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NZIC Chemistry IN NEW ZEALAND

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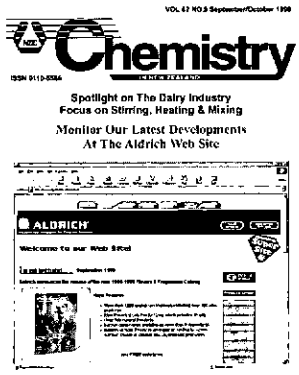

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For further information see the cover story item on page 2

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November 1998 - Education, Training, Quality Systems, pH, Titration, Electrochemistry

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

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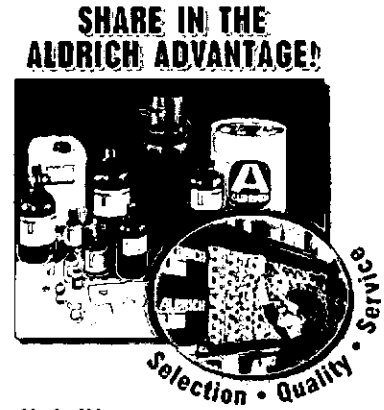

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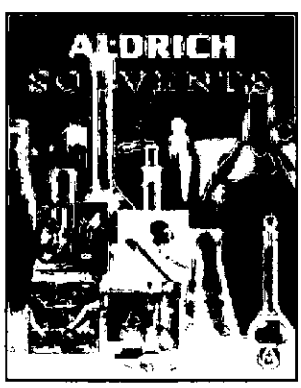

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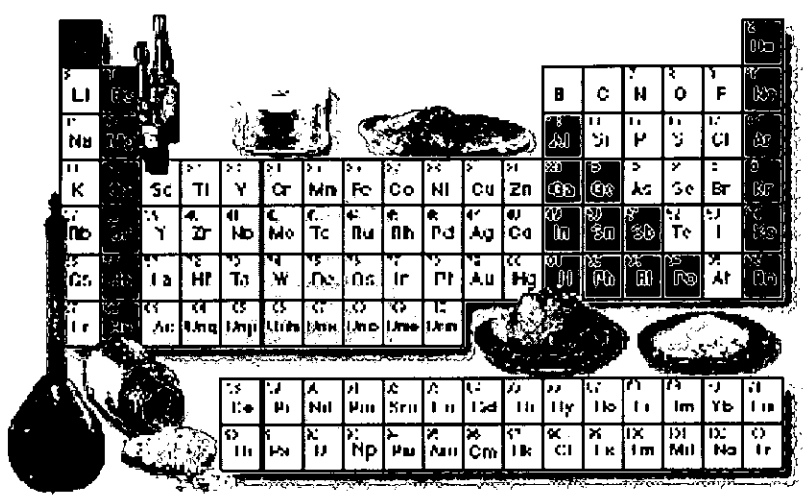

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LOCAL NEWS

CHEMICAL INDUSTRY INVOLVED IN POLYMER SCIENCE DEGREE

A postgraduate programme designed to meet the needs of the New Zealand coatings, adhesives and related industries was launched recently at the University of Auckland.

"At least half of the New Zealand chemical industry is based on polymers," says the Director of the programme, Neil Edmonds. "Polymer-based industries are therefore a large employer group for chemistry graduates. Our courses will focus on industry needs in the area of formulation, manufacture, research and development."

The Masters and Diploma courses in Polymers and Coatings Science have been developed in conjunction with the Surface Coatings Association of New Zealand (SCANZ).

SCANZ is a professional organisation representing scientific and technical expertise within the coatings industry. Students on the programme will include both recent graduates and chemists already in employment, many in senior positions.

Substantial financial contributions to the programme will come from SCANZ and the industry will also provide specialist lecturers. "Industry involvement" says Neil Edmonds, "brings significant advantages".

"Recent graduates will be working alongside experienced chemists and scientists. Also, the research programmes will focus on industry requirements".

The programme, which begins next year with an intake of 24 students, was launched at a short function in the Conference Centre of the Department of Chemistry, University of Auckland, on 8 September 1998.

For further information please contact the programme Director, Mr Neil Edmonds, phone: (09) 3737599 ext. 8342

BIOTECHNOLOGY POISED TO GATHER LARGER SLICE OF WORLD MARKET

New Zealand's growing biotechnological achievements could conceivably change the nature of the economy, writes Yoke Har Lee, in a recent article in the *NZ Herald*.

New Zealand has a deep tradition in biotechnology and the industry is gaining momentum which could see it become a major world player.

The New Zealand Biotechnology Association estimates the industry's contribution to GDP will reach $10 billion in 2010.

Success in cornering a bigger slice of the world's biotechnology market could catapult New Zealand into a knowledge-based economy, shifting it from being a commodity producer to be the world's "biopark".

If the biotech industry can work cohesively, it will gain prominence as a world supplier of ingredients to biopharmaceutical companies, the diagnostic market and the rapidly expanding high-tech nutritional market.

Already, biologically derived ingredients from New Zealand bear a distinct hallmark. Geographical isolation has shielded the country from a host of animal diseases such as foot-and-mouth, blue tongue and BSE, popularly known as "mad cow" disease.

For the full article, see *NZ Herald*, Wednesday 5 August 1998.

OLYMPUS OPTICAL ESTABLISH NEW ZEALAND OPERATION

The Japanese corporation Olympus Optical Company Ltd has established a company in New Zealand. As from July 1 1998, the distribution of this company's high technology products which include microscopes, fiberoptic and video endoscopes for medical and industrial application and related products, which were previously sold and serviced by Hyde Instruments Ltd, will become the responsibility of Olympus New Zealand Limited. The transfer will be a harmonious one with Hyde severing their ties with the Japanese company after a period of thirty seven years.

The move was initiated by Hyde to enable the greater resources of the Japanese company to be used to assist in the expansion of the fast growing field of endoscopy. Olympus manufacture and sell the widest range of endoscopy products of any company worldwide and their committment to research and development is enormous. Olympus cameras and dictation equipment will continue to be marketed by their current distributors. All staff have been retained with David Hyde assuming the role of Resident Director, Bevan Chiplin remains as General Manager, and the Managing Director, resident in Australia, is Mr Y Watanabe. Mr Watanabe also holds the position of Managing Director of Olympus Australia Pty Ltd.

For more information contact:
Bevan Chiplin, Olympus New Zealand Ltd
P O Box 104-049, Henderson, Auckland
Phone: (09) 8369993, Fax: (09) 8363386

LIKELY DELAY TO IMPLEMENTATION OF HSNO ACT 1996

Following representations by industry, the Minister for the Environment is considering postponing implementation of the HSNO Act relating to hazardous substances. A delay of possibly 4-5 months would enable:

- the outstanding regulations to be completed;
- a 'technical' amendment to the HSNO Act clarifying the 'Every Person' issue;
- resolution of technical inconsistencies in the 'Control' regulations, e.g. labelling requirements;
- industry to better prepare for implementation; and

- ERMA New Zealand to coordinate a nationwide public information campaign, incorporating industry initiatives, such as seminars.

MATERIALS PROFESSOR AWARDED PERSONAL CHAIR

A groundbreaking researcher in advanced materials, Professor Debes Bhattacharyya, has accepted a personal chair at the University of Auckland.

He is believed to be the first New Zealander of Indian ethnic origin to hold a professorial chair at the University of Auckland.

Professor Bhattacharyya's research is well known both in New Zealand and overseas, and he has forged many links with industry and academica as a result of his work in creating and analysing strong, mouldable composite materials.

Most recently Professor Bhattacharyya and his research group at the University's Centre for Composites Research have been working in collaboration with Forest Research and the Plastics Institute of New Zealand to create composites of virgin and recycled plastics reinforced with natural fibre such as discarded radiata pine.

At the University of Auckland, composites research began with the study of materials for the first America's Cup syndicate. Since then theoretical and experimental research has continued involving polymers reinforced with both synthetic and natural fibres. The research areas range from aircraft/automobile components to biomedical aids and packaging materials.

The Centre for Composites Research now attracts funding from many bodies both public and private, and companies such as Air New Zealand, Boeing (USA), Borealis (Norway), Mitsui-Toatsu (Japan), ICI (UK), Duralcan (USA) and Du Pont have been actively interested in and supportive of the centre's research.

International students from Germany, Sweden and Japan come to the Centre to carry out their research.

Professor Bhattacharyya has been involved in three patents, and has received many distinctions and honours including, most recently, the prestigious German Science Foundation Fellowship and Guest Professorship.

In Auckland, he is strongly involved in various cultural activities of the Indian and in particular the Bengali community.

LETTER TO THE EDITOR

SCIENCE OF THE CENTURY: POSTSCRIP

With Thanks to Dr A Carty - ChemNZ No.71 p.2

From now until 2000 (or 2001 if you are a purist) many writers will give us their opinions on what have been the most important scientific advances of the century. For what it is worth my choices are:

1. The discovery of structure of the atom, of quantum theory and relativity. All these have provided the foundation for our understanding of atomic fission and fusion, the creation of atomic and hydrogen bombs, the production of energy from the nucleus, and greater understanding of the nature of matter and the universe. This work also led to the transistor and the laser. The former and subsequent advances in semiconductor technology are now essential parts of our lives. The laser, from its use in surgery to the supermarket, also has an important role in communicating with fibre optic cable.

2. Molecular biochemistry. This includes the revelation of the structure of DNA as well as the structures of penicillin and other antibiotics, the sulphonamides and numerous new drugs. Vitamins and other molecules essential to our health were key discoveries, Genetic engineering has speeded up evolution, and has raised serious ethical problems. The human genome project has already made startling medical advances possible.

3. Computers, from the 1949 type weighing 30 tons, containing 18,000 radio valves, are becoming smaller and faster every day, and already control much of our lives. If the Y2K problem turns out to be serious we will know how extensive this control has become.

4. Polymers - plastics and others. Which plastics could we do without? The substitution of metals by organic polymers may be sometime away but ceramic polymers have already reduced our need for metals.

The Future: Which bits of our current knowledge will affect our futures will depend on the political background, not just of our country, but of the world. Genetic therapy and genetic engineering may revolutionise medicine and agriculture; commerce technology may see business conducted, not in huge buildings, but in our homes, or in small neighbourhood offices; and communication technology will see every dwelling, and perhaps every room in every home connected to every room in every other building.

My personal hope is that we may learn how to motivate and reward people by means other than by vast amounts of worldly goods.

C L H Stonyer

Flavour Compounds And Their Origin In Dairy Products

*A R Keen**

** Written while on staff in the Sensory Science Section, NZ Dairy Research Insitute, Private Bag 11-029, Palmerston North*

Introduction

The flavour of dairy products can vary from the subtle almost bland flavour of good quality fresh milk to the much stronger flavour of Vintage Cheddar cheese for the United Kingdom market. In all cases a wide range of critical flavour compounds contributes to the final flavour perceived by the customer. If the ratio of the flavour components meets a finite criterion, the flavour of the products is balanced and is judged to be of finest grade. However, if the ratio of the flavour components is not appropriate, the flavour of the product is deemed to be out of balance and undesirable flavour nuances will be perceived on tasting, e.g. an excess of flavourful fatty acids in rancid milk or unsaturated aldehydes in tallowy whole milk powder. The requirement in sensory science is to identify and quantify sensory aspects and then develop an understanding of the origin and processes involved in the formation of these critical flavour components, so that the concentrations can be effectively managed in order to contribute an overall product flavour that is subsequently rated as finest grade for that particular customer's requirements.

