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NZIC Chemistry IN NEW ZEALAND

ISSN 0110-5566

Focus on Pharmaceuticals, Cosmetics, Nutrition

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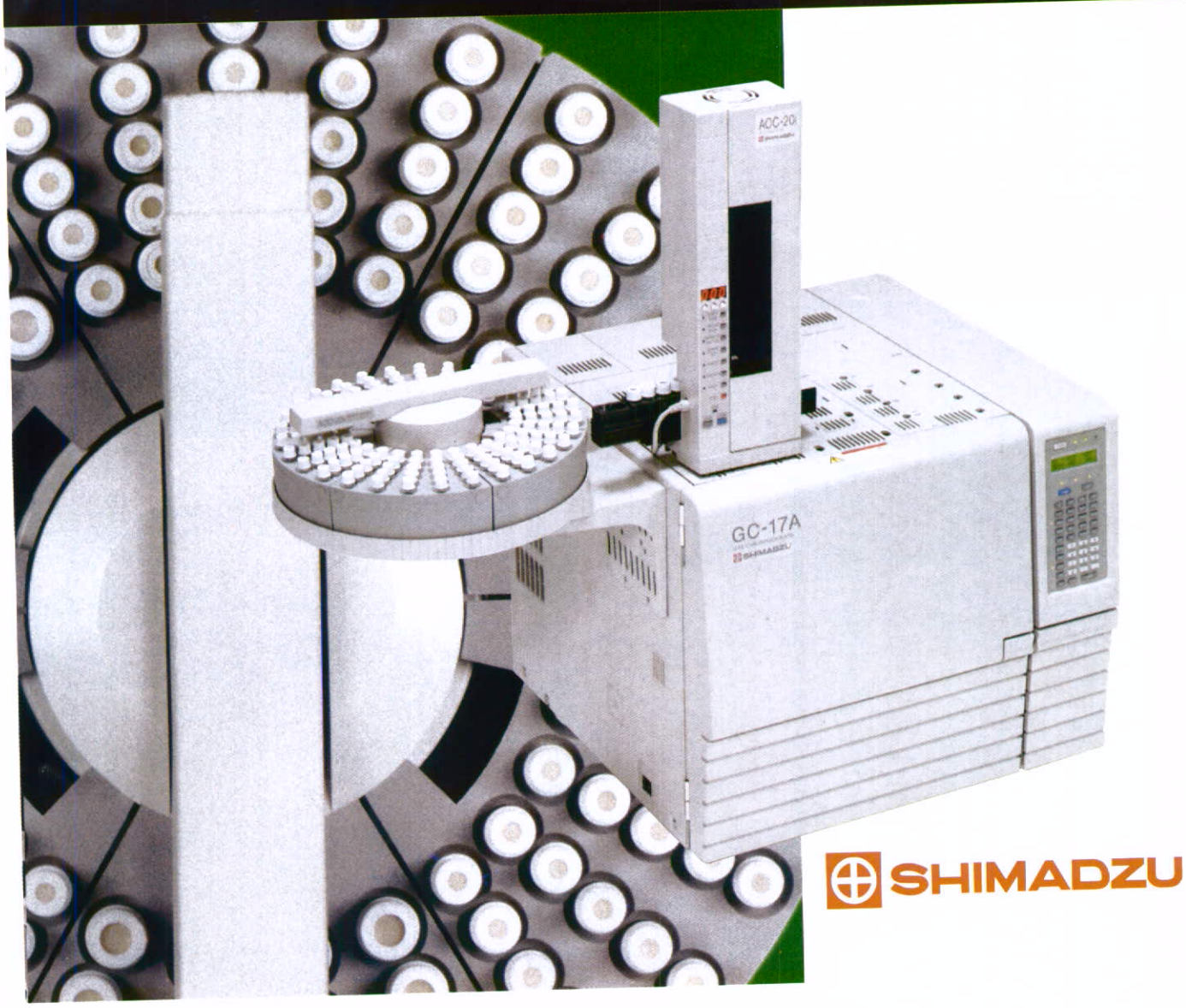

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UP FRONT ...

Regulations e.g. ISO or GLP have led to a need for greater assurance of weighing reliability and precision in laboratories and plants. Mettler-Toledo have now equipped their complete balance range with fully automatic internal adjustment.

For further information see the cover story article on page 2

NZIC Chemistry IN NEW ZEALAND

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IN THIS ISSUE ...

COMING UP ...

September 1997 - The Dairy Industry

November 1997 - Petroleum and Oil Industry

Deadline for material:
5th of the month of publication

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COVER STORY

METTLER-TOLEDO BALANCES WITH SELF-ADJUSTMENT

Internal regulations (e.g. following ISO or GLP) have increased the need for greater automatic assurance of the weighing dependability in laboratories and plants. Mettler-Toledo AG has now equipped its medium level balances (<<Standard Level>>: AG models and the recently developed PG-S series) with those features which were formerly reserved only for products which had to fulfil the most exacting requirements. The complete balance range, up to 32 kg, capacity now has fully automatic internal adjustment (FACT; Fully Automatic Calibration Technology). Due to built-in temperature sensors, the balance can itself recognise when a readjustment is indicated; the internal weight is loaded automatically and its value determined. However, the user can also initiate this operation.

On the other hand, in-plant regulations may stipulate the use of external test weights. Such an adjustment can be performed at up to four points in the weighing range with the <<VariCal>> function. The balances thus always operate with a constantly high accuracy and ensure traceability of the measured values to in-house standards at all times. With the LC-P45 Printer for normal paper, available as an option indelible printouts with all relevant records (time, date, balance identification number, signature field) can be generated. The RS232C interface built into the balance is used for a standardised point-to-point connection to a printer or computer. The LocalCAN universal interface is available as an option for expansion to a small system with up to five peripheral devices. With the plug-in application cassette, the balances can always be used for new tasks (e.g. density determination, differential weighing).

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BAN DIHYDROGEN MONOXIDE!

The invisible killer
Dihydrogen monoxide is colourless, odourless, and tasteless, and kills thousands of people throughout the world every year. Most of these deaths are caused by accidental inhalation of DHMO, but the dangers of dihydrogen monoxide do not end there. Prolonged exposure to its solid form causes severe tissue damage. Symptoms of DHMO ingestion can include excessive sweating and urination, and possibly a bloated feeling, nausea, vomiting and body electrolyte imbalance. For those who have become dependent, DHMO withdrawal symptoms mean certain death.

Dihydrogen monoxide:
* is the major component of acid rain
* contributes to the "greenhouse effect"
* may cause severe burns
* contributes to the erosion of our natural landscape
* accelerates corrosion and rusting of many metals
* may cause electrical failures and decreased effectiveness of automobile brakes
* has been found in excised tumors of terminal cancer patients

Contamination is reaching epidemic proportions
Quantities of dihydrogen monoxide have been found in almost every stream, lake and reservoir in New Zealand today. But the pollution is global, and the contaminant has even been found in Antarctic ice. In the Northland alone DHMO has caused millions of dollars in property damage.

Despite the danger, dihydrogen monoxide is often used:
* as an individual solvent and coolant
* in nuclear power plants
* in the production of Styrofoam
* as a fire retardant
* in many forms of cruel animal research
* in the distribution of pesticides. Even after washing, produce remains contaminated by this chemical
* as an additive in certain "junk-foods" and other food products

Companies dump waste DHMO into rivers and the ocean, and nothing can be done to stop them because this practise is still legal. The impact on wildlife is extreme, and we cannot afford to ignore it any longer!

The horror must be stopped
The Government has refused to ban the production, distribution, or use of this damaging chemical due to its "importance to the economic health of this nation". In fact, the navy and other military organisations are conducting experiments with DHMO, and designing multi-million dollar devices to control and utilize it during warfare situations. Military facilities receive tons of it through a highly sophisticated underground distribution network. Many store large quantities for later use.

It's not too late
Act now to prevent further contamination. Find out more about this dangerous chemical. What you don't know CAN hurt you and others throughout the world.

... / continued on page 5

LOCAL NEWS

TECHNOLOGY MANAGEMENT INNOVATION PROGRAMME

South Island companies are amongst New Zealand's most technologically innovative and in recognition the country's only executive technology management post-graduate programme is holding two modules in Christchurch this year, out of the nine run annually.

The University of Waikato's Technology Management and Innovation (TMI) programme is modelled on the highly successful Massachusetts Institute of Technology programme and is unique in New Zealand in that it focuses on creating technologically adept managers who understand the value of technology and how to manage it for profit. Modules can be taken separately or grouped to give a Masters or diploma.

"Whilst companies are eager to embrace new technology, or carry out R&D in new areas, they are frequently caught in a bind," according to TMI guest presenter Mr John Cunningham. " I believe scientists and engineers need to be more exposed to commercial realities in undergraduate study, whilst at the same time, senior management needs to understand that technology can give a competitive advantage and increased profit to companies."

With an engineering background followed by senior management positions in a multi-national company, and now a director in Caltech Capital Partners, a venture capital organisation specialising in technology, Mr Cunningham has the credentials to see both sides of the equation. As chairman of the TMI Advisory Committee he also is a firm believer in the need for boosting lower to middle management skills in turning technology into commercial success.

"Management needs a mix of business and technology smarts," he said. "If New Zealand is to compete successfully internationally we need to put more emphasis on postgraduate training which expands individual horizons and helps businesses to understand that the traditional management ladder, of isolating scientists and engineers whilst management-mainstreaming lawyers and accountants, has significant impact on a company's ability to adapt and grow in a technological age," he said.

Cunningham was one of the guest presenters at the 'Risk Management for Technology Companies' executive course run by TMI, June 23-27, 1997, in Christchurch. The other presenter was Piet Beukman, Director of the Engineering Management Programme at the University of Canterbury. Beukman will also anchor the next Christchurch module, 'Maintenance Management for Technology Companies', in August.

For more information contact:
Bob Mills/Geoff Boxell, TMI Unit
University of Waikato
Ph: (07) 8384579 Email: tmi@waikato.ac.nz

PLASTICS INDUSTRY POISED FOR MARKET GROWTH

Predictions of a huge increase in plastics consumption in Asia is likely to lead to a boom in exports and long-awaited growth for the New Zealand plastics industry, according to Mr Laurie Cranfield, President of the Plastics Institute of New Zealand (PINZ).

In an address to the PINZ annual conference recently, Mr Cranfield said the local industry was poised to take advantage of growing markets, with significant investment in new plant and equipment and an emphasis on leading edge technology.

Despite a current low in general business confidence, with manufacturing being the most pessimistic of all, Mr Cranfield believed investment by plastics industry manufacturers heralded a belief in future potential. With advantages of light weight, design flexibility and technical performance, low conversion cost and ease of recycling, plastics are increasingly superseding traditional materials, particularly in packaging and construction.

Additionally, a 'tsunami' of petrochemical capacity coming on stream will add to raw material cost advantages and provide huge growth potential for New Zealand manufacturers. To ride this wave, the Plastics Exporters Group working with Tradenz, was recently set up to promote plastics exports.

Mr Cranfield blamed a too-rapid drop in barriers, the trend to globalisation, and high bureaucratic compliance and social costs as historical factors which have impacted on manufacturers.

"Many multi-national producers of personal care and household products and foodstuffs have relocated to Australia or South East Asia, with resulting job losses both in those companies and amongst the companies supplying services such as packaging," he said.

"If lower prices for the New Zealand consumer were a result of this reorganisation, then we could at least see some benefit, but we doubt that low prices have occurred. Whilst few companies would want to see a return to protection, we don't yet have the level playing field we hoped would come with economic restructuring and dismantling of import restrictions."

CO-OPERATION AGREEMENT ANGLIAN WATER INTERNATIONAL (NZ) LTD AND WASTE MANAGEMENT NZ LTD

A co-operation agreement has been signed between Anglian Water International (NZ) Ltd and Waste Management NZ Ltd with the objective of jointly pursuing water, wastewater and water services business in New Zealand.

Anglian Water brings to the New Zealand market the expertise it has developed in delivering water and wastewater services to over 5 million customers in the British domestic, commercial

and industrial markets. It is undertaking the $149 million Clearwater Project for the Wellington City Council, which includes a 21-year operation period.

Through investment in innovation and product development, Anglian Water is at the leading edge of water and wastewater technology and has proprietary rights to some of the world's most advanced systems and processes.

Waste Management is the largest provider of environmental services in New Zealand. It is uniquely well equipped to offer waste handling and disposal, hazardous waste treatment and disposal, water and waste water treatment, and the construction of state-of-the-art waste disposal facilities. As part of the world's largest environmental services company - Waste Management Inc, Waste Management NZ Ltd has special capability to care for the environment without compromising the ability of future generations to sustain economic needs.

Together both companies offer a unique combination of resources and experience to New Zealand local authorities and industries challenged by the critical need for higher quality water supply, wastewater treatment and water services.

CALIBRE PLASTICS LAUNCHES A WEB SITE

Calibre Plastics announce the launch of their new internet address: http://www.calibre.co.nz

The web site comprises an index page, linked to individual product pages of descriptive text and pictures.

Pages are included for Smoothflow Fume Cabinets, Fumeflow PVC centrifugal fans, Fumeflush scrubbers, Captair ductless fume hoods, Smeg glassware washing machines, Trafalgar flammable goods storage cabinets and more.

The site also includes an article written about fume cupboards, to inform technicians about legal safety performance requirements, and to enable technicians to make informed choices for their own safety.

NEW EDUCATION AND SCIENCE SELECT COMMITTEE

A new Education and Science Select Committee has been appointed following the formation of the Coalition Government. Its function is to review all bills relating to education, research, science and technology. It also carries out inquiries, considers the estimates and conducts the annual financial reviews of the Government departments and crown entities in these areas.

The membership of the new Committee is: Tony Steel (Chair), Belinda Vernon (Deputy Chair), Donna Awatere Huata, Gerry Brownlee, Liz Gordon, Janet Mackey, Deborah Morris, and Jill White.

RECENT ACTIVITIES OF THE NSS COMMITTEE FOR CLIMATE CHANGE

The National Science Strategy (NSS) Committee for Climate Change has recently published its fifth annual report. Copies are available from The Royal Society of New Zealand, P O Box 598, Wellington, Email : usher.s@rsnz.govt.nz. The committee is in the process of establishing a web site with the Royal Society's *Gateway to New Zealand Science* web server: http://www.rsnz.govt.nz

The report this year outlines the emerging gaps in climate change science compared with the funding strategy set out in the forth annual report.

The key gaps are:

• comprehensive studies of greenhouse gas emissions, particularly ruminant methane and nitrous oxide which address sources, sinks and the potential formitigation, and the implications for policy development and refinement of New Zealand's inventory, especially methane and nitrous oxide fluxes;

• aerosol chemistry and cloud research;

• research in New Zealand into climate-related pests and diseases of biological systems and human health;

• climate change research related to economic plants and biological systems;

• indigenous forests as sinks, including the impact of possums and other animal pests;

• ultraviolet radiation monitoring to better understand the processes and effects of UV radiation on human health and biological systems;

• transport-related research which addresses people's behaviours in the use of fuels and means of modifying behaviours to reduce carbon dioxide emissions;

• coastal (including sea level) monitoring and research on coastal physical processes, to underpin coastal impact projections;

• better validated economy-wide models to test economic impacts of public policy; and

• energy-related research on climate adaptation and effects, including building design and construction.

The committee is currently undertaking discussions with providers to ensure the gaps in climate change science are well understood and to ensure that quality programmes are put up for funding in those areas.

The Minister has raised with the committee the importance of the need for ongoing departmental operational research on climate change to be funded and well coordinated by all government agencies. This has also raised the need for science input to policy development to be well coordinated and peer reviewed. The committee will be giving specific attention to this issue and providing advice to the Minister.

The committee has met with the Foundation advisory committees to identify the emerging gaps and to discuss ways in which the NSS climate change strategy can be better integrated with the allocation process. The committees expressed interest in seeing the NSS. Committee's priorities picked up by the providers.

CALL FOR SCIENCE PROJECT PROPOSALS FOR 1998

Project proposals for 1998 are now called for under the France/ New Zealand Cultural Agreement. There are no priority areas for funding, however some key areas where previous funding has been granted are: environment, agriculture and forestry, chemistry, physics, modelling and marketing. Finance is provided on a yearly basis, but projects included in a three to five-year plan are preferred.

The researcher's work should fit within the framework of their institute or university, but this should not exclude strongly motivated individuals from applying. The proposal should demonstrate benefits to both New Zealand and France. The scientists should find a counterpart in France with whom they need to develop and submit the project. Heads of the French and New Zealand research institutes should write a letter of support for the proposal and argue in favour of the proposal from their own country's perspective.

Financial support provided is not restrictive and may cover internal travel and living expenses in France (or New Zealand in the case of a French candidate), grants for laboratory works, etc. Projects are funded on a reciprocal basis, each country contributing 50 percent of each project. The French Ministry of Foreign Affairs finances about 20 percent of the French contribution. The project must be presented in detail and be accompanied by the justified financial request and other sources of funding.

Deadline for 1998 - 30 September 1997.

Application forms are available by writing (letter, fax or email) to: Dr SergeVerniau, Cultural and Scientific Counsellor, or Ms Christine Lodge, Assistant at the Embassy of France,
Cultural and Scientific Section,
34-42 Manners Street,Wellington
Fax: (04) 384 2578, Email: fnzi@mail.netlink.co.nz

DEVELOPING NEW LINKAGES IN THE ASIA/PACIFIC REGION

As New Zealand's trade with Asia has risen dramatically in the last few years, we are beginning to see ourselves as very much part of the Asia-Pacific community, and are developing new linkages with Korea, Japan, China and Malaysia.

Although we may not get the same immediate science benefits that we get through our more traditional linkages, these economies are rapidly building their research capabilities and investing large mounts of money in research and development. These are also economies that are rapidly becoming strategically important to New Zealand as major trading partners and will play key roles in global economic growth. Being members of, and committed to active involvement in, APEC, provides a forum for New Zealand to collaborate with these economies.

A long-term perspective needs to be taken in terms of assessing the value of the relationship. If New Zealand wants to develop a balanced and truly collaborative relationship, not only does it need to identify what it can offer these economies (e.g. expertise, information, training and development), but it needs to focus on what these economies can offer in return.

The recent Joint Commission Meeting in Malaysia highlighted that international science and technology linkages must be aligned closely to future science and technology based business opportunities. The opportunities are there for New Zealand, but collaboration should increasingly focus on niche technologies and research industry linkages.

NATIVE TREE RESEARCH WINS WELLINGTON STUDENT MoRST TRAVEL AWARD

Above: *The head of the University of Otago Plant Extracts Unit, Dr Nigel Perry (right), science award winner, Rachel Carter (centre), and Elaine Burgess, a research assistant in the Unit, examine a sample of liverwort.*

Former Queen Margaret's College student, Rachel Carter (14), won the Ministry of Research, Science and Technology travel award for producing the best overall exhibit with an "innovative industrial application" at the ECNZ Wellington Science Fair.

Her winning exhibit displayed her research into the anti-bacterial properties of native trees, particularly ngaio.

With her award, Rachel chose to visit the University of Otago Plant Extracts Research Unit, as well as the University of Otago Microbiology Department and School of Pharmacy. During her visit to the Plant Extracts Unit, Rachel was shown samples of a liverwort species, the potential anti-tumour properties of which are being jointly investigated by the Plant Extracts Unit and the United States National Cancer Institute.

BAN DIHYDROGEN MONOXIDE!

... / continued from page 2

The above article (concerning water (H_2O)) was sent to me by a reader who downloaded it from the internet. When I showed it to a number of "non-chemists" they were obviously concerned and wished to know what this nasty chemical was! If you know of any similar pieces, please send them to me. - *Ed.*

Patent Proze

by Jane Calvert and Greg Lynch

In "Patent Proze" in the January/February 1997 issue of *Chemistry in New Zealand* we discussed a significant change to New Zealand patent practice in respect of pharmaceutical inventions.

The change in practice meant that patent applications containing "Swiss-style" claims were being accepted by the New Zealand Patent Office. Swiss-style claims are used in some jurisdictions, including Europe, to protect a new therapeutic use for a known pharmaceutical. This form of claim is important for those jurisdictions, including New Zealand, where it is not possible to claim a method of therapeutically treating humans.

The practice change early this year stemmed from a review by the Commissioner of Patents, of the New Zealand Patent Office's practice of not accepting Swiss-style claims. That practice was inconsistent with international trends to broaden the scope of what types of inventions are regarded as patentable. Additionally, it is thought that the practice change was also prompted by proposed legislation which is expected to be introduced in New Zealand in the future. It is anticipated this proposed legislation will allow for patents covering methods of therapeutically treating humans.

However, on 26 June 1997, Pharmac (the Pharmaceutical Management Agency Limited) filed an application in the High Court for judicial review of the Commissioner's decision to allow Swiss-style claims. This challenge to the validity of Swiss-style claims may have important consequences for New Zealand's pharmaceutical industry.

Pharmac is the Government Agency which has responsibility in New Zealand for approving reimbursement of pharmaceuticals. Its role is to ensure the total pharmaceutical expenditure in New Zealand is kept within certain limits.

We understand that Pharmac's reason for requesting a review of the Commissioner's decision is that the Commissioner's decision may essentially extend the life of patent protection over particular pharmaceutical products, leading to prices being sustained at higher levels than would be the case if a Swiss-style claim was not permitted.
However, we question Pharmac's reasoning as Swiss-style claims provide effective protection only for a new therapeutic use of a known pharmaceutical. This protection provides a valuable incentive for researchers to pursue research into finding other useful medicinal properties of pharmaceuticals beyond those already known.

Pharmac is seeking an order revoking any patents granted as a result of the Commissioner's decision released in January this year. If this order is granted, it could mean that individual patents issued as a result of the Commissioner's decision may be revoked without the patentee having a right to be heard. Such action will breach natural justice, the Patents Act, and a number of other basic legal doctrines and statutes.

As a result of the request for judicial review lodged by Pharmac, the Commissioner is no longer accepting any patent applications containing Swiss-style claims. Presumably, this revised practice will continue until the outcome of the Judicial review is known. This means a large number of patents will not be granted as early as would otherwise be expected.

In the meantime, inventors involved in the area of pharmaceuticals should continue their practice of not delaying the filing of Patent applications, even if the invention is directed to a new therapeutic use of a known pharmaceutical. It is, of course, still important to establish a priority date as early as possible, particularly where overseas patent protection is required.

We will keep you updated with the outcome of the proceedings and any further changes in practice adopted by the New Zealand Patent Office.

INTERNET

The Baldwin Son and Carey home page contains Patent Proze (including back issues). Information on a variety of topics including trade marks, designs, copyright, plant variety rights and other aspects of intellectual property is also available on the home page. The address is www.baldwins.co.nz

Jane Calvert

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

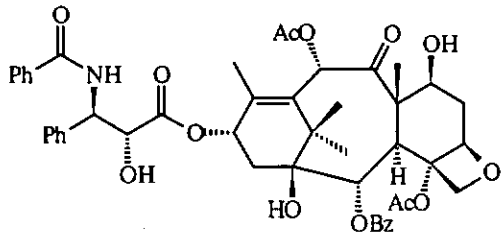
Greg Lynch

TAXANE ANTI-CANCER COMPOUNDS

Andrew J Phillips and Andrew D Abell,
Department of Chemistry, University of Canterbury, Private Bag 4800, Christchurch

Since ancient times people have made extensive use of natural products for a variety of purposes. For several thousand years natural oils, resins, dyes, flavours and fragrances have played important economic and cultural roles in most societies. Many natural products have also provided medicines and remedies for various ailments. Not surprisingly, many of these 'traditional' medicines are now being shown to be based on sound science.

The yew tree *(Taucus)* has a long history as being a source of potent extracts. Numerous authors including Caesar and Shakespeare make mention of the yew and its role as a source of deadly poisons. More recently, the yew tree has yielded paclitaxel (**1**), an increasingly important anti-cancer drug. The modern story of the yew tree began in 1962. As part of the United States Government's 'war on cancer' the National Cancer Institute asked botanists and biologists to collect plant samples. These samples were to be screened for biological activity in an effort to discover new drug candidates, or compounds that might lead to drugs. As part of this effort, Arthur Barclay, a US Department of Agriculture botanist, collected bark from *Taxes brevefolia,* the Pacific Yew tree, from forests in the northwestern United States. The extracts from this bark demonstrated potent anti-cancer activity, and in 1971 two American chemists, Monroe Wall and Mankush Wani[1], reported the structure of paclitaxel, the principle anti-cancer agent of these extracts.



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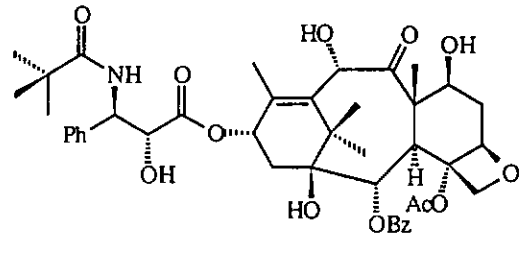


2

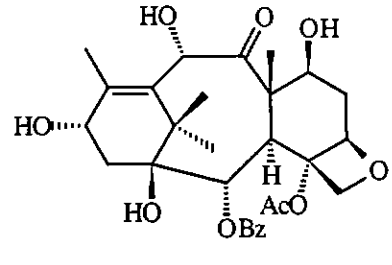
However, paclitaxel received little further attention until 1979 when its mode of action was elucidated by an American biologist, Susan Horowitz.[2] A number of important anti-cancer drugs (e.g. vinca alkaloids such as vincristine) act by destabilising microtubule formation. Microtubules play important roles in both regular cells and also cancer cells. In regular cells they aid in the formation of the cytoskeleton, and in dividing cells they are important in the formation of the mitotic spindle during mitosis (the two sets of chromosomes align themselves for separation along the spindle). However, paclitaxel's mode of action was unique: it acted by stabilisation of microtubules. This discovery renewed interest in paclitaxel as a potential drug candidate.

