combined use of virtual reality and scanning probe microscope technology to put scientists into a microscopic domain where they can prod real viruses to learn more about how they work or push atoms around to build transistors that are one hundred times tinier than those in a Pentium® chip.

The UNC received two grants: "Development of the Nanomanipulator: A Real-Time Scanning Probe Microscope Interface for Nanometer Science" is a two-year, $460,000 program with half of the funds from the UNC, TopoMetrix, and Silicon Graphics Inc. The other grant, "Application of High-Performance Graphics Supercomputers and Communication to Provide Improved Interfaces to Scanning Probe Microscopes," is a five-year grant for $2.3 million from the National Science Foundation.

The Nanomanipulator Project is a collaborative effort between the molecular graphics and physics groups within the departments at the UNC. It will provide a radically improved interface to scanning probe microscopes, using a graphics supercomputer and force-feedback device to provide the illusion of a physical surface floating in front of the user. The project was initiated by Dr Warren Robinett in the computer science department and Dr R Stanley Williams, then a professor of chemistry at the University of California at Los Angeles.

The two-year grant provides funding to build a dedicated system from off-the-shelf components. The five-year grant provides funding to explore the use of next-generation graphics and networking hardware, allowing visualization of multiple data sets simultaneously with surface topography, and the use of remote connections to microscopes.

For further information regarding the Nanomanipulator Project, please contact Dr Russell M Taylor II, Department of Computer Science, the UNC-Chapel Hill, phone: (+1-919)-9621701, fax: (+1-919)-962-1799, e-mail: taylorr@cs.unc.edu, or visit the Web page at: <http://www.cs.unc.edu/nano/etc/www/>.

TOPOMETRIXANNOUNCES ITS NEW "SPM IMAGING MODES TUTORIAL" ON THE WEB

The new "SPM Imaging Modes Tutorial" by TopoMetrix is a great way to get started learning about the basic concepts of scanning probe microscopy—a technique that allows the human eye to see three-dimensional nanometer-scale features of surfaces.

TopoMetrix Corporation, a leading designer and manufacturer of scanning probe microscopes (SPMs), has announced that a "Scanning Probe Microscopy Imaging Modes Tutorial" is now available on the TopoMetrix World Wide Web site (http://www.topometrix.com). The tutorial includes 10 pages and 19 full-color figures explaining the basic concept, imaging modes, and applications of an SPM. This tutorial is the perfect introduction into the world of scanning probe microscopy. It features sections covering:

- The basic concepts of an SPM
    - Probe/sample forces - instrumentation
- Atomic force microscope imaging modes
    - Introduction
    - DC contact and non-contact
    - Lateral force microscopy
    - Force modulation
    - High amplitude resonance (HAR)
    - Low amplitude resonance (LAR)
- How to contact TopoMetrix Corporation

SPMs are used to characterize the surfaces of materials via three-dimensional images that have nanometer-scale resolution. These high-resolution images provide quantitative, dimensional information in x, y, and z and can provide additional information related to the physical, chemical, mechanical, and electrical properties of the specimen.

LETTER TO THE EDITOR

1 February 1996.

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Attention: Editor Chemistry in New Zealand
P. O. Box 12-347 Wellington.

Dear Sir

At a recent committee meeting for the Waikato branch of the NZIC it was noted that it was difficult to maintain students as members of the Institute when they moved into the work force. We, as current graduate students at the University of Waikato, feel that reasons that contribute to the loss of this potential membership include:

1) The NZIC is not recognized as being a professional body with the same requirement or prestige of membership as the engineers or accountants professional bodies command.

2) Benefits for members from the NZIC and value for money of membership were not easily recognisable.

Perhaps the NZIC should:

1) Highlight its role in providing contacts within the chemistry community to aid in problem solving, providing activities for a membership that has common interests and helping bring together potential employers and employees.

2) Market itself and its members to employers and the community as a whole as being a professional body of the highest order. Membership of the NZIC should say that an individual has fulfilled high professional and ethical standards.

3) Be pro-active within society and comment on issues of a chemical nature that should have expert comment to make them more understandable to the lay person, or even become an advocate when required.

Having a strong and active membership is the key to the survival of the NZIC and recent graduates must be kept aware of the benefits and activities of the Institute to retain their interest.

Yours sincerely,

Ian Graves Greg Olsen Lisa Walker

CHEMISTRY AND PATENTS IN NEW ZEALAND

T. H. Syddall
A J Park & Son
Intellectual Property Lawyers, Solicitors, Patent Attorneys and Notaries Public
P O Box 30-687, Lower Hutt

NEW ZEALAND PATENT APPLICATIONS

Of the 4,534 patent applications filed in the New Zealand Patent Office in the year ending 31 March 1992, the technical content of 2,267, exactly 50%, fell into the "chemistry" category.[1]

In the two previous years, the proportions had been 51% (2,342 of the 4,582 total in the year ending 31 March 1990)[2] and 51.6% (2,315 of the 4,488 total patent applications in the "chemistry" category in the year ending 31 March 1991)[3]. In the past year, ending 30 June 1995, the proportion had dropped to 42% with 1,890 of the 4,503 total patent applications falling into the "chemistry" category.[4]

In the year ending 31 March 1962, there were 708 patent applications in the "chemistry category out of a total of 2,848 patent applications, or 25%. The 708 patent applications in the chemistry field were then second to the number of applications (899) in the mechanical engineering field.[5] The field of chemistry became the largest category in the year ended 31 March 1967 with 1,085 applications, or 29%, of the 3,665 total patent applications, as compared with 993 in the field of mechanical engineering.[6]

Thus, during the author's 35 years in the patent attorney profession, there has been a marked increase in both the numbers and the proportions of New Zealand patent applications classified as relating to inventions in the field of chemistry.

A review of information contained in the Patent Office annual reports (from 1952 to 1989 published within the Department of Justice annual reports) gives an indication of the change in the subject matter of chemical inventions over the same period, and even further back to 1 January 1954 when the present Patents Act 1953 came into force.

The Patent Office report for 1954-55[7] recorded 384 applications in the field of chemistry, out of a total 2438 applications, almost 16%, and "noticeable activity in ...

Chemistry: Addition of stain inhibiting compounds to detergents; electrolytic production of titanium; impregnation of textile fabrics for crease and abrasion resistance; internal combustion engine fuel additives; hair dyes and insecticides in capsule form."

The report of the Patent Office for the year ended 31 March 1962[5] recorded that

"the following developments are apparent in the under-mentioned fields: ...

Chemistry - pharmaceuticals, antibiotics, steroids, pesticides, veterinary medicines, polymerisation processes and catalysts, stabilisers, coatings, fabric finishes, anti-rust additives, germicidal detergents, liquid abrasive cleaners, dyeing processes, beer production, and light-sensitive copy material."

In contrast, the Patent Office report for the year 1 April 1989 to 31 March 1990[2] records that:

"Applications for microbiological and genetic engineering inventions continue to increase as do applications for cellular telephone technology, optical integrated circuits and subscription television. Applications for human and veterinary antibacterial and antiviral medicines have increased as have applications for methods of delivery formulation for such medicines. Other applications included foodstuffs, agricultural chemicals such as pesticides and plant growth regulants, agricultural machinery and computer control of industrial processes."

The corresponding report for the following year[3] notes that:

"Applications for microbiological and genetic engineering inventions continue to increase as do applications for cellular telephone technology and optical integrated circuits. Applications for human and veterinary antiviral medicines have increased as have applications for vaccines, immunoassay methods and kits. Applications for composite structural building panels have increased as have applications for water and waste-water treatment and for cleaning and prevention of fouling in general. Other applications included foodstuffs, pesticides, agricultural machinery and devices, fabric treatment and recreational devices."

The report for the year 1 April 1991 to 31 March 1992[1] records that:

"Genetic engineering, techniques for producing vaccines, and human and veterinary antiviral medicines have all led to increasing numbers of applications."

and reference is also made to "pesticidal methods and formulations" and to "detergents, cosmetics".

The corresponding report for the period 1 July 1994 to 30 June 1995 records that:

"Applications relating to genetic engineering, vaccines and techniques for producing them, enzymes, and for human and veterinary antiviral medicines have been maintained. There has been an increasing interest in drugs that have anticancer activity."

Thus, during the lifetime of the Patents Act 1953, the field of chemistry has expanded from largely traditional organic chemistry to include biochemistry and then biotechnology.

The major role which chemistry, including biotechnology, has come to play in providing subject matter for patents worldwide is reflected in the publication of specialised texts[8] and journals[9] on the subject of patents in chemistry and biotechnology.

It must be pointed out that the vast majority of patent applications which have been and are currently filed each year in New Zealand in the chemistry category relate to inventions made overseas with the owners seeking to include New Zealand in worldwide patent portfolios.

The proportion of the total New Zealand patent applications filed in each of the three years in 1989/90, 1990/91 and 1991/92 on New Zealand inventions varied from 17 to 23%. The proportion of patent applications on inventions made within New Zealand in the field of chemistry is estimated to be considerably less than that average 17 to 23% of all patent applications.

PATENTS ARE TOPICAL

The draft discussion document entided *RS&T:2010 The Government Strategy for Research, Science and Technology in New Zealand to the Year 2010* issued by the Ministry of Research, Science and Technology in August 1995 recognised "the rate of generation of new patents" as one of five stated performance indicators of innovation and technology uptake.

The issue of the ownership of intellectual property rights generated by Public Good Science Funded research was the subject of a review by the Foundation for Research, Science & Technology (FRST) in early 1955. In December 1994 FRST distributed to around 300 interested parties, a public discussion paper: *Foundation Review of Intellectual Property Rights generated from Public Good Science Fund Research.* 78 submissions were received.

As a result of this review, the current FRST policy of vesting intellectual property rights (IPR) generated from PGSF research in science providers was endorsed, but some changes to future PGSF contracts and in guidelines for applications and achievement reports were decided upon.[10]

Within the area of biotechnology, the propriety of patenting living genetically modified organisms, of patenting genes and of patenting human cell-lines are currently matters of philosophical and ethical debate in Europe,[11] the USA and elsewhere, and in New Zealand where there is also a Maori perspective.

Issues relating to the patentability of biotechnological inventions were the subject of a discussion paper issued in March 1995 by the Ministry of Commerce, followed by two meetings in April 1995, each with the same agenda, chaired and facilitated by officers from the Ministry and attended by representatives of Maori groups, patent attorneys, the Patent Office, the biotechnology sector (research organisations and universities), conservation groups and other interested parties.[12]

It therefore seems appropriate to review the nature of and requirements for a patent and the procedure for obtaining patent protection in New Zealand and overseas.

WHAT IS A PATENT?

A patent is a grant by the government of a right for a specific term (20 years in New Zealand) to prevent others from using an invention. The grant is given in return for disclosure of the invention to the public. The purpose of this monopoly is to give the patent owner a chance to at least recover development costs, thereby encouraging research, while ensuring the spread of technology for the benefit of the community.

New compounds, compositions and processes may be patented and should be protected if they are likely to be commercially useful or valuable or important to industry. It is not possible to patent a bare chemical formula or reaction scheme, however, without disclosing examples of the preparation of the compound or of the performance of the reaction.

The New Zealand Patents Act 1953 and Patents Regulations 1954 establish the system under which patents are granted in New Zealand. Other forms of protection such as registered designs, copyright, and plant variety rights, and trade marks, exist, but are not discussed here.

THE INVENTION MUST BE NEW

To obtain a valid New Zealand patent the invention must be new and non-obvious over what is known in this country up to the date the application for patent protection is filed at the Patent Office. It must also be useful.

The invention must not be publicly disclosed before filing the patent application. In particular, the invention must not be published by articles in the scientific literature or disclosed at conferences. Confidential disclosures for assessment or assistance may be made, but these should be covered by written confidentiality agreements entered into before the disclosures are made.

Filing a patent application establishes a priority date after which details of the invention may be released without affecting the patent rights. However, in some cases it is desirable to continue making only confidential disclosures after filing to maintain some control over the invention until closer to granting of a patent. Any significant improvements to the invention should also be kept confidential until further patent applications have been filed if required.

Arising out of the above-mentioned FRST PGSF IPR review,

"criteria for making judgments on commercial confidentiality will be added to PGSF application guidelines. This does not represent any change in the Foundation's stance on the importance of publication. In keeping with the strategic nature of the PGSF, the Foundation considers that PGSF research findings should generally be made widely available. However, where benefits to New Zealand can be enhanced through commercial exploitation, then the Foundation considers that commercial confidentiality should be able to be maintained".[10]

THE INVENTION MUST BE USEFUL

As indicated by the above quotations from Patent Office reports, the range of inventions classified in the field of chemistry is broad. In the area of chemical compounds, compositions and processes, including the usages of chemical compounds and compositions, the principal subject matters may be divided into:

1. New chemical compounds;
2. New chemical processes;
3. New compositions containing chemical compounds as active ingredients; and
4. New methods of using chemical compounds or compositions.

New chemical compounds are claimable as such in a patent application, and are usually claimed by way of a general formula defusing the new chemical compounds, often within a class of closely analogous compounds which the inventor(s) might reasonably expect to be similar in properties. The patent specification must contain working examples of the preparation of a representative number of the new compounds. The patent specification must contain some disclosure of the properties of, and/or an area of expected utility for, the compounds, for example as pharmaceuticals or agricultural chemicals, and should contain some evidence of tests which are indicative of or support the statements of utility. Another area of utility could be as an intermediate compound in a new process for preparing a known useful compound.

A patent application directed to new chemical compounds may also claim the general process or processes disclosed in the specification for the preparation of those compounds and may contain claims related to the area of utility disclosed in the patent specification, for example, pharmaceutical compositions or agricultural formulations containing the compounds as active ingredients and appropriate carriers.

New chemical processes are claimable in a patent application, for example, a new or improved process for the manufacture of known chemical compounds. Again, the patent specification must disclose working examples of the preparation of the compounds by the novel process. Claims can be included to the known chemical compounds when prepared by the novel process.

New compositions containing chemical compounds as active ingredients are claimable. An example would be the unexpected discovery that a known compound or class of compounds has herbicidal properties; herbicidal compositions can be claimed as also may be methods of using the compound as a herbicide. Similarly, the discovery that a compound not known to have any biological activity has a medically useful activity may provide a novel pharmaceutical composition claimable as such; present New Zealand patent law would also allow claims to the use of that compound in a veterinary method of treatment but not in the medical treatment of humans.

A discovery that an admixture of two or more known compounds or known classes of compounds have unexpected properties may provide claimable novel compositions containing the admixture. To be non-obvious, the admixture must possess more than the aggregate of the known properties of the ingredients. For example, the discovery that two known herbicides exhibit a synergistic relationship either generally or in relation to certain categories of weeds will enable patent protection to be sought for the admixture composition and also for the use of the admixture as a herbicide.

The fourth suggested category of new methods of using chemical compounds or compositions overlaps with the previous category. The discovery that a known compound has a new property may enable the claiming of a method of using the compound for that new property for example as an agricultural chemical or in a method of veterinary treatment, but not in a method of medical treatment.

Under current New Zealand patent law, it is not possible to obtain patent protection based on the discovery of a second or subsequent medical use for a known pharmaceutical compound, unless the new medical use requires a completely new dosage formulation, where the formulation could be claimable. The exclusion of methods of medical treatment from patentable inventions is based upon long standing judicial interpretation (in English, Australian and New Zealand Courts) of the definition of "invention" contained in the Patents Act 1953, culminating in the New Zealand Court of Appeal decision in 1983 in *Wellcome Foundation* v *Commissioner of Patents.*[13]

The above concepts, expressed in terms more appropriate to organic chemistry, extend by analogy to biochemistry and biotechnology products and processes, and to the use of those products.

Thus new metabolites of microorganisms, such as antibiotics, are claimable, even if initially only definable by physicochemical and spectra characteristics, as are microbiological processes for their preparation, and novel metabolite-producing microorganisms. Claims to newly discovered but naturally occurring microorganisms and "biological compounds" must be so worded as to exclude the substances in their naturally occurring state or environment, even if only by the use of limiting terms such as "isolated". "substantially pure" and "biologically pure culture".

Patent specifications disclosing new or known specific microorganisms and their use in microbiological processes must identify the organisms by reference to their deposit in an internationally recognised depository, the date of deposit being earlier than the patent application filing date. Morphological descriptions and related characteristics may be disclosed but are not as sufficiently identifying as a deposit number.

Novel genes or DNA sequences, genetically modified organisms (GMOs), novel expression products defined by amino acid sequence, and novel cell-lines are examples of biotechnology products claimable as such. Claims to such "biological compounds" must also be so worded as to exclude any such "compound" in its naturally occurring state or environment. Where relevant, deposit details should be given in the patent specification.

PATENT APPLICATION AND SPECIFICATIONS

The right to apply for a patent application belongs to the inventor(s) of the invention. Usually, however, the right will vest in the employing organisation(s) by virtue of an implied or express term in the employment contract or relationship. The right to apply can be assigned before filing a patent application.

A patent application is normally filed with a provisional specification which broadly describes the invention. The provisional specification should include some technical detail and some working examples.

If the patent application has been filed with a provisional specification and is to be continued, a complete specification should be filed within 12 months. While three months extension of time is available to file the complete specification in respect of the New Zealand application, no extensions of time beyond the 12 month period are possible for patent applications covering other countries under the Paris Convention or Patent Cooperation Treaty (see below). The complete specification must include a detailed description and drawings (if appropriate), disclose the best method of performing the invention known to the applicant, and end with at least one claim defining the essential features of the invention for which protection is being sought. It may include any improvements and variations made to the invention since filing the provisional specification.

A patent application may be filed with a complete specification in the first instance. However, a provisional specification is faster and cheaper to prepare and file than a complete specification. Filing a provisional specification allows the invention to be developed and commercially assessed before deciding whether to proceed further. It also ensures a further year of protection as the actual patent term runs from the date of filing of the complete specification. Proper content of each specification is important to obtain a valid patent.

EXAMINATION, ACCEPTANCE AND GRANT OF PATENT

The Patent Office will examine the complete specification for form and content approximately 6 to 12 months after filing. Objections that the claimed invention lacks novelty may be raised. A 15 month period is set for overcoming all objections, with three months extension being available.

Once any objections are overcome, acceptance of the complete specification is advertised in the Patent Office Journal. The specification is also made public in the Patent Office library. Any interested person can oppose the grant of a patent on an application within three months of the advertisement.

In the absence of successful opposition the patent will be granted following payment of the official sealing fee. Grant occurs with issue of the Letters Patent sealed by the Patent Office.

THE GRANTED PATENT

The life of a New Zealand patent is 20 years from the date of filing the complete specification provided renewal fees are paid by the end of the 4th, 7th, 10th and 13th years.

Enforcement of patent rights (when necessary) must be undertaken by the patentee (patent owner). A patent marking on products or product literature usually is sufficient to deter potential infringers. Sometimes a carefully drafted warning letter to an infringer of the patent may be sufficient to halt ongoing infringement, otherwise court action may be commenced once the patent is granted. A challenge to the validity of the patent is usually made in court by the alleged infringer.

Income from a patent can be obtained by the patentee setting up as sole manufacturer and market supplier of the patented invention. Alternatively, if this is not possible or if the patentee does not wish to set up as a manufacturer, income can be obtained by licensing others to use the invention in return for a royalty. A joint venture with a commercial partner may be possible. Moreover, a patent can be sold to another party by way of an assignment.

The main advantage of the patent system is that it gives some reward and incentive for the development of new products or processes.

A New Zealand patent protects the invention in New Zealand only. To protect the invention overseas, it is necessary to obtain a patent in each country where protection is required. There are two options for achieving this from the original New Zealand patent application.

PARIS CONVENTION

Under the international convention, known as the Paris Convention, a patent application can be filed in the national Patent Office of each country in which protection is desired within 12 months of the date of filing the New Zealand patent application. The foreign application claims priority from the date of filing the New Zealand application. Where protection is desired in Europe, a single initial patent application can be filed at the European Patent Office designating a number of European countries for eventual grant of national patents; this enables some expenses to be deferred in Europe.

Obtaining and maintaining patents in other countries is more expensive than in New Zealand. This is because of higher foreign fees and the charges of agents in those countries. Translation of documents for non-English speaking countries is also expensive.

A search of foreign patent specifications is recommended before filing foreign applications as the high filing costs are forfeited if the invention is later found to be anticipated or obvious.

PATENT COOPERATION TREATY

A second option for seeking international patent protection for an invention is provided for by the Patent Cooperation Treaty (PCT).

The PCT system simplifies the procedure for seeking patent protection for the invention in many countries outside New Zealand, at least at the 12 month stage. A single patent application (called an international patent application) is filed in English at the New Zealand Patent Office within 12 months of the date of filing the initial New Zealand patent application (the priority date). When filing this application, any or all of the more than 80 countries which are members of the PCT are designated. This holds open the option of proceeding with separate patent applications at a later date in each of the countries designated.

The approximate cost of filing an international patent application designating all PCT member countries is considerably less than the initial cost of filing separate national applications in the first instance where four or more countries are designated.

However, the filing of the international patent application is only the first step in the process. In order to obtain patent protection in the countries designated, the "national" phase in each country in which protection is to be sought must be entered within specified time limits. The national phase is essentially the same as filing separate national or regional applications in the individual countries concemed. At that time, the filing costs payable are essentially the same as for patent applications filed under the Paris Convention.

A useful feature of the PCT system is that an international search is conducted before any decision need be made to enter the national phase. If relevant prior art is revealed by the search, amendments can be made to the patent specification. If necessary, the application can be abandoned at much less expense than if separate national applications had been filed.

The initial deadline for entry into the national phase under the PCT is 20 months from the earliest priority date (i.e. 8 months later than would normally be the case in respect of a convention application). This can be deferred to 30 months from the earliest priority date (i.e. 18 months later than would normally be the case) by using the international preliminary examination (IPE) procedure provided for in Chapter II of the PCT.

The IPE procedure involves an additional cost (incurred 19 months after the earliest priority date) for requesting examination. However, it defers the major costs associated with entry into the national phase for a further 10 months and results in an examination report being issued. This report assesses the novelty and inventiveness of the invention for which protection is sought. The applicant can use this examination report and the international search report to make an informed decision on the worth of proceeding further with the application.

The costs involved in entering national phases are comparable with the costs of filing national applications in the first instance. The PCT route therefore has the potential to be more expensive overall. However, the PCT system has the advantage that the initial cost of filing a PCT application is substantially lower than filing separate national applications. There is also no compulsion to proceed with patent applications in any or all countries originally designated. This allows the very substantial costs of filing in individual overseas countries to be deferred for 18 months if the IPE procedure is used, or 8 months if the IPE procedure is not used. This period of deferral allows more time to assess the market potential for the invention and to locate a commercial partner or licensee if required.

PATENT LAW REFORM

The New Zealand Patents Act 1953 may now be one of the oldest patent statutes of the member countries of the Paris Convention and PCT. The New Zealand Act closely followed the UK Patents Act 1949, but the latter was replaced by the Patents Act 1977. There have been only two substantive amendments to the 1953 Act: the Patents Amendment Act 1992 which enabled New Zealand to join PCT and the Patents Amendment Act 1994, which came into force on 1 January 1995 and only made changes to the 1953 Act to meet New Zealand's obligations under the World Trade Organisation (WTO) Agreement, including the increase of the patent term from 16 to 20 years and the repeal of the sections which had provided for extension of patent terms.

More extensive reform of New Zealand patent law has been under active consideration since mid-1990.[14]

In February 1992 the Ministry of Commerce published recommendations for the reform of the Patents Act 1953.[15] In the chapter entitled "Eligibility of Inventions for Patent Protection" the first two of the six recommendations were -

a) Repeal the definition of "invention" and determine patentability by three criteria:

- the invention has to be new;
- it has to involve an inventive step; and
- it has to be industrially applicable.

b) Do not provide for exclusions from "patentability."

The six "eligibility" recommendations were repeated in identical wording in a discussion paper issued in November 1994.[16]

Adoption of the above two recommendations and the consequential amendment of the 1953 Act should remove the present prohibition on the patenting of methods of medical treatment, and bring New Zealand patent law into consistency with United States patent law and with Australian patent practice.