In order to carry out the management of these important or critical flavour compounds, an understanding of their origin and the processes leading to their formation is required. The main flavour compounds in dairy products can originate from at least four different sources:

(1) milkfat;
(2) lactose;
(3) proteins;
(4) on-farm (feed, rumen and metabolic processes).

1 Flavours Derived From Milkfat

1.1 *Free Fatty Acids*

One of the unique features of milkfat is the presence of esterified short chain saturated fatty acids, which can contribute flavours to dairy proudcts when they are present in the unesterified form. Of the wide range of other commercially available fats and oils, only palm kernel and coconut oils have significant amounts of short chain fatty acids. However, these two oils lack butyric acid.

Free fatty acids arise in dairy products in four basic ways, *viz:*
(1) lipolysis by the native milk lipase enzymes;
(2) lipolysis by contaminant lipolytic organisms;
(3) hydrolysis of the milkfat in the dairy product by water;
(4) bacterial fermentations, e.g. butyric acid from *Clostridium tyrobutyricum.*

In all cases, a range of free fatty acids is available. The short chain volatile fatty acids (C4 to C12), being water soluble, tend to concentrate in the aqueous phase and are important contributors of flavour. Fatty acids with more than 10 or 12 carbon atoms partition into the fat phase and exert either little flavour or a soapy flavour. A low but desirable level of C4 to C12 free fatty acids is necessary for balanced flavour in many dairy products. However, as a result of excessive free fatty acid levels in dairy products, such flavours as rancid, cheesy, goaty, etc. arise from the cumulative effects of the low molecular weight fatty acids, *viz:*

Butyric acid (C4)	rancid, cheesy, sweaty	(FTV* 3 ppm)⁺
Caproic acid (C6)	goaty, sweaty	(FTV 10 ppm)⁺
Caprylic acid (C8)	goaty, sweaty	(FTV 10 ppm)⁺
Capric acid (C10)	waxy, tallowy, rancid, soapy	(FTV 5 ppm)⁺

(*FTV - flavour threshold value)
(⁺FTV determined in butter)

$CH_3CH_2CH_2COOH$ Butyric acid

1.2 *Lactones*

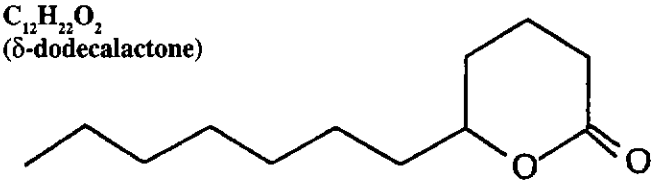
Homologous series of aliphatic 4 and 5 hydroxy alkanoic acids exist in butterfat as glyceride esters. These two series of esters are commonly referred to as the lactone potential of milkfat because, on heating, a number of very flavourful gamma and delta lactones are obtained, in particular:

delta-octalactone	FTV 0.1 ppm	Sweet creamy
gamma-decalactone	FTV 1.0 ppm	Sweet/fruity
delta-decalactone	FTV 1.0 ppm	Peach/coconut
delta-codecalactone	FTV 10 ppm	Cocount

The process of liberation and formation on heating occurs for example in butter on baking, frying and spreading on toast, and accounts for much of the rich flavour imparted to foods by heated butterfat, in contrast to vegetable oils and margarines. The latter processes insignificant quantities of lactone flavour potential.

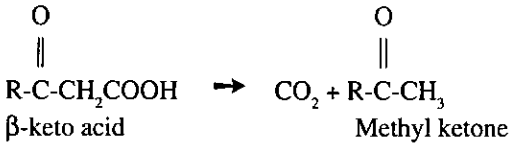
Whereas in baking and frying processes, the liberation of lactones has a desirable effect on the flavour of milkfat, the process becomes undesirable in some products, such as butter, anhydrous milkfat, condensed milk and whole milk powders. Here, decomposition of the lactone potential by heat abuse or long term storage results in flavourful lactones that give rise to undesirable coconut or peach-like flavours in the products. It is also believed that accumulations of liberated lactones give rise to non-oxidative stale flavours in stored dairy products, e.g. whole milk powder

$C_{12}H_{22}O_2$
(δ-dodecalactone)



1.3 *Methyl Ketones*

A homologous series of even carbon numbered alkanoic acids, the β-keto acids, occurs in milkfat as glyceride esters. This class of compound is called the methyl ketone potential of milkfat because, on the application of heat or on long term storage at ambient temperatures, the β-keto acid esters decarboxylate to form a homologous odd carbon numbered series of flavourful methyl ketones.



In addition to being derived form the β-keto acids, *Penicillium roqueforti* used in the manufacture of blue-veined cheeses is particularly adept at oxidising fatty acids to β-keto acids which, as mentioned above, decarboxylate to form methyl ketones. Methyl ketones are particularly important in the flavour of blue cheese varieties. This mould can also reduce the ketones to the corresponding secondary alcohols, which are also important in blue cheese flavour.

The low molecular weight methyl ketones C5 to C11 (FTV of C7 methyl ketone 2.0 ppm; FTV of C9 methyl ketone 0.2 ppm) give rise to blue cheese type flavours whereas the high molecular weight methyl ketones can give rise to tar-like flavours. Although it is doubtful whether methyl ketones contribute to the flavour of fresh butter, it is expected that they may be functional in baking and frying processes using milkfat or butter.

Whereas in baking and frying processes the liberation of methyl ketones is considered to contribute to desirable flavour, the process becomes undesirable in products such as anhydrous milkfat, evaporated liquid whole milk and cream, where excessive heat treatment liberates sufficient methyl ketones such that an undesirable blue flavour is imparted to the product.

1-Octen-3-one is another highly flavourful ketone found in some dairy products (FTV 25 ppt in water). At flavourful concentrations, it has an undesirable metallic flavour impact in butter and milk powders but a desirable mushroom type flavour impact in cheese such as Camembert and Brie. The ketone is formed from oxidative processes on unsaturated fatty acids in the milkfat. Lipoxygenase enzymes produced by the mould in Camambert and Brie are responsible for the oxidative formation of carboyl compunds which include 1-octen-3-one. The latter ketone may also possibly be derived from forage (see Section 4.1.2). Further microbial action can result in the reduction of a portion of some of the carbonyl compounds to alcohols such as 1-octen-3-ol which also contribute important flavours to these two cheese varieties.

1.4 *Aldehydes*

The unsaturated fatty acid esters in milkfat and butter, on exposure to air, undergo oxidative deterioration, resulting in rancid, painty, fishy, metallic and tallowy type flavours. These flavours are caused by the accumulation of both saturated and unsaturated aldehydes which arise from the decomposition of peroxides formed by the reaction of the unsaturated fatty acids with oxygen.

A number of aldehydes formed by the oxidative deterioration of milkfat have extremely low FTVs:

trans-2-Hexenal	FTV 0.5 ppm	Grassy
cis-3-Hexenal	FTV 0.025 ppm	Green beany
cis-2-*trans*-4-Heptadienal	FTV 0.8 ppm	Rotten apples
trans-2-*trans*-4-Heptadienal		Rancid Hazelnut
cis-4-Heptenal	FTV 0.0005 ppm	Creamy
Penta 2,4 dienal		Potatoes
Octadienal		Nutmeg
Nonanal	FTV 0.018 ppm	Lemons
2-*trans*, 6-*cis*-Nonadienal	FTV 0.00005 ppm	Cucumber
2-*trans*, 4-*cis*-Hexadienal	FTV 0.8 ppm	Cinnamon

These compounds are extremely flavourful and are organoleptically detectable at very low concentrations in foods. Consequently, the degree of oxidation required to produce off-flavours and render the food product objectionable is quite small.

Although the aldehydes formed by oxidation give rise to objectionable off-flavours when in excess, extremely low levels are important in the formation of desirable creamy or buttery flavours, e.g. *cis* 4-heptenal in butter and fudge, and the more desirable flavour of whipped cream is attributed to oxidation causing the formation of small quantities of aldehydes. Some are also expected to be desirable in the flavour of other dairy products. It is obvious from the wide range of flavours associated with the aldehydes (end products of oxidation) that there is a danger of assigning the sensory consequences of an atypical oxidative process to another sensory attribute.

1.5 *Esters*

Pseudomonas fragi, a common psychrophilic recontaminant, is responsible for the fruity flavours sometimes experienced in dairy products. This strongly lipolytic organism has the ability to hydrolyse milkfat and esterify certain of the lower fatty acids with ethanol. The resulting ethyl esters are extremely flavourful with rather strong fruity and pineapple type flavours and have very low FTVs:

Ethyl butyrate	FTV 0.4 ppm
Ethyl caproate	FTV 0.2 ppm

Usually these ester flavours are regarded as defects in dairy products and, when they are present in noticeable amounts, denote the presence of uncontrolled fermentations. From investigations carried out at the New Zealand Dairy Research Institute, it is evident that esters such as ethyl butyrate are a requirement in milkfat to effect a desirable baked-through flavour for certain markets.

2 Flavours Derived From Lactose

Lactose gives a slightly sweet flavour to milk and many dairy products. There is considerable interest in using lactase to hyrolyse lactose in order to increase sweetness and to overcome the lactose intolerance prevalent in some populations.

Fermentations with streptococci, lactobacilli, leuconostocs and propionibacteria have frequently been used to produce acids from other flavour compounds in milk and dairy products. The balance among these fermentation products will vary with the

organism(s) selected, the nutrients supplied and the fermentation conditions.

2.1 *Lactic Acid*

Lactic acid is a common product from the microbial fermentation of lactose. It is a moderately strong acid with a pK of 3.86. Its volatility is limited, and it contributes primarily an acid, sour character to fermented dairy products. The preferred metabolite, in flavour terms, is the L(+) lactic acid. The D(-) enantiomer has a harsh off-flavour note. The majority of starter organisms in the dairy industry produce predominantly L(+) lactic acid; however, certain less used starters such as *Lactobacillus helveticus* form predominantly the D(-) enantiomer. In 2-year-old Cheddar cheese, the two enantiomers exist more or less in a 1:1 ratio due to partial racemisation of the L(+) form by non-starter organisms (DL lactic acid, FTV 400 ppm).

2.2 *Acetic and Propionic Acids*

Acetic acid can be produced by the fermentation of citrate in milk by lactobacilli and certain starters. Acetic acid and propionic acid are commonly produced in a 1:2 ratio by the fermentation of lactic acid by *Propionibacterium*. As acetic and propionic acids, which have pKs of 4.76 and 4.87 respectively, are weaker acids than lactic acid, the pH commonly increases as a result of this fermentation. Acetic and propionic acids are both quite water soluble and volatile; thus they are found in the aqueous phase of dairy products and contribute to the aroma of cheeses (acetic acid, FTV 175 ppm; propionic acid, FTV 150 ppm).

2.3 *Ethanol*

In dairy products, ethanol can be formed by the microbial reduction by starter and non-starter organisms of acetaldehyde which has itself been previously formed by microbial action (i.e. *Streptococcus thermophilus*). Ethanol itself has little flavour impact at the concentrations experienced in typical dairy products. Its FTV in water is about 200 ppm. However, ethanol can react with free fatty acids and produce esters. Microbial esterases may catalyse this reaction. As explained above (Section 1.5), the esters of short chain fatty acids such as butyric acid and acetic acid have rather strong fruity flavours.