Toxicology and formulation studies were quickly completed and paclitaxel entered Phase I clinical trials in 1984. It quickly became apparent that paclitaxel represented an important advance in cancer chemotherapy and Phase II trials established its effectiveness against a number of important cancer types. In 1989, the NCI entered into partnership with Bristol-Myers Squibb to ensure adequate supply and marketing of paclitaxel. The company moved quickly to obtain Food and Drug Administration (FDA) approval and in 1993 paclitaxel became available for general use under the trade name Taxol®.

Presently, Taxol® is approved for the treatment of ovarian and breast cancer. An analog produced by Rhone-Poulenc Rorer called Taxotere® (**2**) has also recently been approved for the treatment of the same cancers. Although yet to be approved, both drugs have also demonstrated potential for the treatment of cancers of the lung, head and neck, and gastrointestinal tract. Importantly, activity against multiple-drug resistant cancers has been observed. In New Zealand, both drugs are available but not yet funded for use by the Government.

Perhaps the most important issue with paclitaxel is that of supply. The yield of drug is only about 100 mg per 1 kg of dried bark (a mature yew tree - approximately 100 years old - yields about 5 kg of bark). A single course of treatment is 125-300 mg of paclitaxel, and typical treatments may extend to greater than 10 courses. It has been estimated that yearly demand for paclitaxel may exceed 300 kg and this would require the sacrifice of some 750,000 trees. Clearly, large scale production of the drug by this route is, at best, environmentally questionable.

A practical solution to the supply problem is semi-synthesis. 10-Deacetylbaccatin III (**3**), a compound that was discovered by French researchers in the needles and twigs of the European Yew tree *(Taxis baccata),* can be converted to paclitaxel in 3-5 steps.[3]



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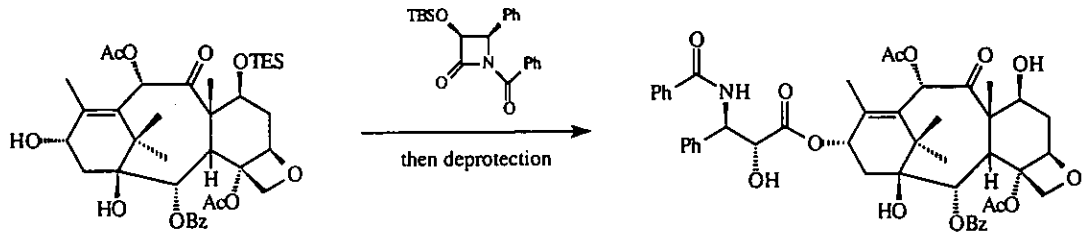


Figure 1: Semi-synthesis of Taxol®

Methodology developed by several groups allows the semi-synthesis of Taxol® from a precursor that is readily available. 10-Deacetylbaccatin III is selectively acetylated and one of its hydroxyl groups is protected as a triethylsilyl (TES) ether to give a compound that reacts with a ß-lactam precursor to the side chain. Removal of the silyl protecting groups (there is also one on a hydroxy group on the ß-lactam) gives Taxol® . Taxotere® is made by the same route utilising a slightly different ß-lactam.

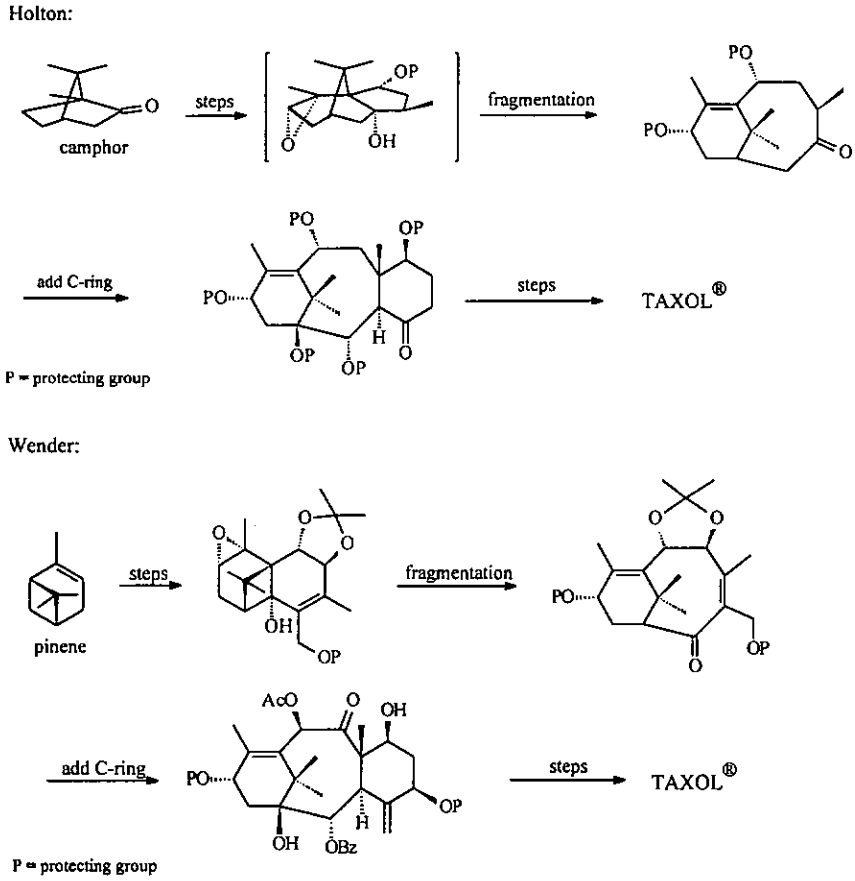
The methodology for this transformation is well established, and although the yield of 10-deacetylbaccatin III from the needles is similar to that of paclitaxel from bark this represents a more renewable resource. This is currently the route by which both Taxol® and Taxotere® are produced commercially (Figure 1).

Another alternative is total synthesis. Due to its chemical complexity, the synthesis of paclitaxel from simple starting materials is not a trivial task. However, four American research groups have recently achieved this goal (Figure 2).[4] It is unlikely that any of their synthetic routes will provide supplies of paclitaxel as they are all greater than 35 steps. For total synthesis to be competitive with semi-synthesis, a route of not more than 20 to 25 steps needs to be established. Synthetic strategies do, however, offer the promise of obtaining analogues of the parent natural products for biological analysis. With this in mind we have embarked on our own synthetic programme.

Several other possibilities exist including plant cell culture, and microbial fermentation. Although the details are closely guarded commercial data, it is clear that paclitaxel and analogs can be produced by plant cell culture. The major question will again be cost-effectiveness compared to semi-synthesis. Although paclitaxel is produced by the yew tree itself, a species of fungi *(Taxomyces)* has recently been isolated from the inner bark of the yew. This fungus also produces paclitaxel, although at very low levels. It may prove possible to increase the levels at which paclitaxel is produced by this organism, thus opening the opportunity for large scale fermentation as a route to paclitaxel.[5]

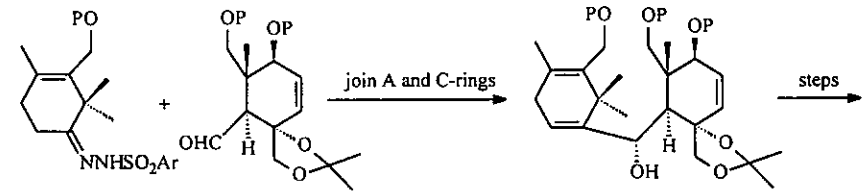
Figure 2: Total Synthesis of Taxol®

The syntheses of Robert Holton (Florida State University) and Paul Wender (Stanford University, California) are conceptually similar. Both are based around the fragmentation of tricyclic systems to give an A/B-ring system, to which the C- and D-rings are attached. Both syntheses start with optically active, readily available chemicals.

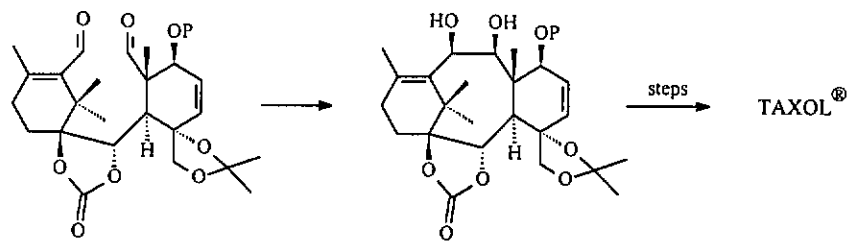


The syntheses of Kyriacos Nicolaou (Scripps Research Institute, California) and Samuel Danishefsky (Columbia University, New York) share some key features. Both involve joining A-ring and C-ring subunits to give structures that are then cyclised to form the central B-ring. Again, both start from simple chemicals which are transformed into the A- and C-ring building blocks. The Nicloaou synthesis differs from all the other syntheses in that none of the starting materials are optically active.

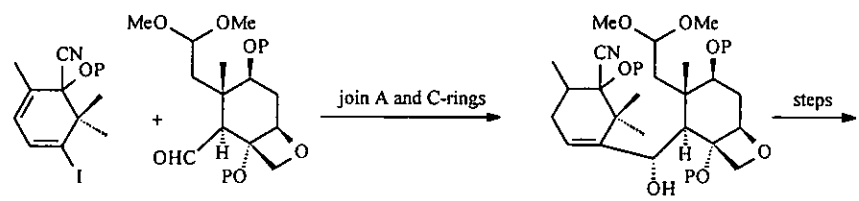
Nicolaou:

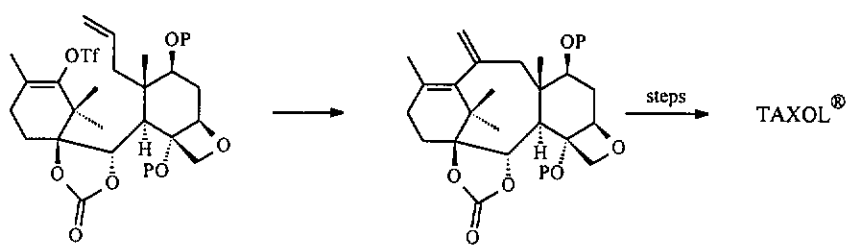


Ar = aromatic group, P = protecting group



Danishefksy:





P = protecting group, OTf = OSO_2CF_3

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Pharmaceutical Industry Applications

Determination of Residual Solvents in Pharmaceuticals With Automated Solid Phase Microextraction

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Introduction

The 1995 United States Pharmacopeia (USP) National Formulary (1) lists four methods for determining organic volatile impurities in pharmaceutical compounds. All of the procedures utilize gas chromatography with flame ionization detection and either direct liquid injection or static headspace (Table 1). Table 2 lists the organic volatiles and the maximum allowable quantities in pharmaceutical compounds and in addition lists the concentration of these components in a standard solution. The area count precision required for replicate determinations of the compounds in the standard solution is 15% relative standard deviation.

The following article describes the use of solid phase microextraction (SPME) for determining solvents in pharmaceuticals.

The results, which included a recovery study on two pharmaceutical compounds, indicated that SPME is a good alternative to liquid injection or static headspace. An automated SPME system is considerably less expensive than a dedicated static headspace system and the problems of injecting aqueous samples into a GC are avoided.

Several additional solvents were considered in addition to the above to conform to compounds actually used in pharmaceutical companies. These were ethanol, acetone, isopropanol and toluene.

Table 1. *Summary of the USP methods.*

Method	Column (0.53 mm fused silica)	Sample Introduction
I	5% phenyl-95% methylpolysiloxane	Direct* injection of 1 µL
IV	6% cyanopropylphenyl-94% dimethylpolysiloxane	Static headspace 1 mL
V	6% cyanopropylphenyl-94% dimethylpolysiloxane	Direct* injection of 1 µL
VI	**	Direct* injection of 1 µL

*Usually water, unless another solvent is specified in the monograph for a particular drug.
**Method VI is used when a procedure is written for a particular pharmaceutical; in that case a column is specified.

Table 2. *Organic volatile impurities and maximum allowable levels in pharmaceuticals. The concentrations in the standard solution assume a concentration of 20 mg/mL for the pharmaceutical compound.*

Component	USP Limit (ppm)	Standard solution (µg/mL water)
Methylene Chloride	500†	10
Benzene	100	2
Trichloroethylene	100	2
Chloroform	50	1
1, 4-Dioxane	100	2

†effective date 1/1/95

Instrumentation and Conditions

Instrument:	Varian Star 3600 CX with a septum-equipped temperature-programmable injector (SPI), FID and 8200 CX Autosampler, modified for SPME. The Autosampler was controlled by the SPME software. The GC Star Workstation ran concurrently on the same PC, controlling the GC and collecting data. A Varian Genesis Headspace Sampler was used for comparative studies with static headspace.
Column:	30 m x 0.53 mm coated with 3 µm DB-624, 35 °C, hold 2 minutes, 20 °C/min. to 200 °C, hold 0.75 min. Carrier gas: helium at 38 cm/s at 50 °C.
Injector:	SPI with insert for 0.53 mm columns, 210 °C, isothermal.
Detectors:	220 °C, FID at range 10-12.
SPME Parameters:	The fibre (Supelco, Inc.) was coated with 100 µm polydimethylsiloxane. Adsorbed in the headspace 14 minutes, desorbed two minutes, one sampling per vial.
Standards:	A test standard was prepared in HPLC water (Table 3). The first three compounds were added directly to water; the last 6 compounds were initially dissolved in a methanol stock solution and diluted 1000-fold in water.
Samples:	Two water-soluble drugs were studied - a cholinesterase inhibitor (A) and a tricyclic antidepressant (B).
Recovery (Accuracy):	Three samples were prepared in 2 mL screw-cap vials, the above test sample alone, drug A in test mix and drug B in test mix. To conform to the concentrations listed in the USP methods of 20 mg/mL, 16 mg of drug was dissolved in 0.8 mL of test sample. Blanks consisting of water and each of the two drugs in water were also prepared. To enhance the response of the polar solvents, the standards and samples were saturated with sodium sulfate (20 g/100 g water).
Linearity:	The above standard was prepared at 0.5, and 2 times the concentrations shown in the table and the recovery experiment above was repeated at the three concentrations. Limits of detection (LOD's) were determined, assuming a signal-to-noise ratio of 2.

1. Methanol (1000)
2. Ethanol (25)
3. Acetone (25)
4. Isopropanol (25)
5. Methylene chloride
6. Chloroform (1)
7. Benzene (2)
8. Trichloroethylene
9. 1, 4-Dioxane (2)
10. Toluene (2)

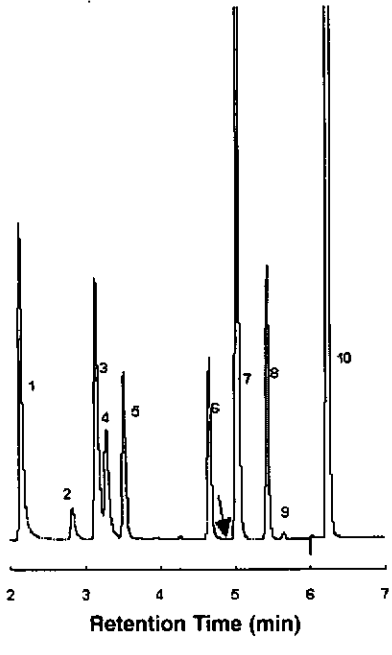

Figure 1. *Automated SPME chromatogram of the headspace over a test sample containing solvents monitored in pharmaceuticals. The concentration in pg/mL is given next to each peak name.*

Results and Discussion

The chromatogram in Figure 1 was obtained from sampling the headspace over Drug A, using SPME. Data for precision and recovery of the solvents in the test sample are presented in Table 3. Correlation coefficients to a straight line and LOD's are also given.

The sample was in a 2-mL vial containing 0.8 mL test standard. Drug B (16 mg) was dissolved in the test standard. Concentration of each solvent is in parenthesis next to the peak name. Compounds 5-10 were initially dissolved in a stock solution with methanol as a solvent; hence the methanol peak. FID attenuation is 10-fold more sensitive before the arrow.

Linearity and recoveries with drug A indicated no matrix effects; therefore this drug was not studied further.

Matrix effects

With Drug B, the polar solvents showed good linear response and recoveries but methylene chloride, chloroform, benzene and trichloroethylene were only partially recovered. Toluene, the solvent that was used in the purification of the drug, was still present. Moreover, the toluene was strongly retained by the drug

Table 3. Precision data (%RSD area counts for 4 replicate determinations) is given for the concentrations shown in the table, linear correlation coefficients were determined by sampling at three levels — 0.5 x, 1 x and 2 x the values in the table. The limits of detection (LOD's) are with FID detection (S/N=2). These values are for the standard mix; to determine the limit of detection in a drug sample, dissolved in water at a concentration of 20 mg/mL, the numbers should be multiplied by 50. Recoveries (accuracies) are calculated by comparing detector response of compounds in the standard mix to drug samples spiked with the standard mix.

	Standard Mix				Drug A		Drug B	
Compound	**Conc. µg/m**	**Precision**	**Corr.**	**LOD µg/mL**	**% Recovery**	**Precision**	**% Recovery**	**Precision**
Ethanol	25	1.82	0.999	2.3	98.4	2.80	100.9	2.47
Acetone	25	1.18	0.998	0.3	103.2	0.29	101.2	0.48
Isopropanol	25	1.29	0.997	0.7	99.5	0.54	101.7	0.60
Methylene chloride	2	1.93	0.999	0.02	100	2.34	91.5	2.15
Chloroform	1	1.42	0.998	0.005	100.4	2.29	76.6	1.25
Benzene	2	0.49	0.999	0.0003	100.1	1.74	70	1.58
Trichloroethylene	2	0.50	0.999	0.00	104.0	2.43	63.4	2.00
1, 4-Dioxane	2	2.18	0.995	0.04	102.8	2.88	104.2	0.44
Toluene	2.00	0.42	0.999	0.0001	98.50	2.65	168.6*	3.82

*Blank runs of the drugs indicated that they were free of solvents with the exception of drug B which contains toluene

even after the dry compound was heated in an oven at 80°C for one hour. Therefore it was felt that further study was warranted and a new toluene-free sample of this compound was purchased.

When toluene was added to the toluene-free drug, the recovery was 29%. The recovery experiment was repeated using conventional static headspace. The data in Table 4 indicates that the matrix effect is present with heated headspace and is therefore not SPME-related.

It was found that elimination of the sodium sulfate and lowering the pH to 2, greatly improved the recovery of toluene. The sodium sulfate was added originally per USP Method IV to improve the response of the polar compounds. Elimination of the salt and lowering of the pH increased the solubility of the drug (pKa was 9.4), thereby improving the partitioning of the toluene into the headspace and ultimately into the fibre. Under these conditions, the recovery with SPME sampling was 73%. More important, recoveries were consistent when the drug was spiked with toluene at the three levels mentioned above (linear correlation coefficient was 0.999). Quantitation could be by the method of standard additions or by comparison of a sample containing toluene with a toluene-free drug sample spiked to a known level.

Table 4. Percentage recovery of toluene in the presence of Drug B with a heated static headspace system.

Static Headspace	
(20 min. equilibration), neutral pH, saturated with sodium sulfate	
50 °C	80 °C
38 %	46 %

Conclusion

For the determination of residual solvents in pharmaceuticals, SPME offers sensitivity and precision that greatly exceed the USP requirements. As compared to a static headspace system, SPME is compact and offers comparable sensitivity and full automation at a lower cost.

In comparison with Method I which normally involves direct injection of water, the sensitivity with SPME was greater by factors varying from 2 (dioxane) to 90 (TCE). As with all techniques, some initial method development is required to optimise results.

Acknowledgement

Samples and valuable inputs on the requirements of pharmaceutical manufacturers were provided by Stephen Scypinski, Linda Clark Nelson, Sandra Rosen Shaw, and Anne-Marie Smith of Hoffmann-La Roche Inc., Nutley, NJ, USA. Their assistance is gratefully acknowledged.

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Automated Calibration of Tablet Dissolution With On-line HPLC Analysis

Allan MacDonald, Senior Scientist, Thermo Separation Products, USA

Introduction

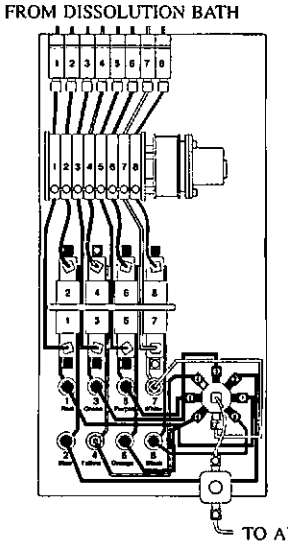
In most pharmaceutical laboratories dissolution baths must be calibrated with USP Dissolution Calibrator Tablets. Dissolution of these tablets is sensitive to vibration, deaeration of the medium, the physical setup of the dissolution bath and, in automated systems, filtration-induced bias. Such sensitivity makes the required calibration ideal for testing the impact of TSP's automated tablet dissolution liquid chromatography (TD-LC) system on the dissolution process.

Regulatory agencies and good scientific practice also mandate that, in addition to passing the bath calibration tests, an automated system must demonstrate equivalence between manual and automated sampling. Finally, for this system, analysis of the dissolved samples should be done by HPLC to give a complete system calibration.

The System

The automated TD-LC system consists of a SpectraSYSTEM TS1000 Sampling Station as a direct on-line interface between a dissolution apparatus and a SpectraSYSTEM HPLC system controlled by PC1000 software. The diagram below is a flow diagram of the TS1000, which does not show the coarse probe filters used to protect the system from clogging by large particulates.

As sample collection begins, the peristaltic pump recirculates sample from all of the vessels simultaneously. When a representative sample is in the lines, the sampling station selects the first vessel from which to deliver a sample to the autosampler. A user-selectable volume of sample is flushed through the HPLC filter to waste. A vial is moved into position and the sample is collected. After collection from all vessels is completed, the sample in the lines is returned to the bath.



Flow diagram of the TS1000 Sampling Station. *Not shown: protective coarse probe filters.*

System Configuration

- Dissolution Bath which has passed tests for physical characteristics
- TS1000 Sampling Station
- P4000 Quaternary Gradient Pump with Solvent Conditioning Module
- AS3000 Autosampler with sample prep and column oven options.
- Column: Keystone ODS2100 x 4.6 mm
- UV2000 Variable Wavelength UV/Visible Detector
- PC1000 Software with options package.

HPLC Procedures

The procedures used for both the disintegrating prednisone and non-disintegrating salicylic acid calibrators were taken from USP monographs [1,2]. For prednisone, the mobile phase was water, tetrahydrofuran, and methanol (688:250:62) at 1 mL/minute. Detection was at 254 nm. Calibration was by external standards at concentrations equivalent to 30, 60 and 100 percent dissolved tablets. This procedure enables reporting the results as percent dissolved. Single-point calibration at 60 percent dissolved is also possible.

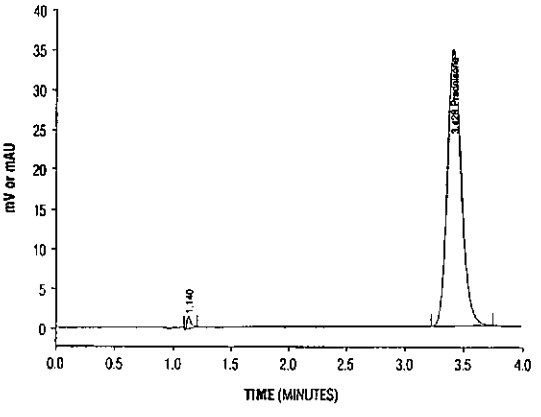


Figure 1. *A typical prednisone chromatogram showing a single peak at 3.4 minutes.*

For salicylic acid, the mobile phase was water, methanol and glacial acetic acid (69:28:3) at 2 mL/minute with a column temperature of 45 °C. Detection was at 302 nm. Calibration was by external standard at concentrations equivalent to 10, 20 and 40 percent dissolved tablets.

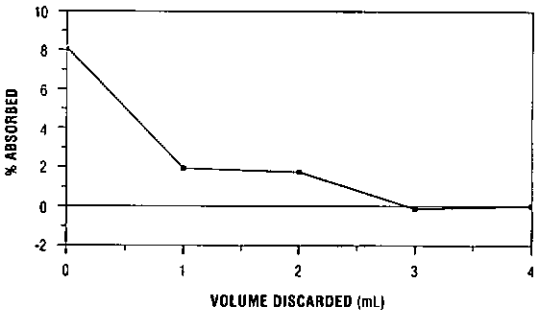


Figure 2. *Results of the procedure for determining correct filter volume, showing decline in the percentage of adsorption.*

Standard Preparation

The prednisone standard was a stock standard of 27.8 mg/100 mL water with five percent methanol added to facilitate dissolution.