The government had indicated an intention to introduce an Intellectual Property Law Reform Bill late in 1994. This was to implement changes as a result of the reviews of the Patents and Trade Marks Act, and it was also intended to include a new regime governing protection for industrial designs and to implement New Zealand's obligations under the relevant Convention in an amended Plant Variety Rights Act.

That Bill did not get introduced prior to the end of 1994. The main reason for the delay was the government's concern about representations made by Maori interest groups that they had not been adequately consulted before New Zealand signed the WTO Agreement and passed the implementing legislation. The government wishes to ensure that there is appropriate consultation before any more changes are made in intellectual property legislation. There is also a concern that existing intellectual property legislation does not adequately protect Maori cultural and intellectual property

Consultation among officials from a number of different government departments and Maori representatives started with four consultation hui held in December 1994. The two general meetings previously referred to were then held in April 1995 on the subject of the patentability of biotechnological inventions.

In December 1994 the Ministry of Commerce proposed a tentative timetable which would have had the Intellectual Property Law Reform Bill introduced in October 1995, be referred to a Select Committee of Parliament for consideration and then passed during 1996. This timetable was dependent upon the Ministry persuading the government to include the Intellectual Property Law Reform Bill in the 1995 legislative programme and also persuading the government that Maori interests had been adequately consulted.

However, in July 1995 the Minister of Commerce announced that the proposed Bill would not be introduced in 1995 either, to allow for the completion of consultations with Maori on those issues of concern to Maori.[17] The Corporate Plan 1995/96 of the Ministry of Commerce confirms that

"Legislation to reform patents, trademarks and designs law will not proceed this year while the Division continues to consult on the protection of Maori intellectual and cultural property."[18]

The future of the current proposals to amend and update the Patents Act 1953 now seems both uncertain and indefinite.[19]

PATENT LITERATURE

This article began with data and quotations from Patent Office annual reports. The Lower Hutt based Patent Office[20], in the course of administering the patent system, publishes the monthly Patent Office Journal containing abridgements of patent specifications accepted during the preceding month and maintains the Patent Office Library. The library contains some 6 million patent specifications from a number of countries, including New Zealand, United States, Great Britain, Australia, and the European Patent Office, and extensive indexes for this material.

The library is open to the public during office hours for searching the patent literature, or for hard-copy access to patent literature which has been revealed during an in-house literature or overseas database search. The Patent Office also provides a mail-order service for photocopies of New Zealand and foreign patent specifications and other documents held by the office.

FOOTNOTES

1. Report of the Commissioner of Patents, Trade Marks and Designs to the Minister of Commerce for the year 1 April 1991 to 31 March 1992.

2. Report of the Commissioner of Patents, Trade Marks and Designs to the Minister of Commerce for the year 1 April 1989 to 31 March 1990.

3. Report of the Commissioner of Patents, Trade Marks and Designs to the Minister of Commerce for the year 1 April 1990 to 31 March 1991.

4. Report of the Commissioner of Patents, Trade Marks and Designs to the Minister of Commerce for the year 1 July 1994 to 30 June 1995. Useful figures are not available for the 1992/1993 and 1993/1994 years because the number of patent applications filed from overseas reduced during the phase-in period of filing under the Patent Cooperation Treaty which became effective in New Zealand on 1 December 1992. It is too early to speculate whether the fall from 50% to 42% is an anomaly or indicates a falling trend.

5. Patent Division report within the Report of the Department of Justice for the year ended 31 March 1962.

6. Patent Division report within the Report of the Department of Justice for the year ended 31 March 1967.

7. Patent Division report within the Report of the Department of Justice for the year 1954-55.

8. e.g. *Biotechnology and the Law* - I.P. Cooper, Clark Boardman Callaghan, USA (2 Vol; loose leaf; updated); *Patenting in the Biological Sciences* - A Practical Guide for Research Scientists in Biotechnology and the Pharmaceutical and Agrochemical Industries, 1983 - R.S. Crespi, John Wiley & Sons; *Patents in Chemistry & Biotechnology* - P.W. Grubb, Clarendon Press, Oxford, 1986.

9. e.g. *Biotechnology Law Report,* Mary Ann Liebert, Inc., New York (published bimonthly).

10. *Foundation News*, **No. 21**, May 1995.

11. Crespi, S. Biotechnology Patenting: The Wicked Animal Must Defend Itself. *9 European Intellectual Property Review*, **431**.(1995).

12. Patentability of Biotechnological Inventions: Issues For Discussion, Business Policy Division, Ministry of Commerce, March 1995; and subsequent *Note of the Meeting on Patentability of Biotechnology,* Wednesday 19 April and Friday 21 April, Ministry of Commerce Building.

13. A patent application by The Wellcome Foundation Limited for a method of treating or preventing meningeal leukemia or neoplasms in the brain by the administration of previously known compounds, was refused in 1977 by the then Assistant Commissioner of Patents as not relating to an invention as defined in Section 2 of the Patents Act 1953.

On appeal to the High Court, Davison C.J. held that the application was proper subject matter and should be allowed to proceed; a process for the medical treatment of a human ailment or disease was patentable under the 1953 Act: *Wellcome Foundation Ltd. v Commissioner of Patents* [1979] 2 New Zealand Law Reports **591**.

This decision was reversed on appeal to the Court of Appeal - *Wellcome Foundation Ltd. v Commissioner of Patents* [1983] NZLR 385: A patent may not be granted in New Zealand under the Patents Act 1953 for a method of treating disease or illness in human beings.

14. *Review of Industrial Property Rights, Patents, Trade Marks and Designs - Possible Options for Reform,* Ministry of Commerce, Wellington, July 1990 (2 volumes).

15. *Reform of the Patents Act 1953 Proposed Recommendations.* Competition Policy and Business Law Division, Ministry of Commerce, February 1992.

16. *Intellectual Property Law Reform Bill: Maori Consultation Paper*, Business Policy Division, Ministry of Commerce, November 1994. Page 33 reads in part:

"The proposed changes to the Patents Act are as follows.

2.2 Eligibility of inventions for patent protection

- Repeal the definition of inventions and determine patentability by three criteria
    - the invention has to be new;
    - it has to involve an inventive step; and
    - it has to be industrially applicable.
- Do not provide for exclusions from patentability.
- Define novelty on the basis of publication anywhere in the world.
- Provide that prior secret use by an applicant does not invalidate novelty.
- Provide that disclosure of an invention by way of a breach of confidence will not constitute prior disclosure.
- Replace the prior claim approach with the whole contents approach, together with an anti-self-collision clause."

17. Statement dated "July 1995" of the Minister of Commerce, the first two paragraphs of which read as follows::

"I am aware that a number of parties are interested in the proposed Intellectual Property Law Reform Bill. The proposed Bill would have completed the reform process begun last year with the Uruguay Round implementation legislation, in particular updating New Zealand's industrial property rights and Plant Variety Rights legislation. I had planned to introduce this Bill into the House in 1995, subject to the completion of consultations with Maori on those issues of concern to Maori.

It has, however, not yet been possible for the Ministry of Commerce to complete these consultations. The consultation process is unlikely to be completed for some time given the complexity of some of the issues. In light of this, I have decided that the proposed Bill should not be introduced into the House in 1995."

18. Corporate Plan 1995/96 - Ministry of Commerce, page 11.

19. What has become of the process of intellectual property law reform: D.C. Calhoun, Editorial, *N.Z. Intellectual Property Journal*, September 1995, Butterworths.

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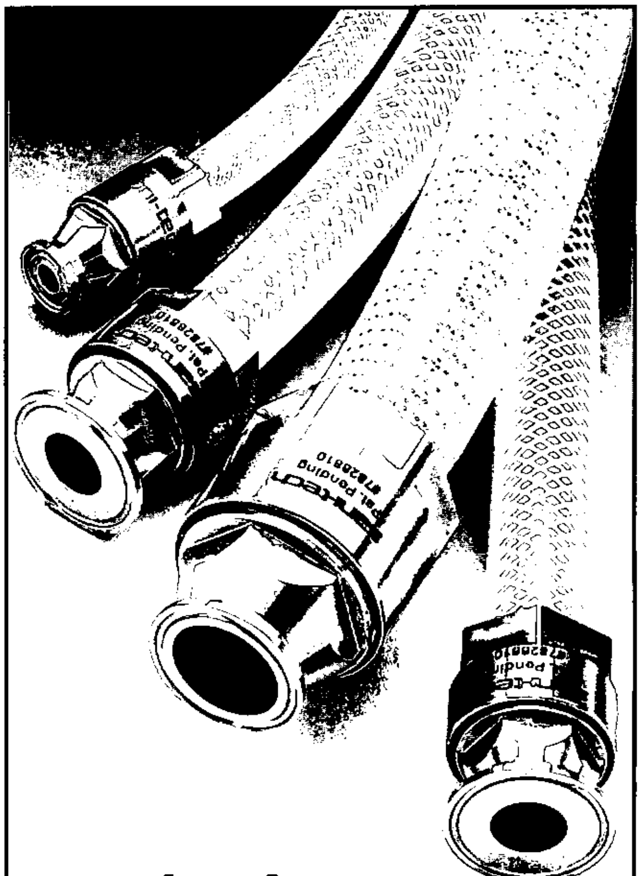

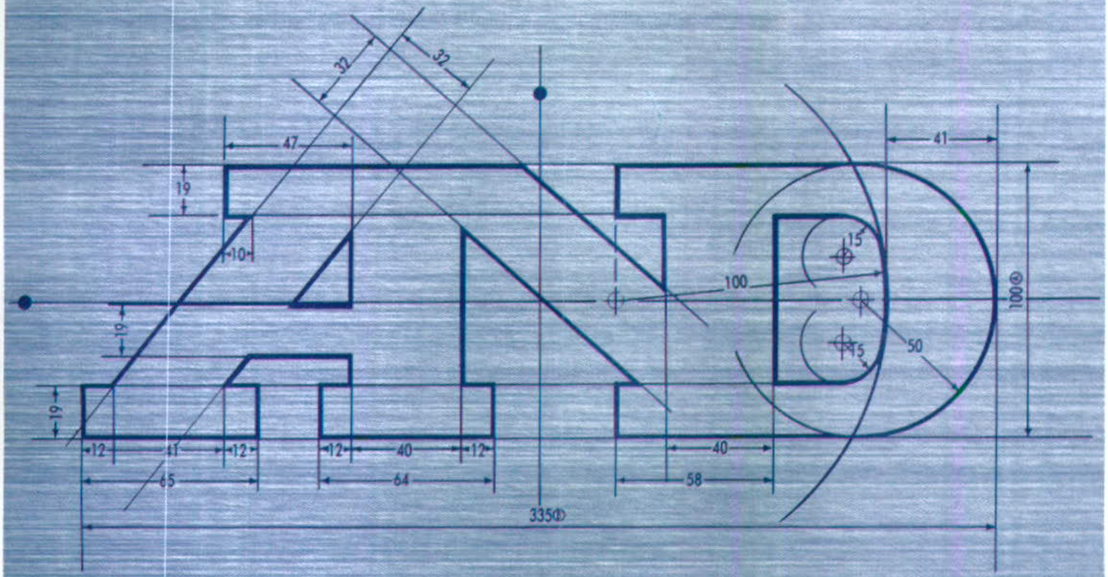

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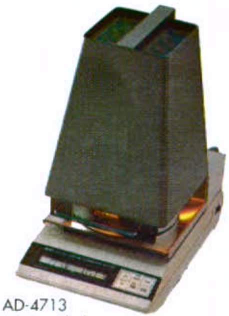

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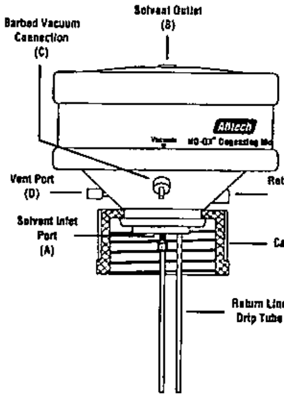

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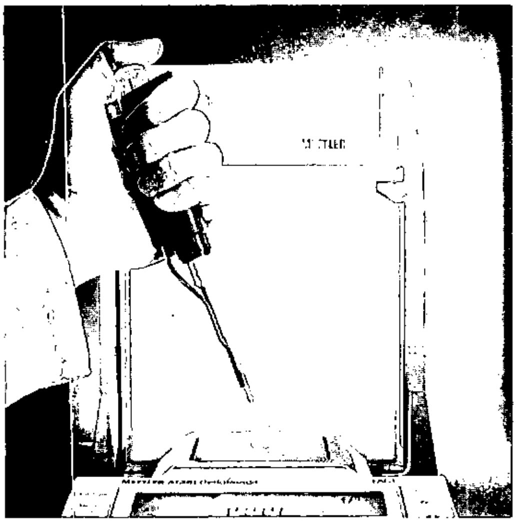

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METTLER TOLEDO RENEWS ITS COMPLETE LABORATORY PRECISION BALANCE RANGE IN JUST TWO YEARS.

Within just two years, METTLER TOLEDO has replaced its entire product line of laboratory precision balances with products employing the very latest technology. As a result, METTLER TOLEDO now offers complete product ranges in the three performance classes, Professional, Standard and Basic Level, up to a weighing range of 32 kg.

1993 saw the launch of the Basic Level with the PB/SB balances to handle the simple, day-to-day weighing tasks.

The Professional Level with the PR/SR balances launched in 1994 sets a new standard among precision balances. This range is distinguished by weighing technology offering powerful performance, wide application possibilities and user guidance. The fully automatic adjustment feature, numerous weighing ranges, as well as alphanumeric text entry on the dot matrix display leave no wish unfulfilled. With the PR/SR balances, all work can be performed in an optimum manner to QA guidelines.

The recent introduction of the PG/SG balance family of the Standard Level offers exceptional price/performance ratio. Rugged, chemically-resistant housings, high contrast displays and short weighing times are part of the standard. To meet the demands of modern quality assurance systems, all models are equipped with internal adjustment weight.

All balances of the Professional and Standard Level have a built-in, future-orientated LocalCAN universal interface. This is also available as an option for Basic Level balances.

Contact: Watson Victor Ltd
P O Box 1180 Wellington
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circle number 27 on the reader reply card


OCTAGON 2000

CEM BRINGS MICROWAVE SPEED TO "SAMPLES ON DEMAND" DIGESTION WITH THE NEW STAR™ SYSTEM

CEM Corporation, the world pioneer in microwave technology for laboratory applications, introduces its revolutionary STAR™ Technology Digestion System. The STAR (Simultaneous Temperature Accelerated Reactions) System, designed for large sample sizes and/or hard-to-digest samples, brings microwave speed to open-cavity digestions to produce samples on demand.

Special features include: independent position vessels that let each vessel (up to six) run a separate digestion method, staggered start times so the STAR System's individual positions can fit into the laboratory workflow, optional program-controlled reagent addition during digestion, and individual temperature feedback control for highly reproducible results. The control software is easy to learn and the system is extremely reliable. Patents pending.

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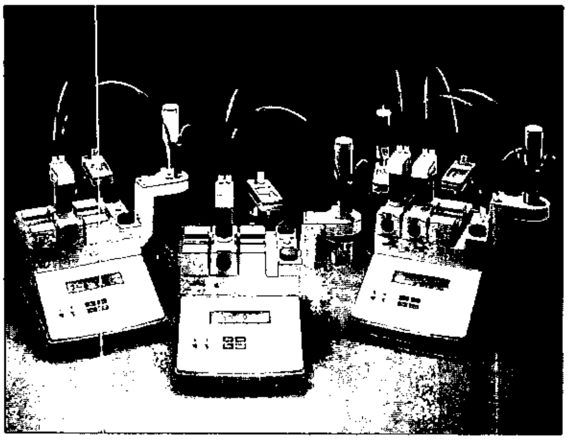
EXPANDABLE IN ALL DIRECTIONS - THE NEW DL50 FAMILY OF TITRATORS

The models of the new DL50 family of titrators from METTLER TOLEDO can grow and develop with your requirements. With the aid of the revolutionary plug-in memory cards the memory capacity can be expanded at will. The titrators in this new family can be connected to peripherals via various interfaces and a wide range of optional equipment permits the DL50, DL53 or DL55 titrators to be equipped for specific applications. Worthy of mention is the new bottle holder behind the titrator, an elegant solution to ensure an orderly working space.



The most striking feature of the new titrators is the memory cards. While they can be inserted in the new DL53 and DL55 titrators for storage of methods and system set-up data, another important function is to offer virtually unlimited provision for future extension by allowing the titrator to be loaded with new methods as developed by METTLER TOLEDO.

The plug-in sensor and RS cards already installed can be supplemented by additional plug-in cards. Personal computers, balances, bar code readers, sample changers, a wide range of electrodes, pumps, dispensers, valves and other equipment can be attached to the titrators of the new DL50 family. The prerequisites for extensive networking with laboratory information management systems (LIMS) and the automation of determinations are thus already in place. The titrators can naturally also be fully remote controlled in the system network.

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INNOVATIVE NEW DENSITY METERS

The METTLER TOLEDO range of analytical instruments has recently been expanded by the addition of the new DA density meter family. These new density meters are used where rapid and precise results are demanded and where at the same time extremely simple operation is required.

The DA density meters determine the density of gases and solutions and operate according to the oscillating body method. This allows determination of the density of a sample to an accuracy of 0.0001 g/cm^3.

The family consists of a hand held density meter, the DA-110, and the DA300M and DA310M models. The DA300M/310M density meters have a memory for 7 methods and can store up to 100 measured values per method. Furthermore, statistical evaluations of mean and standard deviation are possible. EPROMs are available for both instruments which can be used for automatic conversion of measured density of solutions to Brix, alcohol and API. Additional concentration determinations are also possible.

A range of optional equipment is available for both models such as a sampling pump unit for continuous measurements. In accordance with "Good Laboratory Practice", a built-in printer generates records.

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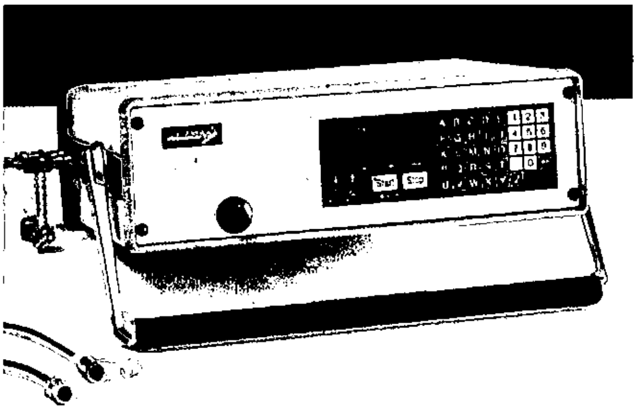
PORTABLE PARTICULATE MONITORS

A new range of portable liquid contamination monitors have been released by PAMAS GmbH.

There are three models available depending on the application. All the models have eight size channels which can be set by the operator and automatically calculate the results in accordance with ISO 4406 or NAS 1638 cleanliness codes.

One unique feature of these systems is that they can sample from either a pressurised or pressureless system. The built-in pump can handle pressures from 0-6 bar and an optional high pressure inlet allows the units to work up to 210 bar. Liquid viscosities up to 250 cst can be analysed without changing any settings on the systems.



Control of the systems are through either the front control panel or a notebook computer depending on the specific requirements of the operator.

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P O Box 494 Gosford, NSW 2250, Australia
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A SINGLE DROP SUFFICES WITH THE NEW METTLER TOLEDO REFRACTOMETER

METTLER TOLEDO recently introduced a new product into their extensive line up of analytical instruments, the RA-510M Digital Refractometer. A single drop of sample (0.2 mL) suffices for exact determinations of the refractive index.

Operation of the METTLER TOLEDO RA-510M is extremely simple : The sample is added to the measuring prism, the instrument then measures the refractive index automatically. The RA-510M is further distinguished by it's minimal maintenance requirements thanks to a long life LED, a highly precise, quality sapphire prism and a measuring cell made of high grade steel.

The METTLER TOLEDO RA-510M Digital Refractometer determines results over a wide range (refractive index from 1.32000 to 1.56000) with a precision of +/- 0.00002. Thanks to the built-in, high performance temperature control with an accuracy of .02 °C, no external thermostat is necessary.

The Brix value is determined in the range 0.01 to 85.00%. As with all other data, results can be read directly off the display or outputted to a printer. The RA-510M calculates various concentrations with selectable units.

Applications comprise all areas in which purity and content determinations are required or where sugar and alcohol content have to be determined.

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SKC 1996 AIR SAMPLING GUIDE AND COMPREHENSIVE CATALOGUE

Medtec Products announces the publication of the SKC Sampling Guide containing NIOSH, OSHA and EPA air sampling standards. Extensively updated by SKC's certified industrial hygienist and technical staff, the guide cross-references over 1750 chemical compounds and lists agency reference number, permissible exposure limit, sampling parameters in volume, rate and time, analytical method, and the appropriate SKC collection media for each chemical. The Guide makes media selection for specific air sampling requirements quick and easy.

The catalogue section features the complete line of SKC air sampling products including sample pumps and accessories, calibrators, collection media and passive samplers

New products of interest include the high volume MCS-10 sampler, the lightweight Pocket Pump and programming software, environmental and VOST tubes for EPA methods, the expanded product line of coated filters in preloaded cassettes, and the new area and personal formaldehyde passive samplers.

Contact: Medtec Products Ltd
P O Box 38-543 Wellington
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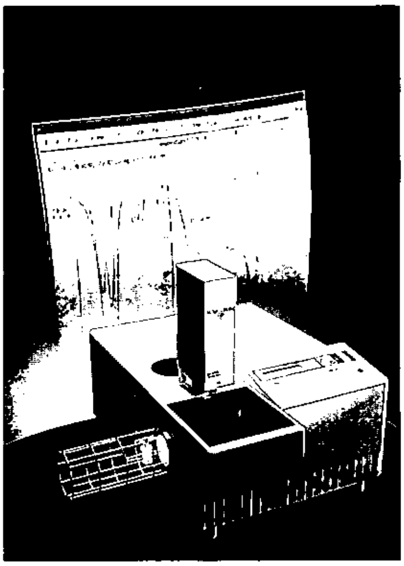
TWO NEW DSC MODULES FROM METTLER TOLEDO

Specific customer requirements and a pronounced cost consciousness are increasingly characterising the market for instruments in thermal analysis. With the launch of two new DSC modules from METTLER TOLEDO , these demands are met.



The new measuring cells are distinguished by their outstanding measurement performance (resolution, measurement range, peak separation, temperature accuracy), their high degree of modularity, as well as attractive automation possibilities and introductory prices. The following options are offered as important expansion possibilities for the two new measuring cells:

- automatic furnace lid
- local module operation
- temperature range extension
- switched power output
- two electronic gas controllers for purge gases
  four different cooling options : liquid nitrogen, intra cooler, cryostat and air cooling (standard)
- automatic sample changer
- automatic opening of hermetically sealed aluminium crucibles

All options can be retrofitted at your workplace protecting your initial capital investment if your requirements change.

Detailed product documentation and selected application examples are available for these new DSC modules.

Contact: Watson Victor Ltd
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SPECIAL GV FERRULE FOR SHIMADZU QP-5000 MS

SGE have developed a new ferrule especially for use with the Shimadzu QP-5000 Mass Spectrometer. Manufactured from graphite-filled polyimide, this ferrule is solvent extracted and baked to provide an exceptionally low MS background.

Contact: Alltech Associates Inc.
P O Box 100-352 North Shore Mail Centre, Auckland
Ph: (09) 4443230, Fax: (09) 4442399, Toll Free: 0800 652766
circle number 35 on the reader reply card

SGE GLASS-LINED TUBING DESIGN AND FABRICATION SERVICE

Glass-Lined Tubing (GLT) is a unique product invented by SGE, who are the only company in the world who can provide GLT products. GLT is a stainless steel tube with a micro-smooth uniform layer of fused silica bonded to the interior surface. GLT is available in standard sizes of 1/2", 8 mm, 1/4", 1/8", 1/16" OD's with inside diameters from 0.3 mm to 9.5 mm. Customers are invited to request other dimensions as required. The design and fabrication of components for LC, GC, MS, exhaust probes, stack gas probes or any application you can imagine can be arranged through this special service.