2.4 *Carbonyl Compounds*

2.4.1 Acetaldehyde

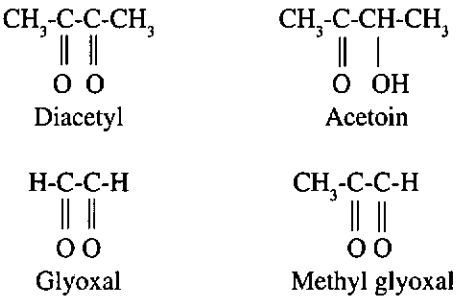
Acetaldehyde is an important flavour compound produced by fermentation with cultures such as *S. thermophilus* and *L. bulgaricus*. Acetaldehyde is important in yoghurt flavour. In too high a concentration in yoghurt or lactic butter it imparts a "green" flavour defect. It has a FTV of around 25 ppm.

2.4.2 Diacetyl

Diacetyl is a powerful flavour compound that is produced particularly by the fermentation of *S. diacetylactis* and *Leuconostoc* strains. Diacetyl production is also favoured by the inclusion of citrate in the fermentation medium. The heat degradation of certain dairy products, such as the conversion of butter to ghee or in the baked through flavour processes, also leads to the formation of small quantities of diacetyl where it is an important part of the flavour profile. Diacetyl is very water soluble, has a low FTV (0.15 ppm in butter) and has a sweet buttery aroma.

It is an important and desirable component of the flavour of both sweet cream butter and, more importantly, lactic butter. Diacetyl can be reduced to acetoin by several starters and organisms that are used or occur in the dairy industry. Acetoin itself has no appreciable flavour, but it can interact with amino acids, as is discussed later (Section 3.6), to produce pyrazines that have cereal-like flavours.

Likewise, the two carbonyl compounds glyoxal and methylglyoxal, which can be produced by fermentation with lactobacilli, have no flavour impact themselves but are able to interact with amino acids to form intense flavours (see Section 3.3 and 3.7).



3 Flavours Derived From Proteins

3.1 *Amino Acids*

Many of the flavours of fermented dairy products arise from the reactions of amino acids. The level of free amino acids in milk is low; however, the organisms used in dairy cultures generally have some proteolytic activity. Amino acids accumulate in some fermented products such as cheeses and they are often regarded as important flavour compounds in themselves. Alanine, glycine, serine and threonine impart sweet flavours that may be important in some cheeses. Proline has been implicated in the sweet flavour of Swiss cheese varieties. The interaction of calcium and magnesium ions with amino acids and peptides has been found to be important in the production of sweet flavours in cheeses.

Some varieties of cheese have been shown to contain small amounts of benzoic, phenylacetic and phenylpropionic acids as well as branched-chain fatty acids. These are all considered to arise from the degradation of phenylalanine and the branched-chain amino acids. *O*-aminoacetophenone, which is thought to arise from tryptophan, gives rise to off-flavours in sterile milks and casein. Skatole derived from tryptophan is important in cheese and butter flavour, as is *p*-cresol from tyrosine.

3-Methylbutanal (FTV 0.6 ppm) can arise as a malty flavour defect in butter and other dairy products such as cheese. The malty flavour defect is caused by the growth of the contaminating microorganism *S. lactis* var. *maltigenes*, which is capable of deamination and decarboxylation of the amino acid leucine, forming the corresponding aldehyde.

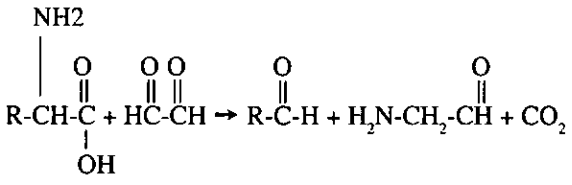
3.2 *Peptides*

Bitter flavours in fermented dairy products often arise from the formation of bitter peptides by proteolysis. It is generally agreed that, to be bitter, a peptide must be composed predominantly of non-polar amino acids.

Investigations carried out at the New Zealand Dairy Research Institute in the late 1980s indicated that certain peptides can have cheesy type flavours.

3.3 *Strecker Aldehydes*

Amino acids that react with carbonyl compounds can undergo the Strecker degradation (one reaction pathway in the Maillard reaction) in which carbon dioxide is lost from the carboxyl group and an aldehyde one carbon shorter than the original amino acid is formed. This reaction can be brought about at ambient temperatures by acetaldehyde, but glyoxal and methylglyoxal are more effective. The latter two potent dicarbonyls can be formed by heating lactose as well as by fermentation with lactobacilli.



Amino acid | Glyoxal | Strecker aldehyde | Amino acetaldehyde

Amino acids, that form intensley flavoured Strecker aldehydes are methionine, phenylalanine, leucine, isoleucine and valine. Methionine leads to methional (FTV 0.25 ppm), which has an intense brothy flavour. Some report that this flavour resembles cheese. Phenylalanine gives rise to phenylacetaldehyde which has a floral, rose-like aroma. Oxidation during the formation of phenylacetaldehyde (FTV 1.25 ppm) can give rise to benzaldehyde (FTV 2.0 ppm) which has a cherry or almond aroma. Leucine, isoleucine and valine give rise to branched-chain aldehydes, which have malty flavours, especially 2-methylbutanal (FTV 1.25 ppm) from leucine. Condensation of 2-methylpropanal (from leucine) and phenylacetaldehyde (from phenylalanine) gives rise to 4-methyl-2-phenylpent-2-enol. This can impart a chocolate-like flavour as experienced in heated Gruyere cheese. Strecker aldehydes can give rise to a wide range of off-flavours in cheese. This reaction could also be important in the formation of off-flavours in milk powders when there has been a delay in manufacture and some microbial growth has taken place in the raw milk silo.

3.4 *Branched-Chain Fatty Acids*

Strecker aldehydes may be further oxidised to acids. This mechanism explains the occurance of volatile branched chain acids (iso-acids), which have been repeatedly identified in surface ripened cheeses. These acids, which have a lower FTV than the straight-chain acids, could be important in the flavour of certain cheeses and in off-flavours that may develop in milk powders manufactured from microbiologically unsound milk.

3.5 *Sulfur Compounds*

Of special interest are the decomposition products of the sulfur amino acids cysteine and methionine. These products are in some cases responsible for flavour defects but in most cases they contribute to the typical flavour of dairy products.

Hydrogen sulfide, which is formed in milk and cream on heating, is responsible for the cooked flavour that develops.

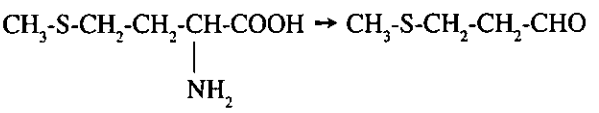
Upon severe treatment, other sulfur components such as methane thiol may also be formed.

Dimethyl sulfide, which is a normal component of raw milk (see Section 4.2), may, if present at too high a level, lead to cowy or unclean flavour, especially if formed by psychrotrophic bacteria.

In most cases, sulfur compounds greatly contribute to cheese flavour. Hydrogen sulfide, which is present in any type of mature cheese, is considered as playing a role in flavour. Methane thiol has been considered by some as essential to normal Cheddar cheese flavour. Hydrogen sulfide, methane thiol, dimethyl disulfide, dimethyl trisulfide and methional occur regularly in mould-ripened cheese. A specific role can be attributed to methane thiol, which in mould-ripened cheeses can be partly converted to dimethyl sulfide and higher polysulfides by oxidation or esterfied to methyl thioesters by volatile free fatty acids.

Methional, dimethyl disulfide and dimethyl trisulfide are formed when methionine reacts with methylglyoxal at ambient temperatures. Methane thiol can oxidise to sulfides and to 2,3,5-trithiahexane. A heat labile precursor in milk, an S-methyl-methionine sulfonium salt, on heating decomposes to liberate dimethyl sulfide.

Methional and sulfides have also been found to be responsible for the flavour of milk irradiated with sunlight or fluorescent lights. Riboflavin is activated by this irradiation and activated riboflavin generates various free radical oxidations of fatty acids and the degradation of methionine initially to methional which is further degraded to methane thiol, dimethyl disulfide and dimethyl disulfide, resulting in the characteristic burnt feathers flavour.



Methionine → Methional (FTV 0.25 ppm)

→ $CH_3 - S - CH_3$ Dimethyl sulfide (FTV 50 ppb)

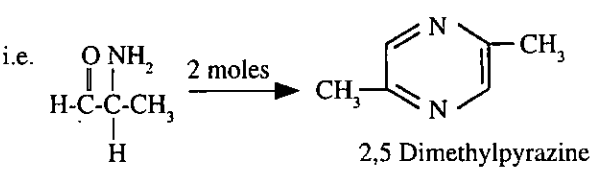
→ CH_3SH Methane thiol (FTV 20 ppb)

3.6 *Browning Reactions - Pyrazines And Other Heterocycles*

Non-enzymatic browning reactions, of which the most important are the Maillard reactions, occur in foods on drying, processing and cooking. Maillard reactions yield many chemicals such as furans and alkyl pyrazines. The latter have been found in cheeses, milk powders and casein. Many steps are involved in their formation which can be represented as;

amino compounds + reducing sugar → subsituted amino acetone (amino acid, amine or NH_3)

2 moles substituted amino acetone → alkyl substituted pyrazine



2,5 Dimethylpyrazine

Amino acids are not essential, as amines and even ammonia can supply the nitrogen, but the amino compound and reducing sugar determine the final pyrazine. Many heterocyclic compounds are formed in browning reactions such as unsaturated lactones, pyridines, pyrroles, thiazoles and furans, as well as many benzoid compounds and maltol.

Some pyrazines are of microbial origin and a number of cultures including *L. helveticus* have been shown to produce alkyl pyrazines. In this situation, alpha hydroxy compounds such as dihydroxyacetone, hyroxyacetone and acetoin from microbial fermentation can react with lysine at ambient temperatures, the major product being dimethylpyrazine. However, some trimethyl- and tetramethyl-pyrzines are also formed. Acetoin yields mostly ethyl dimethylpyrazine. Whereas the latter pyrazines, which occur in cheeses, have musty earthy notes, some pyrazines also give rise to flavours ranging from nutty to that of roast meat. Pyrazines have been considered to be important for the flavour of Gouda cheese. Some pyrazines formed by microbial action (earthy, musty, etc.) could be important in the formation of off-flavours in milk powders when there has been a delay in manufacture and some microbial growth has taken place in the raw milk silo.

3.7 *Acetylated Heterocycles*

Methylglyoxal reacts readily at ambient temperatures with cysteine to form 2-acetylthiazole. This compound has a roasted meat odour, which could be important in some cheese types.

Proline and lysine react with methylglyoxal and glyoxal at ambient temperatures to generate two cereal-like flavours that are important in the flavour of Swiss cheese. These are 2-acetylpyroline and 2-acetyltetrahydropyridine respectively. They are extremely potent flavour compounds previously reported in cereal products. Again, they could conceivably contribute to off-flavours in milk powders when there has been a delay in manufacture and sufficient microbial growth has occurred in the raw milk silo to form the respective precursors.

It may be more productive, when seeking the explanation for the occurance of off-flavours in milk powders, to attempt to identify the presence of specific Strecker aldehydes, pyrazines and acetylated heterocycles rather than to apply the nebulous and often uninformative Limulus test to implicate microbial contamination of the milk before spray drying.

4 Flavours Derived From The Cow - Feed, Rumen And Metabolic Processes

There are three modes of transmission of feed flavours to milk within the cow.

Respiratory Route

The odours from the feed pass from the air in the cow's lungs into the blood and are transported to the udder and show up in milk.

Digestive Route

The flavour-producing substances are absorbed by the blood from the digestive tract and transmitted to the milk.