Working standards were prepared by diluting the stock with water. The salicylic acid standard was prepared by making a stock standard of 33.3 mg/100 mL dissolution medium with one percent methanol added. Working standards were prepared by diluting the stock with dissolution medium.

Experimental Procedure

Each calibrator was dissolved in at least six vessels according to procedures provided by the USP. The tablets were tested in Apparatus 2 at 50 rpm and 100 rpm. Concurrent with the automated sampling, manual samples were processed through identical filters and stored in vials for subsequent analysis. Since all vessels may not be equivalent, this procedure permits a paired comparison experiment within each vessel.

Several issues are specific to prednisone calibrators. Since steroids are well known to adsorb to many plastics, the minimum filtration volume must be determined and the system must be checked for significant loss of the active ingredient. The pumping action and the coarse filter back flush step discussed below are potential sources of positive bias due to agitation.

This potential positive bias was evaluated by first performing the calibration experiment manually. Only vessel eight was used, as any effect due to the pumping action would be greatest for this vessel. Eight manual replicates were performed, then the experiment was repeated automatically. Finally, all results were compared to the expected ranges for each experiment.

Results and Discussion

The chromatographic methods for both procedures were checked on standards. Figure 1 shows a typical chromatogram for prednisone. There is an injection artifact, as the sample is not dissolved in mobile phase, and there is a single peak for prednisone at 3.4 minutes.

Prednisone was used to evaluate carryover in the TS1000. First, vessel-to-vessel carryover was measured by placing a concentrated solution of prednisone in vessels one, three and five. The even-numbered vessels were filled with water. The average carryover was less than 0.2 percent with a 2.5 mL flush volume. The odd-numbered vessels were then emptied and refilled with water to measure carryover within the vessels, which averaged 0.6 percent.

The process for determining the correct LC filtering volume was taken from a procedure for spectrophotometric methods.[3] About 7 mL of a prednisone standard were withdrawn into a syringe. The first mL was filtered into one vial, the second mL into the second, until five samples were taken. Figure 2 shows the results. If the first 3 mL are discarded, no further adsorption occurs.

We discovered a discrepancy between the results from manual and automated samplings that increased with vessel number (Figure 3). We attributed this to build-up on the coarse filters and incorporated a backflush step before the final sampling of each vessel. Figure 3 shows the improvement.

While the agreement is excellent, both results could be affected by the agitation from the automation. The eight manual samplings averaged 58.7 percent dissolved with a standard deviation of 1.1 percent dissolved. The eight automated samplings averaged 59.2 percent dissolved with a standard deviation of 0.5 percent dissolved. Comparison of the standard deviations via the F-test indicates that the automated method has a significantly lower standard deviation at the 95 percent configuration limit, indicating the advantage of automated procedures in reproducibility. A t-test shows no significant difference in the means at the 95 percent confidence limit.

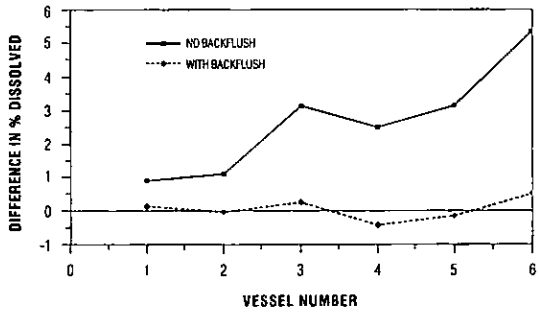


Figure 3. Differences in percentage dissolved between manual and automated runs decrease as the result of backflushing.

Table 1 shows the paired comparison tests for prednisone and salicylic acid at 50 rpm and 100 rpm. In all cases, agreement between manual and automated results is excellent. The average difference in all cases is less than 0.5 percent. All results are well within the acceptance ranges for USP bath calibration tests.[4,5]

Table 1. Differences between paired prednisone and salicylic acid tests are within acceptance ranges for USP bath calibration tests (N=6, in all cases).

Calibrator	Paddle Speed (RPM)	Average Value Manual	Average Value Automated	Average Difference	Standard Deviation of Difference	Acceptance Range
Prednisone	50	48.7	48.9	0.18	0.52	41 - 54
Prednisone	100	63.9	63.9	0.018	0.33	57 - 66
Salicylic Acid	50	17.3	17.5	0.19	0.14	12 - 23
Salicylic Acid	100	21.8	21.6	0.18	0.11	17 - 25

Summary

The TD-LC system performs well on the USP calibrator tablets. For prednisone, any adsorption of the analyte by the apparatus is insignificant. The mechanical action of automated sampling is also insignificant for the prednisone calibrators at 100 rpm. Carryover is minimal, and loss due to adsorption to the filters can be managed by proper selection of the filtration volume.

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3. *Care and Feeding of Your USP Dissolution Apparatus*, VanKel Industries, 1993.

4. USP Dissolution Calibrator, Non-disintegrating Type, Lot M.

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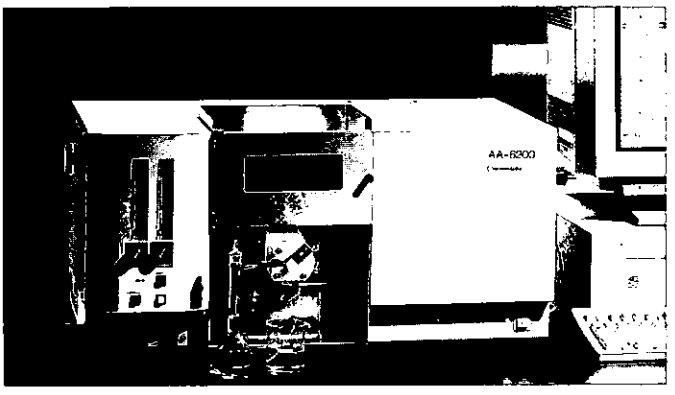

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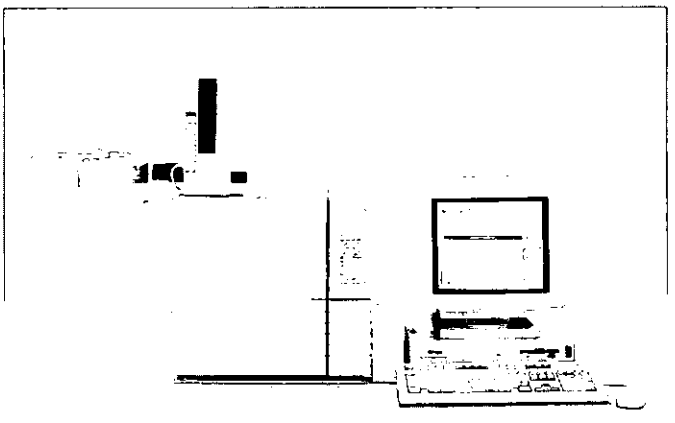

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POLAR CAPILLARY GUARD COLUMNS

Usually if interfering and low volatility compounds do not settle out on the bare retention gap, they will clog up the head of your

analytical column. Especially for the more polar columns this is a common cause of early column senescence. These columns are already more susceptible to thermal break-down too, making the analysis of polar compounds very costly. Alltech has new capillary guard columns available including both polar and intermediate polarity in 0.25 mm ID, 0.32 mm ID and 0.53 mm ID in packs of 5. These will effectively trap the contaminants that destroy polar columns before their time. The new Heliflex AT-2335 high polarity cyanopropyl column with a 270 °C upper temperature limit for *cis, trans* and positional isomer analysis in FAMEs is one column among many that these new guard columns will help to keep in long and reliable service.

Contact: Alltech Help Desk
Freephone: 0800 255832, Fax: (09) 4442399
Email: alltech@alltech.co.nz
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COMING SOON - J&W '98/'99 CATALOGUE

Register today for your free copy of the J&W '98/'99 Catalogue, your first stop for information on the latest J&W capillary column phases and gas chromatography accessories.

Includes useful application information, a chromatogram library and a useful troubleshooting and reference guide.

Register today! We will send you the current '96/'97 Catalogue (unless you advise that you already have this) and make sure you are on our list to receive the new catalogue late this year/ early next year.

Contact: Clare Hodgson, Shimadzu Scientific Instruments
Ph: 0800 735725, Fax: (09) 8367757
Email: clareh@shimadzu.co.nz
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USP 467 CALIBRATION STANDARDS

A new addition to the Alltech Standards product line are the USP 467 calibration mixes. The part numbers for these mixes are:

- 19275 USP 467 Calibration mix (methanol solvent)
- 19274 USP 467 International Calibration mix

Alltech have extensive ready-mixed test mixes for all purposes and provide standards from both Ultra Scientific and ChemService on a weekly delivery schedule from the USA by Federal Express Priority One Air Courier. For fast service, and delivery of the standards you need now:

Contact: Alltech Help Desk
Freephone: 0800 255832, Fax: (09) 4442399
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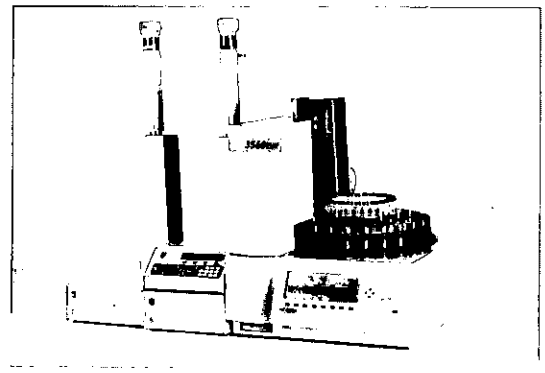
DUAL-MODE SFE/ESE EXTRACTOR

The Isco-Suprex SFX 3560DM Dual Mode Extractor now provides food, polymer, and environmental chemists with two powerful extraction techniques in one automated instrument.

The SFX 3560DM performs unattended, sequential extraction and collection of up to 24 samples, using bar-coded 10 mL sample cartridges.

Software-selectable modes for SFE (Supercritical Fluid Extraction) and ESE (Enhanced Solvent Extraction) let you choose the best method for a wide range of samples and analytical requirements.

In ESE mode, the SFX 3560DM provides fast, exhaustive extraction of solid matrices by using traditional organic solvents at elevated pressures and temperatures.



Compared to Soxhlet and sonication, solvent volumes are reduced and kinetics are enhanced by extraction at higher temperature while increasing pressure to keep the solvent below its boiling point.

The ESE extraction mode meets the requirements of US EPA Method 3545 for extractable organics on the RCRA target analyte list.

In the SFE mode, the SFX 3560DM extracts samples using safe, inexpensive carbon dioxide. Above its critical temperature and pressure (31 °C and 1050 psi) CO_2 exhibits gas-like viscosity and liquid-like solvating properties, and is an ideal solvent for rapid, selective extraction of many non-polar analytes.

SFE official-methods include EPA Methods 3560 and 3561 for pollutants in soil, and AOCS Method Am3-96 for oil in oilseeds.

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AAS & ICP: THE LATEST FROM ULTRA

New ICP and AA EnviroConcentrates offer high quality inorganic standards at the best value in the industry. With more and more laboratories watching their consumable costs, Ultra's new ICP and AA single-element EnviroConcentrates offer the best value without sacrificing quality. Easy to use EnviroConcentrates are NIST traceable and are available at 10,000 µg/mL in a quantity of 10 mL. Simply pipette the required amount and dilute to volume with 1% HNO_3 or water. Every order will receive a free copy of Ultra's Lighthouses of Rhode Island Screen Saver for Windows '95.

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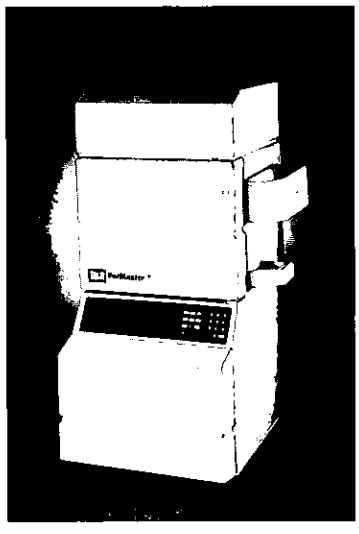
GRAVIMETRIC FAT/OIL ANALYSER

The new Isco-Suprex FatMaster 200 gravimetric analyser provides a fast, productive means for determining total fat in food at the quality control and plant monitoring level.

FatMaster 200 produces results that are directly comparable to those obtained via Soxhlet or similar techniques used to analyse fat content in foods and agricultural products such as soybeans.



Fat determination via supercritical fluid extraction (SFE) using FatMaster is much faster than traditional extraction methods, and uses safe, inexpensive CO_2 rather than toxic and hazardous organic solvents.

Contact: Clare Hodgson, Shimadzu Scientific Instruments
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AUTOSAMPLER VIALS AND ACCESSORIES

With a convenient life-size silhouette chart to help you match your vials or inserts to a catalogue number, the Alltech mini-catalogue of autosampler vials and accessories makes it easy to save on your glassware costs by comparison, shopping at Alltech. We carry the largest vial selection in-stock in New Zealand and if your requirement is a little out of the ordinary, the friendly customer service staff at Alltech will go a long way to obtaining it for you in less than 10 days. And if we can't better your cost we'll say 'thanks for calling Alltech' with a gift of a handsome digital desk clock.

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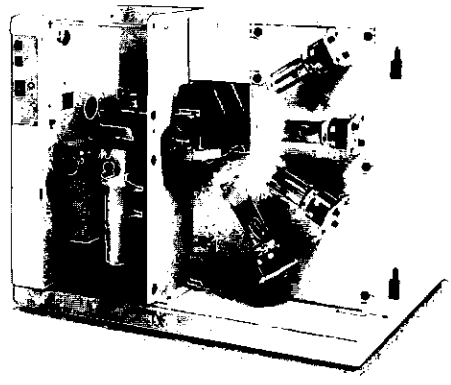
FAST SEQUENTIAL ATOMIC ABSORPTION SPECTROMETER FROM VARIAN



A.i. Scientific is proud to introduce the SpectrAA-220 FS from Varian, claimed to be the first fast sequential (FS) atomic absorption (AA) spectrometer capable of determining samples up to 40% faster than conventional AA instruments. The SpectrAA-220 FS brings the productivity of an inductively coupled plasma (ICP) spectrometer to flame AA by enabling element-by-element determinations on each sample. The SpectrAA-220 FS determines 10 elements in 20 samples in under 50 minutes. Productivity can be further enhanced with the Sample Introduction Pump System (SIPS) and SIP-5 autosampler. SIPS prepares standards, dilutes samples, adds reagents and performs standard additions - minimising manual sample preparation. FS Wizard, the intelligent software program, enables fast sequential operation by prioritising and arranging elements in a logical order for the fastest possible sequential analysis. To accommodate the speed of fast sequential operation, conventional rotating lamp turrets have been replaced with lamps mounted in fixed positions. A motor-driven mirror enables rapid lamp selection, while multi-element lamps enable the determination of up to 11 elements. All lamps are operated simultaneously and are electronically pulsed at their correct operating currents to ensure narrow line widths, improve linear calibrations and extend lamp life. The SpectrAA's Hammer Gas Control provides digitally regulated gas flow, enabling instantaneous changes in flow rates with repeatability, precision and speed.

Contact: Kevin Moloney, A.i. Scientific (NZ) Ltd
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THE DIONEX DX-800 - THE LATEST IN PROCESS ANALYTICAL IC AND HPLC FOR PROCESS MONITORING AND CONTROL

A.i. Scientific announces the release of the DX-800 from Dionex. Designed for reliability, accuracy, reproducibility and low maintenance, the DX-800 incorporates over a decade of experience in process analyser design, operation and support. The DX-800 combines the capabilities of IC and HPLC to determine analytes whose measurements are not possible by other on-line techniques. Analytes such as chemical intermediates, pharmaceuticals, phenols, metabolites, natural products and ionic molecules, including inorganic anions, alkali metal and alkaline earth metal cations, organic acids, amines

and transition metals can be determined with the DX-800. Other capabilities unique to the DX-800 include:

- Multi-component characterisation of a process sample in a single analysis
- Monitoring of ionic analytes at detection limits not possible by other on-line or at-line methods
- Monitoring of multiple process samples with near real-time results.

Incorporating the latest advances in analytical instrument design, the DX-800 can meet the demands of a wide range of samples, from high purity waters to acidic and alkaline solutions. The analytical components are based on the DX 500 instrumentation line and the fluid paths are constructed of high-purity materials that are compatible with a vast array of sample types. The NEMA 4/4X enclosure and wall- or skid-mounting options allow installation in harsh and space-limited production environments. Front access to all components minimises maintenance time requirements. Reagents are located externally to the analyser, optimising accessibility and virtually eliminating the need to expose analytical components. Air conditioning as well as purge and pressurisation options allow even more installation versatility. Dionex's Peak Net-PA software is specifically designed to provide instrument control, data analysis and results reporting. Its capabilities include scheduling sampling, synchronisation of multiple channel operation and automatic error handling using preprogrammed conditional responses.

Contact: Mark Albertson, A.i. Scientific (NZ) Ltd
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NEW DISSOLUTION TESTING SYSTEMS FROM HP FULLY INTEGRATE MULTI-VENDOR EQUIPMENT TO PROVIDE SCALEABLE SOLUTIONS THAT IMPROVE PRODUCTIVITY

Hewlett Packard Company announces new dissolution testing systems based on the HP 8453 UV-visible spectrophotometer and HP ChemStation for UV-visible spectroscopy. These new systems fully integrate third-party equipment by providing full control through the HP ChemStation, of dissolution baths from all major manufacturers.

A basic system for off-line testing comprises an HP 8453 spectrophotometer, HP ChemStation and software; sampling is done manually by a sipper or by an autosampler. To do on-line testing with automatic sampling from the bath, users can choose multi-cell or valve operation. Valve operation provides scalable solutions with one, two, three, or four dissolution baths for increased productivity, with the possibility to run different methods for different pharmaceutical products on each bath.

The HP 8453 spectrophotometer forms the analytical centrepiece of the dissolution testing systems. With a wavelength range of 190 nm to 1,100 nm, a 1 nm slit width and less than .05 % stray light, the HP 8453 meets all requirements of both the European Pharmacopoeia and the US Pharmacopeia (USP).

The software for the new dissolution testing systems is an add-on module for the HP ChemStation general-purpose UV-visible software. Running within the Windows 95 and NT environments, the dissolution testing software uses the same easy-to-use graphical user interface (GUI) as HP's highly acclaimed general-purpose, advanced and biochemical analysis UV-visible software. Once familiar with the GUI, operators can move comfortably between the different modules. The dissolution testing software builds on the GLP features of the general-purpose UV-visible software, providing compliance capabilities.

Additional features of the dissolution testing software include flexible pre- and post-run sequences, e.g. for remeasuring standards or control samples, or for report generation, as well as automatic correction for volume changes caused by pH change, sampling or evaporation.

The HP 8453 dissolution testing systems can be used not only with conventional types of dissolution test apparatus (USP types 1 and 2), but also with less common types, such as the flow-through and other apparatus (USP types 3 and 4).

Information about HP chemical-analysis products and services can be found on the worldwide web at:
http://www.hp.com/go/chem

Contact: Medtec Products Limited
P O Box 34241, Auckland
Ph: (09) 4791068, Fax: (09) 4791450
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NEW IEC CENTRA CL-3 CENTRIFUGE

The latest innovation from IEC's new bench top line includes the CL-3, a one litre centrifuge with amazing features that also adds up to amazing value. You will have to look twice at the control panel to see if it's running as you won't hear it (noise - less than 60 dba maximum). You won't be needing to replace the brushes - there aren't any in this new brushless motor design. You also won't have to remember the last run parameters as the microprocessor control system has the capacity to store up to 99 protocols so you'll get exact run-to-run repeatability, and you won't need to work out the run time once the set speed is reached with IEC's exclusive "at speed" timer, providing you with the appropriate g-force effect on the sample for the desired time period, run after run. With aerosol containment using IEC's new Aerocarriers, you are guaranteed user protection and laboratory safety. A new "quick release rotor" system makes exchanging rotors so simple, no tools and no "muscle" required, you will wonder why all rotors aren't this easy to change. And of course to save you money, other IEC rotors, past and present, are compatible with the CL-3. Temperature control is available in the CL-3R model at a size to suit your bench space and a price to suit your budget. So all you have to do is ask your local SciTech office for more details or a demonstration now.

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Email: scitech@scitech.co.nz
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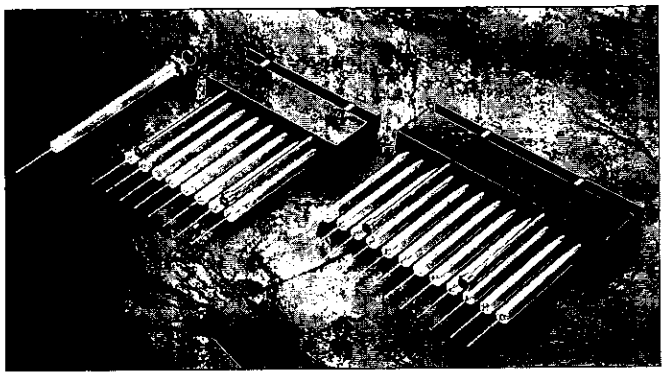
MULTI-CHANNEL GEL LOADING SYRINGES



Hamilton's Multi-channel Gel Loading Syringes allow users to transfer 4 ,6 ,8 or 12 samples at a time from microwell plates to:
- sequencing gels for electrophoresis
- another microwell plate for duplicate analysis
- nylon membranes for visualisation

Three needle sizes are available, including a new 0.2 mm design for 0.2 mm or thicker gels and deeper loading between plates and into wells, minimising spill-over. Adjustable volume stops allow faster and more accurate reloading and excellent reproducibility. No disposable pipette tips need to be changed or oriented to fit. Order L20026 for your free copy of "Save Time with Multi-Channel, Gel Loading Syringes".

Contact: Alltech Help Desk
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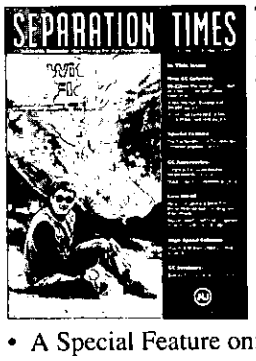
J&W SEPARATION TIMES VOLUME 11, NUMBER 2: GO WITH THE FLOW



The latest edition of the J&W Elves Report features articles on the:
- NEW DB-225 ms columns. Column of choice for FAME and tetrachlorodibenzo-*p*-furan analysis.
- NEW DB-200 column for pesticide, substituted aromatic and solvent analysis.
- NEW Cyclosil-B, a new chiral phase from J&W.
- A Special Feature on; "The Top Ten Habits of Successful Gas Chromatographers".
- Quick Column Connections using J&W's Connex fittings.
- Better Pesticide Analysis using low bleed phases.
- Separation of Toxaphene Congeners by GC/ECD using DB-XLB
- Using 0.1 mm ID Columns for shorter analysis times without loss of resolution.

For your free and future copies of J&W and Alltech publications on gas chromatography:

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Freephone: 0800 255832, Fax: (09) 4442399
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NEW PRODUCTS FROM THE WISE ELVES AT J&W

- J&W now offers single-ended Connex guard columns for customers who are running dirty samples — clip the head of the guard column to remove non-volatile contamination first.
- If you are concerned about breaking your detector connection each time you change columns, why not use a Connex union, now available for megabore columns.
- DB-HT Sim Dis are now in stock.
- GS-Alumina/KCl, the 50 m Megabore configuration is now available and the 30 m will be available soon. Work is continuing on the 0.32 mm configuration as well.
- DB-225ms is coming soon and will be the latest addition to J&W's low bleed family of research grade columns. This all new (50% cyanopropylphenyl) - methylpolysiloxane equivalent stationary phase will provide a much higher temperature limit. It is ideal for FAMEs, sugar derivatives, dibenzofurans, dioxins and flavour compounds.

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LARGE VOLUME INJECTION LINERS FROM SGE

Large Volume Injection Liners, as the name suggests, were designed specifically for injected volumes of >5 µL, typical of temperature programming techniques. The liner has a sintered glass surface which is able to trap the entire dissolved liquid sample, so that the solvent can be removed. As heating continues, the volatilised components of interest are then concentrated onto the capillary column for chromatographic separation. Volumes injected can be as high as 1 mL without flooding the injection port.

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J&W HIGH SPEED MEGABORE COLUMNS

J&W's line of 0.45 mm ID High Speed Megabore columns have steadily gained in popularity since their introduction. They provide you a 24% increase in plate count with minimal sacrifice in sample capacity over 0.53 mm capillaries. And switching from 0.53 mm ID is easy. You do not need any special ferrules or hardware to install 0.45 mm ID High Speed Megabore columns. J&W offers a complete line of 16 stationary phase configurations in (55 individual part numbers) in 0.45 mm ID to cover virtually all Megabore (or 0.53 mm ID) applications. They will be ideal for any GC practitioner who uses standard 0.53 mm ID fused silica capillary columns or "packed" GC columns, particularly process QC laboratories and environmental laboratories. The new 0.45 mm ID High Speed Megabore columns provide added incentive by providing faster run times for increased analytical throughput with minimal column conditioning time required. Switching from packed columns to 0.45/0.53 mm ID capillary columns requires only simple modifications to the GC. If you want to try a 0.45 mm ID

configuration that is not listed (page 57 of the 1996/97 J&W catalogue) then J&W's Custom Column Shop is ready, willing and staffed with able J&W elves.