Contact: Alltech Associates Inc.
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circle number 36 on the reader reply card

NEW HIGH PURITY HYDROCARBON TRAP FOR THERMAL DESORPTION PURGE GAS

Ensuring purge and desorb gases are hydrocarbon free and clean is essential to successful thermal desorption sample introduction. The new High Purity Gas Purifiers from SGE should be changed every three or four cylinders to ensure the gas supply is free of volatile organic compounds. Available with 1/4", 1/8" and 1/16" fittings there is a High Purity SGE Gas Purifier for every application.

Contact: Alltech Associates Inc.
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circle number 37 on the reader reply card

NEW, LOW-COST PARAGON 500 FT-IR SPECTROMETER FOR ROUTINE ANALYSIS IN EDUCATIONAL AND QUALITY CONTROL ENVIRONMENTS FROM PERKIN-ELMER

Perkin-Elmer has introduced the Paragon 500 Fourier Transform-Infrared (FT-IR) Spectrometer, a low-cost integrated system designed for routine educational and quality control environments. This easy-to-use spectrometer is based on the proven Perkin-Elmer Paragon 1000 FT-IR, however it utilizes a stand-alone, colour VDU monitor and is available with or without a floppy disk drive.

Built to be robust , the Paragon 500 features the DynaScan™ interferometer, making it immune to tilt and shear. Sealed and desiccated optics provide for purge-free operation and protection for sensitive optical components. In addition, vibration isolated optics remove the effects of most knocks and vibrations.

Better than 1 cm^{-1} resolution allows the isotopic splitting in HCl to be measured.

Comprehensive spectroscopic data handling is also included with the Paragon 500 via built-in software that allows for full spectral manipulation and includes the most commonly used data processing routines: T/A, DIFF, FLAT, SMOOTH and ABEX. Other *software features* include QA-Compare Material Checking Software and a Method Run capability. The Paragon 500 is also PC compatible for users who want to take advantage of Perkin-Elmer's own Spectrum™ for Windows software and additional application packages.

The Paragon 500 FT-IR accommodates all standard infrared accessories, including Perkin-Elmer's own optimized accessories such as DRIFT, HATR, MIR and VASR. Any accessory currently available for the Perkin-Elmer Paragon 1000 will work with the Paragon 500.

Contact: Perkin-Elmer New Zealand
P O Box 38-833 Wellington
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circle number 38 on the reader reply card

μ-FLOWMETER FOR HPLC

The SGE μ-flowmeter accurately measures the flow from HPLC columns and pumps. A simple and inexpensive product suitable for the validation of flowrates from conventional or micro HPLC pumps, the μ-flowmeter is a must for every laboratory which must follow GLP, GMP, and ISO protocols with international standards traceablility. Two units are available. One is supplied with a 1 mL flow cell for conventional HPLC systems. The other unit is supplied with three flow cells of 50 μL, 250 μL and 1 mL capacity for micro HPLC systems. Ask for literature code PD-0103-H.

Contact: Alltech Associates Inc.
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circle number 39 on the reader reply card

LPG VOLATILITY TESTER

Newly released by A.i. Scientific, the MINIVAP-LPG measures the vapour pressure of liquefied petroleum gas products in a temperature range of 5° to 70 °C with pressures up to 2000 kPa (500 psi) applied and measured. The MINIVAP-LPG provides a safe and sound option to the traditional bomb method. The test results are equivalent to ASTM D 1267-89. The only differences being that the test is performed fully automatically with a much smaller sample volume of 15 mL and a testing time of only 5 minutes. Injection of liquid gas is performed via a Swagelok quick connector at a measuring chamber temperature of 5 °C. After expansion, up to 5 test temperatures are regulated automatically and the vapour pressure is determined, stored and printed.

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PERSONAL DUST MONITOR FOR TRUE BREATHING ZONE MEASUREMENTS

Medtec Products announces from SKC its electronic personal dust monitor which uses field-proven near-forward light scattering technology to measure airborne dust particles such as lead, silica, welding fumes and construction dusts. The HAZ-DUST II measures only 9 x 3¾ x 2½ inches, weighs 3 lbs, and is completely portable. The sensor is easily attached to the worker's pocket or collar for true breathing zone measurements. The HAZ DUST II displays and records thoracic, respirable and inhalable mass using a microprocessor and interchangeable sampling heads. Also, the optional sampling heads allow for the collection of concurrent filter samples for gravimetric analysis.

Its four-key programmable operation makes it simple to use and the internal alarm can be preset to alert the user of approaching threshold limits. The HAZ DUST II internally compensates for noise and drift, thus allowing for high resolution, low detection limits and excellent base stability. The optional HazComm communications software is available for further data analysis using statistics, graphs and spreadsheets.

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ALLTECH alphaBond THE PROVEN REPLACEMENT FOR BONDCLONE™ AND μBONDAPAK™

alphaBond from Alltech offers equivalent performance to Waters' μBondapak™ and Phenomonex's Bondclone™ at a fraction of the cost. You will get comparable column lifetime, excellent column to column reproducibility and true μBondapak performance. Check alphaBond's performance for yourself with an attractive no risk 50% discount trade-up offer for your Phenomonex or Waters column. Alltech alphaBond matches μBondapak capacity, selectivity and efficiency but it is in peak symmetry where you will find alphaBond out-performs competitive μBondapak™ equivalents. For a free trial of Alltech alphaBond in your laboratory:

Contact: Alltech Associates Inc.
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circle number 42 on the reader reply card

GBC OFFERS EXCITING NEW RANGE OF ROTATIONAL VISCOMETERS

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

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

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

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

The RI *Series 1* viscometer is primarily used for QC - it is very reliable with two rotary switches (speed/spindle selections), and monitors viscosity in cPs and % Torque. The *Series 2* viscometer is very versatile and ideal for R & D as well, being able to monitor Viscosity, Shear Rate and Stress, Temperature, % Torque and Absolute Torque.

Contact: GBC Scientific(NZ)
P O Box 68-330 Newton, Auckland
Ph: (09) 3735765, Fax: (09) 3600683, Toll Free: 0800 428428
circle number 43 on the reader reply card

NEW PRODUCTS

ENVELOPE DENSITY ANALYSER.

Envelope density or bulk density as it is sometimes called, is the mass of an object divided by its volume where the volume includes any pores or small cavities in the sample.

Micromeritics have released a new Automated Instrument for the determination of Envelope Density. The GeoPyc 1360 utilises a technique where the sample is immersed in a bed of quasi-fluid, comprising of small rigid spheres with a high degree of flowability (DryFlo™) and the volume of the sample is measured by the volume of DryFlow™ displaced.

If the absolute or skeletal density is known and entered into the system, the specific pore volume and percentage porosity are reported.

Data acquisition and reporting are totally automated so connection to a LIMS or other data collection system is relatively easy.

A variety of sample chambers are available to accommodate a wide range of sample sizes.

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P O Box 494 Gosford, NSW 2250, Australia
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circle number 44 on the reader reply card

WHATMAN CELLULOSE MEMBRANES

Cellulose nitrate (Type WCN) and mixed esters of cellulose (Type WME) are recommended for most routine filtration applications involving aqueous solutions.

Cellulose Acetate (Type WCA) exhibits lower protein binding than cellulose nitrate and mixed esters of cellulose and also improved solvent resistance to low molecular weight alcohols. Whatman membrane filters show the following benefits:

- good handling characteristics
- a low level of extractables
- narrow pore size distribution
- temperature stability up to 130 °C for steam sterilisation
- low shrinkage during autoclaving.

Cellulose nitrate membranes are available white, plain or gridded. Mixed esters are available coloured, plain or gridded.

Contact: Labsupply Pierce (NZ) Ltd
P O Box 34-234 Auckland 10
Ph: (09) 4435867, Fax: (09) 4447314
circle number 45 on the reader reply card

PURADISC 25 25MM SYRINGE FILTERS WITH MINIMUM VOLUME HOLD UP FOR MAXIMUM SAMPLE RECOVERY

■ Puradisc 25 AS: Low protein binding polysulphone for aqueous solutions. Available both in sterile and non-sterile devices.

■ Puradisc 25 TF: Chemically resistant PTFE for organic solvents, especially HPLC samples.

■ Puradisc 25 PP: Versatile polypropylene for both solvents and aqueous solutions. Excellent throughput for hard-to-filter solutions.

■ Puradisc 25 GD: For pre-filtration and where high loading capacity is required, contains Whatman Multigrade Glass Microfibre.

■ Puradisc 25 GF/F: Whatman glass microfibre media with 0.7 µm particle retention for environmental samples.

Puradisc 25 devices have polypropylene housings and easy to use female luer lock/male slip luer connections. Devices with filter areas of 4.2 cm can typically be used to filter volumes up to 100 mL. Puradisc 25 AS is available pre-sterilised in packs of 50. Puradisc 25 PP and Puradisc 25 TF can be autoclaved. Some versions of both are also available pre-sterilised by ethylene oxide.

Whatman gridded filters have grid lines spaced at 3.1mm intervals. The ink is non-toxic and completely free from bacterial growth inhibitors.

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COMPUTER-BASED TRAINING FOR ANALYTICAL CHEMISTRY

Cognitive Solutions Ltd of Glasgow, have developed a series of interactive PC-based training programmes for

- Gas and Liquid Chromatography
- ICP Spectrometry
- Atomic Absorption Spectroscopy
- Mass Spectometry

Endorsed (and marketed) by the Royal Society of Chemistry (UK), the *Analytical Softbooks* range is now available, in New Zealand, only through GBC Scientific (NZ), who can supply additional information, and demonstration disks for this unique product.

Contact: GBC Scientific (NZ)
P O Box 68-330 Newton, Auckland
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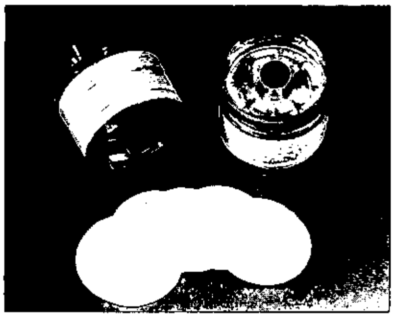
circle number 47 on the reader reply card

PRE-COATED FILTERS CASSETTES FOR MERCAPTANS

Medtec Products announces chemically-coated filters preloaded in ready-to-use cassettes for sampling mercaptans in air in accordance with NIOSH Method 2542 specifications. Mercaptans are commonly used as components to produce pesticides, fungicides, solvents, and fuel additives and as an accelerator in the synthetic rubber industry. Mercaptans are also formed during the manufacture of a variety of chemicals.

The 37 mm glass fibre filter is coated with mercuric acetate and sealed in a cassette (SKC Catalogue No. 225-9007) to ensure accurate sampling results using NIOSH Method 2542. Such filters eliminate the need for in-house coating through chemical pretreatment, thereby dramatically reducing the chance of contamination and simplifying the sampling procedure.



Contact: Medtec Products Ltd
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FLYING HIGH WITH J&W JANUARY SEPARATION TIMES

Featured in the latest issue of J&W's Separation Times is the detailed analysis of orange peel oil using J&W's newest low-bleed GC columns, DB™-XLB and DB-35ms. Promising exceptionally low bleed analysis at higher temperature limits (340/360 °C) these two columns also offer a choice in selectivity to assist with the difficult separations of these components for better GC/MS analysis. Also in this issue is the analysis of anilines and glycols for environmental and industrial chemical applications. The glycol analysis uses J&W's 0.45 mm high speed Megabores columns DB-1 and DB-WAX. Sustaining only a 15% loss in capacity over traditional 0.53 mm Megabore columns these two columns deliver a 24% increase in efficiency. Other applications include "A sure-fire way of doing GC/MS volatiles analysis" and "GC/MS separation of 31-33 of the 36 McFarland and Clarke PCB Congeners".

Your copy of J&W's Separation Times is available from ALLTECH: "EVERYTHING FOR CHROMATOGRAPHY".

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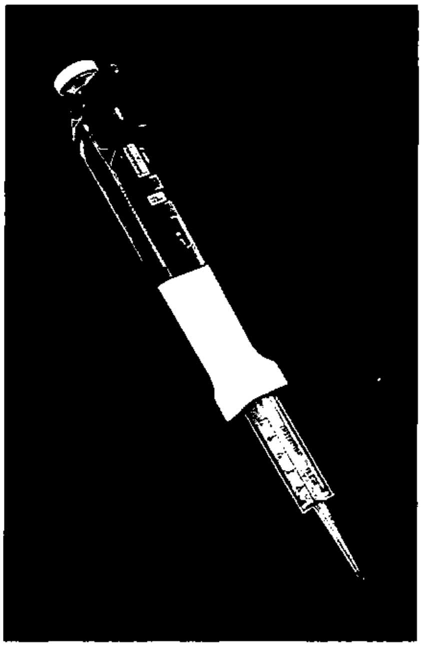
circle number 49 on the reader reply card

FINALLY IT HAS ARRIVED!!! THE "FIRST CONTINUOUSLY ADJUSTABLE REPEATER PIPETTE"

It took Gilson, the world leaders in liquid handling pipetters, to think of it!

The new "DISTRIMAN' repeater pipette is continuously adjustable for every aliquot volume from 1 μL to 1.25 mL. Even fractional volumes like 11.3 μL or 1.13 mL are displayed clearly with direct digital readout. No tables or conversions are required.



The DISTRIMAN is used with DistriTip™ high precision syringes, available in standard or sterilised versions. For added convenience, only three syringes are required to cover the entire volume range. DISTRIMAN will distribute up to 125 aliquots depending on the selected volume. The pipette is intended for diagnostics, quality control and research work.

Contact: John Morris Scientific Ltd
P O Box 6348 Wellesley Street, Auckland
Ph: (09) 3663999, Fax: (09) 3663060, Toll Free 0800 651700
circle number 50 on the reader reply card

PERKIN-ELMER INTRODUCE A NEW RANGE OF UV/VISIBLE SPECTROMETERS

Perkin-Elmer is proud to introduce a new range of UV/Visible Spectrometers; the Lambda 10, Lambda 20 and Lambda 40, to replace the existing Lambda 11, Lambda 12 and Lambda 14 series of instruments. The Lambda 10, 20 and 40 UV/Visible Spectrometers are based on the successful Lambda 2 optical, hardware and firmware concept, which is proven to offer excellent performance and to be outstandingly reliable with an established base of more than 10,000 installed instruments worldwide.

All the new models can be operated as stand-alone instruments with a printer or optionally with a PC and Perkin-Elmer UV WinLab software. They have a sealed, water- and solvent-resistant touch keypad, and new ozone-reduced lamps. Because of a new design, there is space to put a notebook PC on the instrument.

Lambda 10 is a single-beam UV/Visible spectrometer with approximately 20 predefined methods. It is very easy to use. Wavelength range 200-900 nm. This is the economical instrument for simple routine applications and educational purposes.

Lambda 20 is a double-beam UV/Visible spectrometer with optionally 2 nm or 1 nm fixed slit. Wavelength range 190-1100 nm. This is the standard instrument for all routine applications, featuring very high optical stability and reference compensation. It includes 8 open basic methods and additionally the predefined methods from the Lambda 10. Lambda 20 has storage space for 200 user-defined methods.

Lambda 40 has the same features as Lambda 20, but in addition it offers variable slits. Slit widths of 0.5 nm, 1 nm, 2 nm and 4 nm can be selected. An optional pre-monochromator is also available.

- *Printer and PC Connection*

All the new models come standard with a Centronics printer port, an RS232 port (for PC) and an accessory port as standard. Just plug in your printer or PC and you're operational! In addition to EPSON-compatible printers, it is now possible,to control all HP-compatible printers, because the HP PCL printer control language is integrated in all Lambda 10, 20 and 40 Spectrometers. Most of the DeskJet and LaserJet printers on the market can be connected directly to the spectrometers.

- *Spectra Storage Capability*

The replot function is standard on the new line of spectrometers. Spectra are stored in the memory and can be replotted with selectable ordinate and abscissa scales.

- *Integrated Accessory Control*

Lambda 10, 20 and 40 have integrated accessory control. This means that the system prices with sippers and cell changers are very attractive.

- *New Linear Transporter*

A completely new linear transporter has been developed for the instruments, which can be configured for a wide range of available multi-cell, water-thermostatted, Peltier temperature control, and microcell, cell changers. A linear transporter for gels and glasses and gel scanners is also available. With this accessory it is possible to scan over a gel or glass plate of up to 100 mm length, either continuously or at random using defined spots.

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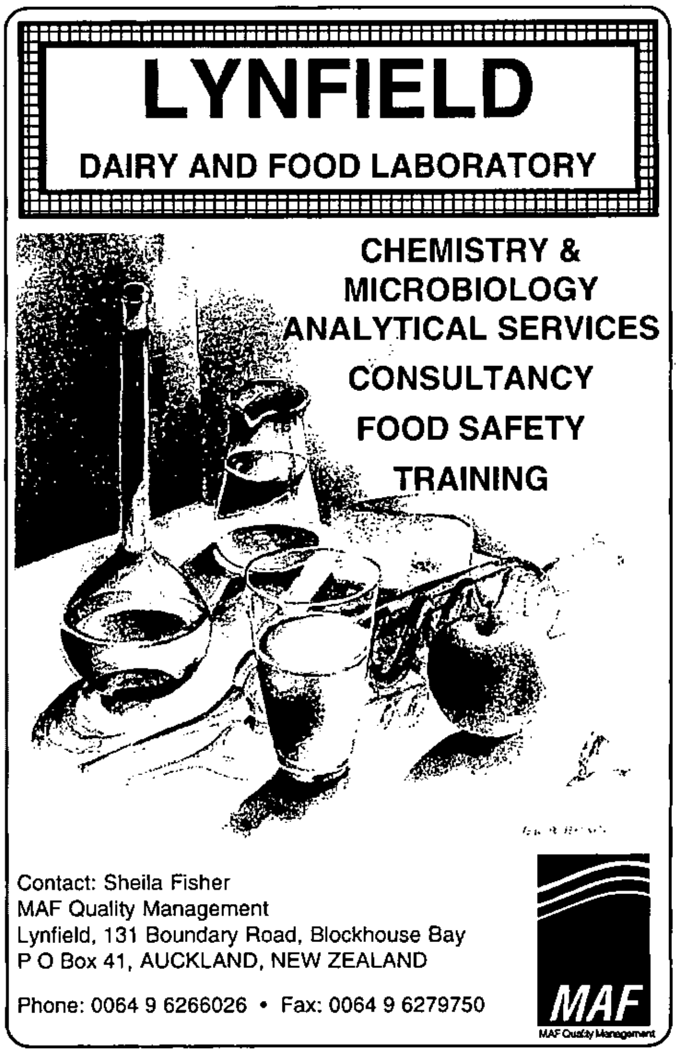

Pacifichem '95

Pacifichem '95 took place in the Hilton and Sheraton properties on Waikiki beach, Honolulu from December 17-22, 1995. The congress was a huge success and it proved to be the largest ever held anywhere in the world.

Advance registration exceeded the budgeted number of 6000 by 926 thus guaranteeing the financial liquidity. However, the number of on-site registrations exceeded expectation by a factor of almost five and resulted in a total registration estimated at a little under 8000.

The number of scientific presentations given over the six days of the meeting was 6456 from 5322 unique presenters. This was the largest number ever at a chemical meeting anywhere in the world. The presentations given in 599 independent sessions, may be broken down as per:

- 4510 - 1 paper each, 633 - 2 papers each, 114 - 3 papers each, 57 - more than 3 papers each
- 6456 presentations from 58 countries with:
Japan - 2492, US - 1840, Canada - 426, Australia - 174, **New Zealand - 54,** Germany - 119, UK - 87, Russia - 86, China - 80, France - 70, Taiwan - 61.

Although Pacifichem is a Pacific Basin chemical congress, many invited lecturers were from non-regional countries, predominantly in Europe.
- 25 Young Scholars from developing countries in the Pacific Basin were offered Congress sponsorship of up to $US 1,000 and registration.
- The number of presentations included 530 student posters that were entered for the Student Poster Awards competition.

25 Awards were made (Pacifichem certificate in holder, a copy of the *Merck Index*, and an invitation to dinner on the last night of the Congress) of which one was to **Rachel Lorimer (University of Auckland), one of the two NZIC/Ministry of Science & Technology and United-Harbour City sponsored students.**

The number of awards for each of the 10 Congress areas was determined by the number of posters entered and equated to an overall 1:21 ratio. Judging was organised using specified criteria with one member of the Organising Committee responsible for each of the 10 subject areas. The New Zealand delegate drew the largest 09-Organic area (183 posters) for nine awards but ensured he was *not* involved with the sessions involving Rachel Lorimer or David Reid of Massey University (the other NZIC sponsored entrant). Both of these students proved to be excellent ambassadors for the NZIC and the country and we can be "comfortably satisfied" with the selections made by the Institute.

Brian Halton
Chemistry Department
Victoria University

SOME THOUGHTS ON PACIFICHEM '95

It was a privilege to represent the NZIC at Pacifichem '95 on behalf of our President. I felt it was important that we were represented in this way as it certainly raised our profile as a chemically active country among the Pacific rim countries.

I was required to speak briefly at the impressive opening ceremony along with the Presidents of the other sponsoring chemical societies. Coming near the end of the speaking list I found previous speakers all saying what I had intended to! However, I was able to stress that New Zealand is increasingly seeing itself as part of the Asia-Pacific region as its ties with Britain are broken and this is reflected in our increasing interactions with chemists in such countries as Japan, Singapore and Malaysia. It is therefore extremely important that we continue to act as a sponsoring society for future Pacific meetings. .

It was great seeing all our New Zealand students gaining so much from the conference. For most, it was their first international conference and their confidence in their work grew as they found their work up with the others. The opportunity to discuss their research with top people in their field is not an easily repeated experience for our graduate students.

I just loved watching the poster winners being presented to Glen Seabourg at the Canadian Chemical Society dinner. It was a delight to see the expressions on their faces when they realised he was a Nobel Prize winner. At the dinner I received a copy of a book *"Chemical Canada: 1970-1995"* on behalf of the NZIC. This describes the history of the Chemical Institute of Canada which embraces the three Canadian Societies for Chemistry, Chemical Engineering and Chemical Technology. This book is now held by Alan Turner. At this dinner Larry Weiler, Chairman of the Pacifichem '95 Organizing Committee thanked Brian Halton for his tremendous efforts and enthusiasm in assisting with the organizing. On behalf of the NZIC I would like to thank Brian for making sure the NZIC had a high profile at Pacifichem '95.

I have not mentioned the chemistry - needless to say it was great. The chance to meet and hear so many of the top people in my field was extremely stimulating even if it meant some 7.30 am starts!

Andrew Brodie
Chemistry and Biochemistry Department
Massey University

My thanks to Andrew Brodie and Brian Halton who represented the NZIC so admirably at this significant event.

Nath Pritchard, President NZIC

PACIFICHEM '95 TRAVEL REPORTS - NZIC SPONSORED STUDENTS

Waikiki beach is not the first place you would expect to find 8000 scientists, but from December 17 to 22, 1995 (designated "Chemistry Week in Hawaii" by the State Governor) chemists of every persuasion flocked to the beaches, the bars, and not least the conference centres of Honolulu. It's hard to describe the excitement and intensity generated by a meeting of this size and calibre. I attended 6 or 7 lectures and a couple of poster sessions each day, meeting other delegates for coffee, lunch and dinner, not to mention swimming, shopping and an amazing day spent snorkelling in one of Oahu's marine reserves. Some of the top names in asymmetric synthesis gave fascinating presentations relevant to my own work, and I took advantage of the opportunity to hear experts from less familiar fields such as combinatorial chemistry and self-assembly.