Eructated Gases

Feeds release or produce volatile flavours after partial digestion in the rumen. These volatiles are eructated or belched from the rumen, inhaled into the lungs and transferred to the milk via the blood.

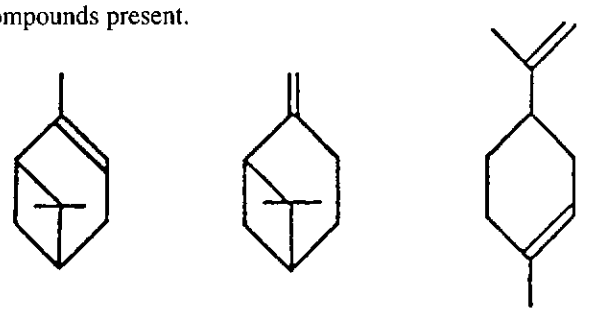
The above pathways have similar effects on the flavour of milk but differ in the rate of flavour transmission. Certain chemicals such as esters appeared in milk within 15 minutes when introduced via the respiratory route. When added through the digestive tract, these same chemicals were detected only after 60 minutes. However, the flavours showed up in 30 minutes when the eructated gases from the rumen were allowed to enter the lungs. It has also been observed that the transmission of flavour is a selective process. Some flavours are transmitted without alteration, some are altered within the cow and others are prevented from entering the milk.

The reverse of the above pathways eliminates feed and weed flavours, thereby providing a means of control. If the concentration of the flavour substance is higher in the milk than in the blood, the substance will pass from the milk to the blood. This exchange will continue for about 5 hours, until eventually all the flavour substances are eliminated from the cow's body. This is the basis for the recommended practise of witholding objectionable feeds from cows during the 4-5 hour period before milking to avoid off-flavour appearing in the milk.

4.1.1 Terpenes

Monoterpenes are the C10 representatives of the terpenoid family and are formally considered to be constructed of two isoprene units. It would appear that monoterpenes are ubiquitous in higher plants, including essential-oil-bearing plants.

The monoterpenes α- and β-pinene and D-limonene, which have extremely low FTVs (66, 14 and 200 ppb respectively), have been detected in both New Zealand butter and Japanese butter. They are expected to contribute to flavour. α-Pinene has a sharp pine flavour, β-pinene has a woody pine flavour and D(+) limonene has a mild citrus sweet orange lemon flavour at the appropriate concentrations. The terpenes are also considered to have a contribution to cheese flavour. The unique flavours attributed to dairy products manufactured in the alpine regions of Europe are attributed in part to the variety of terpenoid compounds present.



α-Pinene β-Pinene D(+) Limonene

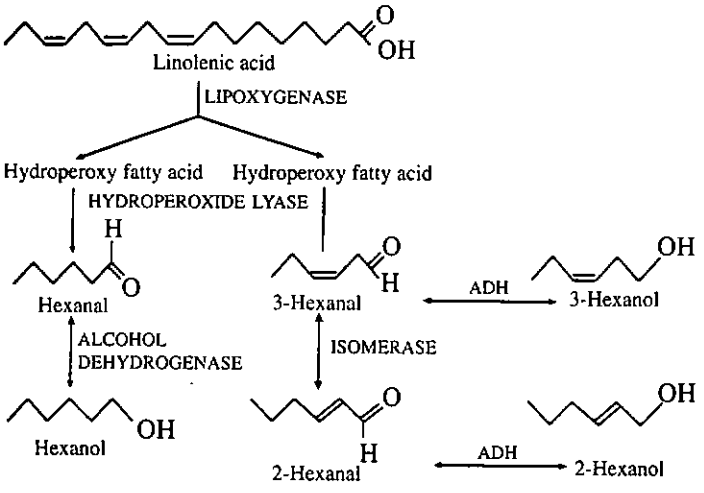
4.1.2 Carbonyls and Alcohols

Fatty acid metabolism in green leaves gives rise to a series of precursors and aroma chemicals including grassy-flavoured aldehydes and alcohols. When the green leaf tissue is broken down by say maceration in the cow's mouth, the presence of lipoxygenase enzyme together with oxygen from the air causes the formation of hydroperoxide fatty acids from the unsaturated lipid fatty acids of the grass. Lipoxygenase enzyme is distributed in a wide range of plant species. The hydroperoxides, which are still only flavour precursors, can then undergo further

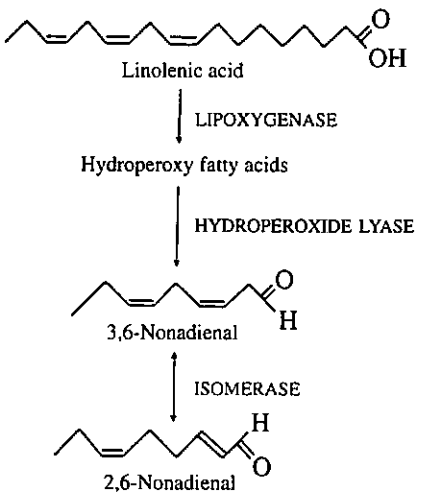
degradation by the enzyme hydroperoxide lyase (which also occurs widely in plant material) to give rise to aroma-active aldehydes. Some of these aldehydes react further to form aroma-active alcohols, catalysed by the enzyme alcohol dehydrogenase. These C6 and C9 aldehydes and alcohols have green and grassy type flavours and are exceedingly potent, i.e. they have very low FTVs:

cis-3-Hexenal	FTV 0.25 ppb
trans-2-Hexenal	FTV 17 ppb
trans-cis-2,6-Nonadienal	FTV 0.01 ppb
trans-cis-2,6-Nonadienol	FTV 3.0 ppb

It is believed that the grassy-flavoured C6 and C9 aldehydes and alcohols derived from grass feeding could be responsible for the grassy flavour nuance perceived in New Zealand milkfat by certain customers. These compounds have been identified in New Zealand milkfat at or above the FTV but their sensory impact has not yet been characterised.



(ADH = alcohol dehydrogenase)

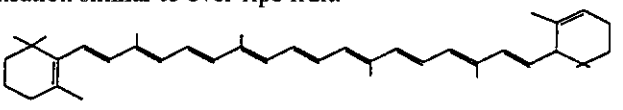


A New Zealand Dairy Research Institute investigation to identify some critical flavour compounds in three butters (New Zealand early-season butter, New Zealand mid-season butter and a Japanese butter) identified significant quantities of 1-octen-3-one. As these butters were in good condition (oxidatively), this ketone, rather than being formed from milkfat oxidation (see Section 1.3), may have been transmitted from the forage via the cow to the milkfat. Clover, which exists extensively in New Zealand pastures, has been shown to contain appreciable levels of 1-octen-3-one. In Japan, significant quantities of lucerne meal are fed in concentrate form. This may contain the same ketone.

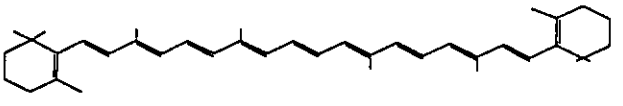
Likewise, in the same study, *trans*-2, *trans*-4-decadienal (FTV 0.3 ppb) was identified in both the New Zealand butter samples at significantly above its FTV but it was not present in the Japanese butter sample, thus suggesting a dietary origin. The aldehyde can be formed from lipoxygenase action in linoleic acid and thus could occur in masticated green forage. The aldehyde possesses an oily, fatty, deep-fried flavour and may be a possible explanation as to why some Japanese customers have perceived a fatty oil flavour in New Zealand milkfat products that is not present in Japanese milkfat products.

4.1.3 Carotenoid Degradation Products

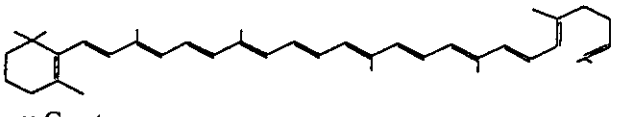
Carotenoids, which are a class of terpene, are widely distributed in the plant and animal kingdoms. In nature, so far more than 400 carotenoids have been identified. Two carotenoids that occur most frequently in plants are α-carotene and β-carotene along with xanthophyll and xanthophyll-epoxide. At least two enzymes, peroxidase and lipoxygenase, can be responsible for the formation of aroma chemicals from carotenoids in macerated plant tissue. Reactions that are not enzymatically catalysed can also be of importance. Many of the postulated ways of forming carotenoid decomposition products still lack experimental proof. Many of the decomposition products of the carotenoids consist of 13 carbon atoms and are known as C13-norisoprenoids. Although the norisoprenoids occur in nature in only very small concentrations, they are often of great sensory significance because of their very low FTVs. β-Ionone and β-damascenone, both of which occur frequently, have FTVs of 7 and 9 ppt (in water) respectively. β-Ionone, which is described as having a warm, woody, balsamic flavour, has been identified in New Zealand milkfat at levels that could be flavourful. β-Damascenone has been identified in fresh milk where it may make a flavour contribution. It is purported to have a flavour sensation similar to over-ripe fruit.



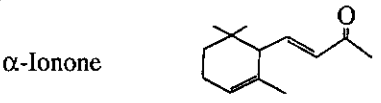
α-Carotene



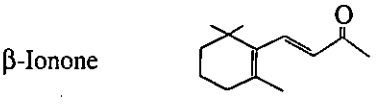
β-Carotene



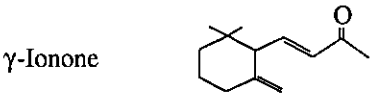
γ-Carotene



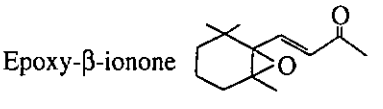
α-Ionone



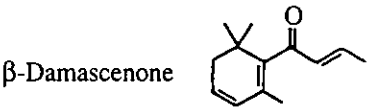
β-Ionone



γ-Ionone

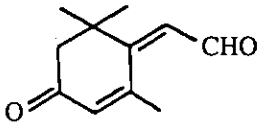


Epoxy-β-ionone

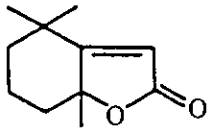


β-Damascenone

In addition to having the potential to contribute flavour to dairy products, certain carotenoid degradation products that are seemingly odourless add flavour and enhance the flavour of the product in which they occur, i.e. the aldehyde below.



Other compounds exert only a tactile effect. Dihydroactinidiolide, which exerts a cooling effect on the mucous membranes of the mouth cavity, occurs widely. It has been shown to be formed on photooxygenation (a process that would occur in grass) from β-carotene as well as from β-ionone.



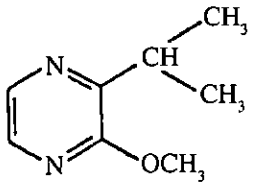
Dihydroactinidiolide

4.1.4 Esters

Recently the esters hexyl acetate (FTV 3.5 ppm), *cis*-3-hexenyl acetate and *trans*-2-hexenyl acetate have been isolated from New Zealand milkfat. It is believed that these esters may arise from the diet of the cow as they are present in macerated green forage.

4.1.5 Methoxypyrazines

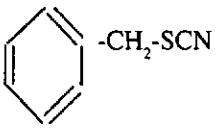
As the 3-alkyl-2-methoxypyrazines occur widely in vegetables including such species as lettuce, it is potentially feasible that they could also occur in grass forage where they would be available for incorporation into milk by the cow. The lower molecular weight alkylmethoxypyrazines have odours that are characteristic of bell peppers and freshly shelled green peas. It may be a consequence of the extremely low FTVs (i.e. 3-isobutyl-2-methoxypyrazine, FTV 2 ppt; 3-hexyl-2-methoxypyrazine, FTV 1 ppt; 3-propyl-2-methoxypyrazine, FTV 6 ppt; 3-isopropyl-2-methoxypyrazine, FTV 2 ppt etc.) that their presence in dairy products has not been detected. They are important flavour components of sauvignon blanc wines being derived from the grape and not by fermentation.