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HAULIN' WITH HIGH SPEED J&W MICROBORE COLUMNS

- Shorter analysis time with comparable resolution
- 0.1 mm ID columns are available in a variety of stationary phases.

Considerable time savings can be achieved by reducing your column length. To provide equivalent efficiency, however, the internal diameter of the column needs to be reduced. Columns with 0.10 mm ID will satisfy the desire for significantly reduced analysis times, yet there are some challenging but manageable problems that need to be addressed. Your GC needs to be optimised for the use of 0.10 mm ID columns. This includes small sample volumes injected at high split ratios, high inlet pressure capability, and a detector capable of scanning the resulting sharp peaks. J&W Microbore columns are also available in DB-5, DB-17, DB-225, DB-1701 and DB-WAX.

Contact: Alltech Help Desk
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DB-225MS - THE NEW SKINNY ON FATTY ACID METHYL ESTER AND DIBENZO-*P*-FURAN ANALYSIS

Because of its unique selectivity, DB-225, a (50% cyanopropylphenyl)-methylpolysiloxane column has long been the column of choice for FAME analysis. By extending the "ms" technology, J&W have developed a higher temperature, lower bleed DB-225: DB-225 ms.

DB-225 ms has virtually identical selectivity, to DB-225 for critical separations. The lower bleed (Figure 3) allows for more sensitive analysis of trace compounds in bleed sensitive detectors and less detector fouling. The higher isothermal upper temperature limit (260 °C for DB-225 ms vs 220 °C for DB-225) can be used to shorten run times for late eluting compounds and elute more retained compounds at higher temperatures while still maintaining reasonable run times.

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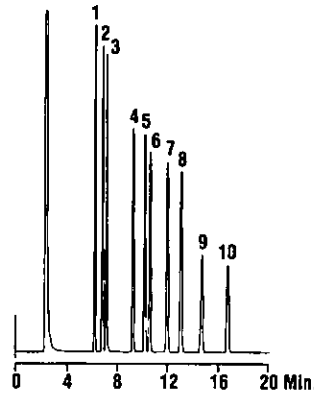
NEW HIGH TEMPERATURE HELIFLEX CAPILLARY COLUMN

The new Heliflex AT-2335 is a highly polar yet thermally stable cyanopropyl-polysiloxane capillary column. Ideal for the separation of positional isomers in FAME analysis, AT-2335 has the higher polarity necessary to separate *cis* and *trans* isomers as well. AT-2335 has a higher degree of cross-linking than comparable stationary phases resulting in less bleed and a higher temperature limit (275 °C).

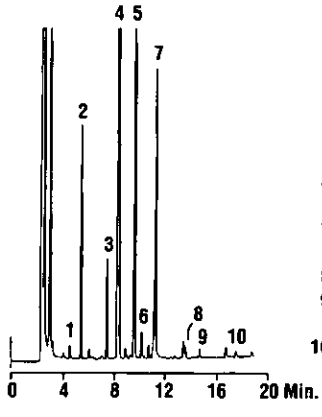
FAME Standard Mixture



1. Methyl Palmitate (C16:0)
2. Methyl Palmitelaidate (C16:1 trans)
3. Methyl Palmitoleate (C16:1 cis)
4. Methyl Stearate (C18:0)
5. Methyl Elaidate (C18:1 trans)
6. Methyl Oleate (C18:1 cis)
7. Methyl Linolelaidate (C18:2 trans, trans)
8. Methyl Linoleate (C18:2 cis, cis)
9. Methyl Arachidate (C20:0)
10. Methyl Linolenate (C18:3 cis, cis, cis)

Column: (Part No. 13400)	Heliflex AT-2335, 30 m x 0.25 mm ID x 25 µm
Carrier Gas:	Helium at 22 cm/sec (12 psig)
Temperature:	170 °C isothermal
Injector Temperature:	250 °C
Split Ratio:	100:1
Detector Temperature:	275 °C (FID)

Canola Oil FAME Mixture



1. Methyl Myristate (C14:0)
2. Methyl Palmitate (C16:0)
3. Methyl Stearate (C18:0)
4. Methyl Oleate (C18:1 cis)
5. Methyl Linoleate (C18:2 cis, cis)
6. Methyl Arachidate (C20:0)
7. Methyl Linolenate (C18:3 cis, cis, cis)
8. Methyl Behenate (C22:0)
9. Methyl Erucate (C22:1 cis)
10. Methyl Lignocerate (C24:0)

Column:	Heliflex AT-2335, 30 m x 0.25 mm ID x 25 µm (Part No. 13400)
Carrier Gas:	Helium at 22 cm/sec (12 psig)
Temperature:	170 °C - 210 °C at 2 °C/minute
Injector Temperature:	250 °C
Split Ratio:	100:1
Detector Temperature:	275 °C (FID)
Sample Preparation:	Meth Prep II (Part No. 12007)

Alltech has also introduced new Heliflex capillary column geometries for the following: AT-1, AT-5, AT-1701 and AT-WAX. Alltech Heliflex columns can save you money. These high quality columns share the same chemistries as higher priced

brands but are up to 20% cheaper. All Heliflex columns are individually tested for your security and confidence in a successful analysis. Wide bore, narrow bore, 15 m to 60 m lengths, even custom columns to suit your exact requirements are available in the Heliflex column range.

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WHY BUY THE KIT? LESS EXPENSIVE PARTS FOR HPLC

Have you ever wondered why the price of replacement parts for the more popular HPLC components never come down in price? The rules that apply for all other industries seem to be ignored by the laboratory instrumentation manufacturers. And then there's the 'KIT', forcing you to buy more parts than you need further inflating the cost of repairs.

Alltech have the solution, less expensive component parts for your HPLC instruments. You won't have to upgrade to the 'new improved' version for "thousands" when you can maintain what you've got for a "few hundreds". We even supply parts discontinued by the manufacturer, for example all the parts necessary to maintain the older model WATERS WISP autosamplers. Pump seals, plungers and convenient cartridge check valves are available for all the major brands as well as the specialised tools required by some manufacturers help you to take the labour cost out of DIY maintenance. But please note this is not a repair service. We want you to save money, so if we can't better the local price, we'll give you a handsome desk clock just for giving us a chance to try to reduce your maintenance costs.

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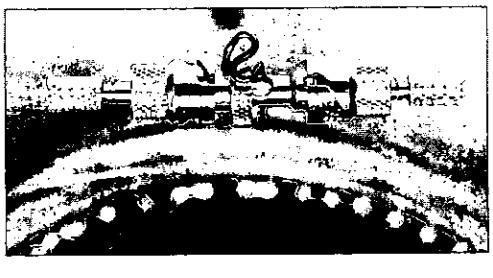
CONNEX FOR MEGABORE IN J&W PRODUCT NEWS



Connex fittings which simplify changing capillary columns have now been made available for customers wishing to add this quick change capability to their existing Megabore columns. Details are available in the latest *J&W Product News* for 1997 Volume 3, #1 from Alltech. J&W has recently been recommending polyamide sealing resin to customers who attach Connex to their own columns. If the column has been used prior to attaching Connex, the polyamide coating is not elastic enough to bond to the Connex ferrule. J&W now include a dilute solution of polyamide with every shipped end connector. The dilute polyamide is shipped in an eye dropper which is very easy to apply.

Also mentioned are:
- GS-Alumina/KCl columns for light hydrocarbon analysis.
- DB-HT Sim Dis for extended temperature simulated distillation.
- DB-200 for pesticides analysis.
- Custom columns and heaps of elf wisdom on every page.

For your free copy of *J&W Product News*:

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HAVE YOUR CAKE AND EAT IT TOO! BETTER PESTICIDE ANALYSIS USING J&W LOW BLEED PHASES

- Full resolution of 22 CLP pesticides in under 15 minutes
- Higher temperature limits
- No degradation of DDT and endrin

DB-17 ms, the newest member of J&W's low bleed family, has overcome the barrier between polarity and low bleed. DB-17 ms combines the proven selectivity of a 50% phenyl phase with the thermal stability and inertness found in low polarity "ms" columns. The result of this combination is the complete separation of all 22 common CLP pesticides and surrogates in under 15 minutes, with minimal bleed even at 320 °C (Figure 1). J&W has a low bleed column for every organochlorine pesticide application. The low bleed line of columns from J&W provides unsurpassed selectivity, thermal stability and inertness resulting in increased productivity with superior results.

J&W ELVES CHOCOLATE KAHLUA CAKE

(the elves frequently request this amazing, and easy to make cake)
1 chocolate cake mix
1 packet instant chocolate pudding mix
2 cups sour cream
4 eggs
¾ cup vegetable oil
1/3 cup Kahlua
1 packet semi-sweet chocolate chips
Combine in a mixing bowl: cake mix, pudding mix, sour cream, eggs, oil and Kahlua. Use medium speed and mix until well blended. Stir in chocolate chips by hand. Pour into well greased and floured pan. Bake at 180 °C for about 1 hour. Frosting: drizzle melted chocolate chips over top or sift icing sugar on top of cool cake. Serve with a big glass of milk.

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SPE MEMBRANES IMPROVE ANION ANALYSIS

Membrane-based solid-phase extraction (SPE) disks from Alltech known as NOVO-Clean IC disks used as a sample clean-up device, improve anion analysis by ion chromatography and capillary electrophoresis. The SPE disk consists of a polytetrafluoroethylene (PTFE) membrane impregnated with high purity polystyrene-divinylbenzene sulphonated cation exchange beads. NOVO-Clean 25 mm disks contain 2.0 meq of either hydrogen (IC-H) or silver (IC-Ag).

IC-H will remove an equal amount of hydroxide or carbonate, and IC-Ag will remove an equal amount of contaminating halides. More than one disk can be used in series to increase this capacity using the convenient luer-lok fittings. Figures 2 and 3 show the results of sample pre-treatment by NOVO-Clean IC disks. For more information ask for our SPE Catalogue #346.

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RHEODYNE INJECTORS AND ACCESSORIES BROCHURE

Rheodyne has built a solid reputation for providing quality injectors and valve accessories. This brochure is designed to provide you with a listing of Rheodyne's most popular valves and accessories, along with some technical background to help choose the products ideal for your application. It contains pages about the features you should consider when choosing a valve and includes specifications on various injector models. There is a short summary of the flow mechanics involved in injecting a sample fluid into a path and their impact on partial filling of a sample loop. Request your copy of bulletin #367 now.

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NEW IMPROVEMENTS IN METTLER-TOLEDO'S PROFESSIONAL, STANDARD, AND BASIC LEVEL LABORATORY BALANCES

Watson Victor Ltd have pleasure in announcing significant improvements to Mettler-Toledo's Professional Level PR, Standard Level PG-S and Basic Level B laboratory balances.

⇨ Professional Level - PR/AT Update

Implementation of New Features
As a result of the competitive environment, it has become necessary to offer FACT in the standard level. In addition a further step forward has been taken in the professional level with the implementation of new features. Information derived from the market has contributed to this and as a result new possibilities with the PR balance have been offered.

These are:
- proFACT (FACT plus programmable time control of the calibration), and
- ReproCheck (reproducibility of a loaded weight under ambient conditions).

Additional Product Benefits
The control of inspection, measuring and test equipment is better supported by the freely configurable adjustment and documentation possibilities offered by **proFACT** and the possibility to determine the repeatability at the balance location with **ReproCheck**.

⇨ Standard Level - PG-S/AG Update

Product Improvements
To meet changing needs in the market, the new PG-S has been developed and has replaced the existing PG line. Substantial product improvements involve not only the PG models but also the AG models:

- Built-in RS232 interface
- DeltaTrac
- New industrial design for 0.1 g and 1 g models
- Compact design with models up to 12 kg weighing range
- Weighing pan size enlarged to 240 mm x 240 mm with the 0.1 g and 1 g models
- Separate tare/zeroing key with the 0.1 g and 1 g models
- FACT
- VariCal
- LocalCan retrofittable to all models as an option
- New design for 1 mg and 10 mg models.

⇨ Basic Level - B Update

Product Improvements
Further product improvements have been made to the basic balances following the changeover last year of the 0.1 g and 0.001 g balances to Monbloc technology. The following information applies to all basic balances.

- Built-in RS232 interface
- Backlit LCD on request for 0.1 g and 1 g models

- Back-lit LCD for special segments
- LocalCan retrofittable to all models as an option
- Tough in-use covers now for all models of the B line
- B-M emulation as an option (backward compatibility to PM)
- B-OEM as an option (fast interface for OEM applications).

For more information on any of the Mettler-Toledo balance line,
Contact: Watson Victor Ltd
P O Box 1180, Wellington
Ph: (04) 3857699, Fax: (04) 3844651
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EXPANSION OF THE APPLICATIONAL COMPETENCE IN THE LABORATORY

⇨ LC-P Density

Implementation of Software for the Professional and Standard Level

Determination of density based on the principle of the displacement method is becoming increasingly more important in the laboratory. The application software Density successfully offered in the Standard Level with the AG/PG line is now also being implemented for the Professional Level (particularly for the AT line) with the compact instrument, LC-P Density. Mettler-Toledo now offer a complete selection of instruments for determination of the density of solids, liquids and viscous materials within the Professional and Standard Levels.

Main Features

- Compact instrument based on an LC-P45 for determination of density by the displacement method, of solids, liquids and viscous substances
- Result recording following the guidelines of modern quality assurance systems such as ISO and GLP
- Statistical evaluation of the samples
- Extremely simple operating concept as used with the AG analytical balance
- Documentation in five languages
- Attachable to AT, PR, AG, PG-S and AM/PM balances.

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Each time you purchase a J&W GC column and return the warranty card to J&W, J&W will send you a free gift, i.e., coffee mug, playing cards, baseball cap, etc., to name a few. This program was created to encourage customers to register their columns for warranty replacement. Complete the information on the warranty card, including the serial number and part numbers of the products purchased and drop it in the mail. The gifts are frequently changed and there is no limit, every card receives a free gift. *Please note:* Gifts will be sent to the end user and are randomly selected, special requests will not be accepted.

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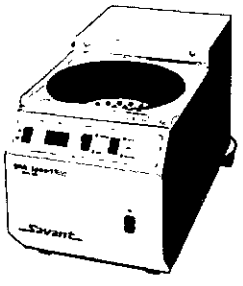
SAVANT'S NEW DNA120 SPEEDVAC

The DNA120 SpeedVac is designed primarily for concentrating and drying samples contained in microcentrifuge tubes but has the flexibility to process other sample containers as well. The digital timer allows for complete, automatic runs for precise, reproducible results every time with independent control of the run and heat times.

The Teflon-coated diaphragm vacuum pump, conveniently located behind the concentrator, does not take up additional bench space. The maintenance-free and oil-free design eliminates the need for messy oil and water changes and the associated hazardous disposal of these additional liquids.



- New! Dual digital timers - for complete, independent control of heat and run times
- Built-in, Teflon-coated vacuum pump - eliminates messy oil and water changes for maintenance-free vacuum
- Complete, compact, integrated unit - occupies only one foot of bench space
- Standard Teflon-coated chamber - provides long lasting service and corrosion resistance
- Accepts multiple rotors including a swing bucket microtitre plate rotor - allowing for maximum user flexibility.

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P O Box 34-234 Birkenhead, Auckland
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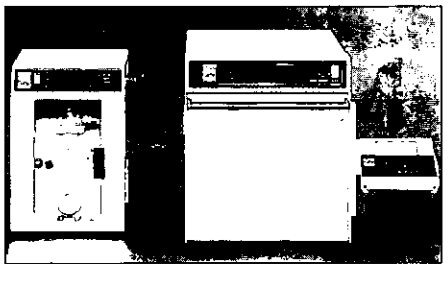
ALPHATECH SYSTEMS PRESENTS MILESTONE MLS-1200 PYRO SULFATE ASHING SYSTEM



In the pharmaceutical, polymer and food industries ashing procedures frequently involve the use of H_2SO_4. Hot sulfuric acid vapour is both hazardous to the operator and corrosive to equipment. In addition to these complications, many sulfate ashing procedures require 8-12 hours time to complete. Milestone has engineered a solution to these problems - the SAM35 Sulfate Ashing Module.

Sulfate ashing procedures can be performed inside a MLS-1200 Pyro Microwave System equipped with a SAM35 module, with complete operator safety and no damage to the instrument. The SAM35 module consists of three principal components; a microwave-transparent ceramic muffle furnace with an acid-resistant quartz ceiling; perforated quartz tube for acid fume evacuation from within the muffle furnace and an external vacuum evacuation/acid neutralization module. In operation, samples are introduced into crucibles with H_2SO_4, and pre-heated on a bunsen burner for ten minutes prior to placement in the muffle furnace. The ashing temperature of 550 °C is achieved in 20 minutes and ashing is completed in approximately 60 to 90 minutes.

Sulfuric acid fumes released into the muffle furnace are continuously removed by the SAM35 module as follows:

An all PTFE Teflon vacuum pump inside the SAM35 creates suction that draws acid fumes into the perforated quartz tube, the fumes then pass out of the muffle furnace and microwave cavity to a dust filter, before entering a condenser and an acid scrubber/neutralising solution, then exit the vacuum pump free of sulfuric acid.

Sample	Microwave Ashing Temperature (°C)	Microwave Ashing Time (minutes)	Traditional Ashing Time (minutes)
Lactose	600	60	480
NFT	800	50	480
Cellulose	800	80	500
Heavy Oil	550	230	980

Contact: Peter Hassan, Alphatech Systems Ltd & Co
P O Box 37583, Parnell, Auckland
Ph: (09) 3770392, Fax: (09) 3098514
Email: sales@alphatech.co.nz
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ELIMINATION OF IONISATION INTERFERENCES IN ICP SPECTROSCOPY NEW APPLICATIONS NOTE FROM THERMO JARRELL ASH

...compared to the flame, an ICP contains orders of magnitude higher electron densities. This could lead to the conclusion that ionisation equilibria due to the matrix components, e.g.

$$Na \leftrightarrow Na^+ + e^-$$
$$K \leftrightarrow K^+ + e^-$$
$$Ca \leftrightarrow Ca^+ + e^-$$

would have minimal effect.

In the case of the alkali elements, the equilibrium is biased heavily towards the ion. The degree of ionisation is therefore strongly influenced by the ionisation potential. The order of ionisation energies for the alkali elements is as follows:

Li>Na>K>Rb>Cs

Detection limits for the alkali elements deteriorate in the same order.

In practice it is found, particularly with the axial plasma, that simple variations in the concentrations of sodium, potassium and calcium cause problems obtaining accurate analysis. However, even the radial plasma shows matrix effects which vary with observation height, so that the problems are seen to some extent with this orientation as well...

For a free copy of the complete applications note,

Contact: Andrew Pearce, Sci Tech
P O Box 663, Dunedin
Ph: (03) 4777860, Fax: (03) 4777870
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DEMONSTRATION OF A REAL-TIME STACK METALS CONTINUOUS EMISSION MONITOR NEW APPLICATIONS NOTE FROM THERMAL JARRELL ASH

...an instrument capable of measuring metals in stack gas emissions real-time has recently become available.[1] This system was successfully tested at a jointly sponsored DOE/EPA demonstration for metals continuous emission monitors (CEM) in April of 1996.[2] In an effort to further gauge instrument performance in the field, several sites were selected for demonstration of the instrument's capabilities. Sites were targeted based on fuel type and nature of the facility, e.g. power plant, hazardous waste incinerator, etc...

This report summarises the results and experiences gained from demonstrating the stack gas metals CEM instrument at the vonRoll WTI hazardous waste incinerator at East Liverpool, Ohio...

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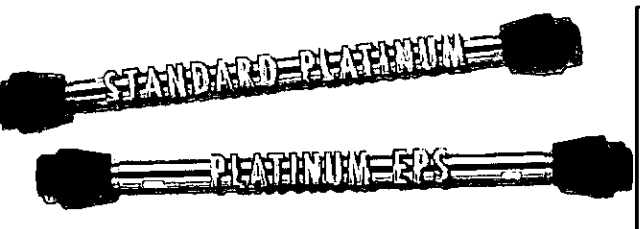

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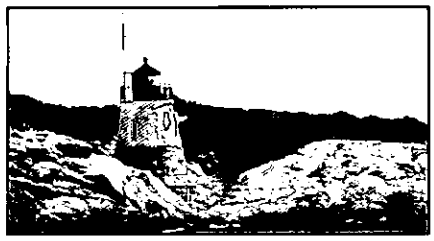

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The Alltech Guide to
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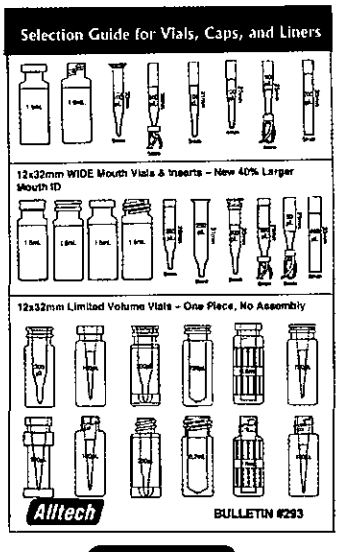

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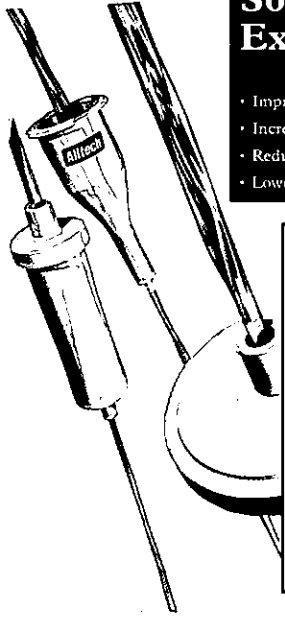

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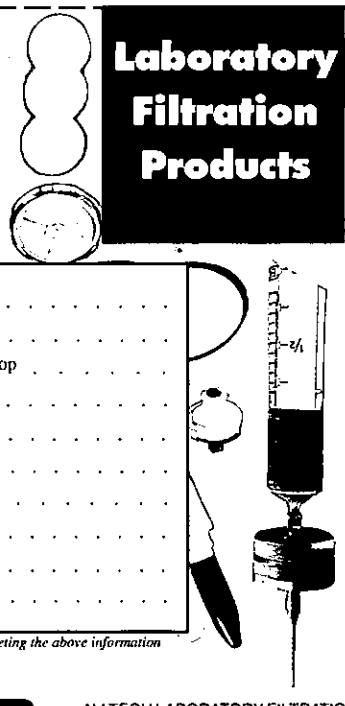

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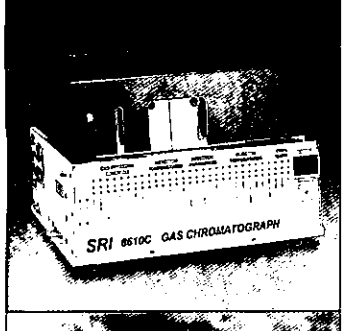

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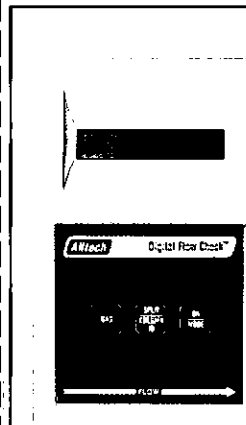

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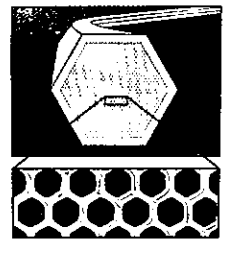

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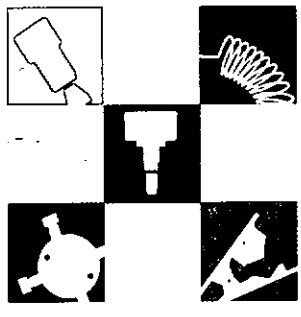

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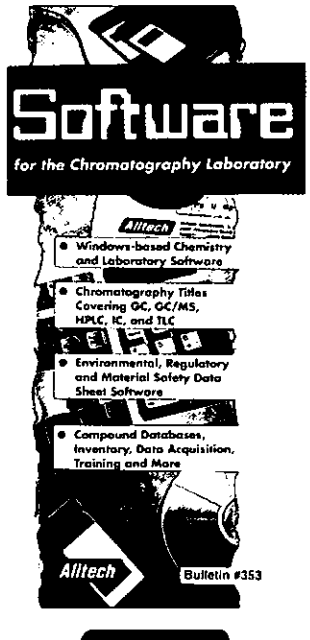

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the SPECTROFLAME family - with its quality, speed and flexibility - has been incorporated in the SPECTROQUANT.

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Its unique feature, the detection of the halogens in organic materials, is of special importance for the combustion of waste oil. The SPECTROQUANT analyses the element chlorine, which is critical in determining the dioxin contamination levels. The instrument also offers an important contribution to the prevention of corrosion at gas turbines. It is employed as a monitoring instrument for the oil which is burned to generate electricity. Among all these performance features the SPECTROQUANT also complies with European DIN and ISO as well as American EPA requirements.