Pacifichem '95 was a very friendly conference - I met many other chemists both from around the world, and from other universities within New Zealand. Presenting my own work in one of the organic chemistry poster sessions involved many interesting and useful discussions with chemists working in related fields, and of course I was thrilled to be awarded one of the prizes in the Student Poster Awards. I learned a great deal at Pacifichem '95 - a lot of chemistry, but also a lot about chemistry; about working as a chemist, as a postdoc, an academic or in industry, and about practising chemistry outside of New Zealand. It was an inspirational event in a spectacular setting - possibly the perfect conference to attend as a New Zealand PhD student.

I am grateful to the Department of Chemistry at the University of Auckland, and particularly my doctoral supervisor Stew Rutledge, for their support, and I was honoured to receive one of the NZIC Pacifichem '95 Travel Grants enabling me to attend. These travel grants provided an important opportunity for New Zealand students to contribute to Pacifichem '95, and I hope that the NZIC will be able to extend their support to other students for future meetings.

Rachel M Lorimer
Chemistry Department
University of Auckland

Late in December, I attended Pacifichem'95 in Waikiki, Hawaii. This was a very large conference with over 8000 delegates and over 6000 papers given. It represented an opportunity to hear prominent chemists speak about their (recent) work and put faces to the names in the 'literature'. I was able to meet and mix with many chemists allowing a number of contacts to be made (in Japan, Australia and the United States) that may be useful in the future. I presented a poster entitled 'A Building Block Approach to Porphyrin Arrays' which attracted a large audience of predominantly Japanese chemists. It was generally well received and I learnt a good deal about techniques for poster presentation (as well as oral paper presentation) that I can use in the future.

Outside of the chemistry arena, I took the opportunity to walk around Waikiki and Honolulu. Late in the trip, I went snorkelling at the famous Haunama Bay, definitely the highlight of the whole Hawaii excursion. On the last day, we did a 'Round the Island' bus tour which took us to the pineapple plantations and rainforests of Oahu as well as the northern beaches with their huge surf.

Overall it can all be summed up as a 'great experience' and I am grateful to Professor Brian Halton for his help and to the NZIC, MoRST, Claude McCarthy Fellowship and Massey University for funding this trip.

David C W Reid
Chemistry and Biochemistry Department
Massey University

The work presented by the above two students as posters at Pacifichem '95 is detailed in the two following papers

ASYMMETRIC SYNTHESIS OF NOVEL FLUORINE CONTAINING ANTHRACYCLINONES USING CHIRAL ACETAL AUXILIARIES

Rachel M. Lorimer*, Job J. Rustenhoven, and P. Stewart Rutledge,
Department of Chemistry, University of Auckland, Private Bag 92019 Auckland

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Anthracycline antibiotics, coloured metabolites produced by a variety of *streptomyces* species,[1] are widely used in cancer chemotherapy and are the most commonly prescribed antitumor agents.[1d] Promising new compounds in this series include the synthetic drug idarubicin (Scheme1), whose clinical use has increased significantly in recent years.[1c]

We have been interested in the asymmetric synthesis of novel anthracyclines and anthracyclinones (the corresponding aglycones) via the Lewis acid mediated cyclisations of *ortho*allylated anthraquinonyl acetals (Scheme 1).[2] The stereochemistry of the two stereocentres in the A-ring is controlled by the use of chiral acetals as auxiliaries in an asymmetric cyclisation step.

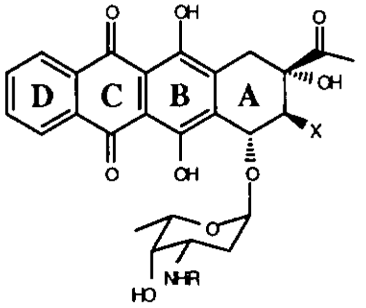
High yielding and versatile synthetic pathways have been developed to generate the necessary precursors. For example, the methallyl dioxan (**3**) was produced in 10 steps and 53% yield from quinizarin (**4**).[2b] $TiCl_4$ mediated cyclisation of this acetal gave the 7*S*-*trans*-tetracycle (**5**) in 82% yield (Scheme 2).[2b] Two new chiral centres were generated in one step, and this represents a very high degree of stereochemical control.

The selectivity at C7 is attributed to the intermediacy of a transition state in which the structure of the acetal is largely intact. The Lewis acid coordinates to one of the acetal oxygens, weakening the bond between that oxygen and the acetal carbon and activating the acetal carbon towards nucleophilic attack. Nucleophilic attack by the allyl group in the transition state then occurs *anti* to the weakened bond.

Such nucleophilic attack in a transition state in which the acetal is coordinated to O3, (**6**), generates the 7*S*-tetracycle (**7**) *(Pathway A),* while reaction via a transition state involving coordination of the Lewis acid to O1, (**8**), produces (**9**), the 7*R*-tetracycle *(Pathway B).* The Lewis acid lies in an quasi-equatorial position relative to the ring giving rise to unfavourable steric interactions with adjacent equatorial groups,[3] so that transition state (**8**) in which the Lewis acid is flanked by two equatorial substituents is higher in energy than (**6**). As the reaction proceeds, the developing positive charge at C9 is captured by a halide from the Lewis acid in a stereoselective manner. C9-halogenation has proven to be a general phenomenon in these cyclisations and it has so far been impossible to introduce external nucleophiles in this position.[4]

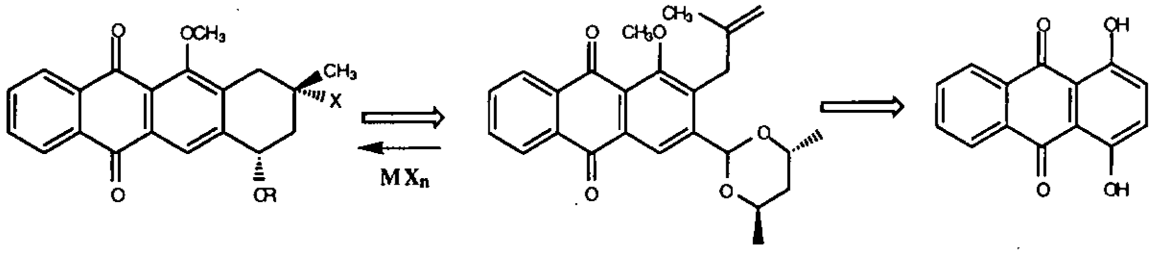
Recently, our attention has turned to the synthesis of fluorinated anthracyclines. The introduction of fluorine into compounds can alter their properties in biologically significant ways,[5] and several fluorine containing anthracyclines have been

Scheme 1.



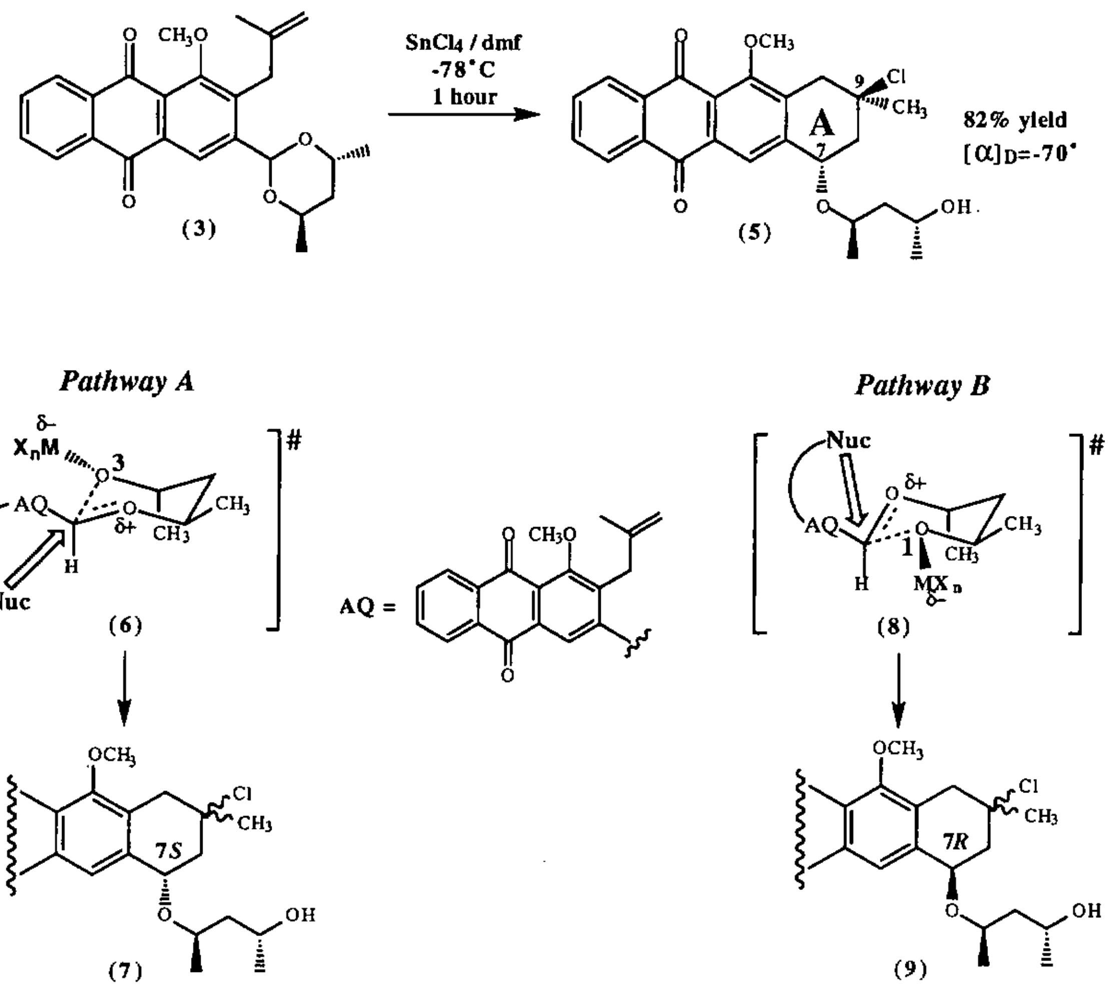
(1) X=H R=H Idarubicin
(2) X=F R=COCH$_3$ 8-Fluoroidarubicin

Retrosynthetic Strategy



A Synthetic Anthracycline **An *Ortho*allylated Anthraquinonyl Dioxane (3)** **Quinizarin (4)**

Scheme 2.

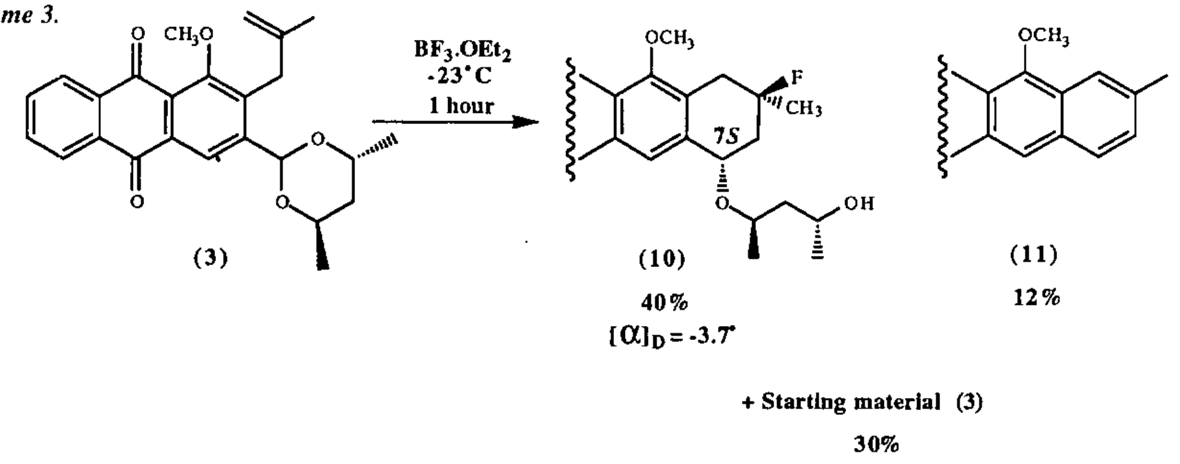


synthesised. However, the first A-ring fluorination was only reported recently with Arcamone's synthesis of the C8 fluorine analogue, (2), of idarubicin.[7] We recognised that fluorine containing Lewis acids such as boron trifluoride etherate could be used to synthesise a series of novel enantiopure 9-fluoroanthracyclines for biological testing.

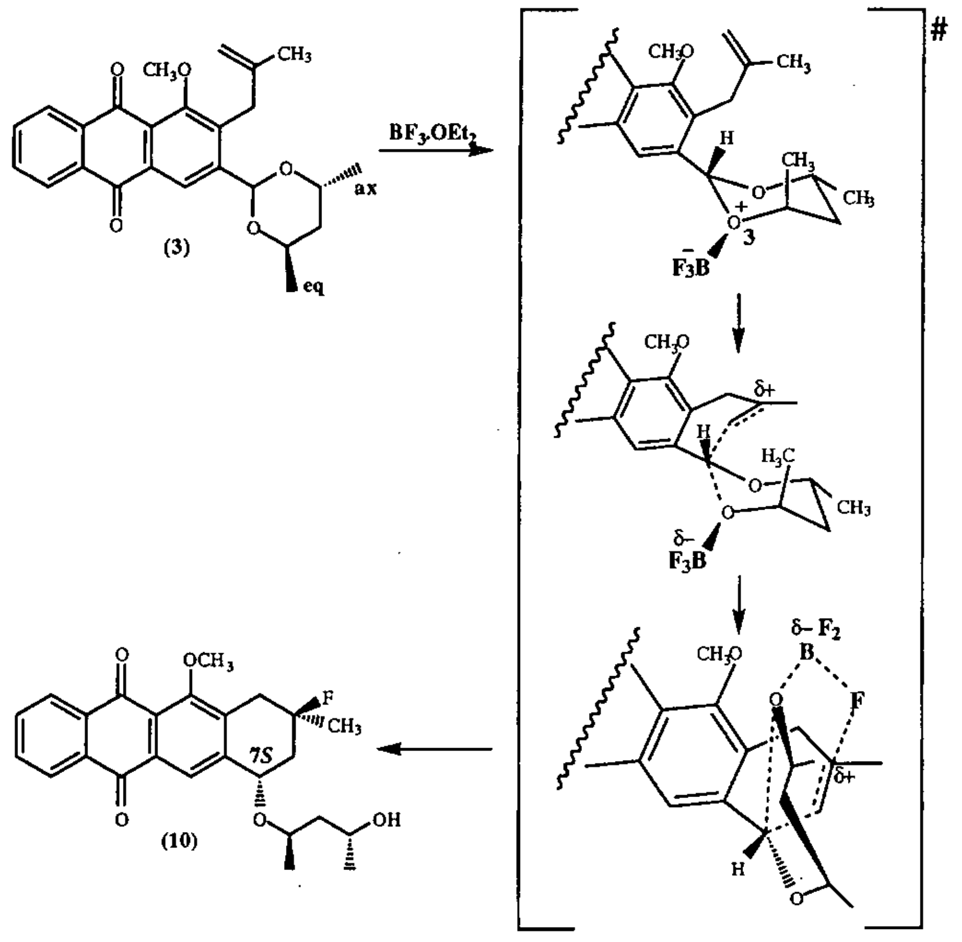
Thus, reaction of (3) at -23°C generated 40% of the 7*S*-*cis*-tetracycle, (**10**), as the major product (Scheme 3).[2b] Analysis of the products using ^{19}F nmr confirmed fluorine incorporation and indicated that trace amounts of other fluorotetracycles were formed, although these could not be isolated. While the reaction did not go to completion, the diastereoselectivity is clearly very high. The recovered substrate (30%) can be reused.

A transition state in which the Lewis acid is coordinated to O3 is proposed to explain the stereochemistry of the major product (**10**) (Scheme 4). The C2-O3 bond is weakened and a new bond begins to form between the acetal carbon and the terminal olefin carbon, in a direction *anti* to the weakened bond. This defines the C7 stereochemistry as 7*S*, with the hydrogen sitting above, and the acetal lying below the newly formed A-ring in (**10**). As this new bond forms, the developing positive charge at C9 is stabilised by an interaction with one of the fluorine atoms of the Lewis acid. The acetal is orthogonal to the plane of the anthraquinone with O1 below the plane and the O3-bound Lewis acid above the plane. In this transition state the fluoride is delivered from the same side of the molecule as the weakening C2-O3 bond. The extra stabilisation afforded by this interaction lowers the energy of the transition state leading to the *trans*

Scheme 3.



Scheme 4.



product and this accounts for the high degree of stereochemical control achieved at C9.

Our most recent work in this area has focussed on the reactions of C_1-symmetrical dioxan derivatives of *R*-2-methyl-2,4-pentanediol.[8] Model studies showed that the acetal residue was often lost during the cyclisation step, presumably late in the reaction, generating synthetically versatile 7-hydroxyanthracyclines.[9] Thus, cyclisation using the strong Lewis acid $TiCl_4$ gave (**13**), the *trans*-7-hydroxytetracycle, in 54% yield (Scheme 5).[8]

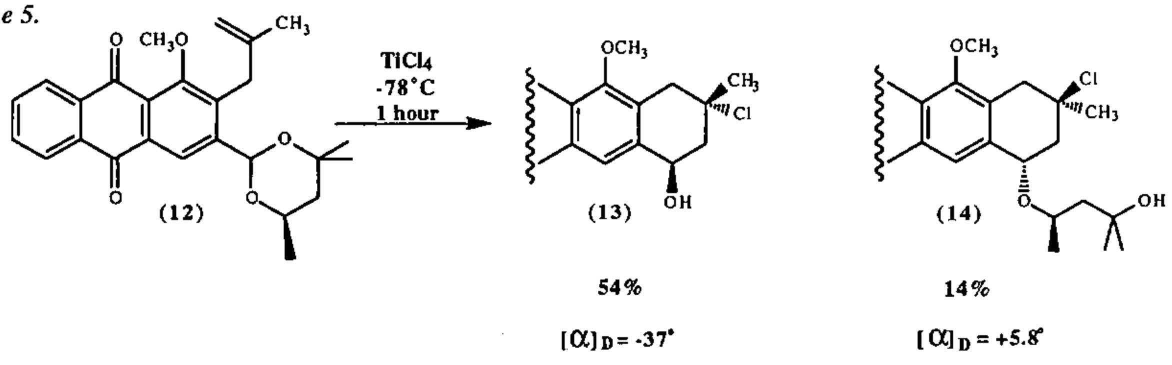
The enantioselectivity has yet to be determined. The minor product, (**14**), contained the acetal residue and its regiochemistry was assigned on the basis of shift reagent ^1H nmr experiments.

A transition state involving coordination of the Lewis acid to the less sterically hindered acetal oxygen is proposed to account for formation of the 7*R*-*trans*-tetracycle (**13**) (Scheme 6). Nucleophilic attack in such a complex establishes the C7 stereochemistry, with the hydrogen lying below and the acetal residue sitting above the new ring in the 7*R*-configuration. The *trans* relationship of the A-ring substituents is rationalised by a transition state analogous to that in Scheme 4, involving internal delivery of a chloride anion from the oxygen bound Lewis acid.

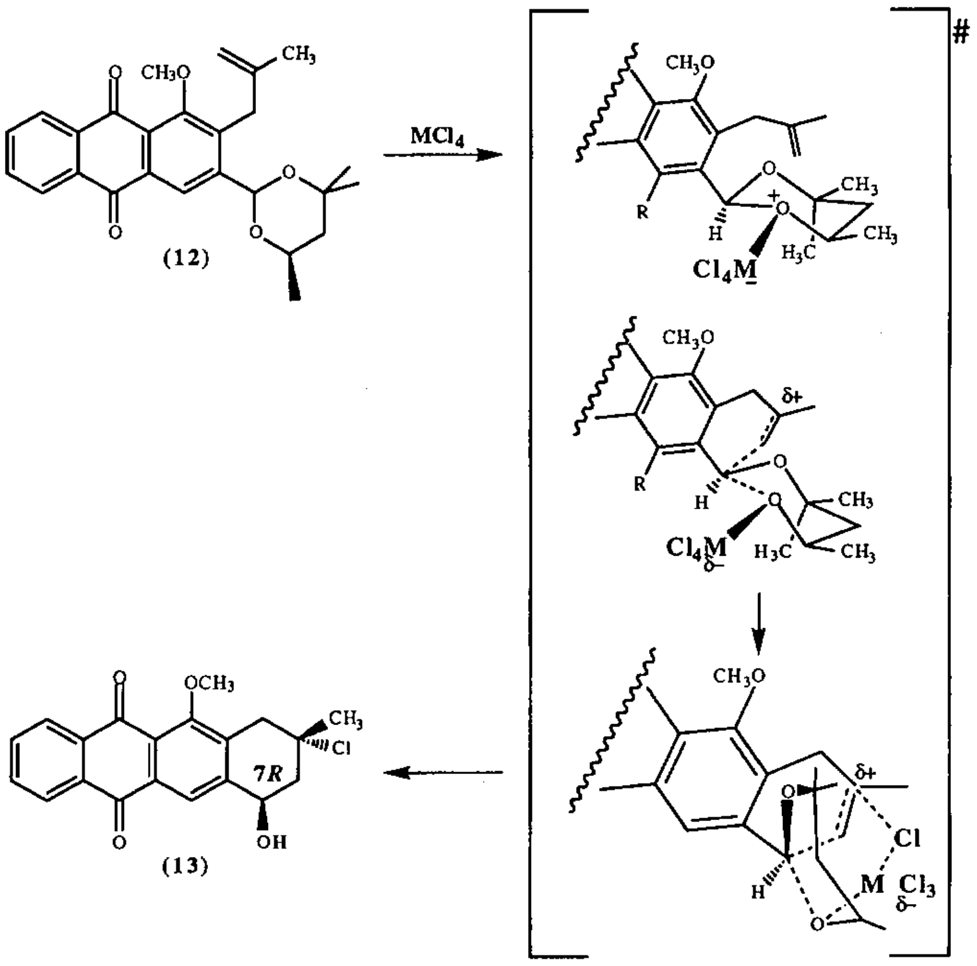
Boron trifluoride etherate mediated cyclisation of (**12**) generated a single, side-chain containing tetracycle (**15**) (Scheme 7).[8] In contrast with the corresponding titanium promoted reaction, the 7*S*,9*R*-diastereomer was isolated as the major product. Under these conditions the substrate is presumably reacting via a transition state similar to (B), in which the Lewis acid is coordinated to O3, the more sterically hindered oxygen.