3-Isopropyl-2-methoxypyrazine

4.1.6 Weed Taints

Landcress indigenous to South America is now prevalent in most dairy countries, where it causes scorched flavours which are intensified by heating. The plant contains mustard oil glucosides which on enzymatic hydrolysis (caused by crushing as in mastication by the cow) yield at least six benzyl compounds (disulfide, isothiocyanate, thiol, methyl sulfide, nitrile and thiocyanate) which contribute to the taint. Benzyl thiocyanate contributes to the flavour of unheated cream, and benzyl α-toluene thiol, considered to be responsible for the scorched flavour, may be formed from dibenzyl disulfide through reduction by SH groups generated during heat treatment. The landcress flavour defect cannot be removed from cream by vacreation.



Benzyl isothiocyanate

Peppercress (Lepidium spp.)

Peppercress can also cause serious taints, especially in early season. It acts indirectly in the rumen, emphasising the breaking down of tryptophan from other sources to indole and skatole. The resultant elevated levels of these two compounds result in dairy products with faecal or "old rubber" odours.

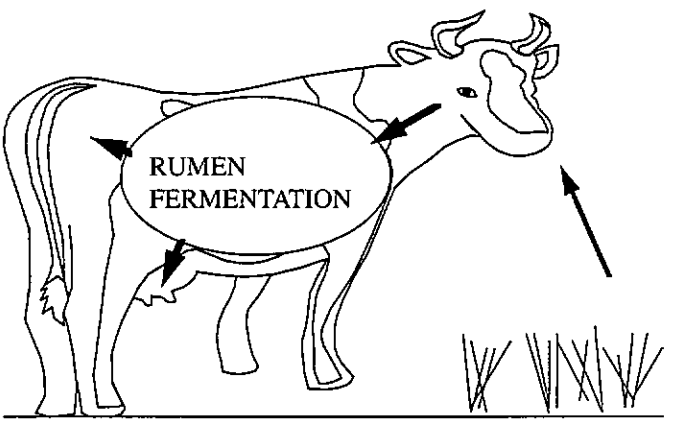
4.2 *Flavours Derived From Rumen Processes*

Like all ruminants, dairy cows are entirely dependent upon the microorganisms in their rumens to process plant tissues into nutrients for growth and for milk production. The insoluble components of forage are converted by a vigorous and complex fermentation to produce volatile fatty acids which are absorbed into the blood stream for energy production and fat synthesis. A wide range of minor metabolites is also produced.

Digestion in the rumen can be considered to be largely a steady-state fermentation with forage and buffer (saliva) entering and small plant fragments and microorganisms passing out. Upon ingestion, forage passes into the rumen and is mixed into the rumen contents by muscular contractions of the rumen wall. The cow's rumen (approximately 50 litres in volume) is a compartmentalised chamber rather than a simple vat.

Because the rumen contains a high concentration of many different anaerobic microorganisms, it is metabolically very active. The liquid phase is highly anaerobic and, in the main, biochemical reactions are carried out without the aid of oxygen.

The chemical composition of the liquid in the rumen depends upon the diet and to a large extent is undefined. Rumen liquor contains a range of different compounds, often in low concentrations. These include forage constituents released during digestion, breakdown products of forage components and fermentation, and breakdown products of rumen microorganisms. Compounds such as skatole, vanillin, phenylacetic acid, terpenes and dimethyl sulfide found in rumen liquor are thought to contribute flavour qualities to milk.



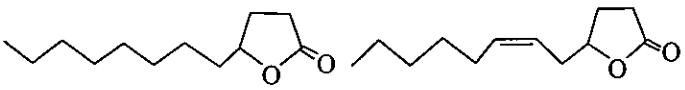
4.2.1 Gamma Lactones

The rumen microflora are considered to be responsible for the generation of precursors for the gamma lactones, which subsequently appear in milkfat as the glyceryl esters of gamma hydroxy acids. On heating or long term storage, the esters

decompose to the free acids which spontaneously cyclise to the flavourful lactone.

A number of conditions must be met in order to obtain the formation of γ-lactone precursors in the rumen. There is a need for a readily available source of starch (such as crushed oats rather than whole oats). A starch diet results in more propionic acid formation in the rumen due to the selection of a specific range of microorganisms. In addition, there is a requirement for a source of a fatty acid precursor: oleic acid for γ-C12:0 lactone (γ-dodecalactone) and linoleic acid for γ-C12:1 lactone (γ-dodec-*cis*-6-enolactone). These rumen and dietary requirements are easily met by a European-type diet, which consists largely of concentrates (which contain both starch and fatty acid precursor, i.e. grain, meals etc.) but not by a New Zealand grass forage diet which primarily lacks adequate quantities of starch.

Consequently, European dairy products in general possess a relatively sweet fruity flavour due to the presence of γ-lactones. This sweet fruity flavour is believed to be desirable by certain markets. New Zealand dairy products, due to substantial grass feeding, lack the sweet fruity γ-lactone flavour. The FTV for γ-C12:0 lactone is 1.0 ppm. The FTV for γ-C12:1 lactone has not been determined but it is likely to be less than 1.0 ppm.



γ-dodecalactone γ-dode-*cis*-6-enolactone

Current research is being carried out by the Rumen Research Team (Led by Dr Keith Joblin) at AgResearch, Palmerston North. It is hoped that this research will provide suitable rumen microorganisms which, when inoculated into cows, will provide γ-lactones in milk when the cows are on a grass diet.

It should be pointed out that the European diet, which modifies the microflora in the rumen (when compared with a grass diet), effects other flavour changes in dairy products, and some of the strong flavours experienced on a grass diet are no longer apparent. Except for the changes in γ-lactones, fatty acids, terpenes, indole compounds and phenolic compounds with this change in diet, the effects on other flavour compounds have not yet been elaborated.

4.2.2 Amines

Indole and skatole (3-methyl indole) are two flavourful amines that occur in milk and dairy products. Their appearance in milk at parts per billion levels represents only a trace proportion of the total flux through the cow and is essentially a spill-over from rumen metabolism and waste detoxification and excretion by the cow. Ruminal deamination of dietary tryptophan is a likely source of milk indoles. Consumption of the *Lepidium* species of weed, which at times is prevalent in New Zealand pastures, can accentuate this pathway. As a consequence of excess indole and skatole, a faecal taint is experienced in milkfat and dairy products.

Indole has an FTV in butter of 0.02 ppm with an optimum value for desirable flavour contribution at 0.06 ppm. At 0.1 ppm or above, indole contributes a dirty, faecal, mothball flavour to butter. Skatole is just discernible at 0.05 ppm, adds fullness to butter flavour at 0.10 ppm and has maximum desirable impact at 0.20 ppm. At 0.30 ppm, it imparts a faecal flavour.

A New Zealand Dairy Research Institute survey has shown that skatole occurs in New Zealand milkfat at a concentration (0.2 ppm) for optimum contribution to flavour as perceived by Australasian palates. However, this may be too high for Asian and European customers. The level of indole and skatole found by the survey in Japanese and European milkfat was substantially less than 0.20 ppm. In New Zealand milkfat, the level of indole and skatole is highest in early season when it is believed to contribute to early season flavour defects of dairy products.

Indole Skatole (3-methyl indole)

4.2.3 Phenols

Phenol and the alkyl phenols are a group of flavourful compounds that occur in milk and dairy products.

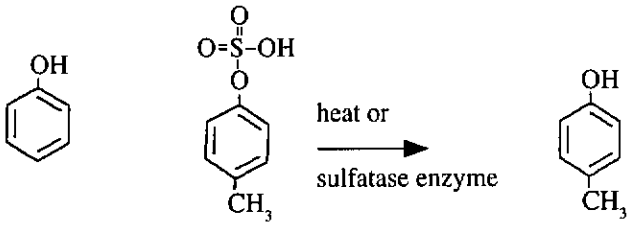
Their appearance in milk at parts per billion levels again represents only a trace proportion of the total flux through the cow and is essentially a spill-over from rumen metabolism and waste detoxification and excretion by the cow. Ruminal degradation of dietary tyrosine and lignins is a likely source of phenolic compounds. In the process of metabolic detoxification, the phenolic compounds are excreted primarily as sulfate conjugates; however, some glucuronate conjugates are also present. Some of the conjugates enter the milk stream and subsequently, on strong heating or in the presence of sulfatase or glucuronase enzymes (as may occur in the formation of certain dairy products), decompose to very flavourful free phenolic compounds. Two common phenolic compounds experienced in New Zealand milk and dairy products are phenol and *p*-cresol (4-methyl phenol). Whereas at optimum concentration (10 and 2 ppb respectively for butter) they are desirable for butter and cheese flavour, at a higher concentration dairy products take on an unpleasant flavour, i.e.

phenol	phenolic, carbolic flavour
p-cresol	barny, sheep yard flavour

In fact, *p*-cresol is considered to be responsible for the formation of undesirable barny flavours in some US and New Zealand cheeses.

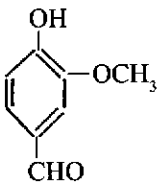
In New Zealand milkfat, the level of phenol and *p*-cresol is highest in early season when it is believed to contribute to early season flavour defects in dairy products. The presence of phenolic compounds in dairy products has also been associated with astringency, a textural defect in dairy products.

The presence of *p*-cresol in dairy products is indicative of a grass forage diet. When cows are fed a concentrate type diet, the level of *p*-cresol in the milk is considerably reduced.



phenol *p*-cresol sulfate *p*-cresol

Vanillin (a phenolic compound) has been identified in milk and dairy products at low levels but which are considered to have a very positive contribution to flavour. It is believed to be formed in the rumen through the microbial degradation of lignin in the forage.



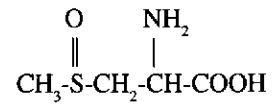
Vanillin (*m*-methoxy-*p*-hydroxybenzaldehyde)

4.2.4 Sulfur Compounds

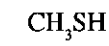
Certain fermentation processes carried out in the rumen are able to degrade sulfur-containing amino acids in the diet (i.e. methionine, cysteine) to low molecular weight flavourful sulfur compounds, i.e. hydrogen sulfide, methane thiol and dimethyl sulfide. All these compounds have been isolated in fresh milk and butter.

Although studies have not been reported, it could be envisaged that changing the ratio of microbial species in the rumen, as occurs when going from a New Zealand grass diet to a European concentrate diet, will influence the ratios and final concentrations of sulfur compounds that end up in the milk and dairy products.

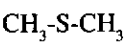
Some plants such as kale (*Brassica spp.*), which are popular winter fodder, contain the compound S-methylcysteine sulfoxide. This compound breaks down in the rumen to methane thiol and dimethyl disulfide. As explained in Section 3.5, the latter compounds are very flavourful and in excess can lead to undesirable flavours.