Contact: Spectro Analytical Australia Pty Ltd
P O Box 568, Gosford NSW 2250
Ph: (+61-43)-232924, Fax: (+61-43)-2321117
New numbers as of August 1997:
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REMOVE SODIUM IMMEDIATELY AFTER HPAE CHROMATOGRAPHY

A.i. Scientific announces the release of Dionex's new Carbohydrate Membrane Desalter (CMD), an in-line device that effectively removes sodium ions after High Performance Anion-Exchange Chromatography with Pulsed Amperometric Detection (HPAE-PAD). This permits lyophilisation of samples without dialysis prior to further characterisation steps. Placed after the electrochemical detector cell, the CMD exchanges sodium acetate eluants to water and acetic acid immediately after leaving the detector cell. Collected fractions can then by lyophilised, leaving the pure carbohydrate sample ready for further manipulation, such as chemical hydrolysis and enzymatic digestion. The samples are also suitable for mass spectrometry or further chromatography. Molar substitution of sodium with hydronium ions also significantly reduces the pH of the eluant from more than 13 to less than 6, which helps limit analyte degradation that can occur during long-term exposure to high pH. Within the CMD, the column effluent passes between two cation-exchange membranes. Sodium ions in the effluent stream are exchanged for protons on the face of the membrane, thus converting the sodium hydroxide and sodium acetate to water and acetic acid, respectively. An electrical potential applied to electrodes within the CMD drives an electrolysis and electrodialysis reaction to increase the exchange on the cation-exchange membranes. The CMD will remove greater than 99 percent of sodium ions in eluants that contain up to 0.30 M sodium ions flowing at a rate of 1 mL/minute. The CMD Start-Up kit includes all hardware needed to desalt after HPAE-PAD. The kit includes a CMD, an SRC-1, other necessary hardware and a complete manual.

Contact: Mark Albertson, A.i. Scientific
Ph: (09) 4784967, Fax: (09) 4781360
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NEW CO_2 INCUBATORS FROM SANYO

Sanyo's new CO_2 incubators are constructed to match the needs of modern laboratory professionals.

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- Precisely controlled temperature with PID control and chamber-air sensing system
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- One unit can be stacked on top of another using stacking kit.

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WALLAC INTRODUCES THE NEW TRILUX JET

Wallac Oy, Turku, Finland, has released a version of the most successful plate counter in the world that now allows users to carry out flash luminescence assays. A JET-optioned Microbeta Trilux can be configured for flash luminescence assays enabling users to measure up to six samples simultaneously and have one to four reagent additions depending on the counter configuration. The clever "Fins" have designed this additional label use for the Trilux without losing any of the other Trilux capabilities which include radiolabels, glow, and now flash luminescence assays in either 96-, or 24-sample formats.

Flash luminescence is growing in popularity as new hardware becomes available, as it offers superior sensitivity, especially when compared to modified flash assays that are "slowed down" to enable reading in a glow-capable luminometer.

The Trilux's superior dual PMT design not only provides unrivalled counting efficiency for liquid scintillation counting but also luminescence counting from above or below the sample plate or filter. Peltier cooling provides a stable temperature to reduce thermal noise from the PMT when using flash luminescence assays ensuring an excellent signal-to-noise ratio.

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* * * * *

LETTERS TO THE EDITOR

New Zealand Dairy Board

Dear Sir

RE: KJELDAHL VERSUS DUMAS

In his article which appeared in your March/April 1997 issue Mr Granger is correct to state that "there is no substitute for good laboratory practice: you must know what your analytical results are being used for, and validate your analysis method accordingly". This cannot be over emphasised - but there can be much more to the establishment of a quality management system for product certification. In addition, we would suggest that if you are dealing in goods that have to meet specified levels of composition (especially proteinaceous products) with overseas customers, then you should ensure that you use an internationally recognised analytical method that is agreed upon between seller and buyer. Also, your laboratory should have a quality management system in place that is appropriate for your contractual obligations (ISO 9000 series, if you have international customers) and the quality system will need to be audited regularly by an appropriate auditing agency e.g. Telarc or SGS. Subtle differences in the interpretation of analytical methods can have major consequences, as highlighted by a recent dispute between the New Zealand dairy industry and the EC regarding the composition of butter.

We have some comments regarding the determination of protein raised in Mr Granger's article which could benefit from clarification. Over the past 20 years, the Kjeldahl and Dumas (combustion) methods have been the subject of intensive research with over a dozen published comparisons covering a very wide range of materials. We have scrutinised many of these comparisons and the overwhelming conclusion is that there is no clear consensus on the relative bias between the two techniques which falls mostly in the range 0-2%, and the worrying implication from this variability is that there are factors involved that, as yet, are not under satisfactory control. Here lies fertile ground for contractual disputes unless the systems noted above are in place.

The dairy industry has an immense financial interest in this matter, and we have conducted recently our own collaborative trial comparing the methods using a variety of dairy products and reference samples. The results are being drafted currently for publication. The reasons for a possible bias between the methods (not withstanding the fact that the two methods do not determine exactly the same thing - see below) are many and complex, and include the levels of inorganic nitrogen, and occluded nitrogen (air) in the samples - as mentioned in Mr Granger's article.

We need to be clear about what the methods measure: the Kjeldahl technique determines the apparent nitrogen content in a sample that results from the catalytic decomposition of the organic nitrogen into ammonia. In general, nitrate and nitrite along with atmospheric nitrogen is not detected. In contrast, the Dumas method combusts the sample in oxygen and essentially all the nitrogen in the sample (including organic nitrogen, inorganic nitrogen, absorbed and occluded nitrogen) is detected. In either method, this yields what is known as the "total nitrogen" content of the sample. The crude protein content is determined from the total nitrogen value by multiplying by the "Kjeldahl" factor. For milk proteins, this factor is 6.38, for animal proteins 6.25 and cereal proteins 5.70. Whether or not the Kjeldahl factor is applied depends on the nature of the sample and its use (i. e. by agreement between the contracting parties). For instance, with dried blood which was to be used as fertiliser, it would be relevant to quote the nitrogen content. If the dried blood was to be used for animal or human nutrition purposes then the crude protein content might be appropriate. Either analytical method could be used to determine its nitrogen content.

Non-protein nitrogen comprises peptides, amines, amides and other organic nitrogen compounds such as urea and uric acid, etc. as well as inorganic nitrogen compounds (nitrates etc.). The non-protein nitrogen concentration can be determined using either method by prior removal of the protein (usually by precipitation at the isoelectric point). The conversion of non-protein nitrogen concentrations to a sample mass basis requires care as the above Kjeldahl factors may be inappropriate. True protein is the difference between the crude protein nitrogen and the non-protein nitrogen values times the appropriate Kjeldahl factor.

There are at least three internationally recognised Dumas methods for the determination of total nitrogen or crude protein. These are AOAC 990.03, for the determination of the crude protein content of animal feeds; 992.23, crude protein in cereals and oilseeds; and 992.15, crude protein in meat and meat products (Official Methods of Analysis (1996) 16th Ed. AOAC Arlington, VA., Vol.1). However, the use of these official methods does not offer any escape from the issues of laboratory quality validation, contract agreement and possible Kjeldahl-Dumas bias. In the case of a dispute involving foodstuffs, irrespective of whether the dispute is local or international, various international agreements (FAO/WHO Codex Alimentarius standards, GATT/WTO protocols, USA Food Chemical Codex regulations etc.) specify the use of the (reference) Kjeldahl method, as the only legally sanctioned method.

Finally, the accuracy of the nitrogen (or protein) determination needs to be considered alongside the uncertainties associated with product sampling and sample preparation prior to actual analysis, and the uncertainty associated with the actual size of the batch of product.

It is hoped that these comments clarify some of the issues.

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NZ Dairy Board

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MUSINGS & POSTURINGS ABOUT 'CHEMISTS'

A few years ago whilst on the NZIC Waikato Branch committee I was asked to give a talk from the viewpoint of the commercial sector since I had been involved in chemistry in this area for quite a number of years. I graduated with a BSc in Chemistry from the University of Canterbury after working part-time through a full-time degree (to this day I don't know why but I think it had something to do with money). I didn't go on to do a Masters (if they had of let me) because, in the wisdom of the day the Masters degree was deleted and replaced with an Honours degree which carried a different set of entry pre-requisites. I gather that this decision was later retrieved from the deleted files and the degree reactivated. However I was never very good at exams being more practically oriented. I don't think I ever got to the point though of the student who had a total mind blank and wrote nothing on each page but his name and the words "refer Macbeth Act 2 Line 10". At the end of a long session of marking the examiner looked up the appropriate lines which read "I cannot do this bloody thing".

Anyway, back to the Waikato Branch talk. With my academic background and a career as an "Industrial Chemist" from four widely divergent industries and at that stage proprietor of my own laboratory I could not get to grips with what esoteric subject I could bring to an august (that's 'or-gust - not the month) gathering of predominantly university research chemists. In a flash while working in the lab (please don't tell OSH) I thought that it might be interesting to give a talk on the history and evolution of private consulting chemists in this country. Being a bit of a hoarder by nature I had kept all of the back issues of *Chemistry in New Zealand* as well as the extinct *NZ Chemistry in Industry* journals. Analysis of articles in these gave interesting backgrounds to chemical practitioners in industry back to around the early 1960s but that was it. As expected, I found that there was plenty of history written about early Dominion Analysts and Government Chemists but virtually nothing I could find regarding private chemists. Perhaps that's why they were referred to as 'private' chemists. So I wrote to two surviving chemists of the 1930s and got their story of life for a chemist in those days. Unfortunately much of this information is now misplaced and probably gone forever. I unearthed from our Institute's publication 'Chemistry in a Young Country", that a Mr G M Thomson worked as a private analyst in Dunedin in the 1890s. From this I weaved a fairly respectable history of what made "Industrial Chemists" (there's a point to this term if the ads on Channel One press you to read on) and their practice survive and evolve. All was not chardonnay and petonque even in those days. A M Wright the chemist at the New Zealand Freezing Company bemoaned the fact that in 1920 his salary was of £50 while the Manager struggled on £1750!

Aside from the personalities over the years (about whom another whole article could be written) it was interesting to analyse the way in which private and industrial laboratories changed as New Zealand's economy and politics changed. In the 1940s the presence in New Zealand of US Army servicemen and their penchant for icecream gave rise to much stricter dairy regulations and hence the demand for dairy regulations and dairy technologists. (In 1866 the Colonial Analyst after one year in office, reported that 27 of 166 milk samples tested were watered down by more than 10% - so much for the good old days!).

Many other factors came in to play affecting the waxing and waning not only of private consulting laboratories but those practicing chemistry in Government laboratories as well. Things like the emphasis on export horticulture in the early 1980s, the evolution of automated instrumentation and computerisation, the transfer of Government science to SOE's in the mid-1980s, and the environmental concerns of the 1990s. In the early days being an "Industrial Chemist" was, if not quite a profession, at least a definable and respectable career. He/She was qualified with a major in chemistry. Meetings with other chemists were important to keep up to date in the relevant industry, or to source difficult to find chemicals. After 3 years working in chemistry one was eligible for full Membership of the Institute.

In 1997, a review of any University's course calendar will show that the extension of courses in which chemistry plays a part has become so diverse that I propose that "chemistry" as such in the industrial or commercial sector no longer qualifies as a career. Graduates of professional subjects such as law, accounting, engineering, computer science, enter into employment as lawyers, accountants, engineers and computer scientists. Few graduates of science majoring in chemistry enter into employment as chemists. Graduates today may take jobs that involve the use of chemistry knowledge and may initially do some chemical analysis as part of their job but do they work in chemistry as a long-term career? Industry will today predominantly require them to also work at being sales people, to develop management skills, to know quality systems, and to be able to access ready-made knowledge from the Internet or databases. One of the major scientific job recruitment agencies in Auckland found when I asked, that only 28% of the positions that became available through their organisation in 1996 required chemistry as a principle part of the job description.

Which beams us right in to May 1997. In the Auckland Branch Newsletter of that month Graham Bowmaker reports that 25% of the Branch's membership (100) has been dropped for not being financial and that the attraction for students to join seems minimal. He notes however that "one potential benefit for students is contact with industry" and that a meeting with 'industrial chemists' could be organised. I applaud the sentiment and was instrumental in suggesting some years ago that the Waikato Branch host a summer BBQ for students to learn more about the Institute. I am not sure that this really succeeded.

The fact that the membership fees have now been decreased and that anyone with an interest in chemistry will now be eagerly embraced in the Institute seems to add weight to my musings that chemists in industry are, if not extinct, certainly on the endangered list. The good news seems to be that chemistry at the academic level is still thriving and attracting higher and higher calibre practitioners. Recognition of this in the award of Fellow carries on the ideals of the Institute but what about the others?

It seems to me that there are still some soft fuzzies dating back to the "Industrial Chemist" days lingering on in the thinking of the Institute. Most professional and semi-professional institutes all over have had to face up to the fact that values in the 1990s bear no resemblance to values even 30 years ago. It is evident from what I read in recent issues of *Chemistry in New Zealand* that the Council of the Institute appreciates this and are striving to address it. However if membership is to increase and the scope and value of the NZIC is to thrive it must market itself, not wave banners and hand out pamphlets. Today the Institute is no different to a company with autonomous branches selling a product (membership). Does the Institute really know who the 'others' (customers) are? What market sectors (academic, commercial, technical sales, teaching etc.) it is catering for?

What position (exclusive, cheap) in the market it is directed at? What the size of the market is? Any competent market research company could establish this at no great cost. With this information, the Council might then see additional opportunities and directions to expand.

It might also form a basis on which Council and branches could plan and promote the product into the 21st Century?

Peter Dawson
DTR & Associates Ltd

International News

SCIENTIFIC INSTRUMENT INDUSTRY MERGERS AND ACQUISITIONS REACH RECORD US$2 BILLION IN 1996

Mergers and acquisitions in the laboratory equipment and analytical instrument industries reached a record US$2 billion in 1996, according to a report from Infocom Ltd, prepared by the editorial team of *Analytical Instrument Industry Report.*

According to report authors Dr Peter Speers and Dr Gordon Wilkinson, merger and acquisition transactions totalled almost one a week in 1996 compared with an average of 37 per year over the past decade. "Despite the acknowledged trend towards globalisation" say Speers and Wilkinson, "most acquisitions still take place within the same major geographic region, although US and Japanese companies did take a particular interest in European investment prior to 'Europe 1992' ... since then, however, there has been an increasing focus on establishing a stronger presence in Japan and emerging markets such as China, India and Mexico".

"Nowhere has global consolidation been more marked than in the laboratory products distribution sector" says the report, which explains that, "huge savings can be made by: electronic purchasing; integrated logistics; centralised administration and warehousing in major geographical areas; plus the provision of a 'one-stop' shopping solution to simplify the 'need it today, fast' purchasing demands of major companies in the chemical and pharmaceutical industries as they, in turn, consolidate". Today, Darmstadt-based Merck, Fisher Scientific of the US and VWR Scientific Products (49% owned by Merck) account for almost US$5 billion's worth of laboratory supplies.

Speers and Wilkinson note that, "although the 1990s has been termed the 'decade of the customer', it also seems to be the 'decade of the shareholder' when companies have focused on restructuring and repositioning to achieve better performance and increase shareholder value". They observe that, "the scientific instrument industry is now performing better than at any time in the past decade, primarily as a result of the interest that major investment groups and large corporations have taken in providing seasoned management teams with the investment funding to identify and purchase suitable acquisition candidates, turn the businesses around and provide a healthy financial return". Equally as important, mature participants in the industry, "have come to recognise the financial realities of the 1990s ... a factor which has transformed the instrumentation sector from a technology-driven business to one that is primarily led by customer needs and the drive for better financial performance and improved shareholder value" they add.

The report offers a unique benchmark for buyers and sellers of companies by providing - for over 350 merger and acquisition deals - the name of the buyer, the target company (together with its financials and employee count where available) and transaction details if disclosed. The study includes diskettes with the data in Excel spreadsheet form plus the text of news stories from, *AII Report* relating to each of the transactions identified by the authors.

IUPAC PROPOSES NAMES FOR TRANSFERMIUM ELEMENTS

The Commission on Nomenclature of Inorganic Chemistry (CNIC) has presented a revised list of recommended names for elements 101-109. The revision is based partly on suggestions received during the official five-month comment period called for by IUPAC's bylaws. Comments came from individual chemists worldwide and from the 39 National Adhering Organizations (NAOs) that comprise IUPAC. The new names replace the provisional recommendations initially proposed by CNIC in August 1994. Major changes include the recommendation of seaborgium for element 106; hassium, rather than hahnium, for 108; the retention of rutherfordium for 104; and the adoption of dubnium for 105.

The naming of the transfermium elements has been controversial, partly because of disagreements on priority for discovery of several elements. According to Alan Sargeson, Chairman of CNIC, the Commission accepted the conclusions on discovery reached by the Transfermium Working Group (TWG) in 1993. The TWG was formed jointly by IUPAC and the International Union of Pure and Applied Physics in 1986 to establish criteria that must be satisfied for the discovery of a new chemical element to be recognised and to evaluate competing claims. In selecting names, CNIC gave great weight to proposals by discoverers of the elements but considered other factors as well. The current recommendations were developed by CNIC after dropping its previous restriction of not naming an element for a living person. According to Sargeson: "The response from NAOs and the chemical community showed quite clearly that chemists in general did not see this as an important issue and many thought it was irrelevant. The Commission therefore did not appear to reflect general chemical opinion on this issue".

IUPAC President Albert Fischli complimented CNIC and the President of the Inorganic Chemistry Division of IUPAC, Jeff Leigh, on their conscientious efforts to forge a consensus on a difficult issue. "IUPAC's responsibility is to develop recommendations that are widely accepted and that can form the basis for international communication in chemistry", said Fischli. "Our standard process of proposing provisional recommendations, soliciting comments from the chemistry community and making revisions where indicated has worked well. Unfortunately, with conflicting claims and preferences, it has not been possible to devise names that are completely satisfying to all the laboratories involved in these discoveries. I believe that the proposal from CNIC comes close to achieving our goal. Nevertheless, these names will not have final IUPAC endorsement until they are approved by our Council, which meets in Geneva in August 1997. The delegations from our 40 member countries will have the final say".

The names and symbols recommended by CNIC are as follows:

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

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

CONSTITUENTS OF FIJIAN PLANTS - A REVIEW

Richard C. Cambie,[1] William Aalbersberg,[2] and Sadaquat Ali[2]
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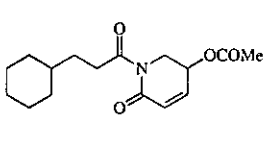
[2]Department of Chemistry, School of Pure and Applied Sciences, University of the South Pacific, Suva, Fiji

The flora of Fiji shows great diversity encompassing ancient indigenous conifers, unusual seed plants, and primitive angiosperms. It comprises more than 2000 species of seed plants of which 1300 or more are indigenous and nearly 500 are adventives. The plants are distributed in ca. 155 families and ca. 445 genera of which 13 are endemic and ca. 88 which are distributed from Malaysia to Fiji but no further eastward. These plants are well documented in a five-volume compilation 'Flora Vitiensis Nova' authored by A C Smith.[1] The flora includes many species which are also found in other Melanesian and Polynesian countries, e g Tonga, Samoa, as well as many which have been introduced from further afield. Considerable investigation has been carried out on the constituents of these latter plants and the literature is extensive. The present review is restricted to constituents which have been isolated within Fiji or from plants which are known to have been collected from Fiji.

Although only a relatively few plants of Fijian origin have been examined they have yielded a varied range of extractives which are grouped below under different classes of compounds. Other than for the examination of a few native species, notably *Piper methysticum* (fam. Piperaceae), virtually all research on Fijian plants has been carried out in the last 25 years since the founding of the University of the South Pacific. Workers of note who have made significant contributions include R M Smith, K D Croft, S Ali, E V Lassak, R C Cambie, W Aalbersberg, and S Sotheeswaran. The medicinal plants of Fiji and their constituents have been compiled in a recent book by Cambie.[2]

Alkaloids

Few studies of alkaloids from plants of Fijian origin have been carried out, a marked exception being the isolation of the novel pyridone alkaloid pipermethysticine (**1**) by Smith[3] from the leaves of *Piper methysticum*, the source of the ceremonial and social drink kava. The alkaloid is a minor component of the stem but is absent from the roots.[4] The alkaloids of the bark of *Hernandia nymphaefolia* (syn. *H. peltata*, fam. Hernandiaceae) have been shown to be bisbenzylisoquinolines,[5] e.g. (**2**), similar to those isolated from the same plant in New Caledonia.[6]



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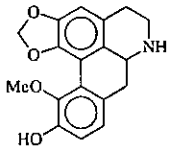

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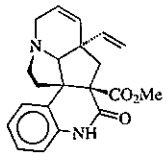

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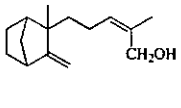
The leaves and stem of a *Melodinus* species, originally thought to be *Alyxia bracteolosa* (fam. Apocynaceae) contain the alkaloid (+)-scandine (**3**).[7] An unpublished screening of ca. 200 plants for alkaloids using common precipitation reagents such as Mayer's and Dragendorff's showed that ca. 18% gave positive results.[8] Despite the paucity of alkaloid studies on Fijian plants, alkaloids have been isolated from a number of these plants obtained from other countries.

Essential Oils

Essential oils comprise the most studied group of chemical constituents. Early studies were promoted by a search for oils of commercial value. The essential oil of Fijian sandalwood (*Santalum yasi*, fam. Santalaceae), which played an important part in the commercial exploitation of Pacific islands, contains α-santalol (**4**) (49%) and β-santalol (**5**) (42%) as the major constituents.[9] Examination of the essential oils of wild guava trees (*Psidium guajava*, fam. Myrtaceae) of Fiji showed that they could be classified into three main chemotypes on the basis of their relative amounts of sesquiterpene hydrocarbons. The principal components are β-caryophyllene (**6**), β-bisabolene (**7**), aromadendrene (**8**), β-selinene (**9**), nerolidiol (**10**), caryophyllene oxide (**11**), and sel-11-en-4α-ol (**12**).[10]



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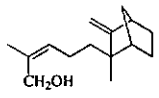

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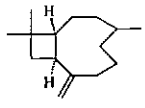

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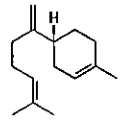

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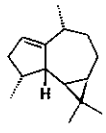

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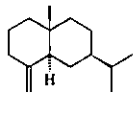

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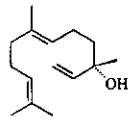

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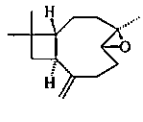

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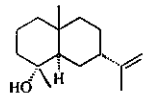
The essential oil of Fijian ginger (*Zingiber officinale*, fam. Zingiberaceae) contains several sesquiterpenes not previously reported from this source including α-copaene (**13**), β-bourbonene (**14**), α-bergamotene (**15**), α-selinene (**16**), calamenene (**17**) and cuparene (**18**).