The greater Lewis acidity of BF_3 may mean that the bond

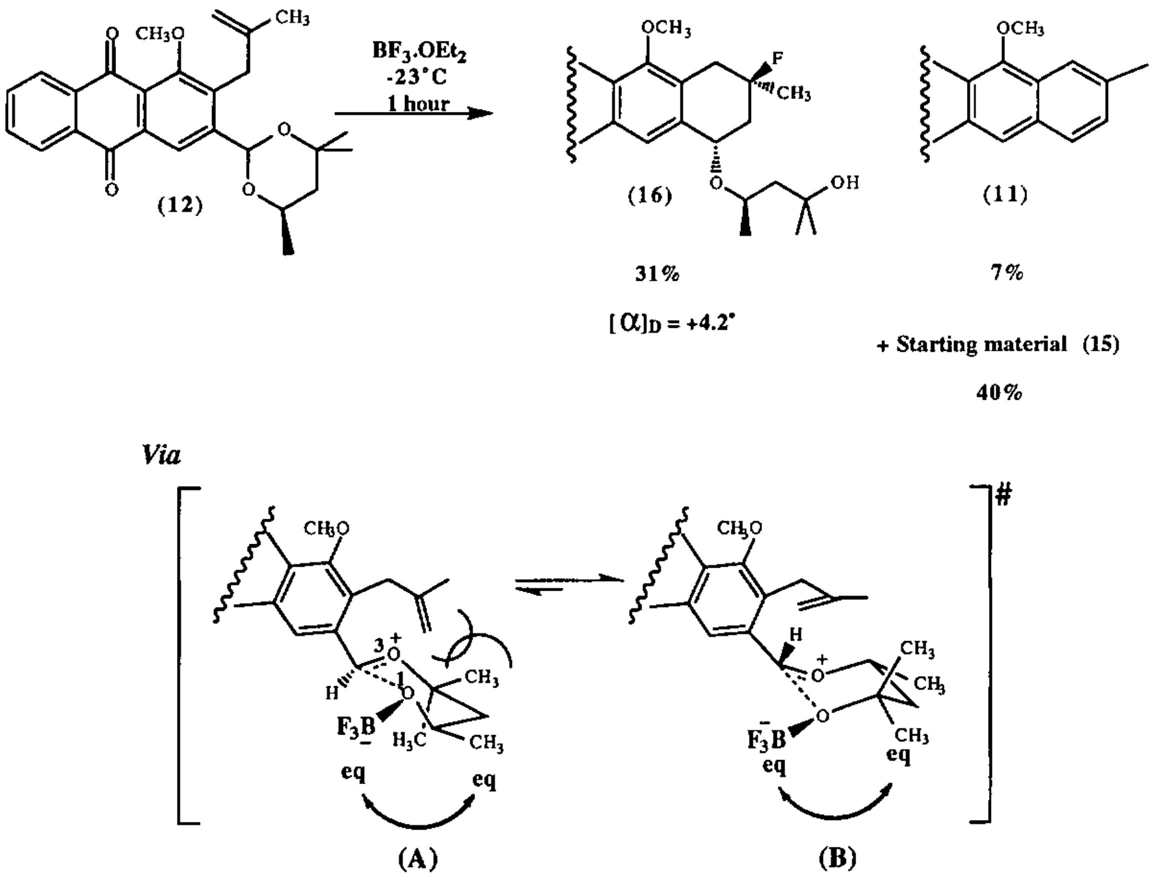
Scheme 5.



Scheme 6.



Scheme 7.



between the acetal carbon and the free acetal oxygen is shorter than in the analogous titanium complexes. Such bond shortening would intensify steric interactions between the incoming olefin and the geminal dimethyl substituents of the dioxan, so that reaction via (B) is favoured.

In conclusion. novel chlorine and fluorine containing anthracyclinones have been synthesised from quinizarin with a high degree of stereochemical control. While the yields of our fluorotetracycles are relatively low, the biological potential of such molecules makes this a promising area of research. Also of interest is the comparison between the diastereofacial selectivities of trimethyl- and dimethyldioxans, and we expect this work to provide important mechanistic insights into the use of such chiral acetal auxiliaries in asymmetric synthesis.

References

1a. Brockmann, H., *Forschr. Chem. Org. Naturst.*, 1963, **21**, 121.

1b. Thomson, R.H., *Naturally Occurring Quinones III*, London, New York, Chapman and Hall, 1987.

1c. Harrington, A.A., and Roberts, A.D., *Dictionary of Antibiotics and Related Substances.*, Bycroft, B.W., Ed.; London, New York, Chapman and Hall, 1987.

1d. Myers, C.E. Jr., Chabner, B.A., *Cancer Chemotherapy*, Chabner, B.A., Collins, J.M., Eds.; J.B. Lippincott, Philadelphia, 1990.

1e. *Anthracycline Antibiotics*, Priebe, W., Ed.; ACS Symposium Series 574, Washington D.C., 1995.

2a. For a review see Cambie, R.C., Rutledge, P.S., and Woodgate, P.D., *Aust. J. Chem.*, 1992, **45**, 483, and references contained therein.

2b. Rustenhoven. J.J., and Rutledge, P.S., Unpublished data.

3. Denmark, S.E., Wilson, T.M., and Almstead, N.G., *J. Am. Chem. Soc.*, 1989, **111**, 9258.

4. Larsen, D.S., PhD Thesis, University of Auckland, 1985.

5a. *Selective Fluorination in Organic and Bioorganic Chemistry;* Welch, J.T., Ed.; ACS Symposium Series 456, Washington D.C., 1991.

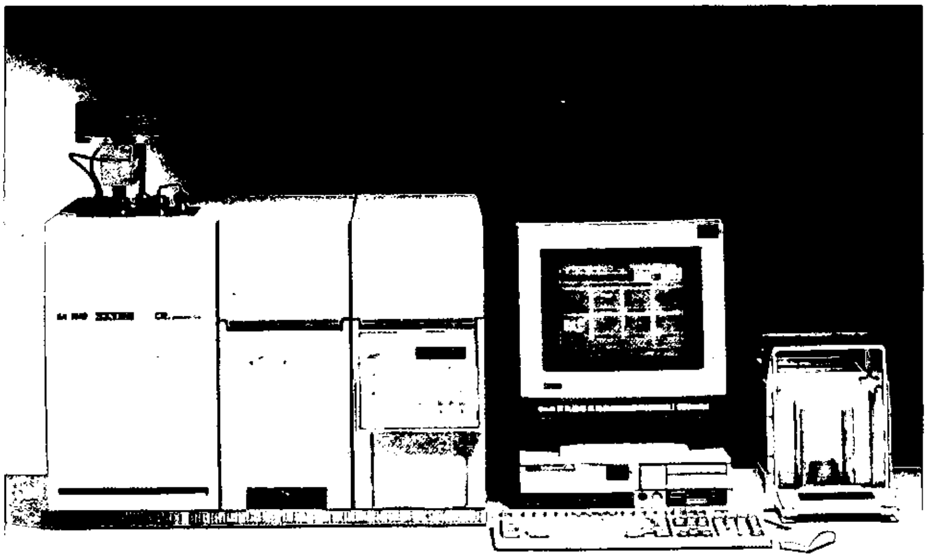
5b. Seebach, D., *Angew. Chem. Int. Ed. Engl.*, 1990, **29**, 1320.

6. Matsuda, F., Matsumoto, T., Ohsaki, M., Terashima, S., *Tetrahedron Letters*, 1989, **30**, 4259, and references contained therein.

7. Giolotto, A., Guidi, A., Pasqui. F., Prestellini, V., Arcamone, F.M., *Tetrahedron Letters*, 1992, **33**, 1637.

8. Lorimer, R.M., and Rutledge, P.S., Unpublished data.

9. Lorimer, R.M., MSc Thesis, University of Auckland, 1992.



A Building Block Approach to Porphyrin Arrays

A. K. Burrell, D. L. Officer and D. C. W. Reid*
Department of Chemistry, Massey University, Private Bag 11 222, Palmerston North

Background

Porphyrins and arrays of porphyrins have been used or proposed for use, in a wide variety of applications, such as catalysis, photodynamic therapy, molecular-scale devices and modelling electron and energy transfer processes.[1] One exciting application lies in light harvesting - can arrays of man-made porphyrins mimic chlorophyll and be employed as agents in harnessing the energy of the sun? There has been considerable research devoted to synthetic methodologies for porphyrin arrays and many elegant syntheses have been published, but in general these pathways are lengthy, inflexible and low-yielding. In recent years building block approaches to array synthesis have proven to be very efficient and effective.[2] Our research team at Massey University uses this type of methodology to prepare porphyrin arrays. The first step is to obtain a building block that is simple to prepare and readily incorporated into the desired arrays. We do this using porphyrinyl phosphonium salt (1) in Wittig reactions with an appropriate aldehyde (Figure 1).

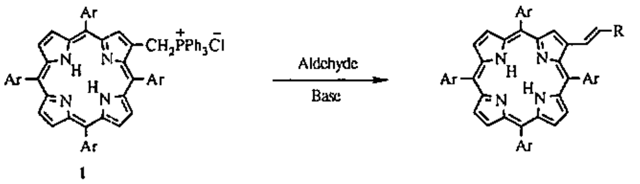


Figure 1: The Key Reaction

The Key Reagent and Key Reaction

In 1993 Bonfantini and Officer published a synthesis of TPP phosphonium salt (1) (Figure 2).[3] Since then the method has been refined and extended to a range of tetraarylporphyrins. They can be prepared in six steps, in good yield and on a large scale, from inexpensive reagents and starting materials. The salt can then be metallated as required. The phosphonium salts react with a wide range of aldehydes, from nitrobenzaldehyde to *N,N*-dimethylaminobenzaldehyde, using very mild Wittig reaction conditions.[3] Thus it represents a very simple way to functionalise a porphyrin or to attach a porphyrin ring to a molecule.

The Building Blocks

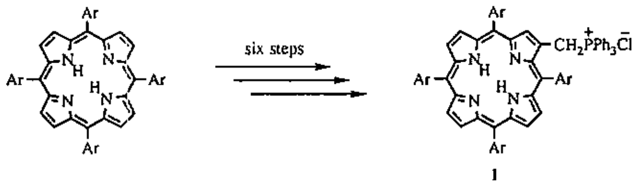


Figure 2: The Key reagent

If a dialdehyde such as *ortho, meta, or para* phthalaldehyde is reacted with one equivalent of phosphonium salt (1) then molecules (e.g. (2)) are obtained that contain the desired porphyrin ring and also an aldehyde functionality which is easily introduced into arrays (Scheme 1 - *para* case only shown).[4] The reactions can be carried out on a reasonable scale (0.5 g so far) and after isomerisation with iodine, give the building blocks (e.g. (2)) in 80-90% yield. X-ray crystallographic determination of the structure of the Cu derivative of building block (2) (Ar = Ph) revealed the planarity of the porphine ring, olefin and benzaldehyde moieties. This has important implications for any electron or energy transfer in this molecule or an array containing this entity.

The Arrays

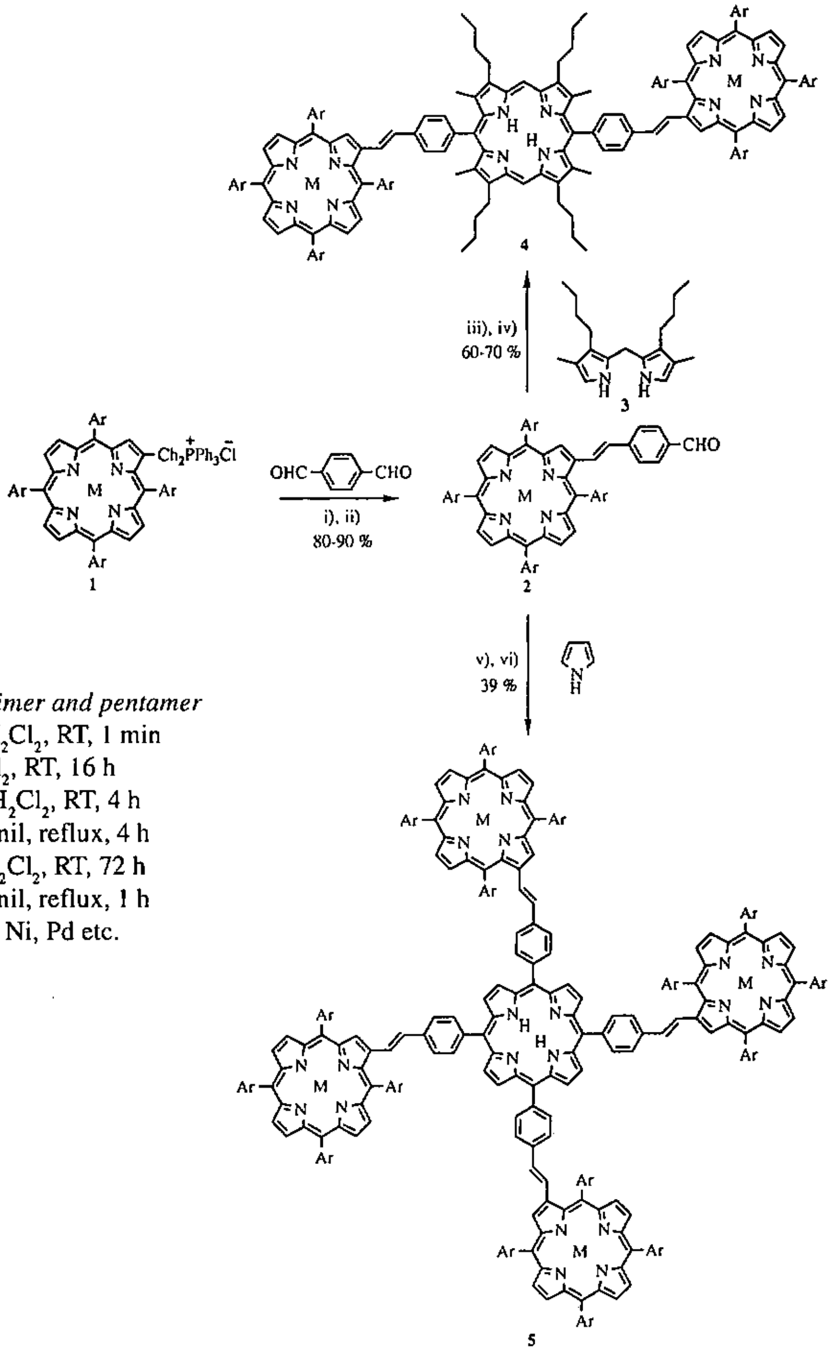
Building block (2) undergoes a second Wittig reaction with phosphonium salt (1) to give the corresponding dimer (not shown - see reference 4). The *ortho* and *meta* building blocks react similarly to give a family of dimers with different bridge geometries and effective ring separations. Furthermore, because the phosphonium salt and building blocks can be readily metallated with a variety of metals, and there is a range of different tetraarylporphyrin phosphonium salts available, then heterodimers are easily accessible. This degree of control is a strength of our synthetic approach and is crucial to allow "tuning" of the properties of the arrays.

Building block (2) and its *ortho* and *meta* isomers condense with dipyrrylmethane (3) to give trimers e.g. (4)[4] in the manner of Sessler *et al.*[5] The yields range from 60-70% but the presence of "up-down" isomers complicates characterisation and spectroscopic study of these molecules. Theses trimers are quite soluble in common organic solvents, aided by the presence of the alkyl chains on the new central ring.

Building block (2) reacts with pyrrole under Lindsey conditions[6] to give pentamer (5).[7] Successful formation of the new central ring is confirmed by UV-visible spectroscopy, NMR and FAB MS. Currently we are investigating the photophysical properties of our molecules to see if they are suitable candidates for photon capture.

Summary

To conclude, we are using a building block approach to making porphyrin arrays. This approach has the following important features: 1) simplicity - there are a small number of steps and no statistical mixtures or troublesome purifications; 2) flexibility - there is good control over metallation states, geometries and type of porphyrin ring and 3) efficiency - cheap starting materials are employed and generally good yields obtained. Overall this is a very powerful methodology for construction of porphyrin arrays.



Scheme 1: Synthesis of trimer and pentamer
Conditions: i) DBU, CH_2Cl_2, RT, 1 min
ii) I_2, CH_2Cl_2, RT, 16 h
iii) TFA, CH_2Cl_2, RT, 4 h
iv) *o*-chloranil, reflux, 4 h
v) TFA, CH_2Cl_2, RT, 72 h
vi) *o*-chloranil, reflux, 1 h
Note: M = 2H, Cu, Ni, Pd etc.

Acknowledgements

We would like to acknowledge: the New Zealand Institute of Chemistry; Ministry of Research, Science and Technology; Department of Chemistry, Massey University; Massey University Research Fund and Claude McCarthy Fellowship (NZVCC).

References

1. H. Brunner, H. Obermaier, *Angew. Chem. Int. Ed. Engl.* 1994, **33**, 2214-2215; M. J. Crossley, P. L. Burn, *J. Chem. Soc., Chem. Commun.* 1991, 1569-1571; M. R. Wasielewski, *Chem. Rev.* 1992, **92**, 435-461, and references cited therein.

2. H. L. Anderson, S. J. Martin, D. D. C. Bradley, *Angew. Chem. Int. Ed. Engl.* 1994, **33(6)**, 655-657; S. Prathapan, T. E. Johnson, J. S. Lindsey, *J. Am. Chem. Soc.* 1993, **115**, 7519-7520.

3. E. E. Bonfantini, D. L. Officer, *Tetrahedron Lett.* 1993, **34(52)**, 8531-8534; E. E. Bonfantini, D. L. Officer, *J. Chem. Soc., Chem. Commun.* 1993, 1445-1446.

4. A. K. Burrell, D. L. Officer, D. C. W. Reid, *Angew. Chem. Int. Ed. Engl.* 1995, **34**, 900-903.

5. J. L. Sessler, V. L. Capuano, A. Harriman, *J. Am. Chem. Soc.* 1993, **115**, 4618-4628.

6. J. S. Lindsey, I. C. Schreiman, H. C. Hsu, P. C. Kearney, A. M. Marguettaz, *J. Org. Chem.* 1987, **52**, 827-836.

7. Submitted for publication.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The Whole CHROMATOGRAPHY Picture

International Macrocyclic Meeting

Wellington, January 28-31, 1996

One hundred and fifteen chemists gathered at Victoria University between January 28 and 31, 1996 to mark the retirement of Professor Neil Curtis from the University. Neil is particularly well known for his work on macrocycles and their metal complexes and the chemistry discussed at the conference was devoted entirely to work in this area. It is a reflection of the high regard that Neil is held in around the world that forty seven of the attendees came from overseas. The promise, and realisation in practice, of perfect summer weather no doubt also proved attractive to those that came from the northern hemisphere.

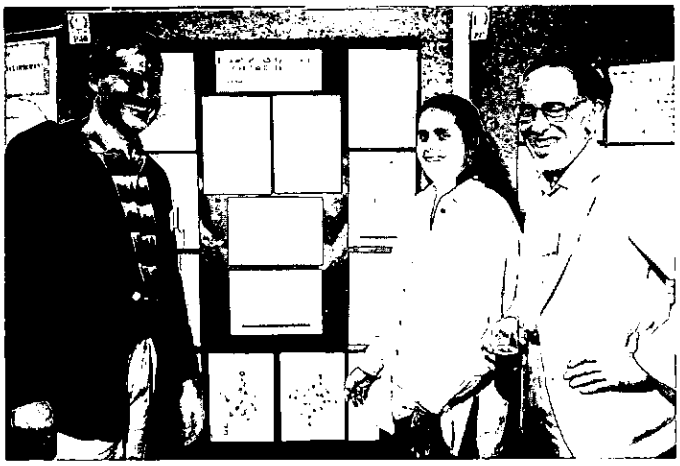
The conference opened on Sunday afternoon with a lecture from Professor Bob Hay, University of St Andrews, St Andrew's, Scotland. Professor Hay is a former staff member of Victoria University. He described some of the earlier work performed at Victoria and went on to describe some of his recent work on the use of macrocyclic complexes to destroy nerve gases catalytically.

Above: Professor Neil Curtis (Victoria University), Professor Karl Wieghardt (Max-Plank-Institut für Strahlenchemie) and Dr Geoff Jameson (Massey University) engaged in meaningful conversations at the barbeque.

The other speakers from overseas were from Australia - Geoff Lawrance (Newcastle), Len Lindoy (James Cook), Richard Robson (Melbourne), and Kevin Wainwright (Flinders); Canada - Alex McAuley (Victoria); England - David Fenton (Sheffield), Mary McPartlin (North London), David Parker (Durham), Gillian Reid (Southampton) and Martin Schroder (Nottingham); Germany - Karl Wieghardt (Max-Plank-Institut für Strahlenchemie); Japan - Eiichi Kimura (Hiroshima) and Hisashi Okawa (Kyushu); Northern Ireland - Jane Nelson (Queens/Open University); South Africa - Jan Boeyens (Witwatersrand) and the United States of America - Daryl Busch (Kansas), Terry Collins (Carnegie Mellon), and John Endicott (Wayne State).

The New Zealand speakers included Sally Brooker (Otago), Penny Brothers (Auckland), Tony Burrell (Massey), Keith Morgan (IRL), David Officer (Massey) and James Wright (Auckland). Neil Curtis closed the conference with a lecture describing the genesis of his research, some recent results and he concluded by saying that on the last day of paid employment he had finally realised why he had done all that work. Earlier that day Professor Kimura had described how a series of zinc tetraazamacrocyclic complexes were extremely promising as a treatment for AIDS and were currently undergoing clinical trials. Neil observed that he had obviously begun his research on tetraazamacrocycles as a search for a cure for a disease which was not discovered until twenty years after he had begun his search for the cure!

In addition to the lecture program more than fifty posters were prepared. There were prizes for the best posters presented by students and the judges awarded first prize to Barry Snushall (Australian Defence Forces Academy), second prize to Paul Croucher (Otago) and third equal to Karen Murphy (Waikato) and Julie Turnball (Otago).



Above: Professor Terry Collins (Carnegie Mellon University), Ms Deborah Tonei and Dr Michael Taylor (University of Auckland) at the poster session.

At the conference dinner Professor Don House (Canterbury) Neil's first PhD student, gave us the real lowdown on the early days in the Curtis laboratory. Neil was presented with the carefully preserved remains of a water bath destroyed by a perchlorate explosion in 1966.

Conferences cost money to run and this particular conference was most generously supported by a large number of organisations including Campbell Microanalytical Laboratory, University of Otago; the Chemistry Department, University of Otago; the Division of Sciences, University of Otago; Oxford University Press; Industrial Research Limited; Wellington Branch of the New Zealand Institute of Chemistry; Victoria University of Wellington; The Royal Society of Chemistry; and Zeneca Specialities, United Kingdom.

Overseas speakers were sponsored by the Royal Society (London) and the British Council. The former students of Professor Curtis most generously contributed to a fund which enabled the organisers to waive the registration fees for all students who attended.