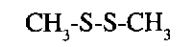
S-methylcysteine sulfoxide



Methane thiol



Dimethyl sulfide



Dimethyl disulfide

4.2.5 Flavour Compounds From Other Rumen Fermentations

It is quite conceivable that rumen microbial metabolic processes could lead to the formation of intermediates that would undergo suitable reactions to form flavourful compounds. Many of the flavourful compounds identified in fresh milk may be derived from this source. A number of alcohols (the rumen would be expected to reduce aldehydes to alcohols) have been identified in fresh milk, some of which could be formed by the Strecker reaction (see Section 3.3). For example, the presence of 2-methylpropan-1-ol could be explained as being derived from valine, 2-methylbutan-1-ol from leucine, butan-2-ol from isoleucine and benzyl alcohol from phenylalanine. In addition, some flavourful heterocyclic compounds have also been identified in fresh milk. They have the potential to be derived from reactions outlined in Sections 3.6 and 3.7; pyrazine, 2-methylpyrazine, pyridine, propylpyridine, pyrrole, 2-methylpyrrole, 2-methylfuran and 2,4-dimethylfuran are some that have been identified in fresh milk. Thus it is apparent that knowledgeable and controlled manipulations of rumen fermentations could be a means to effectively managing the flavour of milk and dairy products. Proof of this effective means of flavour management can be seen in some of the flavour differences experienced between New Zealand and European dairy products. In this instance, unwittingly, manipulations of rumen organisms and fermentations have taken place via dietary control. More precise methods to carry out rumen microbial manipulations need to be researched in order to allow the potential of this approach to be utilised to manage the flavour of raw milk and dairy products.

5 On-Farm Conclusions

Manipulation of the rumen microorganisms, together with or independently of the development of genetic variations in forage species, offers a potentially very powerful, flexible and unique method to manage the flavour components in New Zealand dairy products to meet customer requirements. It is an approach that can take the New Zealand dairy industry into the 21st century and meet the customer's desire for a natural, clean, green image and sophisticated, complex flavour that may not be achieved, or is not achieved in an acceptable manner, by the application of processing technology.

* * * * *

International News

CZECH AND BRITISH AWARDS TO NEW ZEALAND-BORN ACADEMIC

Professor Robin J H Clark, Sir William Ramsay Professor and Head, Department of Chemistry, University College London, has been awarded the Joannes Marcus Marci medal of the Czech Spectroscopy Society. The medal, in the name of a famous Czech scientist and contemporary of Isaac Newton, recognises Professor Clark's distinguished contributions to Raman spectroscopy. He has also been elected the United Kingdom - Canada Rutherford lecturer for the year 2000. This biennial award of the Royal Society of London is open to persons in all branches of science and of scientifically related areas of medicine and engineering. He is the first New Zealander to receive either the Marci medal or to be appointed the United Kingdom - Canada Rutherford lecturer.

Professor Clark is an old boy of both Marlborough and Christ's Colleges, and a graduate of the University of Canterbury. He was elected an Honorary Fellow of the Royal Society of New Zealand in 1989, and both a Fellow of the Royal Society of London and a member of the Academia Europaea in 1990. His research is very well known, and he has lectured in over 30 different countries. He is author of about 400 scientific publications and three books, and is editor of nine monographs and co-editor of the review series "*Advances in Spectroscopy*", now in 26 volumes.

Professor Clark has served on many Research Councils and on the Council of the Royal Society of Chemistry and the Royal Society of London. He has also recently been elected Honorary Secretary of the Royal Institution of Great Britain, which dates back to 1799, and is the first New Zealander to hold this position.

VARIAN INSTRUMENTS ANNOUNCES KEY LEADERSHIP CHANGES

Varian's Instruments, a major manufacturer of analytical and research instrumentation, recently announced several key management changes.

Gary W Rogerson, 45, will step into the newly formed position of Vice President of the Analytical Instruments business. His new responsibilities will include Optical Spectroscopy Instruments and both the North American and European Analytical field organisations, while continuing as Vice President and General Manager for Chromatography Systems in Walnut Creek, California.

Raymond Shaw, 49, will head Instruments' Western Pacific and Latin American field organisations, in addition to his duties as Vice President and general manager of Nuclear Magnetic Resonance Instruments (NMRI) in Palo Alto, California.

The announcement follows Varian's recently revealed plans to reorganise its core businesses into three separate companies. Executive Vice President Allen J Lauer, who heads the Instruments business, said the moves will allow him to focus on his expanding responsibilities as Chief Executive Officer of that soon-to-be-independent company.

Rogerson joined Varian Instruments in 1979 as a sales representative in London, England and has served as Applications Marketing Manager for Europe, Instruments Marketing Communications Manager, US Marketing Manager for the Optical Spectroscopy Instruments (OSI) business unit, and Sales and Marketing Manager for NMRI. He has been Vice President and General Manager of Chromatography Systems since 1995. Rogerson received his PhD in biochemistry from the University of Kent and currently lives in Los Gatos, California.

Shaw has led Varian NMRI, the nation's largest supplier of research and analytical nuclear magnetic resonance spectrometers, for nine years. He joined the company's Instruments business in 1978, holding several research positions for its OSI business unit in Melbourne, Australia. In 1987, he was promoted to head the newly acquired Sample Preparation Products in Harbor City, California.

Prior to joining Varian, Shaw was a senior teaching fellow at Monash University in Melbourne, where he has earned a BS in chemistry and physics, as well as a PhD in chemical physics. He currently resides in Foster City, California.

J&W SCIENTIFIC ANNOUNCES NEW MANAGER OF CUSTOM COLUMN SHOPPE

J&W Scientific, the world's largest manufacturer of high resolution capillary GC columns, announces the appointment of Dean Rood to Manager of the Custom Column Shoppe. Dean previously worked in J&W's Technical Support Department as Senior Applications Chemist, travelling extensively to meet with customers and present technical seminars. He is also known for his published work in the form of technical applications and papers, as associate editor for the *Journal of Chromatographic Science* and for the first and second editions of the popular reference work *A Practical Guide to the Care, Maintenance and Troubleshooting of Capillary GC Systems*. This background will enhance his contribution to J&W's custom manufacturing.

J&W's Custom Column Shoppe serves as an extension to J&W's standard production line, offering customers the flexibility and control to specify columns or accessories to very particular criteria for their applications. The column technicians will design, manufacture and test columns of extreme lengths, inner or outer diameters, custom stationary phases, and customised cages. Leakfree "U" and "Y" union service and other testing services are also available.

J&W's Eric Mittlefehldt, former Manager of the Custom Column Shoppe, has been appointed J&W's new Business Development Manager in charge of acquisition and technology development for J&W Scientific Holding Company.

For more information about J&W Scientific or custom columns, Contact your local J&W distributor. You can also visit J&W's Web Site at http://www.jandw.com for monthly updated information.

ROLAND ANDERSSON APPOINTED EXECUTIVE DIRECTOR OF THE CHEMICAL INSTITUTE OF CANADA

Dr Terrance Rummery, FCIC, P.Eng., Chair of the Board of The Chemical Institute of Canada, recently announced the appointment of Roland Andersson as Executive Director of the Institute.

Mr Andersson graduated from the University of Winnipeg with a four-year Bachelor of Science Degree in chemistry. He has over 20 years of management experience in the chemical field acquired through increased career responsibilities in research and development, operations, administration and marketing, in both chemical manufacturing companies and non-profit associations.

The Chemical Institute of Canada is a national association of chemists, chemical engineers and chemical technologists organised in three Constituent Societies: the Canadian Society for Chemistry, the Canadian Society for Chemical Engineering and the Canadian Society for Chemical Technology. It has approximately 5,700 members employed in industry, government and academia across Canada and internationally. The Institute promotes common scientific and technical interests of the Constituent Societies, provides the chemical community a voice with Government, and delivers common services to its individual members.

VARIAN ASSOCIATES PLANS REORGANISATION TO CREATE THREE INDEPENDENT BUSINESSES, ENHANCE COMPETITIVENESS, VALUE

Varian Associates, Inc, announces that its Board of Directors has approved the development of a detailed plan to reorganise the company's core businesses in health care systems, semiconductor equipment, and instruments into three separate public companies.

Under the plan, Varian would spin-off two or three businesses, with shareholders receiving stock in the new entities commensurate with their holdings immediately prior to the time of the distribution. The company said it will seek stockholder approval of the final plan as well as a favourable ruling from the US Internal Revenue Service confirming the tax-free nature of the spin-offs for both Varian and its stockholders.

Chairman and Chief Executive J Tracy O'Rourke said that the reorganisation is the result of an extensive analysis and will give the management of all three businesses better ability to focus on their respective markets, customer needs, costs, and growth opportunities. The plan will allow each business greater freedom to organise its capital structure, allocate resources, and design strategies appropriate to its particular situation. He added that the management teams of the independent businesses would also be able to design compensation programs targeted to their specific circumstances and performance, and thus will be better positioned to attract and retain key personnel.

Although the three businesses all have historical ties to Varian's rich heritage of technological innovation, O'Rourke noted that there is no longer a material synergy between any of the operations. Each of the three now has distinctly different products and customers and must contend with entirely different competitive forces and business cycles.

Varian's Health Care Systems business is organised around two major product lines - radiation oncology equipment for treating cancer and x-ray tubes for various diagnostic uses. It had fiscal 1997 sales of $472 million and has plants in California, Utah, Illinois, and South Carolina in the US in addition to production centres in England, France, Switzerland, and Finland. With over 3,500 systems in service, the business ranks as the world's largest supplier of radiotherapy equipment as well as the leading supplier of x-ray tubes for original equipment and replacement use.

Varian's Instruments business is a major manufacturer of analytical and research instrumentation for industrial and scientific applications. Its activities also include a line of vacuum pumps and leak detection equipment as well as a state-of-the-art circuit board manufacturing centre. These ventures posted combined 1997 sales of $527 million and include factories in Arizona, California, Colorado, and Massachusetts in the US along with plants in Australia, Italy, and The Netherlands.

Varian's Semiconductor Equipment business makes and services ion implantation systems, a key step in the chip manufacturing process. Its 1997 sales totalled $424 million, and it has manufacturing and R&D facilities in the US (at two Massachusetts locations), Japan, and Korea. This operation is the world's leading supplier of ion implant systems, with over 2,500 systems shipped to chip manufacturers worldwide.

In addition to greater flexibility and sharper focus, O'Rourke said Varian's Board believes the plan will also enhance shareholder value by more fairly recognising the inherent worth of the company's disparate core businesses.

Although Varian has enjoyed considerable operational and financial success since the Board brought O'Rouke in to lead a turnaround in 1990 - including three consecutive record years in 1995-1997 - it has also suffered from the "conglomerate discount" that Wall Street assigns to firms with diverse businesses. As an illustration, the price of Varian's stock currently trades at a discount to that of peer companies in all three of its core businesses despite its significantly improved performance.

The company's overall results are also often inordinately influenced by factors in a single area such as the volatility of the semiconductor industry where the current down-cycle has helped to push its stock price as much as 50% or more below its historical high.

O'Rourke said the reorganisation will have minimal effect on the approximately 7,100 employees in the company's operating units. While most of the employees at Varian's Palo Alto,

California headquarters office are expected to migrate to new positions in one of the three independent companies, he said some jobs will inevitably become redundant when the reorganisation has been accomplished. Those persons will be provided with appropriate severance benefits.

Varian's chairman added that further details on the reorganisation and spin-off of the newly independent businesses will be released periodically over the next six to nine months as part of the process of securing shareholder approval for the proposal. Warburg Dillon Read LLC is advising Varian on the planned reorganisation.

J&W SCIENTIFIC ACQUIRES SYRINGE BUSINESS FROM UNIMETRICS CORPORATION

On August 17, 1998, J&W Scientific Incorporated acquired the syringe business of Unimetrics Corporation located at 501 Earl Road in Shorewood, Illinois, USA. As the world's leading manufacturer of capillary columns and accessories for gas chromatography, J&W believes this acquisition represents a significant milestone in ongoing efforts to best support the increasingly diverse needs of its expanding customer base. According to J&W President and CEO, Jack Frank, "the new syringe business figures prominently in J&W's plans for continued growth through acquisitions offering strategic opportunities to penetrate new markets, while augmenting expansion of the core GC business".