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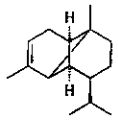

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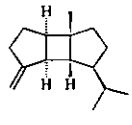

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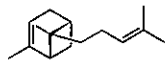

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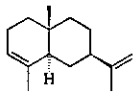
Fijian ginger has a much higher neral (**19**) and geranial (**20**) content than oils from India, Australia, Japan, and Africa.[11] The pungent principals of ginger have been analysed by HPLC using electrochemical detection.[12] The oil of the wild ginger (*Zingiber zerumbet*) has a much higher content of zerumbone (**21**) (~59%) than that of the variety grown in India.[13]



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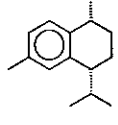

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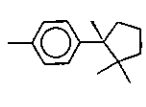

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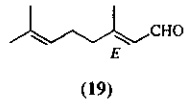

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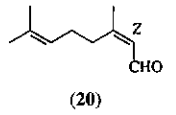
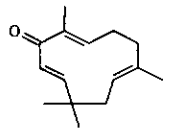


(20)

Likewise, an examination of the oil of the lemon scented introduced plant *Eucalyptus citriodora* (fam. Myrtaceae) showed that while the oil is qualitatively similar to Australian *E. citriodora* oil, it has a lower content of citronellal (**22**).[14] The oil of the flowers of the Fijian ylang-ylang (*Cananga odorata*, fam. Annonaceae) differs markedly from that produced in Java. Analysis of the oil showed that it contained linalool

(**23**) (52%), benzyl benzoate (**24**) (12%), and farnesol (**25**) (21%) as the major constituents.[15]



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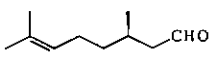

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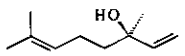

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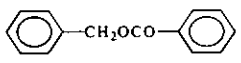

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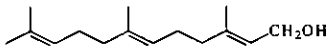
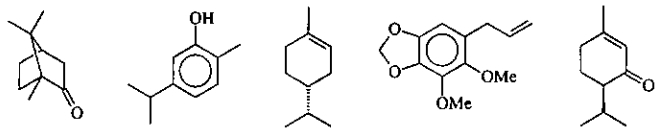


(25)

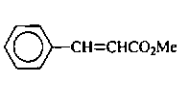
The leaf oil of the medicinal plant *Coleus amboinicus* (fam. Labiatae) contains camphor (**26**), cavacrol (**27**), and limonene (**28**) as the major constituents.[16]



(26) (27) (28) (29) (30)

The essential oil of the leaves and stems of *Piper aduncum* (fam. Piperaceae) contain 4,5-dimethoxy-6-(2'-propenyl)-1,3-benzodioxole (**29**) (58%) and piperitone (**30**) (4%) as the major constituents.[17]

The composition of the steam-volatile leaf oils of two chemotypes of the Fijian sweet basil (*Ocimum basilicum*, fam. Labiatae) has been determined by capillary gas-liquid chromatography and mass-spectrometry. The major components are methyl cinnamate (**31**), linalool (**23**), methyleugenol (**32**), and eugenol (**33**).[18] The oil of the introduced sacred basil (*Ocimum sanctum*) has also been investigated at different stages of growth. Of the major constituents viz. β-caryophyllene (**6**) and methyleugenol (**32**), the former compound is at its maximum concentration for the full bloom stage whereupon methyleugenol is at a minimum concentration.[19] The presence of the two chemotypes of *O. sanctum* has also been established, one being a methyleugenol rich variety and the other containing mainly caryophyllene and eugenol.[20]



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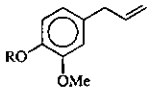
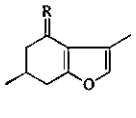
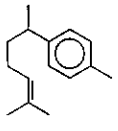


(32) R=Me
(33) R=H

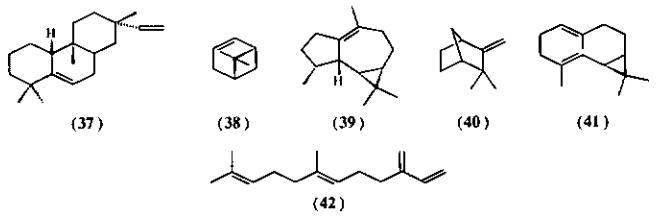


(34) R=H$_2$
(35) R=O



(36)

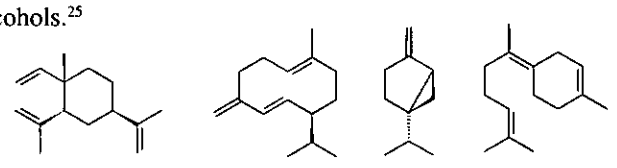
The leaf oil of *Euodia hortensis*, forma *hortensis* (fam. Rutaceae) contains menthofuran (**34**) (64%) and evodone (**35**) (27%) as the major components. Another 42 compounds were detected in the oil of which 29 were identified. The volatile oil of the flowers contains evodone as the main constituent with lesser amounts of menthofuran (**34**), α-copaene (**13**), ar-curcumene (**36**), and β-caryophyllene (**6**).[21] Acetaldehyde constitutes the sole odorous constituent of the oil of the ripe fruits of *Pandanus pyriformis* (fam. Pandanaceae)[22], while the essential oils of the conifers *Dacrydium nidulum* var. *nidulum* (fam. Podocarpaceae) and *D. nausoriense* are a rich source of the diterpene rimuene (**37**) (up to 58%). Other major components are α-pinene (**38**), β-caryophyllene (**6**), aromadendrene (**8**), viridiflorene (**39**), camphene (**40**), bicyclogermacrene (**41**), and β-farnesene (**42**).[23]



(37) (38) (39) (40) (41)

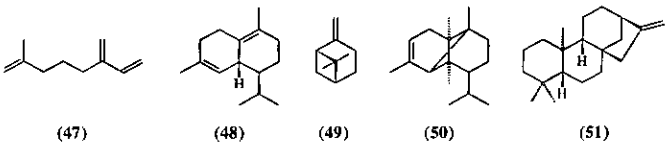
(42)

An extensive study of the essential oils of Fijian plants has been carried out by Lassak. The oil of *Hyptis pectinata* (fam. Lamiaceae) contains 27 constituents among which β-elemene (**43**), β-caryophyllene (**6**), germacrene D (**44**), and bicyclogermacrene (**41**) are the major components[24] while the oil of the leaves of *Vitex trifolia* var. *bicolor* (fam. Verbenaceae) contains 21 constituents which are predominantly sesquiterpenic. They include sabinene (**45**), β-caryophyllene (**6**), β-caryophyllene oxide (**11**), and octen-3-ol as the major constituents.[24] The leaf oil of *Polyscias fruticosa* (fam. Araliaceae) contains 24 constituents which are mainly sesquiterpenes, e.g. β-elemene (**43**), α-bergamotene (**15**), (*E*)-γ-bisabolene (**46**), germacrene D (**44**), and sesquiterpenoid alcohols.[25]

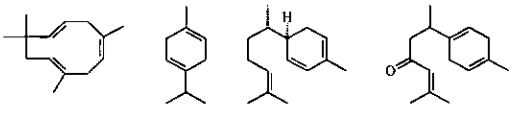


(43) (44) (45) (46)

The oil of the Brazilian fireweed (*Erechtites valerianifolia*, fam. Asteraceae), an introduced and common weed in Fiji, contains 21 components of which 14 have been identified. Myrcene (**47**) (66%) and α-pinene (**38**) (25%) are the chief components.[26] The leaf oil of *Decaspermum fruticosum* (fam. Myrtaceae) contains α-pinene (**38**), limonene (**28**), linalool (**23**), β-caryophyllene (**6**), and δ-cadinene (**48**) as the major components.[27] The leaf oil and outer shell oil of nutmeg (*Myristica castaneifolia*, fam. Myristicaceae) are very similar both qualitatively and quantitatively and contain as the major constituents α-pinene (**38**), β-pinene (**49**), δ-cadinene (**48**) and ylangene (**50**).[27] The leaf oil of *Aglaia elegans* (fam. Meliaceae) contains germacrene D (**44**), and a diterpene, possibly kaurene (**51**), as the major components.[27] The leaf oil of *Schefflera actinophylla* (syn. *Brassaia actinophylla*, fam. Araliaceae) contains α-pinene (**38**), β-caryophyllene (**6**), and humulene (**52**) as the major components.[27] Limonene (**28**) is the major constituent of the peel oils of *Citrus grandis* (fam. Rutaceae) and *Fortunella japonica* (fam. Rutaceae) but each also contains *inter alia* α-pinene (**38**), β-pinene (**49**), sabinene (**45**), myrcene (**47**), and γ-terpinene (**53**) as minor components.[27]



(47) (48) (49) (50) (51)

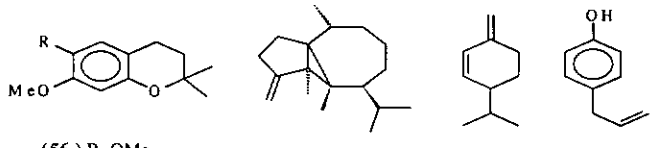


(52) (53) (54) (55)

The rhizome oil of *Curcuma longa* (fam. Zingiberaceae) contains zingiberene (**54**), ar-curcumene (**36**), ar-turmerone (**55**), and a farnesene isomer as the major components.[27] Other leaf oils examined by Lassak include those of *Pimenta racemosa* (fam. Myrtaceae) which contains myrcene (**47**) and phenolic

ethers, *Wedelia biflora* (fam. Asteraceae), one form of which is rich in α-pinene (**38**) and the other rich in sesquiterpenes, and *Wedelia triloba* which contains mainly α-pinene.[27]

The oils of the fresh flowers and a combination of the leaves plus stems of flowering and non-flowering *Ageratum conyzoides* (fam. Asteraceae) growing in different conditions were found to be similar. The oils are rich in sesquiterpenes, ageratochromene (6,7-dimethoxy-2,2-dimethylchromene) (**56**) and 7-methoxy-2,2-dimethylchromene (**57**).[28] The oil from the fruit of *Dysoxylum richii* (fam. Meliaceae) is rich in sesquiterpene hydrocarbons (58%) and oxygenated sesquiterpenes (35%), the major components being δ-cadinene (**48**), germacrene D (**44**), and cadinol isomers.[29] The leaf oil of the common weed *Synedrella nodiflora* (fam. Asteraceae) contains aliphatic alcohols, monoterpenes, sesquiterpene hydrocarbons, and oxygenated sesquiterpenes. The major components of this oil are β-caryophyllene (**6**), β-farnesene (**42**), germacrene D (**44**), and β-cubebene (**58**).[29]



(56) R=OMe
(57) R=H

(58)

(59)

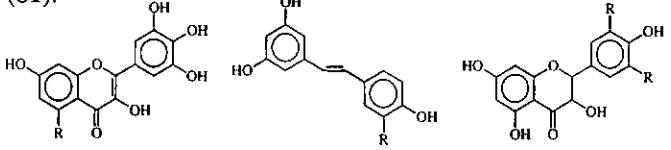
(60)

The gum terpentine obtained by distillation of the resin of *Pinus caribaea* (fam. Pinaceae) grown in Fiji contains α-pinene (**38**) (66%), β-pinene (**49**) (7%), β-phellandrene (**59**) (22%), and estragole (*p*-allylanisole) (**60**) (5%), and differs markedly in composition to that of the oil from Nicaragua.[30]

Phenolic and Related Compounds

A chromatographic examination of the heartwood of *Intsia bijuga* (fam. Caesalpiniaceae) from Fiji showed the presence of the polyphenols robinetin (**61**), 3,5,4'-trihydroxystilbene (resveratrol) (**62**), 3,5,3',4'-tetrahydroxystilbene (**63**), and the flavonoids myricetin (**64**), dihydromyricetin (**65**), and naringenin (**66**), in addition to leucocyanidin.[31]

The constituents of yaqona (*Piper methysticum*, fam. Piperaceae) have been the subject of numerous publications. They comprise seven major compounds, viz. kawain (**67**), 7,8-dihydrokawain (**68**), 5,6-dehydrokawain (**69**), yangonin (**70**), 5,6,7,8-tetrahydroyangonin (**71**), methysticin (**72**), and 7,8-dihydromethysticin (**73**), and eight minor components, (**74**)-(**81**).[32,33]



(61) R=H
(64) R=OH

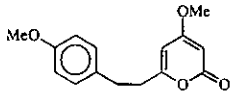
(62) R=H
(63) R=OH

(65) R=OH
(66) R=H

	R¹	R²	R³
(67)	H	H	H
(72)	-OCH₂O-		H
(74)	H	H	OH
(76)	OMe	H	H

	R¹	R²
(68)	H	H
(71)	OMe	H
(73)	-OCH₂O-	

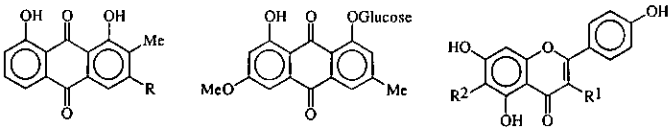
	R¹	R²	R³
(69)	H	H	H
(70)	OMe	H	H
(75)	OH	OMe	H
(77)	OMe	OMe	H
(78)	OMe	H	OMe
(79)	OMe	OH	H
(80)	-OCH₂O-		H



(81)

Gas-liquid chromatographic methods have been developed for the analysis of the major constituents[34] and the lactones were nearly completely separated by chromatography on a column of Alox T.[35] Another study showed that the lactone composition of the leaves, stems, and roots of *P. methysticum* were markedly different but no differences were found between two cultivars.[4]

The leaves of *Cassia alata* (fam. Caesalpiniaceae) contain the anthraquinones isochrysophanol (**82**), physcion-1-glucoside (**83**), aloe-emodin (**84**), and rhein (**85**), as well as the flavanol kaempferol (**86**).[36]

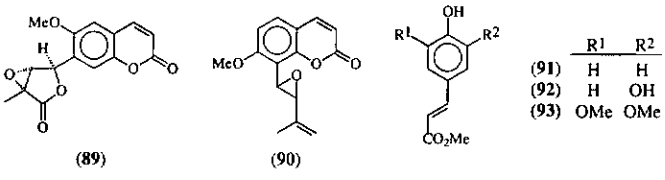


(82) R=H
(84) R=CH_2OH
(85) R=CO_2H

(83)

	R₁	R₂
(86)	H	H
(87)	OMe	OMe
(88)	OMe	H

The flavanols 6-methoxy-3-O-methylkaempferol (**87**) and its demethoxy derivative (**88**) have been isolated from the bud exudates of both *Gardenia gordonii* (fam. Rubiaceae) and *G. storkii*.[37-39] The leaves of *Micromelum minutum* (fam. Rutaceae) contain the coumarin micromelin (**89**) while the leaves and the bark each contain the related phebalosin (**90**).[40]

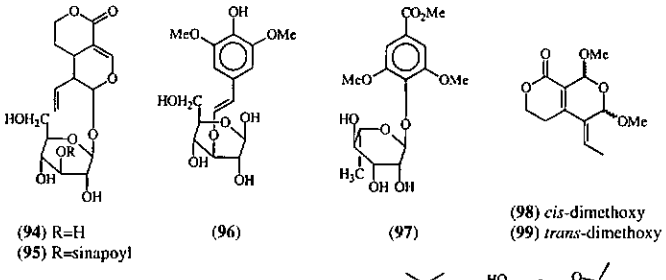


(89)

(90)

	R¹	R²
(91)	H	H
(92)	H	OH
(93)	OMe	OMe

The heartwood of *Fagraea gracilipes* (fam. Potaliaceae) contains methyl *p*-coumarate (**91**), methyl caffeate (**92**), methyl sinapate (**93**), the iridoid glucoside sweroside (**94**) and five novel compounds. Three contained sugars; one was 3-O-sinapoyl sweroside (**95**), another was 3-O-sinapoyl D-glucose (**96**), and the other was the L-rhamnoside of methyl syringate (**97**). The remaining two compounds were the iridoids (**98**) and (**99**).[41] The wood of *Fagraea gracilipes* also contains the antifungal agent (**100**).[42] The heartwood of *Heritiera ornithocephala* (fam. Sterculiaceae) contains the phenolic sesquiterpenoids 7-hydroxycalamenene (**101**), its bis derivative (**102**), the benzoxepinone (**103**), and the benzopyran (**104**).[43]

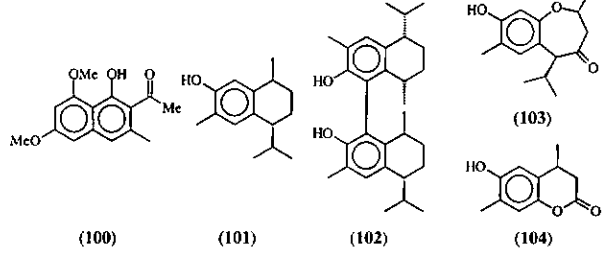


(94) R=H
(95) R=sinapoyl

(96)

(97)

(98) *cis*-dimethoxy
(99) *trans*-dimethoxy



(100)

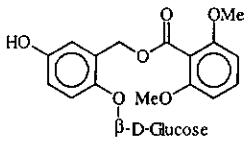
(101)

(102)

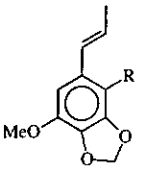
(103)

(104)

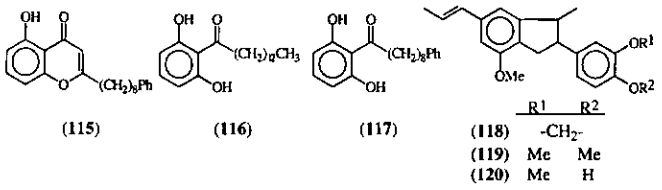
The heartwood of the endemic species *Degeneria vitiensis* which belongs to the monotypic family Degeneriaceae contains the phenolic glucoside curculigoside (**105**) as well as apiol (**106**), and myristicin (**107**).[44]



(105)



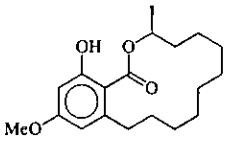
(106) R=OMe
(107) R=H



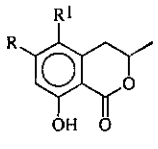
(115) (116) (117)

	R1	R2
(118)	-CH2-	
(119)	Me	Me
(120)	Me	H

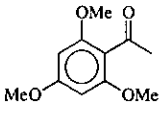
Euphorbia fidjiana (fam. Euphorbiaceae) heartwood contains a variety of phenolic substances including macrolides, e.g. lasiodiplodin (**108**), sugars and five dihydroisocoumarins, e.g. the new compounds 5-methylmellein (**109**), and (**110**), and carboaromatic compounds, e.g. xanthoxylin (**111**).[45]



(108)

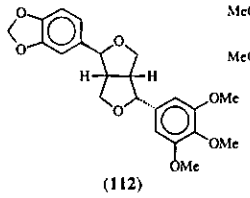


	R1	R2
(109)	CH_2OH	H
(110)	CH_3	OH



(111)

The lignans (**112**), (**113**), and (**114**) have been isolated from *Hernandia nymphaefolia* (fam. Hernandiaceae).[5] An extract of the combined bark and heartwood of *Myristica castaneifolia*



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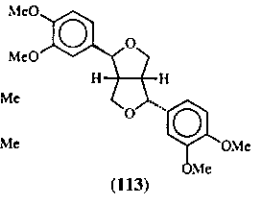

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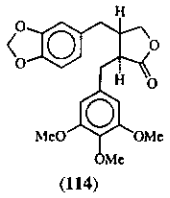
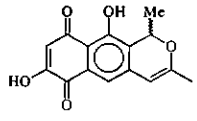


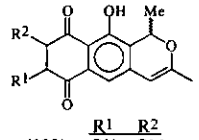
(114)

(fam. Myristicaceae) contains the new arylalkanone castanone (**115**), two structurally related open-chain arylalkanones (**116**) and (**117**), and three benzofuranoid neolignans (**118**)-(**120**).[46]

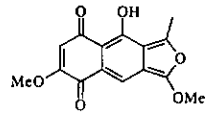
The rare shrub *Ventilago vitiensis* (fam. Rhamnaceae) contains the naphthaquinone derivatives ventilone G (**121**), ventiloquinone L (**122** or **123**), and ventiloquinone (**124**),[47]



(121)

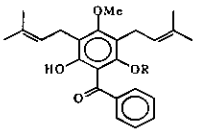


	R1	R2
(122)	OH	OMe
(123)	OMe	OH

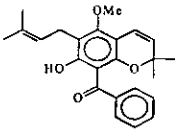


(124)

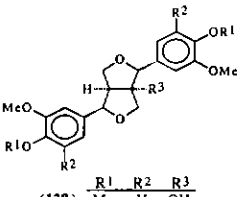
while the bark of *Garcinia myrtifolia* (fam. Clusiaceae) contains three biogenetically related phenolic benzophenones (**125-127**), two of which viz. myrtiaphenone-A (**125**), myritiaphenone-B (**126**) are new.[48] The heartwood of the endemic species *Gmelina vitiensis* (fam. Verbeneaceae) contains the lignans gmelinol



(125) R=Me
(127) R=H



(126)

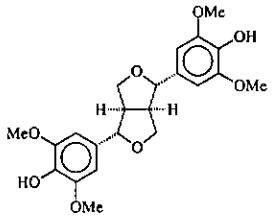


	R1	R2	R3
(128)	Me	H	OH
(130)	H	OMe	H

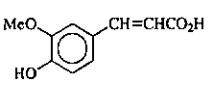
(**128**), syringaresinol (**129**), and epi-syringaresinol (**130**) as well as a series of (*E*)- and (*Z*)- long chain esters of ferulic acid (**131**). It also contains the rare natural product biphenyl (**132**).[49]

Table 1. Wood extractives of Fijian podocarps

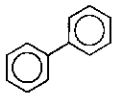
Compound	Dacrydium nidulum	Decussocarpus vitiensis	Podocarpus neriifolius	Dacrycarpus imbricatus	Podocarpus affinus
podocarpic acid (133)	+	+	-	-	-
lambertic acid (134)	-	-	-	+	-
pododacric acid (135)	+	-	+	-	-
totarol (136)	-	+	+	+	+
19-hydroxytotarol (137)	-	+	-	-	+
4ß-carboxy-19-nortotarol (138)	-	+	+	-	+
macrophyllic acid (139)	-	-	+	-	-
sugiol (140)	-	-	-	+	-
sempervirol (141)	-	-	+	-	-



(129)



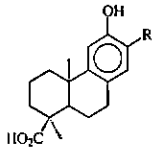
(131)



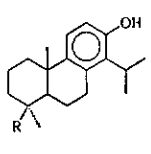
(132)

Terpenoids and Steroids

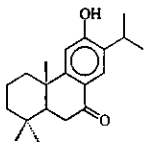
The woods of five Fijian timber trees *Dacrydium nidulum* (fam. Podocarpaceae), *Decussocarpus vitiensis*, *Podocarpus neriifolius*, *Dacrycarpus imbricatus*, and *Podocarpus affinus* all contain phenolic diterpenoids (Table 1), the total yield of diterpenoids affording a useful measure of durability to fungal attack.[50,51]



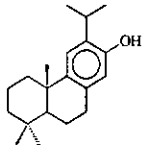
(133) R=H
(134) R=CHMe$_2$
(135) R=CH(CH$_2$OH)$_2$



(136) R=Me
(137) R=CH$_2$OH
(138) R=CO$_2$H
(139) dimer of (138)

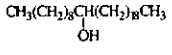


(140)

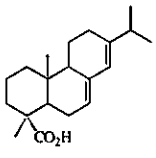


(141)

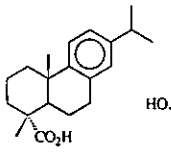
The berries of *P. neriifolius* give a high yield (6.7%) of abietic acid (**142**) and also contain dehydroabietic acid (**143**) as well as nonacosan-10-ol (ginnol) (**144**) and the bisflavone amentoflavone (**145**).[52]



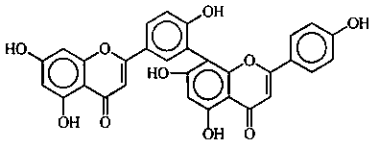
(144)



(142)

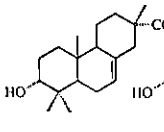


(143)

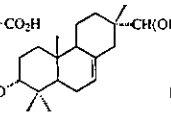


(145)

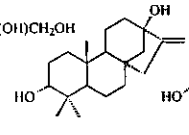
The heartwood of the Fijian kauri *Agathis vitiensis* (fam. Araucariaceae) contains diterpenoids of the pimarane type (**146**) and (**147**), and kaurene type (**148**) and (**149**), but also contains



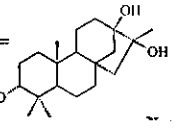
(146)



(147)

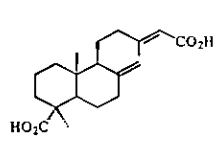


(148)

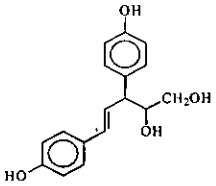


(149)

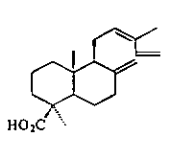
abietic acid (**142**) and agathic acid (**150**) as well as agatharesinol (**151**).[53] The bled resin of this tree has also been examined and has yielded *cis*- and *trans*- communic acids (**152**, **153**), sandaracopimaric acid (**154**), dehydroabietic acid (**143**), abietic acid (**142**), neoabietic acid (**155**), and agathic acid (**150**).[54]



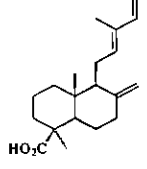
(150)



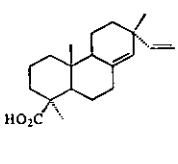
(151)



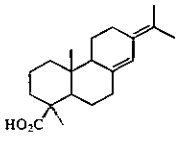
(152)



(153)

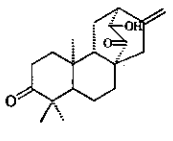


(154)

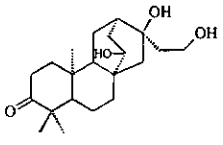


(155)

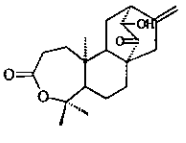
By far the most productive plant studied is the endemic *Euphorbia fidjiana* (fam. Euphorbiaceae) which has anti-HIV activity. Cambie and co-workers isolated and identified 14 *ent*-atisane diterpenoids, of which 13 were new, from the heartwood of this plant, as well as 7 *ent*-pimarane or *ent*-abietane diterpenoids.[45, 55-57] The major *ent*-atisane was the dione (**156**) and other constituents included structures in which the methylene group has undergone addition (**157**) and seco structures such as (**158**). The *ent*-pimaranes are (**159**) and (**160**), and



(156)

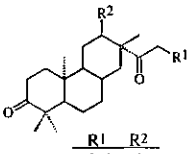


(157)

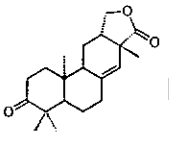


(158)

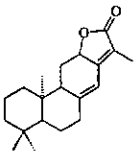
a nor-lactone (**161**), while the *ent*-abietanes include lactones of the jolkinolide group, e.g. (**162**) and the aldehyde (**163**). *Ent*-atisanes have also been isolated from the bark of the tree.[58] The heartwood of *E. fidjiana* also yields a series of cycloartane triterpenoids as well as common sterols such as β-sitosterol and stigmasterol.[45]



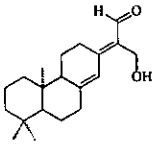
(159) R1 = OH, R2 = H
(160) R1 = OH, R2 = OH



(161)

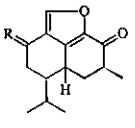


(162)

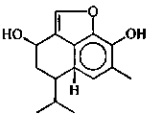


(163)

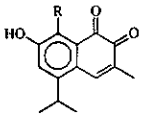
An extract of the heartwood of *Hibiscus tiliaceus* (fam. Malvaceae) yields the sesquiterpene lactones A-D (**164-167**) and hibiscoquinones A-D (**168-171**), and in one sample



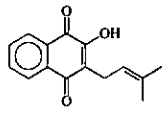
(164) R=H$_2$
(165) R=βOH, αH
(166) R=O



(167)