Dr Sally Brooker, Dr David Weatherburn
IMM Co-Chairpersons

CONFERENCES & SEMINARS

31 March - 4 April 1996
7th International Symposium on Supercritical Fluid Chromatography and Extraction
Venue: Westin Hotel, Indianapolis, Indiana, USA
Contact: Janet Cunningham
Barr Enterprises
P O Box 279
Walkersville
MD 21793, USA
Tel: (+1-301)-8983772
Fax: (+1-301)-8985596

7-9 April 1996
Second International Seminar on Water and Environment
Venue: Kathmandu, Nepal
Contact: Mr Mohan Singh Khadka
Convenor
Ground Water Resources Development Project
Babar Mahal, Kathmandu, Nepal
Tel: (+977-1)-224953
Fax: (+977-1)-231979
or Dr Mohan B Gewali
Co-ordinator
Central Department of Chemistry
Tribhuvan University
Kirtipur, Kathmandu, Nepal
Tel: (+977-1)-213277 ext. 137

11-13 April 1996
1996 Licensing Executives Society (LES) Australia and New Zealand Conference
Venue: Rotorua, New Zealand
Contact: LES Conference Secretariat
Travelworks New Zealand Ltd
P O Box 28440, Auckland, New Zealand
Tel: (+64-9)-5220330
Fax: (+64-9)-5220331

14-20 April 1996
Practical Workshop for High Throughput Screening in Biomolecular Discovery
Venue: Rheinfelden, Switzerland
Contact: Dr S Daniel, BURECO AG
c/o HTS Workshop, Postfach
CH-4310 Rheinfelden, Switzerland
Tel: (+41-61)-8313313
Email: 100701.104@compuserve.com

15-17 April 1996
Starch: Structure and Function
Venue: Cambridge, England, UK
Contact: Mrs MA Staff
Cavendish Laboratory
Madingley Road
Cambridge CB3 OHE, England, UK

15-19 April 1996
Protein Structure Analysis - Chemical and Physical Approaches
Venue: University of Leeds, England, UK
Contact: Mrs J L Johnson
Department of Biochemistry and Molecular Biology
University of Leeds
Leeds LS2 9JT, England, UK
Tel: (+44-113)-2333141
Fax: (+44-113)-2333167
Email: bmb6jlj:iovax.leeds.ac.uk

15-17 April 1996
Starch: Structure and Function
Venue: Cambridge, England, UK
Contact: Mrs MA Staff
Cavendish Laboratory
Madingley Road
Cambridge CB3 OHE, England, UK

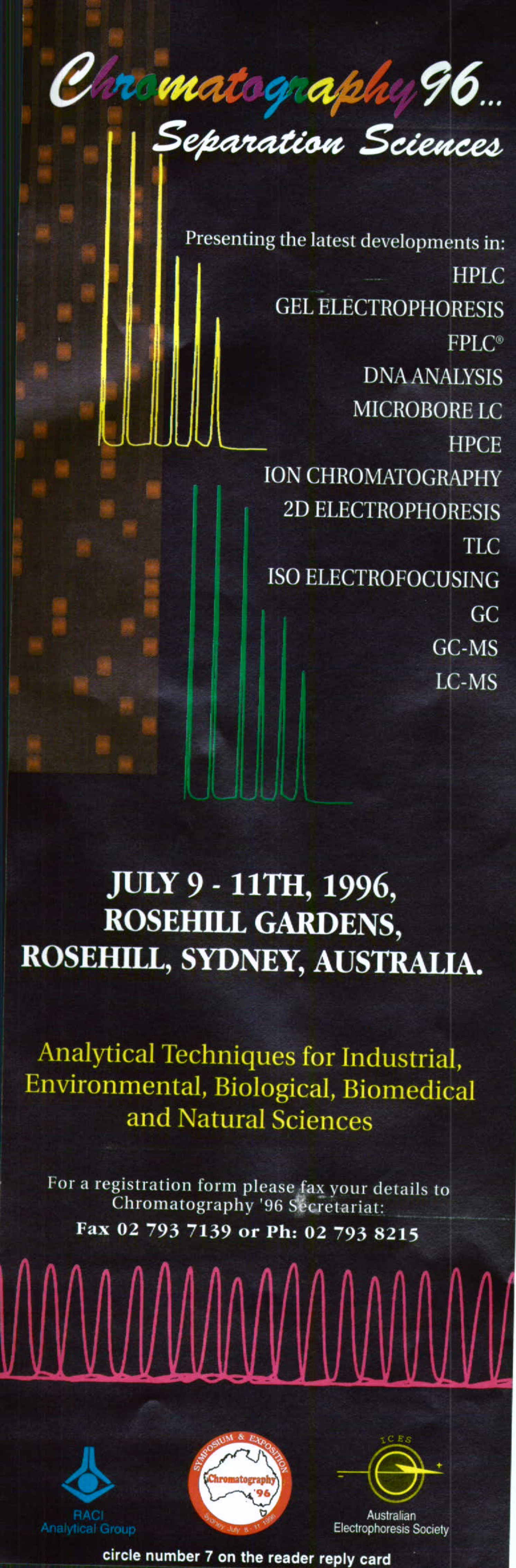
17-19 April 1996
VIIth International Symposium on 'Luminescence Spectrometry in Biomedical Analysis - Detection Techniques and Applications in Chromatography and Capillary Electrophoresis'
Venue: Nice, France
Contact: Professor W R G Baeyens
University of Ghent, Pharmaceutical Institute
Harel-bekestraat 72, B-9000 Ghent, Belgium
Fax: (+32-9)-2214175
Email: willy.baeyens@rug.ac.be

21-23 April 1996
2nd International Conference on Clinical Chemiluminescence
Venue: Berlin, Germany
Contact: Dr Gudrun Lewin
Research Institute for Antioxidant Therapy Co
Chausseestr 119-120
10 115 Berlin, Germany

2-5 May 1996
The Conduct of Science: Keeping the Faith
Venue: Keystone, Colorado, USA
Contact: Keystone Symposia
Drawer 1630, Silverthorne
Colorado C080498, USA
Email: symposia@keystone.org

4-10 May 1996
***In Vitro* Haematoxicology, Drug Development and Regulatory Approval**
Venue: Bethesda, Maryland, USA
Contact: Cambridge Symposia
1037 Chestnut St
Department P, Newton Upper Falls
MA 02164, USA
Tel: (+1-617)-6301399
Email: symposia@xensei.com

6-12 May 1996
Discovery and Development of Tumour Vaccines
Venue: Taos, New Mexico, USA



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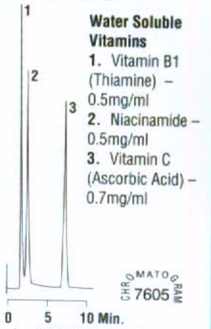

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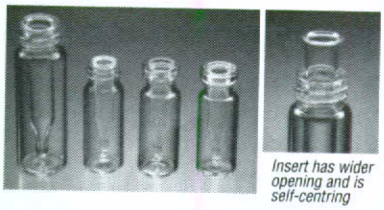

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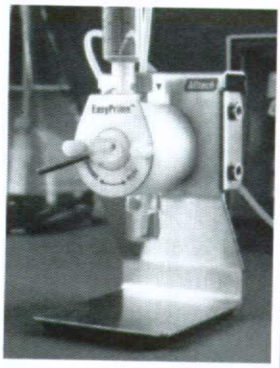

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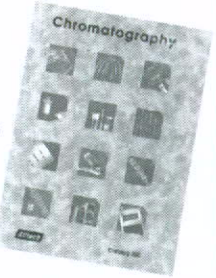

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Contact: Cambridge Symposia
1037 Chestnut St
Department P, Newton Upper Falls
MA 02164, USA
Tel: (+1-617)-6301399
Email: symposia@xensei.com

19-22 May 1996
1996 International Symposium, Exhibit and Workshops on Preparative Chromatography, Ion Exchange, and Adsorption/Desorption Processes and Related Techniques
Veune: Georgetown University Conference Centre
Washington DC, USA
Contact: Janet Cunningham
Barr Enterprises
P O Box 279
Walkersville
MD 21793, USA
Tel: (+1-301)-8983772
Fax: (+1-301)-8985596

19-25 May 1996
9th International Conference on Pteridines, Related Biogenic Amines and Folates
Venue: Port Douglas, North Queensland, Australia
Contact: The Secretariat
World Corporate Travel
Attention: Gary Bender
P O Box 1440, North Sydney,
NSW 2060, Australia
Tel: (+61-2)-99294000
Fax: (+61-2)-99231111

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- Ethics in science

Contact: Helen Hancox, 86 Daniell St, Newtown
Wellington 6002, New Zealand.
Tel: (+64-4)-3892578, Fax: (+64-4)-3892589
Email: hancox@actrix.gen.nz

4-5 June 1996
4th New Zealand Symposium of Chemical and Biosensors
Venue: William Sutton Room
The Arts Centre of Christchurch
Christchurch, New Zealand
Contact: Wendy Collier
AgResearch Grasslands
Private Bag 11008
Palmerston North, New Zealand
Tel: (+64-6)-3568019
Fax: (+64-6)-3518032/8042
Email: collierw@agresearch.cri.nz

16-21 June 1996
HPLC'96: 20th International Symposium on High Performance Liquid Phase Separations and Related Techniques
Venue: Marriott, San Francisco, California, USA
Contact: Janet Cunningham
Barr Enterprises
P O Box 279
Walkersville
MD 21793, USA
Tel: (+1-301)-8983772
Fax: (+1-301)-8985596

14-18 June 1996
1st Science Centre World Congress
Venue: Heureka, Vantaa, Finland
Contact: Ms Helena von Troil
Secretary General, Keureka
The Finnish Science Centre
P O Box 166, FIN-01301 Vantaa, Finland

29 June - 3 July 1996
UIB-GBF-CSIC-TUB Symposium on 'Biodegradation of Organic Pollutants'
Venue: Mallorca, Spain
Contact: Professor K N Timmis
Division of Microbiology
GBF, Mascheroder Wegl
D-38124 Braunschweig, Germany
Fax: (+49-531)-6181411
Email: kti@gbf-braunschweig.de

30 June - 6 July 1996
12th International Symposium on 'Flavins and Flavoproteins'
Venue: Calgary, Canada
Contact: Dr K J Stevenson
Department of Biological Sciences
University of Calgary
Calgary T2N 1N4
Alberta, Canada
Fax: (+1-403)-2844184

7-12 July 1996
Organometallic Chemistry XVII
Venue: Brisbane, Australia
Contact: Eva Comino
Secretariat, International Conference on Organometallic Chemistry
Faculty of Science and Technology
Griffith University
Brisbane, QLD 4111, Australia
Tel: (+61-7)-8757564
Fax: (+61-7)-8755369

CONFERENCES & SEMINARS

9-11 July 1996
Chromatography '96 Separation Sciences Conference and Exhibition
Venue: Rose Hill Gardens, Sydney, Australia
Contact: Secretariat
Fax: (+61-2)-7937139

11-12 July 1996
Perspectives in Marine Natural Products
Venue: The Conference Centre
University of Auckland, Auckland, New Zealand
Contact: Professor R C Cambie
or Dr B R Copp
Department of Chemistry
University of Auckland
Private Bag 92019, Auckland, New Zealand
Tel: (+64-9)-3737999 ext. 8259 or 8284
Fax: (+64-9)-3737422
Email: c.cambie@auckland.ac.nz

14-19 July 1996
RACI/SETAC/ASE International Conference on Environmental Chemistry and Toxicology
Venue: Sydney, NSW, Australia
Contact: Dr Graeme Batley
CSIRO Centre for Advanced Analytical Chemistry
PMB 7, Menai
NSW 2234, Australia
Tel: (+61-2)-7106830
Fax: (+61-2)-7106837

14-19 July 1996
14th International Conference on Chemical Education (14ICCE)
Venue: Brisbane, Queensland, Australia
Contact: Sally Brown
Conference Secretariat
14th ICCE
Continuing Professional Education
The University of Queensland
Brisbane, QLD 4072, Australia
Tel: (+61-7)-3656360
Fax: (+61-7)-3657099
Email: chemed96@ceu.uq.oz.au

29 July - 2 August 1996
Recent Advances in Polymer Synthesis
Venue: University of York, England, UK
Contact: Professor P Hodge
Department of Chemistry
University of Manchester
Oxford Rd, Manchester
M13 9PL, England, UK
Fax: (+44-1)-612754598
Email: philip.hodge@man.ac.uk

4-9 August 1996
IUPAC MACRO '96
Venue: Seoul, Korea
Contact: Dr Kwang Ung Kim
Secretariat IUPAC MACRO SEOUL '96
Division of Polymers, KIOST
P O Box 131, Cheongryang
Seoul 130-650, Korea
Fax: (+1582-2)-9576105
Email: iupac@kistmail.kist.re.kr

4-10 August 1996
VI World Conference on Clinical Pharmacology and Therapeutics
Venue: Buenos Aires, Argentina
Contact: CPT96
Marcelo T de Alvear 1980
1122 Buenos Aires, Argentina
Tel: (+54-1)-8116650
Fax: (+54-1)-8142733

11-16 August 1996
3rd International Hydrocolloids Conference
Venue: Sydney, Australia

This conference will focus on the new industrial opportunities for hydrocolloids in important areas including foods, nutritional products, pharmaceuticals, health and personal care products and agricultural and veterinary products. To meet those challenges, the conference will discuss novel production and processing techniques.

Contact: Gail Hawke, Conference Secretariat
P O Box N399
Grosvener Place
Sydney, NSW 2000, Australia
Tel: (+61-2)-2523388
Fax: (+61-2)-2415282

25-30 August 1996
10th International Biotechnology Symposium
Venue: Sydney, Australia
Contact: Symposium Secretariat
G P O Box 128
Sydney, NSW 2001, Australia

1-4 September 1996
Environmental Biotechnology, An International Conference
Venue: Massey University
Palmerston North, New Zealand
Contact: Conference Secretary
Environmental Biotechnology Conference
Process and Environmental Technology Dept.
Massey University
Palmerston North, New Zealand
Tel: (+64-6)-3505351
Fax: (+64-6)-3505654
Email: g.f.withers@massey.ac.nz

10-13 September 1996
NZWWA Annual Conference and Expo
Venue: Quality Hotel Rutherford, Nelson, New Zealand

CONFERENCES & SEMINARS

Contact: NZWWA Annual Conference and Expo
C/- Conferences & Events
P O Box 1254
Nelson, New Zealand
Tel: (+64-3)-5466022
Fax: (+64-3)-5466020

24-26 September 1996
BioInnovations Convention
Venue: Wembley, London, England, UK
Contact: Bob Kyte, Step Exhibitions Ltd
The Studio, Northfields, Speldhurst
Tunbridge Wells, TN3 OPL, England, UK
Tel: (+44-1892)-863986
Fax: (+44-1892)-863464

29 September - 4 October 1996
The International Meeting and Exhibition of the Australian and New Zealand Societies For Microbiology
Venue: Christchurch, New Zealand
Contact: ASM and NZSM '96 Secretariat
GPO Box 128
Sydney, NSW 2001, Australia
Tel: (+61-2)-2622277
Fax: (+61-2)-2622323
Email: TOURHOSTS@TOURHOSTS.com.au

8-11 October 1996
AUSPLAS '96 (Australian Plastics Conference)
Venue: Melbourne Exhibition Centre
Melbourne, Australia
Contact: John Kelly
Exhibition Management Pty Ltd
Melbourne, Australia
Tel: (+61-3)-96464044
Fax: (+61-3)-96461828

9-11 October 1996
Anticancer Targets and Strategies for the 21st Century
Venue: Castres, France
Contact: Marian Cabailh
Conference Secretariat, CRPF
17 Avenue Jean Moulin
81106 Castres Cedex, France
Tel: (+33-63)-714368
Fax: (+33-63)-714299

22-25 October 1996
19th International Federation of Societies of Cosmetic Chemists Congress
Venue: Darling Harbour, Sydney, Australia
Contact: Secretariat
P O Box 249 Kingsgrove
New South Wales 2208, Australia
Fax: (+61-2)-5543228
or Peter Strasser
Tel: (+61-3)-93875371

23-24 October 1996
Near Infrared Spectroscopy and Imaging of Living Systems - A Royal Society Discussion Meeting
Venue: London, England, UK
Contact: Science Promotion Section
The Royal Society
6 Carlton House Terrace
London SW1Y 5AG, England, UK
Fax: (+44-171)-8392891
Tel: (+44-171)-8395561

25-29 November 1996
13th International Corrosion Congress
Venue: Carlton Radisson Hotel, Melbourne, Australia
Contact: Conference Secretariat
P O Box 5142, Clayton
Victoria 3168, Australia
Tel: (+61-3)-95440066
Fax: (+61-3)-95435905

9-11 December 1996
4th Annual RACI Research and Development Topics In Analytical Chemistry Meeting
Venue: RMIT, Melbourne, Australia
Contact: Marie Bou-Raad
Secretary of the Organising Committee
Tel: (+61-3)-96602557
Fax: (+61-3)-96391321
Email: chem_rd96@bunyip.ph.rmit.edu.au

13-15 December 1996
Second Symposium on Oceanian - Japanese Organic Chemistry Synthesis and Natural Products
Venue: Tokushima Bunri University
Faculty of Pharmaceutical Sciences, Japan
Contact: Associate-Professor Rob A J Smith
Chemistry Department
University of Otago
P O Box 56
Dunedin, New Zealand
Tel: (+64-3)-4797924
Fax: (+64-3)-4797906
Email: rajsmith@alkali.otago.ac.nz

10-14 December 1996
Fifth Eurasia Conference on Chemical Sciences
Venue: Zhongshan (Sun Yatsen) University
Guangzhou (Canton), China
Contact: Professor Liang-Nian Ji
General Secretary, $EuAsC_2S$-1996
Biotechnology Research Centre
Zhongshan (Sun Yatsen) University
Guangzhou (Canton) 510275, China
Tel: (+86-20)-4185461
or Tel: (+86-20)-4186300-7115
Fax: (+86-20)-4189173 or (+86-20)-4185551
Email: leiy@pebc2ihep.ac.cn

4th Annual RACI Research and Development Topics In Analytical Chemistry Meeting
(9-11 December 1996)
Hosted By: RMIT, Melbourne, Australia

This conference provides a forum for young researchers in the area of analytical chemistry to present their work. We are now calling for expressions of interest from people who wish to be added to our mailing list.

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

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

2-6 December 1996
NZIC Conference 1996: "Molecules for the FUTURE"
Venue: University of Otago, Dunedin, New Zealand
Contact: Dr R M Carr
Chemistry Department
University of Otago
P O Box 56
Dunedin, New Zealand
Tel: (+64-3)-4797932
Fax: (+64-3)-4797906
Email: chemmail@otago.ac.nz

2-6 February 1997
The Australian and New Zealand Society for Mass Spectrometry 16th Conference (ANZSMS 16)
Venue: University of Tasmania, Tasmania, Australia
Contact: Mures Convention Management
Victoria Dock
Hobart, TAS 7000, Australia
Tel: (+61-002)-312121
Fax: (+61-002)-344464
Email: mures@hba.trumpet.com.au
http://www.csl.edu.au/ANZSMS/anzsms16.html

3-7 February 1997
22nd Australasian Polymer Symposium
Venue: Auckland, New Zealand
Contact: Mr N R Edmonds
Faculty of Science and Engineering
Auckland Institute of Technology
Private Bag GPO, Auckland, New Zealand
Tel: (+64-9)-3079999 ext: 8181
Fax: (+64-9)-3079973

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

13-17 July 1998
MACRO '98 - 37th IUPAC International Symposium on Macromolecules
Venue: Gold Coast, Queensland, Australia
Contact: Department of Chemistry
University of Queensland
Queensland 4072, Australia
Tel: (+61-7)-3653511
Fax: (+61-7)-3653628

* * * * *

NZIC NEWS

COUNCIL DISCUSSES CHANGE AND THE FUTURE OF THE INSTITUTE

At the recent council meeting, the Council decided that :-

1. The NZIC should immediately improve its public image and publicity. The President to produce a leaflet of current products and services provided by the Institute.

2. An Annual Business Plan should be prepared outlining the products and services that the Institute should provide to satisfy members requirements, and the products and services to be sought from a Secretariat or "service providers". The plan is to be the responsibility of the First Vice-President.

3. A paper to be produced on the membership structure. The two options being the current structure or a Fellow/Member structure. A Fellow to be of a recognised standard, a Member being anyone with an interest in chemistry. The paper is to be produced by the Second Vice-President.

4. The computer systems in the Secretariat to be reviewed as soon as possible. This is to be undertaken by Rob Tilbury of the Wellington Branch.

These actions are to be ratified by Council and then by a Special General Meeting if constitutional changes are called for.

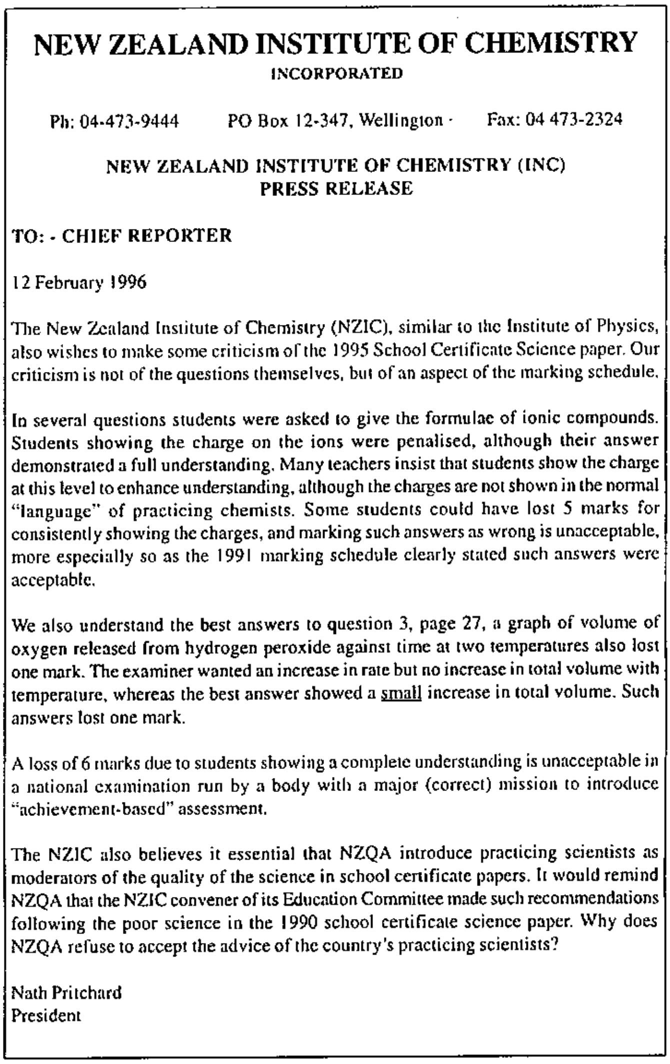
The new image NZIC to be launched at the Dunedin conference in December 1996.

Nath Pritchard, President NZIC

The NZIC *In Action*

School Certificate Science Paper

Below is the NZIC press release on the problems with the marking of the School Certificate Science Paper as sent to the *New Zealand Herald* and a copy of the item as published in the *New Zealand Herald* on Tuesday 13 February 1996.



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INCORPORATED

Ph: 04-473-9444 PO Box 12-347, Wellington · Fax: 04 473-2324

NEW ZEALAND INSTITUTE OF CHEMISTRY (INC)
PRESS RELEASE

TO: - CHIEF REPORTER

12 February 1996

The New Zealand Institute of Chemistry (NZIC), similar to the Institute of Physics, also wishes to make some criticism of the 1995 School Certificate Science paper. Our criticism is not of the questions themselves, but of an aspect of the marking schedule.

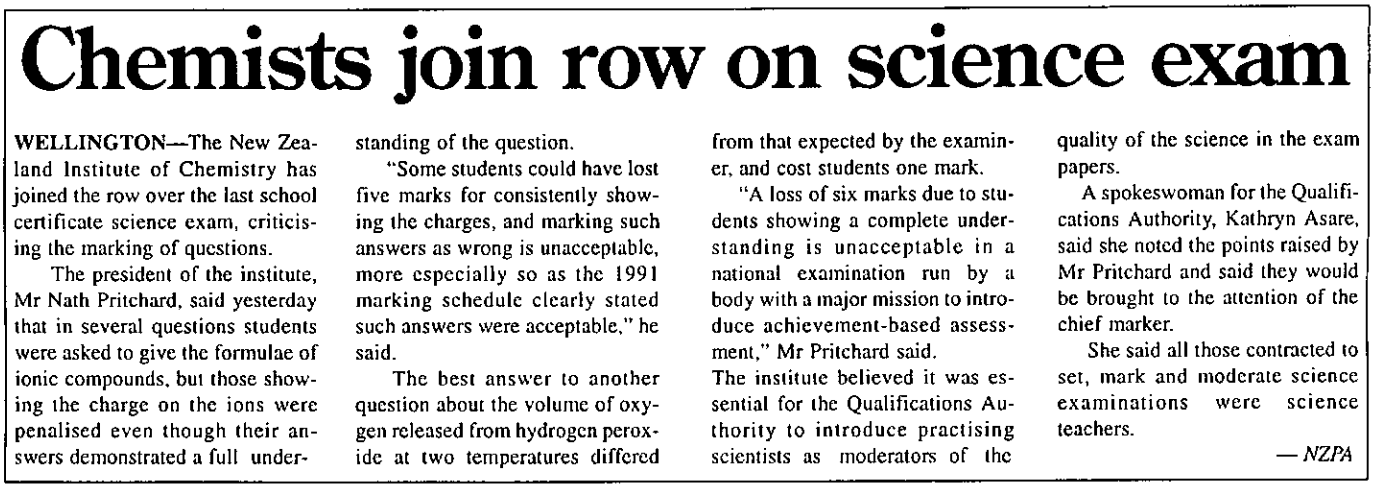
In several questions students were asked to give the formulae of ionic compounds. Students showing the charge on the ions were penalised, although their answer demonstrated a full understanding. Many teachers insist that students show the charge at this level to enhance understanding, although the charges are not shown in the normal "language" of practicing chemists. Some students could have lost 5 marks for consistently showing the charges, and marking such answers as wrong is unacceptable, more especially so as the 1991 marking schedule clearly stated such answers were acceptable.

We also understand the best answers to question 3, page 27, a graph of volume of oxygen released from hydrogen peroxide against time at two temperatures also lost one mark. The examiner wanted an increase in rate but no increase in total volume with temperature, whereas the best answer showed a small increase in total volume. Such answers lost one mark.