Unimetrics' full line of sampling syringes and syringe accessories are utilised in applications ranging from gas and liquid chromatography to air sampling and industrial process control sampling. Coordinating relocation of the syringe business to J&W Scientific's headquarters in Folsom, California will be J&W's New Business Development Manager, Eric Mittlefehldt. Former Unimetrics' President, Helen Frazier, will remain with the syringe business as a consultant during this transition. For further information, please contact Dr Eric Mittlefehldt at (815) 7411370.

For more information about J&W Scientific and its products visit the J&W Website at http://www.jandw.com

AMERICAN CHEMICAL SOCIETY DEDICATES NATIONAL CHEMICAL HISTORIC LANDMARK ON UNIVERSITY OF AKRON CAMPUS

Few students of history are unaware of the significance of World War II's Manhattan Project and the atom bomb it created. But few may know that Akron was at the centre of another massive scientific project that was possibly even more vital to the war effort - the development of commercially viable synthetic rubber.

This obscurity was lifted on August 29, 1998. More than 50 years after scientists from five companies with local ties solved the synthetic rubber puzzle in dramatic fashion, the American Chemical Society (ACS) has dedicated a National Chemical Historic Landmark on The University of Akron's Buchtel Common. The five companies that spearheaded the federal government's National Synthetic Rubber (NSR) program are Goodyear Tire & Rubber Co, BF Goodrich Co, Firestone Tire and Rubber Co, (now Bridgestone/Firestone), US Rubber Co (now Uniroyal), and Standard Oil of New Jersey (now Exxon). According to the ACS nominating letter, the University was chosen as a neutral site to acknowledge the remarkable collaborative effort that solved World War II rubber shortages and gave rise to a thriving synthetic rubber industry. The University is also an appropriate location given its prominence in war-era rubber research by legendary UA Professor G Stafford Whitby, says Roger Crawford, chair of the ACS Akron Section. The ACS Akron Section and the Rubber Division, ACS, joined forces to propose the acknowledgement of the NSR program.

In 1940, nearly 100 percent of the rubber products produced in the United States were made from natural rubber, largely imported from areas soon to be made unaccessible by war. By 1945, thanks to the efforts of the companies, synthetic rubber accounted for about 800,000 tons, or 85 percent, of domestic rubber production. And rubber was a vital commodity in the war effort.

Each US soldier required 32 pounds of rubber gear and accessories. A single B-17 bomber required half a ton of rubber. Tanks used 1 ton and each battleship required 75 tons.

The ACS National Historic Chemical Landmarks Program, started in 1992, recognises scientific and technical heritage and encourages the preservation of historically important achievements and artifacts in chemistry, chemical engineering and the chemical process industries. It provides an annotated roster to remind chemists, chemical engineers, students, educators, historians, and travellers of an inspiring heritage that illuminates where we have been and where we might go when travelling the diverse paths to discovery.

A site designation marks the location of an artifact, event, or other development of clear historical importance with special significance to the development of chemistry and chemical engineering.

The Rubber Division ACS, ACS Akron Section and the University hosted a dedication ceremony, and surviving researchers, company representatives and ACS officials joined University and local national dignitaries for the program at the west end of Buchtel Common. The landmark consists of a stone monument with bronze plaques commemorating the achievement, naming the participating companies and explaining the placement at The University of Akron.

"The University of Akron is proud to provide a place to acknowledge such an important and impressive technical achievement," said University President Dr Marion A Reubel. "We've enjoyed longstanding technical relationships with each of these companies, and being associated with them in such a distinguished fashion is a great honour and privilege".

CONFERENCES & SEMINARS

4-9 October 1998
3rd Australian Peptide Conference
Venue: Laguna Quays, The Whitsundays
Queensland, Australia
Contact: Dr A I Smith, Conference Secretary
Baker Medical Research Institute
P O Box 348, Prahran, Victoria, Australia
Tel: (+61-3)-95224333
Fax: (+61-3)-95211362

11-17 October 1998
RNA: Biochemistry and Biotechnology Workshop
Venue: Poznan, Poland
Contact: J Barciszewski
Institute of Bioorganic Chemistry
Polish Academy of Sciences
Noskowskiego 12/14, 61-704 Poznan, Poland
Fax: (+48-61)-520532
Email: jbarcisz@ibch.poznan.pl

12-13 October 1998
6th Pharm Tech Europe
Venue: Düsseldorf Hilton Hotel, Germany
Contact: M Kermode
Pharmaceutical Technology Europe
Advanstar Communications
Advanstar House, Park West, Sealand Road,
CH1 4RN, England, United Kingdom
Tel: (+44-1244)-378888
Fax: (+44-1244)-370011
Email: mkermode@advanstar.com

13-16 October 1998
Preparative High Performance Liquid Chromatography Training Course
Venue: Champigneulles, France
Contact: PROCHROM S.A.
Training Courses
BP. 9, F-54250 Champigneulles, France
Tel: (+33-383)-312244
Fax: (+33-383)-312051
Email: prochrom@millipore.com

18-22 October 1998
14th International Clean Air and Environment Conference
Venue: Melbourne Hilton on the Park
Melbourne, Australia
Contact: PR Conference Consultants Pty Ltd
Tel: (+61-3)-98169111
Fax: (+61-3)-98169287
Email: prcc@labyrinth.net.au
Web Site: http://www.labyrinth.net.au/~prcc

20-22 October 1998
New Zealand Grassland Association Annual Conference
Venue: Nelson, New Zealand
Contact: Alison Graham
Rainbow Station
Private Bag, Nelson, New Zealand
Tel/Fax: (+64-3)-5211838

26-27 October 1998
The 4th Annual Summit on Asia Pacific Pulp and Paper
Venue: Shangri-La Hotel, Singapore
Contact: AiC Worldwide Pty Ltd
12 Prince Edward Road #03201
Podium A Bestway Building, Singapore 079212
Enquiries Tel: (+61-2)-92105750
To Register Tel: (+65-322)-2700

Ministry For The Environment

AN INVITATION TO ATTEND THE ORGANOCHLORINES PROGRAMME: ECOLOGICAL RISK ASSESSMENT SEMINAR

The Ministry for the Environment has recently completed a nationwide series of investigations into the background levels of dioxins, PCBs and organochlorine pesticides in soils, air, rivers and estuaries. The data will be used to develop national environmental standards (under the RM Act) for dioxins and PCBS.

Professor John Giesy, Michigan State University, has been contracted by the Ministry to undertake an ecological risk assessment for the Organochlorines Programme. He is reviewing both the background data, as well as data from contaminated sites/ecosystems.

Professor Giesy will shortly be visiting New Zealand as part of the risk assessment component of the project. We are taking the opportunity, while Professor Giesy is in New Zealand, to discuss and progress the project at a technical level.

We invite you and your colleagues to participate in a seminar for this project. At the seminar we will present an overview of the New Zealand data, followed by a discussion, led by Professor Giesy, on his approach to the New Zealand project, progress so far, and where we are headed.

Venues: Auckland — Council Chambers, Auckland Regional Council, 21 Pitt Street
Time: 2.30 - 4.30 pm
Date: Thursday 1 October 1998

Wellington — Taupo Room, Level 5, Ministry For The Environment 84 Boulcott Street
Time: 2.00 - 4.30 pm
Date: Thursday 8 October 1998

Christchurch — 3rd Floor, Rooms 2 and 3, Applefield Building, Open Polytechnic (same building as Canterbury Regional Council)
Time: 1.00 - 3.00 pm
Date: Wednesday 14 October 1998

For Enquiries Contact: Sue Scobie
Phone: (04) 9177452
Email: sue.scobie@mfe.govt.nz

Fax: (+65-223)-3554
Website: www.aic-asia.com

30 November-3 December 1998
"Microbes and Molecules" 1998 NZMS and NZSBMB Conference
Venue: Copthorne Resort, Solway Park
Masterton, New Zealand
Contact: Dr John Tweedie
Institute of Molecular Biosciences
Massey University
Private Bag 11-222 Palmerston North
Email: j.tweedie@massey.ac.nz

30 November-3 December
5th Australasian Symposium on Applied ICP-MS
Venue: Monash University, Melbourne, Australia
Contact: Debra Peel
Perkin-Elmer Pty Ltd
Tel: (+61-3)-92128500
Email: peelda@perkin-elmer.com

7-9 December 1998
8th Australian Coal Science Conference. Coal Use: Present and Future
Venue: Sydney, Australia

7-9 December 1998
First Singapore Chemical Conference
Venue: Singapore
This conference will be a major event hosted by the National University of Singapore and will provide a broad forum for researchers to share experiences and exchange ideas in fundamental and industrial chemical research. Emphasis will be made to link chemical research to industrial applications. Another key objective of the conference is to foster better interactions and dialogue among researchers in chemistry or related areas in this region.
Contact: The NZIC Secretariat
P O Box 39-283, Howick
Auckland, New Zealand
Tel: (+64-9)-5356495
Fax: (+64-9)-5353476
Email: NZICOffice@NZIC.org.nz
Web Site: http://www.science.nus.sg/~chem/scc.htm

17-19 December 1998
Oxygen, Free Radicals and Oxidative Stress in Plants
Venue: Granada, Spain
Contact: L del Rio
Estacion Experimental del Zaidin, CSIC
Departamento de Bioquimica
Biologia Celular y Molecular de Plantas
Apartado 419, E-18080 Granada, Spain
Tel: (+34-58)-121011
Fax: (+34-58)-129600
Email: ladelrio@eez.csic.es

24-28 January 1999
Organometallic Chemistry in the South Pacific - A Celebration
This conference is being organised to honour Professor Warren Roper of The University of Auckland on the occasion of his 60th birthday. The scope of the conference will include organometallic and coordination chemistry. The meeting will have a strong international flavour with approximately 35 high profile, invited speakers from around the world. Poster presentations contributed by attendees will be welcomed.
Venue: University of Auckland Conference Centre
Auckland, New Zealand
Contact: Dr P J Brothers or Dr L J Wright
Department of Chemistry, University of Auckland
Private Bag 92019, Auckland, New Zealand
Tel: (+64-9)-3737599
Fax: (+64-9)-3737422
Email: P.Brothers@auckland.ac.nz
or LJ.Wright@auckland.ac.nz
Web Site: http://www.che.auckland.ac.nz/conf.htm

31 January - 4 February 1999
IC '99 Joint Meeting of Inorganic Division of the Royal Australian Chemical Institute and Inorganic Specialist Group of the New Zealand Institute of Chemistry
Venue: Wellington, New Zealand
Contact: Rhyl Singleton
School of Chemical and Physical Sciences
Victoria University of Wellington
P O Box 600, Wellington, New Zealand
Tel: (+64-4)-4715335
Fax: (+64-4)-4955241
Email: chemistry@vuw.ac.nz
Web Site: http://www.vuw.ac.nz/chemistry/conf/index.htm