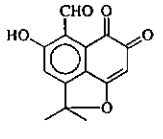
(168) R=CHO
(169) R=OH
(170) R=H



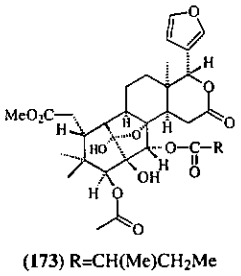
(171)

devoid of pigments the naphthaquinone lapachol (**172**).[59] Minor constituents of *Heritiera ornithocephala* are the triterpenes cycloartenone and 24-methylenecycloartenone,[43] while the fruit of *Elaeocarpus chelonimorphus* (fam. Tilaceae) contains the triterpenes friedelin, epifriedelinol, and sorghumol.[60]

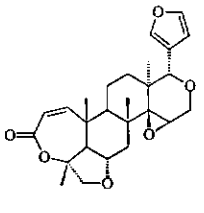
Two plants which grow in Fiji's mangrove forests, *Xylocarpus granatum* (fam. Meliaceae) and *X. moluccensis* each contain two new limonoids (**173**) and (**174**) which indicates that some hybridisation may have occurred in the Fijian plants since structures of this type had previously only been isolated from *X. moluccensis*.[61]



(172)



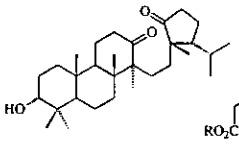
(173) R=CH(Me)CH$_2$Me
(174) R=CHMe$_2$



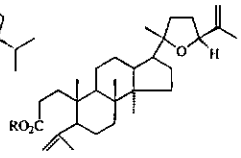
(175)

The leaves of the medicinal plant *Dysoxylum richii* (fam. Meliaceae) contain the limonoid dysoxylin (**175**),[62] while a triterpene (**176**) isomeric with hortensol has been obtained from

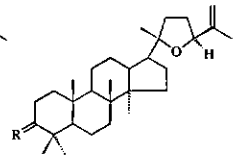
the leaves of *Euodia hortensis* forma *hortensis* (fam. Rutaceae).[5] Work on the fruits of *Dysoxylum richii* yielded diterpenoids with a dammarane skeleton, four of which (**177-180**) were new compounds. Also isolated were four known triterpenoids, viz. ocotillone, cabraleone, shoreic acid and eichlerianic acid.[63] The leaves of the same plant afforded the new triterpenoid (**181**) together with 7 known dammarane triterpenoids.[64]



(176)

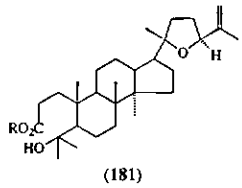


(177) R=Me
(178) R=H

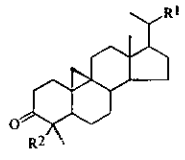


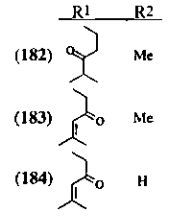
(179) R=O
(180) R=βOH, αH

The bud exudates of five out of nine *Gardenia* species (fam. Rubiaceae) found in Fiji, viz. *G. storkii*, *G. gordonii*, *G. hillii*, *G. taitensis*, and *G. grievi* contain triterpenes including three new compounds, 9,19-cyclolanostane-3,24-dione (**182**), 9,19-cyclolanost-24-ene-3,22-dione (**183**), and 4-nor-9,19-cyclolanost-24-ene-3,23-dione (**184**).[38] The bark of



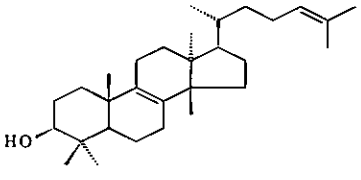
(181)



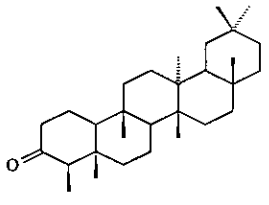


(182) Me
(183) Me
(184) H

Garcinia myrtifolia (fam. Clusiaceae) contains the triterpenes eupha-8,24-dien-3β-ol (**185**) and friedelin (**186**).

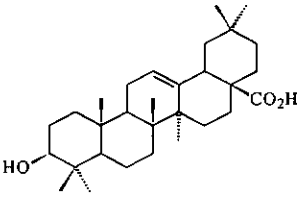


(185)

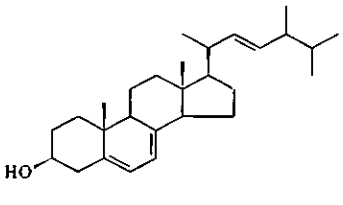


(186)

The bark of *Pometia pinnata* (fam. Sapindaceae) contains a saponin which affords oleanolic acid (**187**) and glucose on hydrolysis.[65] Triterpene methyl ethers which occur in the leaf waxes of over 80 clones of *Saccharum officinarum* (fam. Graminae), *S. edule*, *S. robustum*, and *S. spontaneum* and related species including many from Fiji have been compared as taxonomic markers. The principal triterpenoids are arundoin, crusgallin, and cylindrin.[66] The saponifiable fraction of an oil from the fruit of makita [*Atuna racemosa* (formerly *Parinari glaberrima*), fam. Rosaceae] contains parinaric acid (9,11,13,15-octadecatetronic acid) (53%), eleostearic acid (30.5%), oleic acid (9%), palmitic acid (40%), linoleic acid (2%), and stearic acid (1%), while the non-saponifiable fraction contains the sterols 2,3-dihydrobrassicasterol, β-sitosterol, and stigmasterol (0.9%, 1:4:1).[67] The shelf fungus *Daedala palisoti* contains ergosterol (**188**) and its dihydro and peroxide derivatives but no triterpenes.[68]



(187)

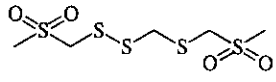


(188)

Miscellaneous Compounds

A survey of the amino acids of the leaves of 8 varieties of *Psidium guajava* (fam. Myrtaceae) growing in Fiji showed some variation in composition but all contained cysteic acid, aspartic acid, glutamic acid, serine, glycine, threonine, glutamine, alanine, hydroxyproline, proline, tyrosine, valine, and leucines. The remaining 19 components were non-protein amino acids and 6 were tentatively identified as γ-hydroxyglutamic acid, γ-methyleneglutamic acid, γ-methylglutamic acid, γ-methyleneglutamine, β-alanine, and γ-aminobutyric acid.[69]

Dysoxysulfone (2,4,5,7,9-pentathiadecene-2,2,9,9-tetraoxide) (**189**) has been isolated from the leaves of *Dysoxylum richii* (fam. Meliaceae) and its structure confirmed by x-ray analysis[70] and by synthesis.[71] The water-soluble constituents of the leaves of *Syzygium corynocarpum* (fam. Myrtaceae) are sucrose, citric acid, malic acid, and lactic acid.[72]



(189)

The predominant n-alkanes of the leaf wax of over 80 clones of *Saccharum officinarum* (fam. Graminae), *S. edule*, *S. robustum*, and *S. spontaneum* and related species including many from Fiji were the odd-numbered C_{27} - C_{35} compounds, the major components being C_{29} and C_{35}, but no chemotaxonomic relation could be derived since the intraspecific variation was greater than the interspecific variations.[73]

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CONFERENCES & SEMINARS

27-30 July 1997
6th International Symposium on 'The Maillard Reaction'
Venue: London, England, UK
Contact: Department of Food Science and Technology
University of Reading
P O Box 226, Whiteknights
Reading RG6 6AP, England, UK
Fax: (+44-1734)-310080
Email: Maillard@afnovell.reading.ac.uk
www: http:\\www.fst.rdg.ac.uk/people/aamesjm/maillard.htm

18-21 August 1997
Plant Protection in a Green Oasis: The Next 50 Years, 50th New Zealand Plant Protection Conference
Venue: Lincoln University, Canterbury, New Zealand
Contact: Don Grabb
Fax: (03)-3252960

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 Hungary
Tel/Fax: (+36-1)-463220

25-27 August 1997
National Agriculture/Horticulture Science Convention: Boffins and Beancounters: Is Science Driving The Economy?
Venue: Lincoln University, Canterbury, New Zealand
Contact: Don Grabb
Fax: (03)-3252960

25-29 August 1997
5th International Conference on Amino Acids
Venue: Chalkidiki, Greece
Contact: Professor Dr M Liakopoulou-Kyriakides
Aristotle University of Thessaloniki
Department of Chemical Engineering
540 06 Thessaloniki, Greece
Fax: (+30)-31996193
Email: markyr@vergina.eng.auth.gr

28 August - 2 September 1997
Structure and Mechanism of Oxidases and Related Systems
This meeting will focus on recent advances on structure and mechanisms of oxidases and related iron-containing enzymes including peroxidases and catalase, di-iron enzymes, P-450 and oxygen-binding proteins
Venue: Devon, England, UK
Contact: Kelly Alderton
The Biochemical Society
59 Portland Place
London W1N 3AJ, England, UK
Tel: (+44-171)-5803481
Fax: (+44-171)-6377626
Email: meetings@biochemsoc.org.uk

1-14 September 1997
Biomolecular Recognition
Venue: Spetsai, Greece
Contact: Professor Dr Brian F C Clark
Department of Biostructural Chemistry
Institute of Chemistry, Aarhus University
Langelansgade 140
8000 Aarhus C, Denmark
Fax: (+45)-86196199

3-5 September 1997
Polymer Additives - Performance and Applications
Venue: University of Surrey, Guildford, UK
Contact: PDDG Secretary
Dr N C Billingham
The Chemistry Laboratory
University of Sussex, Brighton
BN1 9QJ, United Kingdom
Tel: (+44-1273)-678313

Fax: (+44-1273)-677196
Email: N.Billingham@sussex.ac.uk

6-9 September 1997
38th International Conference on the Biochemistry of Lipids
Venue: Assisi, Italy
Contact: Secretariat, 38th ICBL
Institute of Biochemistry
University of Perugia
Via del Giochetto 3, 06122 Perugia, Italy
Tel: (+39-75)-5853419
Fax: (+39-75)-5853428

7-9 September 1997
NSW Southern Highlands Conference on Heterocyclic Chemistry
A multi-disciplinary conference in the style of the Burgenstock, Gordon and Grasmere conferences on the general theme of heterocyclic chemistry.
Venue: Milton Park, Bowral, NSW, Australia
Contact: Professor David St C Black
School of Chemistry
University of New South Wales
Sydney, NSW 2052, Australia
Fax: (+61-2)-93856141
Email: d.black@unsw.edu.au

7-9 September 1997
Northern American Thermal Analysis Society
Venue: Mclean Hilton at Tysons Corner, Virginia, USA
Contact: Program Chair
Tammy M Chalmers
3M Centre Building 260-3B-08
St Paul, MN 55144-1000, USA
Tel: (+001-612)-7379709
Fax: (+001-612)-7373069

18-19 September 1997
Reinforced Plastics Asia '97
Venue: The Mandarin, Singapore
Contact: Philipa Orme
Reinforced Plastics Asia
Elsevier Science Ltd
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Kidlington, Oxford, OX5 1GB
United Kingdom
Tel: (+44-1865)-843691
Fax: (+44-1865)-843958
Email: p.orne@elsevier.co.uk

21-26 September 1997
XXX Colloquium Spectroscopicum Internationale
Venue: World Congress Centre
Melbourne, Australia
Contact: The Meeting Planners
108 Church Street
Hawthorn, Victoria 3122
Australia
Tel: (+61-3)-98193700
Fax: (+61-3)-98195978

29 September - 3 October 1997
International Symposium on Biotechnology of Tropical and Subtropical Species
A symposium run by the Commission Biotechnology and the Commission Tropical and Subtropical Horticulture of the International Society for Horticultural Science
Venue: Brisbane, Australia
Contact: Organisers Australia
P O Box 1237
Milton, Queensland, Australia
Tel: (+61-7)-33697866
Fax: (+61-7)-33671471
Email: oa@bnec.design.net.au

6-10 October 1997
7th International Symposium on Macromolecule-Metal Complexes (MMC7)
Venue: Leeuwenhorst Congress Centre,
Noordwijkerhout, The Netherlands

Contact: Professor Dr J Reedijk
Leiden Institute of Chemistry
The Netherlands
Tel: (+31-71)-5274459
Fax: (+31-71)-5274451

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

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

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

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

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

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

19-22 October 1997
International Symposium on Laboratory Automation and Robotics
Venue: Boston, USA
This three day, international meeting provides an opportunity for managers and scientists from a variety of disciplines to exchange ideas and results on automated methods and procedures. Session Topics: Laboratory Workstations, Data Management and Data Handling, Pharmaceutical Analysis, Chemical Analysis, High Throughput Screening, Drug Discovery Research, Automation and Combinatorial Chemistry, Managing Laboratory Automation, Custom Automation Solutions, Dissolution Testing, Validating Automated Procedures, Automated Synthesis, Bioanalytical Assays, and Re-engineering the Laboratory.
Contact: James N Little
Program Chairman ISLAR '97
68 Elm Street, Hopkinton
MA 01748
Email: islar@islar.com
Web site: http://www.islar.com

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

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

26-30 October 1997
5th Pacific Polymer Conference
Venue: Hotel Hyundai, Kyongiu, Korea
Contact: Professor Sung Chul Kim
Secretariat of PPC-5
Department of Chemical Engineering
KAIST
Yusong-gu, Taejon, 305-701, Korea
Tel: (+81-42)-8698431 ext 3914
Fax: (+82-42)-8698430
Email: kimsc@sorak.kaist.ac.kr
ppc5@cais.kaist.ac.kr

26-31 October 1997
Postdoctoral Course on Degradation, Stabilisation and Reactive Modification of Polymers

Venue: Villa Gualino, Turin, Italy
Contact: Ms Giusy Spinasanta, COREP
Tel: (+39-11)-5645103
Fax: (+39-11)-5645199
Email: giusys@athena.polito.it

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

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

17-18 November 1997
The Seventh Annual Conference on Textile Coating and Laminating
Venue: Charlotte Marriott Executive Park, NC, USA
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Tel: (+1-717)-2915609 or 8002339936
Fax: (+1-717)-2959637

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

23-25 November 1997
6th Conference of the Society for Free Radical Research (Australasia)
Venue: Dunedin, New Zealand
Contact: Dr Mike Murphy
Biochemistry Department
University of Otago
P O Box 56, Dunedin, New Zealand
Tel: (+64-3)-4797871
Fax: (+64-3)-4797866
Email: murphy@sanger.otago.ac.nz

25-28 November 1997
Pacific Oils 2000: An International Conference on Plant Oils and Marine Lipids
Venue: Conference Centre
University of Auckland, Auckland
New Zealand
Contact: Professor Con Cambie, Conference Chairman
Chemistry Department
University of Auckland
Private Bag 92019
Auckland, New Zealand
Tel: (+64-9)-3737999 ext 8259
Fax: (+64-9)-3737422
Email: c.cambie@auckland.ac.nz

30 November-5 December 1997
Nature Conservation in Production Environments
Venue: Taupo, New Zealand
Contact: University of Auckland
School of Environmental and Marine Sciences
Tel: (09)-3737599
Fax: (09)-3737042
Email: sems@auckland.ac.nz

2-5 December 1997
13th Symposium on Biological Macromolecules and Ligands: Structure, Interactions and Applications
Venue: Quezon City, Philippines
Contact: Dr Gisela P Concepion
University of the Philippines
Marine Science Institute
Quezon City 1101
Republic of the Philippines
Tel and Fax: (+63-2)-9213799

6-8 April 1998
Conference on Production and Uses of Starch
Venue: Edinburgh, Scotland, UK
Contact: Dr C M Duffus
Crop Science and Technology Department
Scottish Agricultural College
West Mains Road
Edinburgh EH9 3JG
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24-26 June 1998
Asia-Pacific Society for Neurochemistry: Biennial Conference
Venue: Seoul, Korea
Contact: Peter Dodd,
Email: peterD@qimr.edu.au

or full details from:
Professor Yoo-Hun Suh
C/- Organising Secretariat of 4th APSN Meeting
Department of Pharmacology
Seoul National University College of Medicine
28 Yongon-dong, Chongno-gu
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The conference will embrace both the fundamental and applied aspects of polymer chemistry, polymer physics, materials

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2-7 August 1998

The 9th International Symposium on Novel Aromatic Compounds (ISNA-9)

Venue: The Hong Kong Convention and Exhibition Centre
Hong Kong

Contact: Professor B Halton
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Victoria University
P O Box 600
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Fax: (+64-4)-4955241
Email: brian.halton@vuw.ac.nz

December 1999

23rd Australian Polymer Symposium

Venue: Geelong, Victoria, Australia

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

6-11 February 2000

RACI 11th National Convention

Venue: Canberra, ACT, Australia

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

14-19 December 2000

Pacifichem 2000

Venue: Waikiki, Honolulu, Hawaii

Contact: Professor B Halton
Chemistry Department
Victoria University
P O Box 600
Wellington
Fax: (+64-4)-4955241
Email: brian.halton@vuw.ac.nz

PACIFIC OILS 2000

An International Conference on Plant Oils and Marine Lipids

25-28 November 1997

Venue:
The Conference Centre, University of Auckland, Auckland

Programme:

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

Plenary and Keynote Speakers include:

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

Contact:

Con Cambie
Conference Chairman
Chemistry Department
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Ruth Eyres
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Oils and Fats Specialist Group
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IUPAC-SPONSORED SYMPOSIA IN 1997-1998

27 July - 1 August 1997
8th International Conference on Bioinorganic Chemistry
Venue: Yokohama, Japan

29 July - 1 August 1997
AIMECS '97: AFMC International Medicinal Chemistry Symposium
Venue: Seoul, Republic of Korea

10-13 August 1997
International Conference on Interfaces Against Pollution
Venue: Wageningen, Netherlands

17-22 August 1997
36th IUPAC Congress
Venue: Geneva, Switzerland

18-22 August 1997
13th International Symposium on Plasma Chemistry
Venue: Beijing, China

24-29 August 1997
32nd International Conference on Coordination Chemistry
Venue: Santiago, Chile

25-28 August 1997
12th Bratislava IUPAC International Conference on Polymers – Modified Polyolefins for Advanced Polymeric Materials
Venue: Bratislava, Slovak Republic

3-7 September 1997
International Symposium on Electron Transfer Processes and Reactive Intermediates in Macromolecular and Organic Chemistry
Venue: Cracow, Poland

21-26 September 1997
30th Colloquium Spectroscopicum Internationale
Venue: Melbourne, Australia

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

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

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

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

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

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

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

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

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

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

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

NEW ZEALAND INSTITUTE OF CHEMISTRY

MESSAGE FROM THE PRESIDENT

It has been great to get around the country and meet so many of you over the last couple of months. I have enjoyed giving my President's address and getting feedback on your ideas for the future of the Institute. I also gave a keynote address to Chem Ed 97 at Palmerston North as part of our membership drive to get more chemistry teachers to join the Institute. My thanks to Manawatu branch for all their work at the conference (I especially enjoyed their Dead Chemists Evening), and to Otago branch for producing a great new membership flyer. Copies of the flyer are available from your branch committee or from the Executive Office. Get one and set yourself the goal of enrolling at least one new member.

In a brain storming session at its last meeting, Council set out its vision for the Institute (see below). If you've got additional or different ideas of what you would like the Institute to look like in five years, we want to know. We will build these into next years plan. First Vice-President Alastair MacGibbon is working on it at the moment, email him any ideas you have (A.Macgibbon@nzdri.org.nz).

I received an invitation from the International Union of Pure and Applied Chemistry (IUPAC) to represent New Zealand at a meeting on the future directions of IUPAC. The meeting held in Singapore was the third such meeting. The previous meetings were in the USA and Europe. I am also grateful to the Ministry of Research Science and Technology (MoRST) and The Royal Society for their support of my travel to Singapore through the MoRST International Science and Technology (ISAT) scheme.

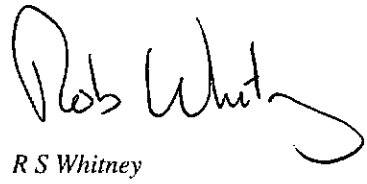
IUPAC has many of the same issues to consider as the NZIC, except on a global scale. It is aiming to move from the traditional role of standardisation of nomenclature, to the wider role of promoting chemistry at a global level. Issues from the meeting included:

- IUPAC should improve the image of chemistry by promoting chemistry's positive contributions to society.
- IUPAC should help to standardise requirements for health, safety and the environment.
- There is a shift of chemical industry to Asia, and a shortage of skilled chemists in these countries.
- We need to popularise chemistry as an option for senior school students.

IUPAC started in 1919 and for the last 30 years its secretariat has been based in Oxford, England. It is now moving its secretariat to North Carolina, and is setting it up as a *Virtual Secretariat.* They will use electronic media rather than paper for communication with members.

This fits in with feedback I have got from NZIC members regarding their needs for support and information from the Institute. Council is therefore looking to make a clean start on its central services, and aiming to set up our own *Virtual Secretariat.* You'll see our advertisement elsewhere in the Journal seeking expressions of interest in providing a virtual secretariat. Maybe you've got some ideas? Do you know someone, perhaps your company or department, who could provide our secretariat? We want to hear from you! E-mail me on R.Whitney@crl.co.nz .

Finally you've probably just got your invoice for this year's subscription. It will help us considerably if you pay your subscription promptly. The Institute is going through great changes, and management of those changes will not be easy. It will help if we know who our members are and how much money we have got to provide services.



R S Whitney
President, NZIC

NZIC VISION STATEMENT

- **Membership**
An increased active membership that represents the majority of those involved in all aspects of chemical sciences.

- **Image**
Dynamic, modern, respected and publicly recognised, proactive and efficient.

- **Services**
A range of services that provide benefits to members, promote chemical and molecular sciences, and represent those with an interest in chemistry.

- **Branches**
Active Branches that provide a focus for social, networking and service activities.

- **Specialist Groups**
Active specialist groups in chemical sciences that contribute to the NZIC and are promoted and supported by the NZIC.

- **Secretariat**
A professional service to underpin the above activities. It needs to be business like, proactive, efficient, and have access to modern technologies for good communication with members.

NZIC COUNCIL NEWS

VIRTUAL SECRETARIAT

The NZIC Council is seeking expressions of interest from organisations or individuals wishing to provide the Institute with a *Virtual Secretariat*, i.e. a secretariat service which is based on making maximum use of computerised and electronic facilities to support the Institute's members and council, and to enhance the services the NZIC provides. The NZIC has about 1000 members and associates.

It is envisaged that the secretariat will provide some or all of the following services (listed in order of priority):

1. A resource base and contact point for members, branches and specialist groups.
2. A computerised membership database including;
   - Membership details (addresses, membership, subscriptions, expertise, activities etc.)
   - Subscription invoicing and collection
   - Supply of mailing lists, labels, envelopes for branches, specialist groups and Chemistry in New Zealand.
   - Additions to, and maintenance of the database.
3. Email, facsimile, post and telephone distribution of information, including bulk mailings.
4. A confidential electronic information resource for the NZIC council and committees.
5. Connection to Internet.
6. Special interest Bulletin Boards, News Groups, or Chat Rooms.

The Secretariat may also be able to assist the General Secretary and Treasurer with some or all of the following services.

1. Accounting, including bill payments.
2. Council Secretariat services.
3. Administration of NZIC, Chem13 News, and RACI examinations and quizzes for college students.

Council is interested in new approaches and ideas using modern simple information technologies which are readily accessible to most of our members. We want to receive expressions of interest by 30 August so we can pick the short-list at our September meeting. We intend to get our new Secretariat up and running by 1 January 1998.

If you want a copy of our Strategic and Business Plan, our three year financial plan, or other information e-mail R.Whitney@crl.co.nz

Please send expressions of interest by snail mail to:
The Executive Officer, New Zealand Institute of Chemistry
P O Box 12-347, Wellington, New Zealand

REPORT ON CHEMICAL EDUCATION TRUST FUNDS DISTRIBUTION 1997

Nineteen applications were received and of these thirteen were partially or fully funded. Although some of the applications were for support for a special project we were a little dissappointed that a high proportion were to make up for deficiencies in equipment which we would have expected to have been provided as a matter of course from normal school funding.

Many of the applications were well presented but some were skimpy and lacked the detail which would have enabled the Trustees to make a measured response.

A total of just under $6,000.00 was distributed.

The Trustees hope to be able to call for another round of applications early in 1998.

The successful applicants for 1997 were:

John Paul College	(Rotorua)
Birkenhead College	(Birkenhead)
Fielding Agricultural High School	(Fielding)
Tapawera Area School	(Nelson)
Glenfield College	(Glenfield)
Mt Aspiring College	(Wanaka)
Ngaruawahia College	(Ngaruawahia)
Sacred Heart Girls' College	(New Plymouth)
Lindisfarne College	(Hastings)
Shirley Boys' High School	(Christchurch)
Freyberg High School	(Palmerston North)
Waiohepu College	(Levin)
Hamilton Girls' High School	(Hamilton)

Professor A G Williamson
Chairman, Trustees

NZIC COUNCIL ELECTIONS

Rule 16.2 states:-

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

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

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

A A Turner
Honorary General Secretary for Council

NZIC BRANCH NEWS

WAIKATO

Waikato University School Analytical Chemistry Competitions

Following on from the success of the 1996 Analytical Chemistry competition, it was decided to hold another one this year along the same lines. Invitations were sent to schools in the Waikato/ Bay of Plenty region to send teams of three students to the University for the day, to carry out an analysis. A total of 22 schools entered this year.