A loss of 6 marks due to students showing a complete understanding is unacceptable in a national examination run by a body with a major (correct) mission to introduce "achievement-based" assessment.

The NZIC also believes it essential that NZQA introduce practicing scientists as moderators of the quality of the science in school certificate papers. It would remind NZQA that the NZIC convener of its Education Committee made such recommendations following the poor science in the 1990 school certificate science paper. Why does NZQA refuse to accept the advice of the country's practicing scientists?

Nath Pritchard
President



Chemists join row on science exam

WELLINGTON—The New Zealand Institute of Chemistry has joined the row over the last school certificate science exam, criticising the marking of questions.

The president of the institute, Mr Nath Pritchard, said yesterday that in several questions students were asked to give the formulae of ionic compounds, but those showing the charge on the ions were penalised even though their answers demonstrated a full understanding of the question.

"Some students could have lost five marks for consistently showing the charges, and marking such answers as wrong is unacceptable, more especially so as the 1991 marking schedule clearly stated such answers were acceptable," he said.

The best answer to another question about the volume of oxygen released from hydrogen peroxide at two temperatures differed from that expected by the examiner, and cost students one mark.

"A loss of six marks due to students showing a complete understanding is unacceptable in a national examination run by a body with a major mission to introduce achievement-based assessment," Mr Pritchard said.

The institute believed it was essential for the Qualifications Authority to introduce practising scientists as moderators of the quality of the science in the exam papers.

A spokeswoman for the Qualifications Authority, Kathryn Asare, said she noted the points raised by Mr Pritchard and said they would be brought to the attention of the chief marker.

She said all those contracted to set, mark and moderate science examinations were science teachers.

— *NZPA*

source: *NZ Herald* Tuesday 13 February 1996

FROM THE PRESIDENT ...

One way or another this could be a notable month for the Institute. Of one thing I am certain, whatever transpires will not satisfy everyone. More of that later.

I should like to thank those people who have given positive feedback on my notes or activities page. What I am endeavouring to illustrate is that my activities, albeit informal, are of interest to others. This suggests to me that there is opportunity for all members to inform on their activities, individually or through their Branch Editors.

I have been impressed of late with the letters received from our members. There is an awakening. For some reason I was reminded of a quotation from Thoreau:

"Things do not change; we change".

Perhaps the Institute does not need to change. It is us, the members, that need to change. There is a letter from a chemist no longer practising with his point of view. There is an excellent contribution from three students from my own Branch, Waikato. There are positive suggestions from many others. I am amazed at the diversity of response. I should not be. Chemists are after all thinkers by training.

I particularly liked a series of bullet points from Past President Arthur Williamson. He suggested that we have 'dumped' on the Secretariat. Everything that needs to be done, - "give it to Alan" is the cry. We have in fact been guilty of expecting too much from the Secretariat. This was a thought provoker. I felt guilty. I recalled asking the Secretariat to do things. Never could it, or was it appropriate for it to do so. He carries on to suggest that deep-seated loyalty to the Institute has seen Alan Turner, our EO, attempt to do too much. Thank you Alan for that loyalty.

Lunch recently, with Ken Mackay of Waikato went along interesting and similar lines. He put forward a proposition that some of the activities of the Secretariat could be treated as small projects and be put out to contract. Releasing our EO from some of the more mundane, but necessary, work of the Institute. I liked his thoughts on trying to get to the budding chemists at an earlier age. This suggests looking closely at the range of services and products that we can take part in or supply. A good example is the accompanying article by Michele Prinsep on a Summer Science School held in the Waikato, (see Waikato Branch News).

My thanks to John Packer for his timely contribution on the chemistry elements of the School Certificate Science Exam. The full release appears elsewhere.

The more I hear and read your thoughts the clearer becomes our objective: To offer the membership, a package of cost effective products and services.

By the time you read these notes we will have held a special Executive Meeting and normal Council Meeting in Wellington. I hope we will be some way further down the track of achieving our objective.

Nath Pritchard

Nath Pritchard, President NZIC

NZIC BRANCH NEWS

OTAGO

The Otago Branch has its new committee for 1996. The Chemistry Department of the University of Otago is well represented, as usual, but a range of other groups and interests also have representatives. The committee is [with email addresses]:

- Jim McQuillan (Chairman), a chemistry lecturer working on spectroscopy and electrode surfaces [jmcquillan@alkali.otago.ac.nz].
- George Morris (Secretary), a chemistry teacher at John McGlashan College.
- Mel Carr (Treasurer), a chemistry lecturer with interests in clays and minerals [chemmail@rivendell.otago.ac.nz].
- John Birch, a lecturer in the Consumer Sciences Department, specialising in flavour chemistry [john.birch@stonebow.otago.ac.nz].
- Paul Croucher, a PhD student in the Chemistry Department working on organometallics [paul.croucher@stonebow.otago.ac.nz].
- Barbara Duncan, first year tutor in the Chemistry Department and in charge of schools liaison [bduncan@alkali.otago.ac.nz].
- Rob Ledger, a lecturer in the School of Pharmacy [rledger@gandalf.otago.ac.nz].
- Mike Murphy, a lecturer in the Biochemistry Department specialising in oxidative stress in mitochondria [murphy@sanger.otago.ac.nz].
- Nigel Perry, who runs the Plant Extracts Research Unit for Crop & Food Research [perryn@alkali.otago.ac.nz].
- Eng W. Tan (just call him Tan), a chemistry lecturer with interests in bio-organic chemistry and peptide inhibitors [ewtan@alkali.otago.ac.nz].

Unfortunately we did not (yet) find a representative of local industry for this year's committee, but we tried to make up for this with our first meeting, a visit to Speight's brewery. About fifty people were shown around by Crawford Brown, Speight's master brewer, who explained the technical details of the process. This was followed by refreshments (frothy) and a talk by Jean-Pierre Dufour on "The Chemical Evaluation of Beer Flavour Stability." Jean-Pierre is professor of Food Science in the Consumer Sciences Department of Otago University. The evening was rounded off by a restaurant meal, subsidised for students as part of our drive for new members.

One of the main events here in Otago this year will be the National Conference, 2-6 December. Jim McQuillan, Mel Carr and Nigel Perry are representing the Otago Branch on the organising committee, which is chaired by Brian Robinson.

Nigel Perry

MANAWATU

For our 23 February meeting we hosted Professor Jim P Collman, the George A. and Hilda M. Daubert Professor of Chemistry, Department of Chemistry, Stanford University. He is an eminent scientist who has won numerous honours and awards, including Churchill Fellow (Cambridge), 1977- present; California Scientist of the Year 1983; Visiting Professor, University of Auckland 1985; American Chemical Society Award for Distinguished Service in the Advancement of Inorganic Chemistry 1991. Professor Collman and his wife had dinner with members of the Branch Committee and Branch members at the Village Inn Restaurant and then he spoke to twenty-two members in the HortResearch seminar room on "Functional models of oxygen binding/activating heme proteins". In this talk Professor Collman gave us the benefit of his 25 years experience in bioinorganic chemistry with fascinating descriptions of "picket fence" porphyrins (New Zealand researchers were involved in early work on these), "pocket" and "picnic basket" porphyrins, and their O_2 and CO binding kinetics. A very lucid talk concluded with a description of novel syntheses for a cytochrome c oxidase model.

Rachel Williamson, postgraduate chemist member from Massey University, has been awarded a travel grant to attend an overseas conference under the Young Scientists' Fund of the Royal Society of New Zealand.

Dr Alastair MacGibbon, New Zealand Dairy Research Institute, was invited to speak at the Milkfat Update Conference (27-28 February 1996) organised by the AFISC (Australian Food Industry Science Centre) in Werribee, Australia.

We congratulate Professor Sylvia Rumball, Dean of the Science Faculty, Massey University on her appointment to the New Zealand National Commission for UNESCO.

Harry Percival

WAIKATO

ECNZ Waikato Science Summer School 1996

The annual ECNZ Waikato Science Summer School was held at the University of Waikato from 21-26 January 1996. Twenty-five current seventh form students from areas as far away as Napier and Gisbome, selected by their local Rotary clubs, gave up the last week of their holiday to participate.

As in previous years, a mystery scenario was created and the students had to analyse clues to try and piece together what had occurred. This year, the scenario involved the disappearance of an elderly Australian couple from the Waiomu Valley area of the Coromandel. Clues found in a pack belonging to the couple such as bottled water, plant samples and shells, along with a diary were used to unravel the mystery.

Monday was taken up in tours of the science departments and the university campus in general, before departure for the field trip late in the aftemoon. The overnight stay at the Waiomu Bay Holiday Park, north of Thames proved enjoyable, as, surprisingly did the students' cooking!

Tuesday saw an early start to the day's activities, with a visit to an old mine in Thames. Although no longer a commercial mine, there was a working stamper battery for students to observe in action, a tour through the mine and a museum of photographs. This was a fitting introduction to the next stage of the trip up the Waiomu Valley to the site of an abandoned mine. Here we collected samples that would characterize the area: rocks, water, stream insects, iron bacteria, plants etc. and went down an old mine drive. After a very late lunch, it was on to Wilsons Bay for further sample collection and finally back to Hamilton.

Above: Students collect samples on the field trip.

The rest of the week was devoted to analysing the samples obtained from the area and matching them to samples contained in the pack. In chemistry, students measured the pH of water samples and analysed the cation content by atomic absorption and atomic emission spectroscopy and the anion content by ion chromatography.

On Wednesday evening, we all crowded into minibuses for a very interesting visit to Huntly power station. After a guided tour around the station we were treated to supper and discussions with the NZIC's illustrious president and other ECNZ employees.

The culmination of the students' efforts was the mock court of enquiry that was held on Friday. Each group presented their findings to a "panel of experts" and other interested parties. A most successful dinner with students, summer school staff and representatives from Rotary and ECNZ was a fitting conclusion to an interesting and enjoyable week.

Left: Michele Princep

Michele Prinsep
Department of Chemistry
University of Waikato

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INDUSTRY APPLICATIONS

VACUUM COMPANY SLASHES LAB'S HUGE WATER BILL

Les Roberts, Industrial Research Ltd's Lower Hutt site manager, began 1996 a very happy man, knowing that he'll no longer have to authorise payment of Hutt City's largest water bill.

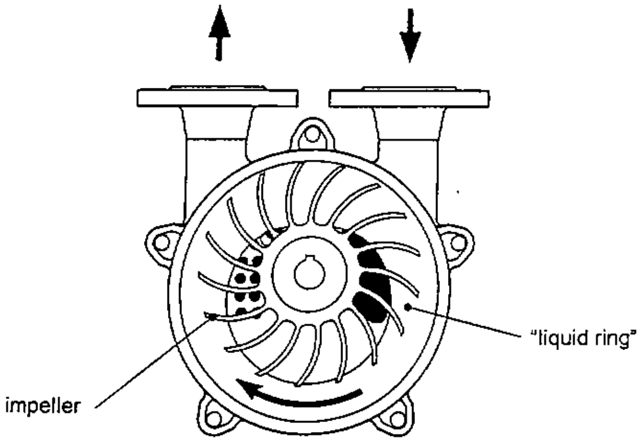
Industrial Research Ltd has laboratory complexes in Auckland, Lower Hutt and Christchurch and employs a total staff of 430. The natural products processing laboratory complex in Lower Hutt houses the largest scale-up pilot research plant of its type in Australasia. The laboratory employs 70 scientists and technicians to conduct research in areas such as chemical processing, plant chemistry and biotechnology. The primary function of the scale-up pilot plant is to generate high value extracts from biological raw materials such as seeds. The chemical process team also investigates the synthesis of organic chemicals for agricultural and pharmaceutical uses. Finding ways to add significant value to New Zealand's primary products is an important role for Industrial Research Ltd.

Until recently, the Lower Hutt laboratory complex was the city's biggest water user, with an annual off-take of 300,000 m^3. This usage was some 25% greater than that of the next largest industrial water consumer in Lower Hutt. Industrial Research's water bill amounted to a whopping $300,000 annually. By mid-1996, as a multi-stage water saving and vacuum system enhancement project comes to an end, Industrial Research's water usage is expected to be well under half of the previous consumption. Cost savings from the much lower water usage, and the associated reduced sewage discharge are projected to exceed $200,000 per year at current costs. The first stage of the project, completed just before Christmas 1995, is already achieving savings equivalent to $90,000 annually.

Industrial Research uses water for many laboratory processes but the largest single use was previously the water supply to the laboratory's central vacuum system. This system provides a vacuum source for laboratory processes such as reduced pressure and temperature distillation, vacuum filtering, vacuum concentration and other low pressure chemical processes. At the heart of the vacuum system are two large liquid ring vacuum pumps, each driven by a 110 kW motor and capable of evacuating over 5000 m^3/h of air and solvent vapours.

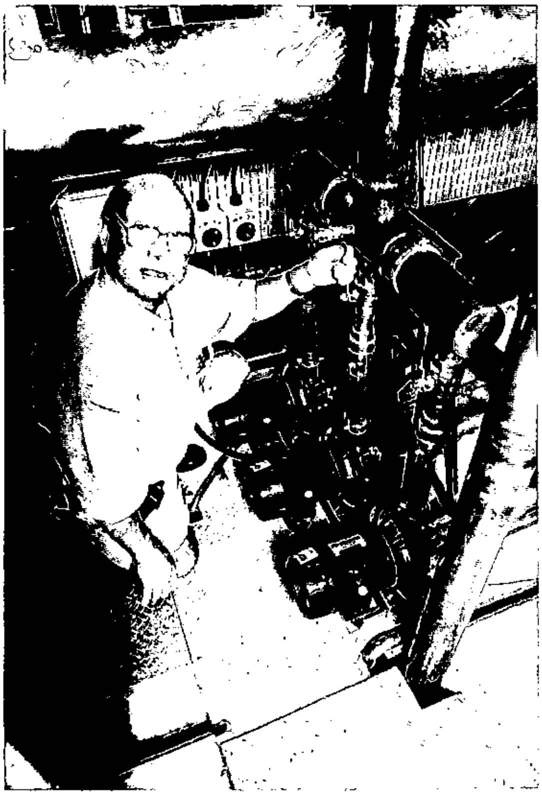
Each of the vacuum pumps requires a water flow in excess of 10,000 litres/hour during operation. (It has been fortunate for Industrial Research that usually just one pump is sufficient to meet the demand.) With this type of vacuum pump, the water is required for both cooling (to dissipate the heat of compression) and as a sealing medium for the pump's vaned impeller. The water "seal" around the vane tips is automatically achieved by the "liquid ring" formed when the impeller rotates and flings water against the outer casing of the pump. Although the thickness of the "liquid ring" remains relatively constant during pumping, the ring always looses water through the exhaust port of the pump. This water loss has to be made-up to sustain the pumping process, hence the considerable water consumption of this type of vacuum pump.

Liquid ring vacuum pumps are widely used throughout industry, and in hospitals, because of their tolerance to "wet" gases and general ruggedness. The liquid ring vacuum pumping process is illustrated in the schematic drawing below.



Having recognised the need to reduce the thirst of its vacuum system, Industrial Research Ltd sought specialist advice from ALTUS Air & Vacuum. ALTUS, with its considerable experience in the area of vacuum and low pressure blowing, concluded that substantial water savings were, indeed, very feasible for the central vacuum system. Even better, *ALTUS* pointed out that water savings and other environmental benefits were possible in other process areas as well. With the assistance of Industrial Research's own technical staff and maintenance contractors, *ALTUS* identified the following potential cost savings and environmental benefits achievable through a staged program of plant enhancement: **1.** Save approximately $90,000 each year by installing a water recirculation and cooling system for the central vacuum pumps and a large hydraulic power unit. **2.** Save a further $90,000 per year by using the same cooling plant to cool and recirculate other process water. **3.** Save $20,000 per year by improving the vacuum capability of the central vacuum system. Enhanced vacuum would eliminate the need for the supplementary water venturi type vacuum pumps previously required for some vacuum processes. **4.** Reduce electricity consumption by adding smaller vacuum pumps to the central vacuum system. Controlled via a monitoring system, these smaller pumps could be used whenever the vacuum requirement was low (which is often the case with the laboratory's widely fluctuating vacuum load). During periods of low vacuum demand, power consumption could be reduced by approximately 80 kW. **5.** Eliminating the discharge of solvent vapours from the exhaust of the vacuum system by condensing and collecting them in liquid form prior to their entry to the vacuum pumps. This will certainly benefit the environment and it is possible the solvents will be recyclable, reducing the substantial solvent supply cost.

Stage 1, the central vacuum pump water recirculation and cooling system, has already been implemented and the projected savings are being realised. Further stages will be installed



Above: Industrial Research's asset manager, Eric Speck inspects part of the water recirculation system expected to conserve more than 150,000 m^3 of water annually.

during the first part of 1996. Implementation is very much a team project, involving Industrial Research's site management, safety and technical staff, the company's regular electrical and plumbing contractors, with overall design and supervision being provided by ALTUS.

The water saving aspect of the project is expected to have a pay-back time of less than 6 months, with a total project pay-back of less than one year. This project, with its significant cost savings and environmental benefits, is proving very satisfying for everyone involved. Installation is being achieved with negligible interruption to the normal workings of the laboratory.

ALTUS's Project Engineer, Paul Vickers, who has engineered several other water savings systems, suggests that all liquid ring vacuum pump users should consider a water recirculation system as the cost savings and environmental benefits can be significant. He recommends Auckland's water crisis not be forgotten either.

For advice on liquid ring vacuum pumps and associated water savings, contact:

ALTUS Air & Vacuum
P O Box 45, Silverdale, Auckland
Ph: (09) 4260370, Fax: (09) 4260371
circle number 52 on the reader reply card

MEASURING THE VISCOSITY OF YOGHURT IN-LINE

On-line control of yoghurt production and processing improves the product quality.

The problem:
The viscosity of yoghurt is an important parameter during the production process. The yoghurt cannot be produced and processed homogenously. During emptying of the fermentation tank, the quality of the yoghurt changes: Segregation and inhomogeneities caused by wrong stirrer configurations will produce yoghurt with changing viscosity.

The classic procedure - taking a yoghurt sample for measurement in the laboratory is labour-consuming and means also a change in the yoghurt sample by the removal. Above all the measurement will be done under different conditions to the process itself.

The solution:

An on-line/in-line measurement of the yoghurt viscosity solves the problem: the viscometer is installed in the main line with the flow-through cell right after the fermentation tank where you can clearly detect if the viscosity i.e. the quality changes. The signal allows immediate action to be taken on process parameters such as stirrer speed.

The measuring principle of the PHYSICA RHEOSWING viscometer perfectly fits the requirements of this application;

- A cylindrical probe rod oscillates in torsional mode at its natural frequency.
- The oscillation amplitude is in the range of nanometers, i.e. there is almost no energy input into the product and thus there is no sample destruction.
- The probe's oscillation is discoupled from the housing and the process by a dynamic fixture (inertial mass).
- There are no rotating parts, no bearings, no gaps and the probe is made of stainless steel : ideal hygienic conditions for food production.
- A wide range of installation modes is available; with flow-through cells for in-line installation in main lines or bypass pipelines as well as direct reactor installation with a flange.

For more information on system configurations and applications contact:

Glenn Grayston, Science & Technology (NZ) Ltd
P O Box 663 Dunedin
Ph: (03) 4777860, Fax: (03) 4777870
circle number 53 on the reader reply card

Microwave-Assisted Extraction For Environmental Samples

With today's emphasis on speed and efficiency in the analytical chemistry laboratory, any technique that will improve the speed and efficiency of solvent extractions is an important one.

Recently there have appeared some exciting applications in agricultural analysis for pesticides and extractions from environmental samples for priority pollutants as well as other organic molecular species using Microwave Assisted Extraction (MAE).

MAE is the process of heating solvents in contact with a sample with microwave energy to partition compounds of analytical interest from the sample matrix into the solvent. The approach is a direct descendant of acid digestion and solvent extraction of organic analytes from solid samples.

The closed-vessel MAE approach can be contrasted to extractions in devices like Soxhlet, which are subject to atmospheric pressure. When using solvents in open devices, the temperature is determined by the boiling point of the solvent at atmospheric pressure. The temperature will in general be consistent unless there is a significant change in the atmospheric pressure. In closed vessels, the solvent can be heated by microwave energy to any temperature, limited only by the vessel's pressure specifications.

In Soxhlet, extraction dynamics may be limited by an azeotrope of solvent mixtures. The boiling point of the azeotrope and the relative ratio of the solvents may limit the analyte solubility. In closed-vessel MAE, the sample is in direct contact with the solvent mixture, not the distilled azeotrope. Analyte solubility can then be maximised by fixing the solvent's mixture ratio and controlling the temperature.

An example of this MAE advantage is the use of a ratio of acetone and hexane that differs from the azeotrope of 60:40. If acetone/hexane is used at atmospheric pressure, it will boil at the azeotrope temperature (52 °C) and limit the solvent ratio to the azeotrope ratio (60% acetone to 40% hexane), independent of the mixture specified by the analyst.

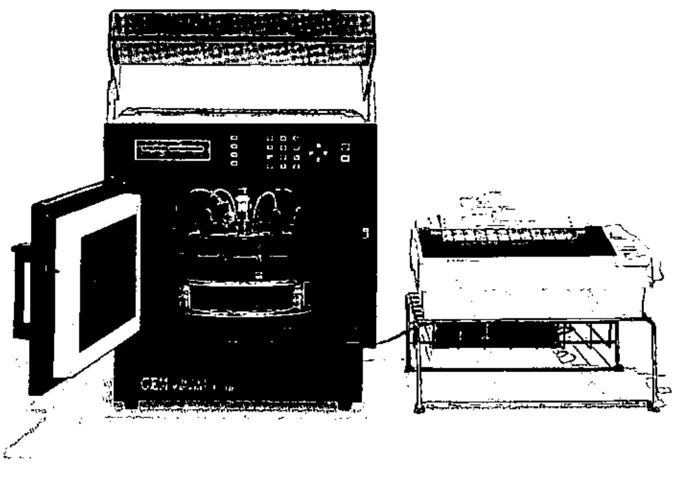


Figure 1: The CEM MES-1000 Microwave Extraction System

The ability to rapidly heat the sample/solvent mixture is inherent to the microwave heating process. Some solvents will heat rapidly in a microwave field while others do not heat because they are microwave transparent.

Therefore, choosing a solvent for its microwave absorbing character is important in order for these extractions to succeed. Also, it is possible to combine solvents into a solvating mixture to effect the needed solvation characteristics and the needed microwave heating.

Another important benefit of MAE is the use of a small volume of solvent, typically 25-50 mL per sample. These volumes are a five to tenfold reduction from those required by traditional solvent extraction methods, thereby reducing exposure to solvent vapours and producing less waste solvent.

The ability to rapidly reach elevated temperatures and hold them for consistent times is most important. By using a temperature monitoring microwave heating instrument such as the MES-1000 by CEM (Figure 1), the analyst can program the temperature needed and be assured that the system will rapidly reach the temperature, then hold it to within 1-2 °C for the set time.

On completion of the heating cycle, removal of the microwave energy enables the vessels to cool rapidly, and the extract can be removed for analyses.

APPLICATIONS

The applications of microwave extraction are widespread, especially in the environmental world. The environmental applications range from polyaromatic hydrocarbons (PAHs) to petroleum hydrocarbons to phenols and pesticides. The samples addressed have generally been solids - soils, sediments, sludges and vegetation. But, recent experience suggests that MAE will also be important for the extractions of some compounds from liquids. Descriptions of some of the solid applications follow.

Poly-Aromatic Hydrocarbons(PAHs)

Experimental methods documenting recoveries of priority pollutants from soil have been developed by various investigators. At Midwest Research Institute (MRI) in California, Lopez-Avila and co-workers addressed the extraction of PAHs from Standard Reference Material soils and sediments.[1]

They developed an analytical technique using the MES-1000 for extraction followed by GC-MS for analyses of 14 unlabelled and three labelled PAHs. They compared MAE with Soxhlet/Soxtec and sonication extractions. Their goal was to maximise recoveries by optimising the solvent mixture and volume plus extraction temperature and time. They studied a variety of solvents and mixtures. PAH recoveries with the MES-1000 using their optimised conditions were greater than 80% of the certified value (range of 80 to 150%) with relative standard deviations less than 10%.

Another method documenting PAH recoveries was conducted at BCO, Centre for Research, in the Netherlands. The goal of this study was to develop a microwave extraction technique for simultaneous PAH and total petroleum hydrocarbon (TPH) determinations. The researchers compared MAE to their in-house liquid/liquid and SFE extraction methods. Analyses for all extractions were by HPLC. The results showed that the microwave extraction system provided a short extraction time, high throughput and reduced solvent usage, all with increased recoveries. Recoveries of PAHs were much higher than the liquid/liquid extraction method. The recoveries compared to SFE were similar.

Pesticides

Extraction of pesticides from environmental samples has also been documented. The first report was from Ganzler and co-workers in Hungary.[2]

Their work is significant since it is among the first published accounts of microwave-assisted solvent extractions. They extracted parathion and bromophos from 1 g of spiked soil samples, and concluded that microwave extraction is more effective than the traditional Soxhlet extraction, especially for polar compounds.

Lopez-Avila *et al.* studied recoveries from 20 organochlorine pesticides from SRM soils and sediments.[1] They wanted to study conditions for optimum microwave solvent extraction without degradation of the analytes. They point out that MAE is a viable alternative to Soxhlet methods while using less solvent. The main advantage they state is reduced extraction time with increased throughput.

These workers report that the recoveries of the organochlorine pesticides were at 83% to 117% of the certified values.

Total Petroleum Hydrocarbons (TPHs)

Extractions of TPHs from environmental samples is yet another application area for MAE. Scientists at CEM have studied the recoveries of TPHs from standard reference materials (soils) and contaminated ground water using the MES-1000 system.[3]

It was found that the MAE technique generated reproducible extraction conditions as a result of the system's ability to control the temperature of the extraction.

The recoveries obtained with the MES-1000 were compared to those obtained using Soxhlet and sonication extractions. The solvent chosen was acetone/hexane. Quantitation of the TPHs was done gravimetrically. The time course of a typical microwave extraction for TPHs from a moist soil is shown in Figure 2. The precision of the temperature control is seen in this Figure. Compared to the sonication procedure, solvent volume was reduced tenfold using MAE with equivalent or higher recoveries.

In comparison to the Soxhlet extraction, recoveries were equivalent or higher with a 66% reduction in solvent usage and a reduction in sample preparation time from 7 hours for one sample to 30 minutes for 12 samples.

As mentioned earlier, a study documenting recoveries of TPHs from soils was also conducted at BCO, Centre for Research. One of the goals of this study was to ascertain if a single extraction protocol could be used for both TPHs and PAHs. The recoveries for MAE were compared to liquid/liquid extractions. The microwave extraction showed substantially higher recoveries than did the liquid/liquid extraction for standard reference materials. Recoveries for real samples were much more comparable between the two techniques. The recoveries for real samples typically do not vary by more than 10% between the in-house method and MAE for both sets of analytes.

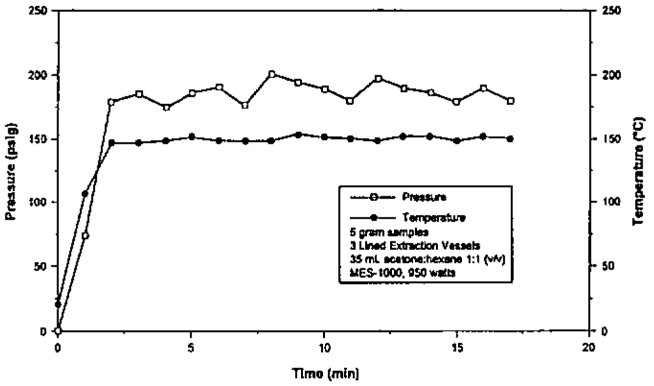


Figure 2: Temperature/pressure heating curve for high moisture soil extraction.

Phenols

Extraction of phenols from environmental samples was also documented by MRI.[1] They extracted SRM soils for 14 phenols. Analyses were by GC-FID. Their goal was to optimise extraction conditions based on solvent mixtures as well as extraction temperatures and times. The authors found that the recoveries of the phenols were substantially lower at room temperature than at elevated temperatures. Generally the recoveries were over 80% for the majority of the phenols they studied.

SUMMARY

The advantages of MAE for extraction of organic compounds from environmental samples are many. Work so far shows MAE offers increased recoveries over most conventional methods.

References

1. Lopez-Avila V., Beckert W. F., Young R. 'Microwave-assisted extraction of organic compounds from standard reference soils and sediments.' *Analytical Chemistry*, 1994, Vol. **66** No. 7, 1097-1106.

2. Ganzler K., Bati J., Valko K. 'A novel sample preparation method for chromatography.' *Journal of Chromatography*, 1986, **371**:299-306.

3. Hasty E., Revesz B. 'Total petroleum hydrocarbon determination by microwave solvent extraction.' Presented at the 1994 Pittsburgh Conference and Exhibition. Paper #1144.

For more information on microwave extraction for food and environmental applications, contact:
Kevin Moloney, A.i. Scientific Ltd
39a Woodcote Drive, Glenfield, Auckland
Ph: (09) 4433940, Fax: (021) 788940
circle number 54 on the reader reply card

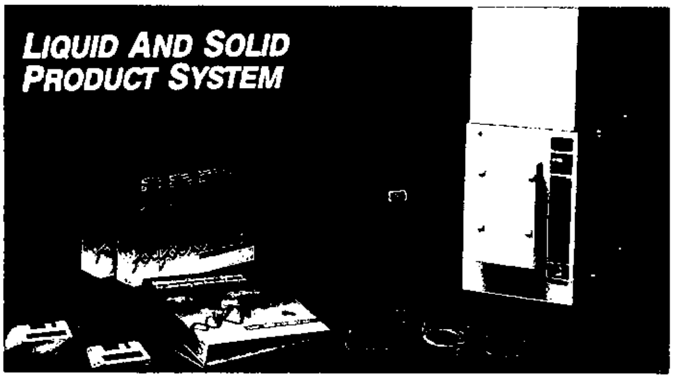
ON-LINE ANALYSIS OF CHEESE BY NEAR-INFRARED SPECTROSCOPY

Introduction

In the dairy industry, competition is high and quality is a necessity. Increased profitability is only realized through reduction of out-of-specification product and maintenance of product consistency. Without rapid analysis, product is packaged before the laboratory results are available. Efficient process monitoring or process control can only be effected by incorporating analytical instrumentation into the process to provide real-time chemical process information.

Near-infrared spectroscopy (NIRS) has traditionally been used in the agricultural and food processing industries for rapid quality control analysis in the laboratory. Through the use of fibre optics, near-infrared (NIR) instruments can now be interfaced directly to the process stream. They provide real-time chemical process information with levels of precision and accuracy comparable to laboratory methods of analysis.

To demonstrate the efficacy of NIRS for the on-line analysis of dairy products, an NIRSystems Process Analytics Model 5500 On-Line Spectrophotometer is used to monitor the fat and moisture levels in a process cheese stream. To accommodate this process analysis, an in-line flow cell was designed that provides a 1 cm pathlength in a 3-inch pipe.



Experimental

On-line spectral measurements were obtained in transmission using an NIRSystems Process Analytics Model 5500 On-Line Spectrophotometer from 400 nm to 1100 nm. The process interface was accomplished by forming a 1 cm pathlength venturi in a 3-inch process pipe with sapphire windows, to which fibre optic probes were positioned at 180 degrees to each other. The flow cell is constructed of food grade approved materials: 316 stainless steel and sapphire optical interfaces. The temperature of the process stream was 80 °C. Standard probe configurations can withstand pressures of 1000 psi and temperatures of 200 °C.

Calibration samples (n=39) were extracted at a time corresponding to the middle of the spectral data acquisition. For fat, duplicate Mojonnier results were within 0.15%. A 5-hour vacuum oven method provided duplicate moisture levels within 0.2%.

Results and Discussion

The on-line NIR spectra of representative process cheese samples are presented in Figure 1. The prominent absorption band at 975 nm is due to water. The baseline variations are due to differences in the total solids content of the cheese samples. Although difficult to isolate, subtle spectral features related to fat occur at about 920 nm.

To enhance spectral features and reduce baseline offsets, the second derivative of the absorbance data was calculated (Figure 2). In the second-derivative spectra, absorbance maxima are inverted to peak minima. Again, the most prominent absorption band was due to water at 975 nm. Spectral variations associated with differences in the fat level of the samples are readily seen in the second-derivative spectra at 920 nm.

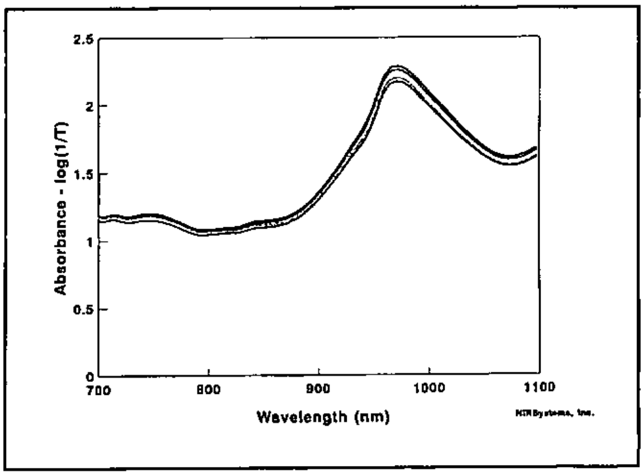


Figure1: On-line NIR absorbance spectra of process cheese samples.

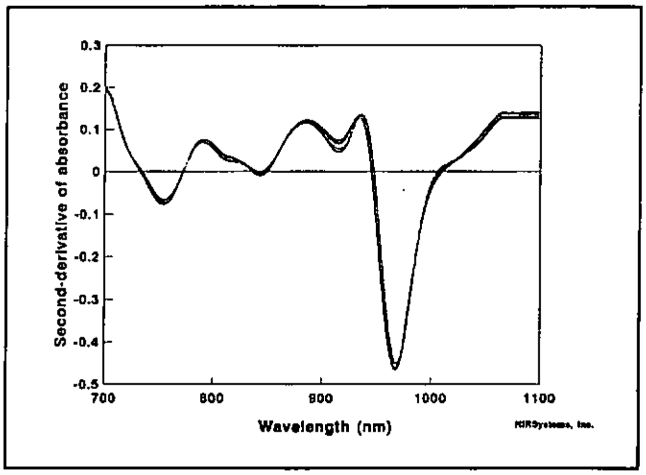


Figure 2: NIR second-derivative absorbance spectra of process cheese samples.

A linear least-squares regression analysis was performed between the reference analytical data and the second-derivative data in the 920 nm region for fat and the 975 nm region for moisture. A summary of the regression results is provided in

Table I. In this table, K(0) is the y-intercept and K(1) is the slope of the regression line. The standard error of calibration (SEC) is the standard deviation of the data about the regression line, and r is the correlation coefficient. Optimal results were obtained at 914 nm for fat and 956 nm for moisture. These wavelengths correspond to the absorption bands unique to each constituent, and reside in regions of minimal physical and chemical interference.

A scatter plot of the NIRS-calculated and the Mojonnier fat results is presented in Figure 3. A scatter plot of the NIRS-calculated and the vacuum oven results is presented in Figure 4.

Table I: Regression Summary for fat and moisture in process cheese samples.

Analyte	Wavelength	Constants	r	SEC(%)
fat	914 nm	K(0)=28.037 K(1)=-76.231	-0.96	0.17
moisture	956 nm	K(0)=24.799 K(1)=-83.505	-0.98	0.23

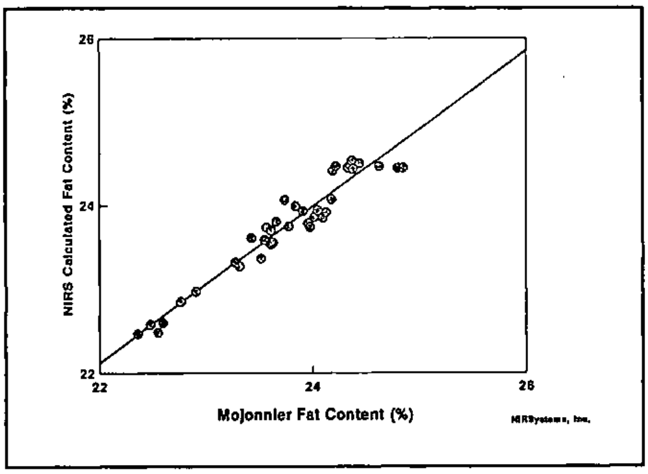


Figure 3: NIRS calculated versus Mojonnier fat levels in process cheese.

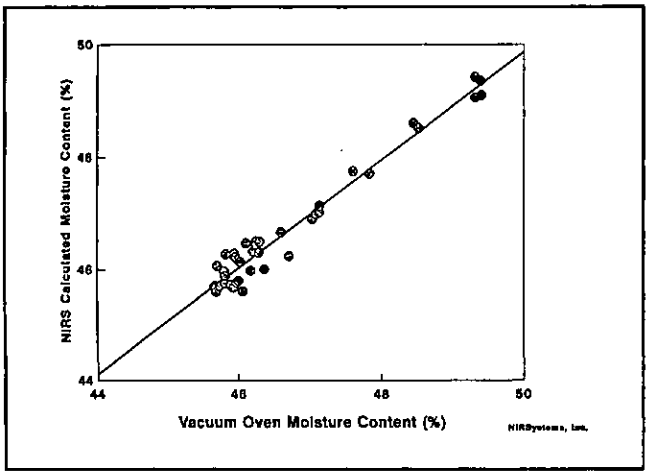


Figure 4: NIRS calculated versus vacuum oven moisture levels in process cheese.

Conclusions

On-line monitoring of a process cheese stream can be achieved in real-time using near-infrared spectroscopy. Improved product quality is expected with on-line NIRS measurements, since the NIRS results enable prompt adjustments to be made to the process.

For more information on other food and dairy industry applications for near-infrared spectroscopy:

Contact: Glenn Grayston, Science & Technology (NZ) Ltd
P O Box 663 Dunedin
Ph: (03) 4777860, Fax: (03) 4777870
circle number 55 on the reader reply card

"PERSPECTIVES IN MARINE NATURAL PRODUCTS 1996"

Conference Centre, University of Auckland, 11-12 July 1996

This is a two-day symposium organised by the Department of Chemistry, University of Auckland and sponsored by the Auckland Branch, and the Fats and Oils Group, of the NZIC. It aims to promote interest in marine natural products and to show the importance of chemistry in this sphere. It follows similar successful symposia held in Auckland in 1982, 1987, and 1991.

The programme will consist of 11 invited lectures of 1 hour, and contributed papers of 20 minutes. The convenor welcomes additional contributions for the 20 minute lectures.

The provisional list of invited lecturers is:

Dr J Blunt, Chemistry Department, University of Canterbury, Christchurch, New Zealand.
Dr P Murphy, Australian Institute for Marine Science, Townsville, Australia.
Dr R Capon, Organic Chemistry Department, University of Melbourne, Melbourne, Australia.
Dr J Volkman, Department of Oceanography, CSIRO, Hobart, Australia.
Dr B Bowden, Department of Chemistry and Biochemistry, James Cook University, Townsville, Australia.
Dr M Garson, Organic Chemistry Department, University of Queensland, Brisbane, Australia.
Dr J Coll, University of Central Queensland, Rockhampton, Australia.
Dr T Molinski, Department of Chemistry, University of California, Davis, USA.
Dr P Northcote, Department of Chemistry, Victoria University, Wellington, New Zealand.
Professor R Anderson, Department of Chemistry, University of British Columbia, Vancouver, British Columbia, Canada.
Professor D J Faulkner, Scripps Institute of Oceanography, La Jolla, California, USA.

The social programme includes a seafood lunch on 11 July and a happy hour on 12 July at the end of the symposium. Visitors from out of town can be accommodated at O'Rorke Hall on request to the Convenor, and parking in the lower car park can be arranged for a minimal fee.

As a consequence of generous sponsorship, the registration fee has been set at only NZ$100 and in order to encourage as many students as possible to attend, a fee of NZ$50 has been set for *bona fide* students. Registration forms are available from the Convenor, Professor R C Cambie, Department of Chemistry, University of Auckland, Private Bag 92019, Auckland. Telephone +64-9-3737599.

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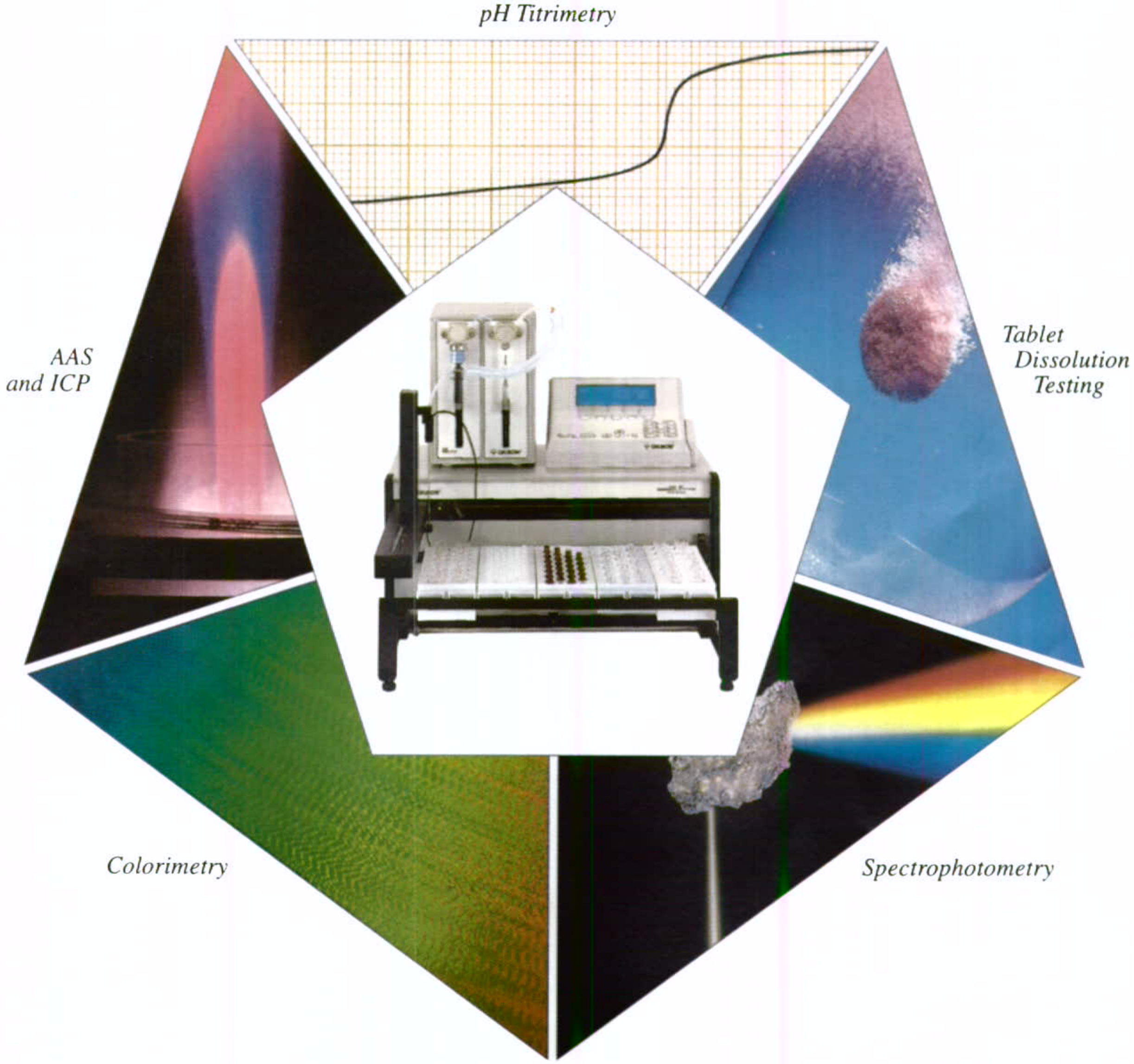

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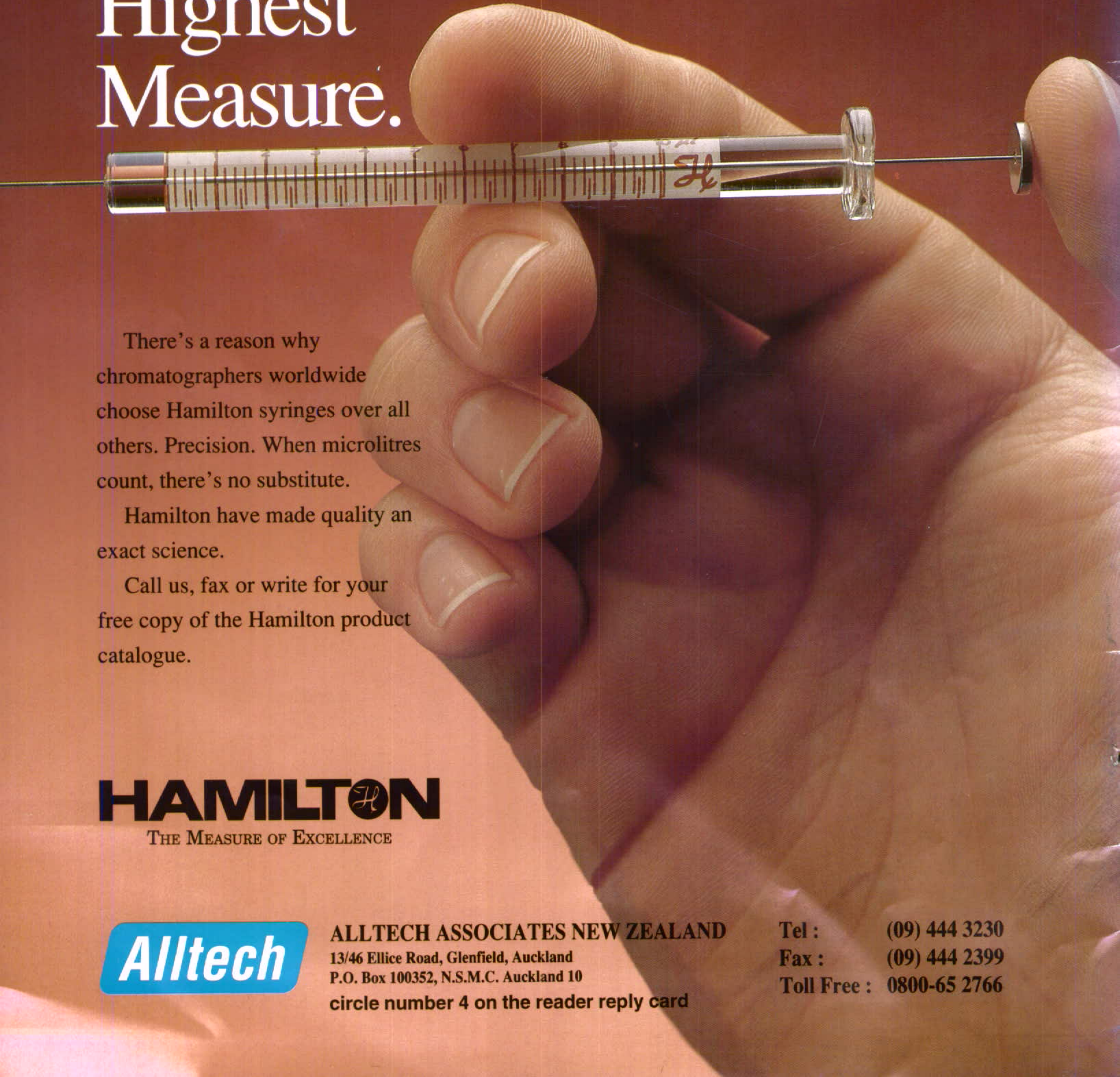

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Chemistry in New Zealand Mar. 1996

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