The task was to analyse a sample for Ba^{2+} using a gravitmetric method, and this analysis was carried out so well by all the teams that judging was very difficult. The criteria used in selecting the prize winners were firstly accuracy and secondly the agreement between the duplicates.

The following prizes were awarded:

1st prize: Whakatane High School (Bridget Carney, Chanelle Clark and Kelly Isemonger, photos of whom appeared in the 19/6/97 edition of the *New Zealand Herald)*

2nd prize: Te Puke High School (Paul Hayes, Lynley Page, Josh Reid)

3rd prize: Matamata College (Sarah Watkins, Nicola McCarthy and Emma Schick)

4th prize: Thames High School (Eryn Isdale, Daniel Wilson-Shelley and Shannon Johnston)

Highly commended were the teams from Hillcrest High School and St John's College.

Numerous people contributed to the success of the occasion:
Bill Henderson, for arranging satchels and publicity material.
Michele Prinsep, for designing participation and prize certificates.
Natalie Curnow, Annie Barker and Jenny Chapman, for setting up the laboratories.
Richard Coll, Lyndsay Main and Bill Henderson for supervising the laboratories.
Peter Robinson, Hill Laboratories, for help with the judging.
Tony Doak and Bryant Halls for excellent lunches.

All important financial support is acknowledged with thanks:
Hill Laboratories for sponsoring the prizes.
NZIC local branch for funding the lunches.
Chemistry Department, University of Waikato for facilities.

Overall the competition enabled 66 keen 7th formers to spend a day in the University laboratories and mix with peers from other schools, and provided an opportunity for the teachers who accompanied the students to meet with each other and with University chemists. It was therefore an effective publicity occasion for both the NZIC and for the University.

This competition looks set to become a popular annual event.

Brian Nicholson
Coordinator

THE NEW ZEALAND PHYSICAL CHEMISTRY NEWSLETTER

A reminder to look out in your mailboxes for the second issue of the *New Zealand Physical Chemistry Newsletter* which should (hopefully) be out in July 1997. Remember that your contributions to the newsletter are extremely important and should be sent by email to: m.mucalo@waikato.ac.nz
or by snailmail to:
Dr M R Mucalo
Chemistry Department, University of Waikato
Private Bag 3105, Hamilton
Faxes: (07) 8384219 will also be accepted

Michael Mucalo

MANAWATU

Dr Iain Moore, Chemical Engineering Unit, University of Birmingham, spoke to a small but appreciative audience at the Seminar Rooms, New Zealand Dairy Research Institute on Wednesday 4 June 1997. His topic was "Phase inversion and drops in drops". Iain presented work done on the process of phase inversion and described a model in which the formation of drops-in-drops (double emulsions) is the critical step in phase inversion. The work has important implications for a range of industrial processes, such as in margarine and butter manufacture and in solvent extraction. Iain was on sabbatical leave at NZDRI but has just been appointed as a Research Scientist in the Cheese and Milkfat Technology Section of NZDRI.

The annual "Dead Chemists" meeting was held this year on Monday 7 July in the Russell Room at "Wharerata", Massey University, in association with the Chem Ed 97 Conference being held at Massey. It was preceded by a buffet dinner in the Wharerata dining room. A social mixing period allowed participants to find out who was chemically who or what (by examining those participants dressed as, or in some way alluding to, a dead chemist). A brief lecture followed on optical isomerisation of several organic salts, originally presented by the well-known dead chemist Louis Pasteur, but delivered on the night by a suitably attired David Officer from the Chemistry Department of Massey University. The final stage of the evening comprised the now traditional quiz (accompanied by wine, fruit juice, and nibbles), masterminded by Mike Boland of the New Zealand Dairy Research Institute. The quiz was in four parts covering chemical elements, famous chemists of the past, some general chemical knowledge, and identification of glassware equipment. Each table of 7-8 people constituted a quiz team for the occasion and the fiendish nature of many of the questions can be gauged by the fact that of the ten teams or so the top team could only muster 43 points from the maximum of about 80 points! The lively nature of the contest, thoroughly enjoyed by all, was illustrated by the the constant demand for partial points for partially right answers!

Earlier this year, the Centre for Structural Biology was established at Massey University. The mission of the centre is to promote high-quality research in structural biology of benefit to participating departments (currently Chemistry and Biochemistry), Massey University, and the community. Professor Ted Baker, Department of Biochemistry, is the current Director. Other members of the Centre are Geoff Jameson

(Department of Chemistry) and Gill Norris, Bryan Anderson, and Heather Baker (Department of Biochemistry). The Centre has facilities and expertise for the purification and crystallisation of macromolecules, data collection on an Raxis IIC image plate system/Rigaku RU200 rotating anode generator, and structure solution, refinement and analysis by means of Silicon Graphics work stations. Massey University staff and other members of the scientific community with interests in the three-dimensional structures of macromolecules are encouraged to talk with members of the Centre.

Harry Percival and Benny Theng of Landcare Research Ltd have returned from attending and presenting papers at the 11th International Clay Conference in Ottawa, Canada, 15-21 June 1997. They were both invited to chair sessions at this conference. Harry also attended and presented a paper at the 4th International Conference on the Biogeochemistry of Trace Elements in Berkeley, California, USA, 23-26 June 1997.

Gavin Hedwig, Chemistry Department, Massey University, is on leave from 25 May - 9 August to visit the University of Bergen, Norway in order to carry out compressibility measurements on some new peptides that have been synthesised.

Ramsey Southward recently retired from the New Zealand Dairy Research Institute. Ramsey joined NZDRI in 1964 to study the physical properties of casein. The field expanded to include the manufacture and applications of casein products and kept Ramsey interested throughout his career. In 1971 he was appointed Section Head of Casein and Related Products and continued in that role until 1993 when he returned full time to the laboratory bench. Throughout his career Ramsey has enjoyed working with a great team and takes great satisfaction from seeing their work being used throughout the dairy industry. Ramsey was involved in the Dairy Industry Graduate Training Program from its inception and has followed the careers of chemists from the program through the dairy industry, New Zealand Dairy Board, and MAF. Ramsey joined the NZIC in 1962 and served on the Manawatu Branch Committee as Secretary and Chairman throughout the 1970s. He plans to spend more time with his family and renovate the family home.

Harry Percival

* * * * *

"GAS TRAPS AND LIQUID SOLUTIONS"

HOW TO MEASURE FOR VIAL, CAP, LINER, AND SEAL SELECTION

Brought To You By Alltech's Chromatography Help Desk

Bottles and caps are described with a two part number system referred to as the Finish* (e.g. 13/425).

The first number represents the neck size of the vial or cap in millimeters. The vial is measured from the outside edge of the threads on one side to the outer edge of the threads on the opposite side (Figure 1). The cap is measured from one side of the inner wall to the opposite side of the inner wall (Figure 2).

FIGURE 1. VIALS

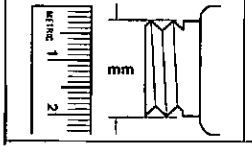
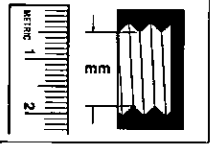
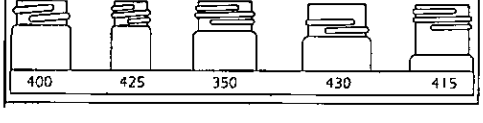


FIGURE 2. CAPS



The second number describes the thread pattern and assures that the bottle and cap will fit together (Figure 3).

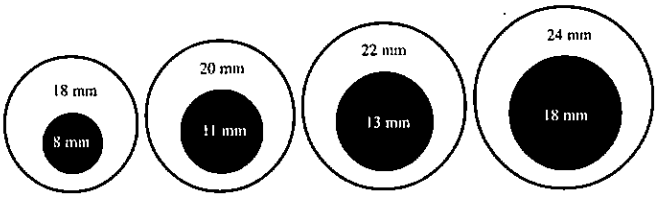
FIGURE 3. THREAD PATTERNS



**Finish sizes are standardised and controlled by the GCMI - Glass Container Manufacturers' Institute. Both cap and vial manufacturers use these specifications.*

Liner size can be determined by comparing liners or crimp seals to the measured circles (Figure 4). The seals will be slightly larger than the circle size measured for the liner.

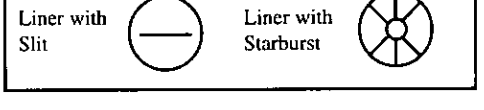
FIGURE 4. LINER SIZES



Liner thickness is measured in mL: 1 mL = 0.001 inch. With combination liners (e.g. TFE/silicone, 5/55) the numbers represent the thickness of the individual components of the liner in mL. This same liner could be described as 0.060" or 60 mL.

Durometer or hardness of liner is referred to as "shore" and is an important consideration in working with some autosamplers. (45-60 shore is a typical range for autosampler liners). You can also purchase liners which are slit or have a moulded starburst pattern (Figure 5). This prevents the needle from bending when penetrating the liner or jamming the arm on the autosampler.

FIGURE 5. LINER STYLES



For assistance with your chromatography questions:

Contact: Alltech Help Desk
Freephone: 0800 255832, Fax: (09) 4442399
Email: alltech@alltech.co.nz
circle number 59 on the reader reply card

NEW LITERATURE & MEDIA

NEW DATABASES ON STN INTERNATIONAL OFFER ACCESS TO GERMAN LIBRARY CATALOGUE, AND TO INFORMATION ON OIL AND GAS EXPLORATION AND AGRICULTURE

STN International (The Scientific & Technical Information Network), has extended its array of databases to include TULSA (oil and gas exploration), AGRICOLA (agriculture and related fields), and ZDB (international academic and popular serials).

The TULSA database (TULSA for subscribers, TULSA2 for non-subscribers) covers worldwide literature and patents related to petroleum exploration, geology, drilling methods and production, as well as related transportation, environmental health and safety topics. TULSA corresponds to *Petroleum Abstracts.* It also includes the *Oil and Gas Bibliography,* a sub-file of earlier references for oil and gas fields around the world. Other sources include journals, conference proceedings, patent gazettes, full-text patents, books, dissertations, government reports, and others. Spanning the years from 1900 to the present, the database contains more than 594,000 records and is updated weekly. Records comprise bibliographic information, indexing, and abstracts. The non-subscriber version, TULSA2, does not include abstracts. The TULSA database is fully patent compatible, making multi-file searching of patent files possible. Easy crossover of CAS Registry Numbers, patent and application numbers, and/or search queries to and from TULSA to other patent files is provided. TULSA on STN has an exclusive Chemical Name (/CN) field making chemical name searching more convenient. Also available are patent file features such as FSEARCH and FSORT, either alone, or as part of a multi-file search. TULSA/TULSA2 is produced by the University of Tulsa, USA.

Comprehensive information on agriculture and related fields is offered in the AGRICOLA (Agriculture Online Access) database. The file draws on journal literature, government reports, bibliographies, serials, symposia, books, conference proceedings, audiovisuals, and technical reports emanating from Agriculture Experiment Stations, Cooperative Extension Services, and other departments and agencies within the US Department of Agriculture. Subject coverage embraces a wide range of fields such as agriculture; agricultural engineering and products; animal science; biotechnology; chemistry; energy; entomology; food science; forestry; genetics; human nutrition; life sciences; natural resources management; pesticides; plant diseases, insect pests, and their control; rural sociology; soil science; veterinary medicine, etc. Records contain bibliographic information, geographic terms, controlled terms, supplementary terms which include GenBank Numbers, chemical names, and CAS Registry Numbers. Abstracts are available for some records. Updated monthly, AGRICOLA contains more than 3.5 million records from 1970 to the present. The database is produced by the US National Agricultural Library (NAL) of the US Department of Agriculture.

The holdings of more than 3,500 German scientific libraries and, additionally, of some libraries in other countries, are available on-line in the ZDB database on STN. Accessible on STN since January 1997, the ZDB (Zeitschriftendatenbank) database is a library catalogue covering worldwide academic and popular serials, journals, newspapers, and conference proceedings from around the world spanning the period from the 16th century to the present. Most of the information provided in the database is standardised and free from duplicates. ZDB contains approximately 860,000 records and approximately 3.5 million location listings. Records include the journal title in the original language, supplementary title information, place and country of publication, publication date, publisher, ISSN number, CODEN, classification, and location listings. Searching ZDB on STN offers the benefit of using the familiar Messenger retrieval language; following a specialist search in an STN database, the user can now immediately retrieve the location of the publication of interest in ZDB; there are no display fees - the cost per connect hour is DM 50. Produced by the German Library Institute and the State Library Berlin, ZDB is made available via a Z39.50 gateway to DBI-Link.

STN International, the Scientific & Technical Information Network, is jointly operated by FIZ Karlsruhe in Europe, Chemical Abstracts Service (CAS), Columbus, Ohio, in North America, and by the Japan Science and Technology Corporation, Information Center for Science and Technology (JICST), in Japan. A network of more than 200 databases, STN international offers information on a broad range of scientific and technical fields.

For further information, please contact:
STN International, c/o FIZ Karlsruhe
P O Box 2465, D-76012 Karlsruhe, Germany
Ph: (+49) 7247 808555, Fax: (+49) 7247 808131
Internet: hlpdeskk@fiz-karlsruhe.de

X-RAY PHOTOELECTRON SPECTROSCOPY OF POLYMERS

The American Vacuum Society (AVS) has published a focused-topic issue of *Surface Science Spectra* (*SSS*) featuring data on the X-ray Photoelectron Spectroscopy (XPS) of polymers, managed by contributing editor J J Pireaux, Facultés Universitairs Notre-Dame De La Paix, Belgium. *SSS* is an international journal devoted to archiving surface spectra of technological and scientific interest - providing high-quality, peer-reviewed spectra in both a hard-copy journal and digital data format on disk. The data records in this issue (Volume 3, Number 4) include:

- Characterisation of 1, 1-Dihydroperfluorooctyl Acrylate (PFOA) by XPS
- Characterisation of 1, 1-Dihydroperfluorooctyl Methacrylate (PFOMA) by XPS
- Characterisation of 1, 1, 2, 2-Tetrahydroperfluorooctyl Acrylate (PTAN) by XPS
- High resolution spectra of Hexatriacontane and Polyethylene
- Analysis of Poly (Ethylene Terephthalate) (PET) by XPS

- Poly (amino acids) by XPS: Analysis of Poly (L-Serine)
- Poly (amino acids) by XPS: Analysis of Poly(L-Leucine)
- Effect of Crystallinity on the XPS spectrum of Poly (Ethylene Terephthalate)
- Observation of electrical conductivity during XPS
- Pristine and over-oxidised Polypyrrole by XPS
- Poly (*p*-phenylenevinylene) UPS valence band spectra
- Elemental Palladium by XPS
- Palladium Oxide by XPS
- Palladium Chloride by XPS

Contact: SSS, MCNC
3021 Cornwallis Road, Caller Box 13994
Research Triangle Park, North Carolina 27709-3994, USA
Ph: (+1-919)-2481861, Fax: (+1-919)-2481857

AVIS' NEW INTERADIVE CD ON SURFACE SCIENCE AND SPECTROSCOPY ALLOWS STUDENTS AT ALL LEVELS TO LEARN THE PHYSICAL PROPERTIES OF SURFACE SCIENCE

The AVS Education Committee has produced a new interactive CD, developed by Professor Yip Wah Chung from Northwestern University, entitled "An Introduction to Surface Science and Spectroscopy." This new software, which runs on a PC, allows students at all levels to learn the fundamental and physical properties of surface science through the use of interactive participation and graphics. Sections include:

Section One: "Introduction to Surface Science" aquaints users with surface science fundamentals, describes the necessity of ultra-high vacuum during surface studies, discusses numerous physical laws relevant to vacuum, and explains the electron spectroscopy role during surface science development.

Section Two: "Auger Electron Spectroscopy (AES)" presents the basic principles and applications of AES, including Auger electron emission, sensitivity issues, and intrinsic factors.

Section Three: "Photoelectron Spectroscopy" describes numerous applications and principles relating to photoelectron spectroscopy, including photoelectric effect, surface chemical bonding, and element chemical identification.

Section Four: Inelastic Scattering of Electrons and Ions" describes physical laws of electron and ion scattering, measurement of the scattered electron energy distribution, overviews of plasma excitations, and surface vibrations.

Section Five: "Low Energy Electron Diffraction (LEED)" presents an elementary treatment of LEED using a kinematic approach. Topics discussed include electron diffraction, naming conventions, and reciprocal space.

Section Six: "Scanning Probe Microscopy (SPM)" reviews the history of SPM, discusses atomic force microscopy (AFM), AFM applications, AFM principles, scanning tunneling microscopy (STM) principles, and STM applications and concerns.

Section Seven: "Interfacial Segregation" explains the Gibbs Adsorption Equation, one-component systems, multi-component systems, and surface versus bulk composition.

Section Eight: "Metal-Semiconductor Interfaces" discusses the role of surface states in controlling electrical properties of metal-semiconductor interfaces. Topics include surface states, semiconductor surfaces, and work function measurements.

Section Nine: "Gas-Surface Interactions" introduces basic parameters describing gas-surface interactions and critical factors affecting such interactions.

The Surface Science and Spectroscopy CD is now on sale for US$50. For more information or to place an order, please contact Angela Mulligan, AVS, (+1-212)-2480200, Fax (+1-212)-2480245, Email: avsnyc@vacuum.org

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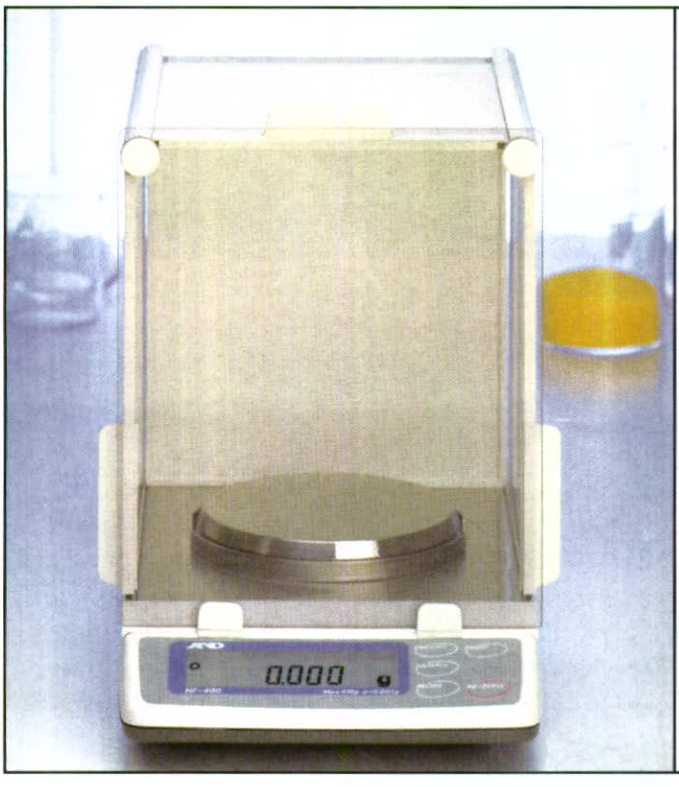

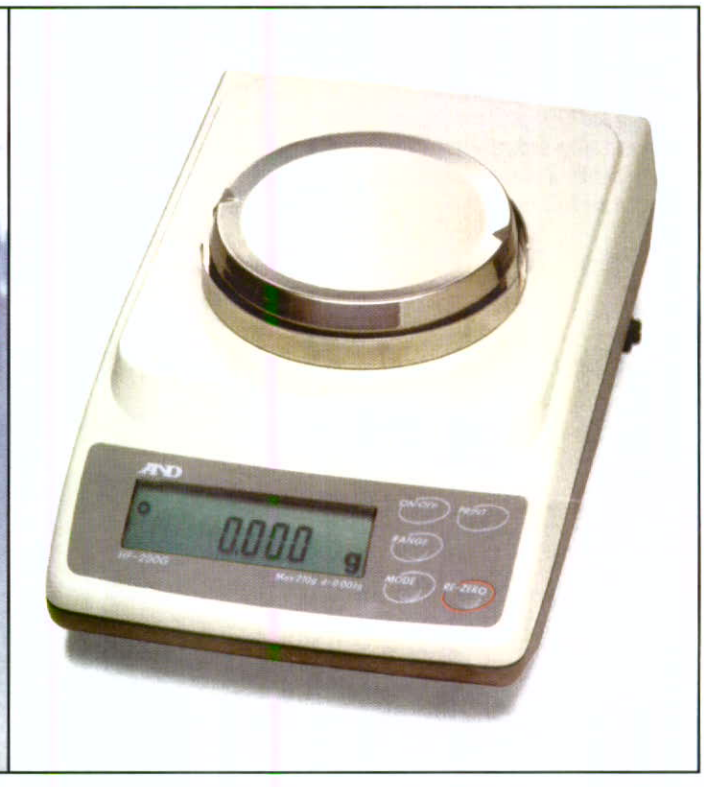

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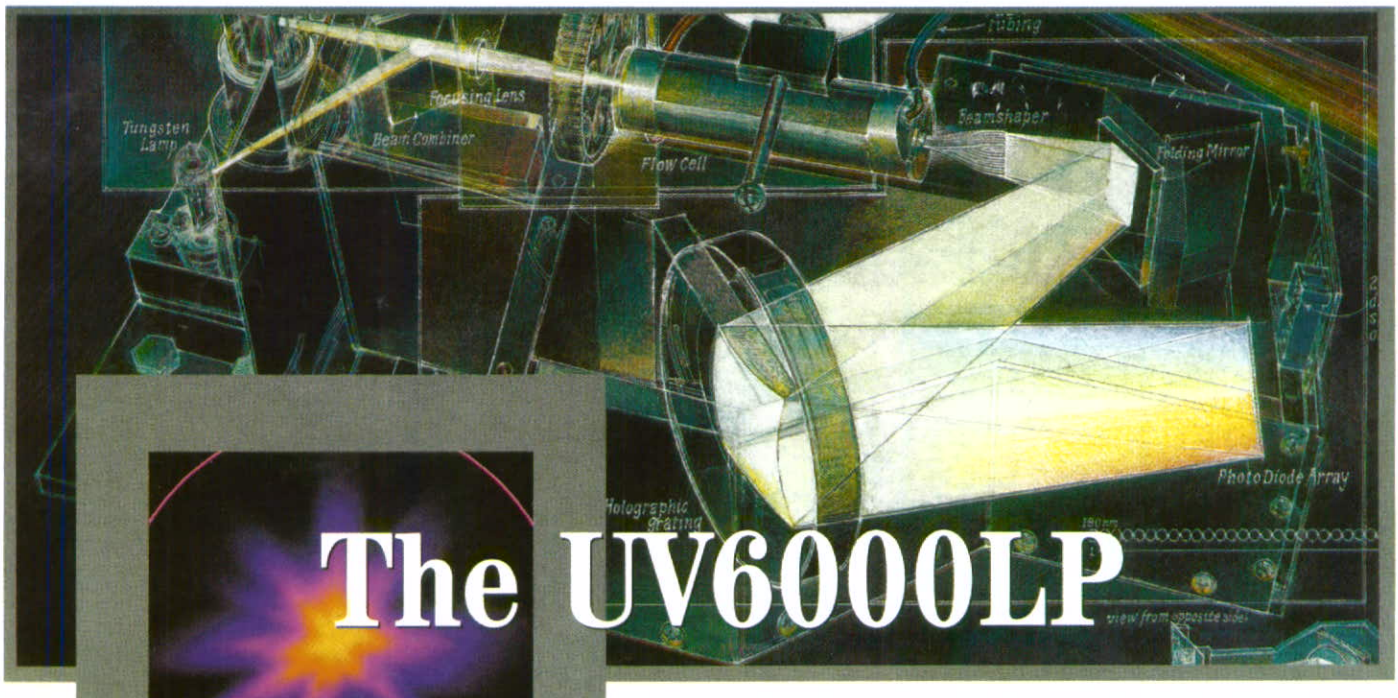

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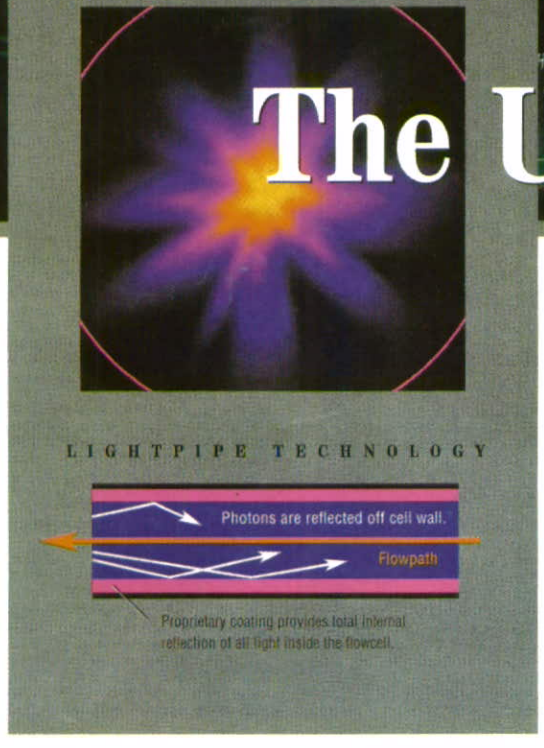

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