8-12 February 1999
10th International Congress on Marine Corrosion and Fouling Incorporating The 2nd US-Pacific Rim Workshop on Emerging Non-Metallic Materials for the Marine Environment
Venue: University of Melbourne, Melbourne, Australia
The International Congress on Marine Corrosion and Fouling brings together scientists from academia, industry, defence and other government organisations to present and discuss recent scientific developments in understanding and combating the degradation of materials, structures and the performance of vessels in the marine environment. The Tenth Congress will be the first congress held outside the northern hemisphere and the first in the Asia-Pacific region. The inaugural US-Pacific Rim Workshop on Emerging Non-Metallic Materials in the Marine Environment held in Hawaii in 1997 addressed the needs of government, industrial and academia scientists, and engineers interested in reducing the costs of building and operating ships against a background of increasing efforts to reduce or eliminate materials potentially toxic to shipbuilders, ship crews and the environment. The second workshop will permit an assessment of progress and a review of developments.
Contact: Dr Patricia Shaw
DOTSE, New Zealand Defence Force
Private Bag 32901

Auckland Naval Base
Auckland, New Zealand
Tel: (+64-9)-4455844
Fax: (+64-9)-4455890
Email: trishs@dotse.mil.nz

3-7 July 1999

IV Liquid Matter Conference

Venue: University of Granada, Spain

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

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

Web Site: http://www.ugr.es/~liquid99

4-9 July 1999

Australian International Symposium on Analytical Sciences

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

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

Contact: Associate Professor Philip Marriott
Chair Organising Committee
Tel: (+61-3)-99251786
Fax: (+61-3)-96391321
Email: AISAS@rmit.edu.au
Website:
http://www.chem.monash.edu.au/raci/index.html

5-9 July 1999

VIII SCAR International Symposium on Antarctic Earth Sciences

Venue: Wellington, New Zealand

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

PUBLIC MEETINGS

ORGANOCHLORINE CONTAMINANTS IN THE ENVIRONMENT

Dioxins and PCBs are persistent organochlorine contaminants that are now internationally regarded as a risk to human health and to the environment. International expert Professor John Giesy, Michigan State University, will speak about the ecological impact of organochlorines in our air, soil, rivers, estuaries, and in food. A summary of the research results will be provided. National environmental standards under the Resource Management Act 1991 are currently being developed to protect human health* and the environment.

Heres your chance to have a say on the PCBs.

Whangarei	Wednesday 30 September 1998, 5.30 - 7.30 pm Quality Hotel Whangarei, 9 Riverside Drive,
Auckland	Thursday 1 October 1998, 7.00 - 9.30 pm University of Auckland, Library Basement, Room MLT2, Cnr Alfred & Princes Sts (entrance off Alfred Street)
Hamilton	Friday 2 October 1998, 7.00 - 9.30 pm Hamilton Gardens, Chartwell Square Room, Cobham Drive, Hamilton East
Whakatane	Monday 5 October 1998, 5.30 - 8.00 pm Environment Bay of Plenty Council Chambers, Quay Street
Palmerston North	Wednesday 7 October 1998, 5.30 - 7.30 pm Manawatu-Wanganui Regional Council Board Room, Regional House, Victoria Ave
Wellington	Thursday 8 October 1998, 7.30 - 9.00 pm BP Theatrette, Ground Floor, 20 Customhouse Quay, (entrance off Johnstone Street)
Nelson-Tasman	Friday 9 October 1998, 5.30 - 8.00 pm Tasman District Council, 189 Queen Street, Richmond
Invercargill	Monday 12 October 1998, 5.30 - 8.00 pm Southland Regional Council Chambers, Cnr Price Street and North Road
Dunedin	Tuesday 13 October 1998, 5.30 - 8.00 pm Otago Regional Council Chambers, 70 Stafford Street
Christchurch	Wednesday 14 October 1998, 7.00 - 9.00 pm 3rd Floor, Rooms 2 and 3, Christchurch Regional Resource Centre, Open Polytechnic, 50-56 Kilmore Street

For further information contact:
Martin Harris
Ministry For The Environment
Phone: (04) 9177495, Fax: (04) 9177523
Email: martin.harris@mfe.govt.nz

* A second round of meetings will be held in February 1999 on Human Health Aspects.

CONFERENCES & SEMINARS

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
Fax: (+61-3)-99054940
Email: WDCOOK@eng2.eng.monash.edu.au

17-25 March 2000
Water 2000 Conference and Expo - "Guarding the Global Resource"
Venue: Auckland, New Zealand
Contact: New Zealand Water and Wastes Association
P O Box 15-974, New Lynn
Auckland, New Zealand
Tel: (+64-9)-8275757
Fax: (+64-9)-8272003

14-18 August 2000
12th International Conference on Thermal Analysis and Calorimetry
Venue: Copenhagen, Denmark
Contact: Dr O Toft Sorensen
Risoe National Laboratory
Fax: (+45)-46351173

14-19 December 2000
Pacifichem 2000
Venue: Waikiki, Honolulu, Hawaii
Contact: Professor B Halton
Department of Chemistry
Victoria University of Wellington
P O Box 600
Wellington, New Zealand
Fax: (+64-4)-4955241
Email: brian.halton@vuw.ac.nz

26 August - 1 September 2001
XXXIV International Congress of Physiological Sciences "From Molecule to Malody"
Venue: Christchurch, New Zealand
Contact: The Conference Company
P O Box 90-040, Auckland, New Zealand
Tel: (+64-9)-3601240
Fax: (+64-9)-3601242
Email: info@tcc.co.nz

ORGANOMETALLIC CHEMISTRY IN THE SOUTH PACIFIC – A CELEBRATION

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

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

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

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

http://www.che.auckland.ac.nz/conf.htm

Department of Chemistry
The University of Auckland
Private Bag 92019, Auckland, New Zealand
Telephone: 64-9-3737599, Fax: 64-9-3737422
Email: p.brothers@auckland.ac.nz,
Email: LJ.Wright@auckland.ac.nz

CHEMISTRY IN NEW ZEALAND NOW AVAILABLE ONLINE

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

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We spent over two years developing this unique internet site. The scientists, laboratory and purchasing managers, and research staff who have used the site since it was opened say its truly amazing. Here's some practical scenarios in a laboratory:

- ***The research assistant requires a solid phase extraction method for sample preparation.***
- ***The molecular biologist wants to get applications support to determine the optimum conditions for her/his PCR.***
- ***The laboratory manager wants to investigate the latest models available from the various suppliers for a new instrument he/she is considering buying.***
- ***The laboratory purchasing manager wants to check out the monthly specials from his/her preferred chemical and glassware supplier.***
- ***The research director wants to find out who the local distributor of a brand of instrument that he/she saw at a recent conference is.***
- ***The chromatographer wants to get a sample chromatogram for a new column he/she is thinking of using.***

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Patent Proze

by Jane Calvert and Greg Lynch

LICENSING

Technology transfer is an important part of the business of scientific research. The results of research and development efforts are not given real meaning until society enjoys some benefit from them. One way is by exploiting a commercial application of the results. Another way is to make the results available to the wider scientific community stimulating further scientific endeavour ultimately resulting in a societal improvement.

Many researchers are often not in a position to take a development as far as the market place. In that common situation their technology needs to be transferred by one or more mechanisms to an entity which does have the requisite capability. Although a number of mechanisms are available, the most common is a license agreement. Others include distribution agreements, joint venture arrangements or simply sale of the know how and intellectual property rights.

In this Patent Proze we wish to focus on licences and point out briefly what aspects of technology transfer such an agreement typically covers.

A licence is the granting of permission to make, use and/or sell a certain product, design, or process. Usually, the licensee is granted the right by the licensor to use certain intellectual property rights and/or technical expertise, including patents, trademarks, copyright, trade secrets, know how and technical assistance.

In return, the licensor will receive revenue normally in the form of an initial lump sum payment and/or royalty payments. Royalty payments are usually calculated as a percentage of the production or sales price of the relevant product and are paid at predetermined regular intervals.

An important feature of a license agreement is quality control. It is in the licensor's interest that product standards are kept to certain levels, particularly when the reputation of the licensor is at stake.

A provision obligating the licensee to keep adequate records and accounts is generally necessary in order that royalty rates can be calculated. The licensee may be required to report to the licensor at regular intervals and additionally provide the licensor with the right to inspect the licensee's books and records or to appoint an independent auditor.

Often there is a clause in a license agreement specifying that the licensee is notified of any modifications or improvements which are made by the licensor. This sensibly ensures that the best product is marketed thereby maximising returns for both licensee and licensor.

It is essential that it is clear between the parties as to which is responsible for enforcing any intellectual property rights. For example, in the event a competitor is found to be infringing any patent rights which are subject to the agreement, the licensor will usually have a discretion as to instituting patent infringement proceedings and the licensee will have a right to institute proceedings if the licensor chooses not to.

It will be in the interests of both parties that a license agreement has a confidentiality clause extending beyond termination of the agreement. The agreement should define clearly whether the arrangement is exclusive or not. There should also be an obligation on the licensee to actively exploit the rights.

A license agreement should make it clear under what circumstances either party can terminate the agreement. For example, financial difficulties of the licensee, non-payment of royalties, or other breaches of the terms of the license which are not rectified within a specified period. The provision will also cover what action is needed in the event of early termination, such as the destruction or return of licensed products.

While there are a number of a standard provisions which will appear in most license agreements, such agreements should be tailored for each situation. Any number of provisions in addition to those mentioned above may be incorporated into a license agreement. Their number and nature is limited only to what the parties agree.

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

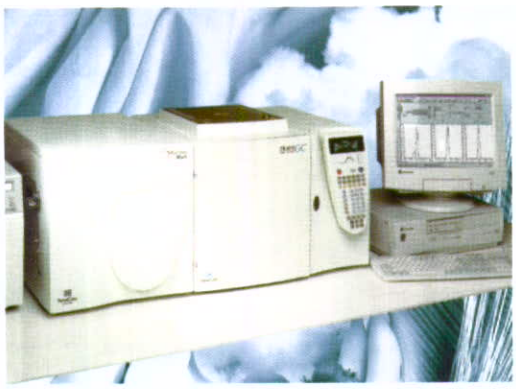
Jane Calvert

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

Greg Lynch

NEW PRODUCTS

FINNIGAN'S AUTOMASS MULTI - THE FIRST REAL GC/MS-LC/MS CONVERTIBLE SYSTEM



Finnigan's new Automass Multi is a single-stage quadrupole mass spectrometer that is easily converted from GC/MS mode to LC/MS mode in under 10 minutes.

Automass Multi comes standard with the TRACE 2000 GC, EI and CI± GC/MS sources as well as the new *aQa* self-cleaning API interface for LC/MS.

With 4-1500 amu mass range, this very versatile instrument is designed to give optimal performance in all operational modes.

EI, CI-, CI+, are all standard with the Automass Multi with options for Direct Insertion Probes and Direct Exposure Probes, for a complete range of GC/MS applications.

aQa with self-cleaning, prevents contamination of the interface due to non-volatile buffers even with high salt concentrations and ion pairing agents. *aQa* has ESI and APCI in both positive and negative ion modes.

Now with the Automass Multi an extremely versatile MS is added to Finnigan's already extensive range of benchtop mass spectrometers.

Contact: Stuart Tyler, Alphatech Systems
Phone: (09) 3770392, Fax: (09) 3098514,
Email: sales@alphatech.co.nz
circle number 21 on the reader reply card

NALGENE®
Ban glass from your lab ... for safety's sake

Before 1950 there really was no alternative to glass, ceramic or metal containers in the laboratory. All that changed drastically with the development of ever more "glass-like" plastics, which possess a number of important characteristics:

- plastic is lighter than glass
- it does not crack, break or shatter when dropped
- it can be formulated to suit a particular application
- it is biologically-inert and suitable for most biotechnology/ tissue culture uses
- it is often less costly than glass
- it is environmentally-friendly - it takes one-third less energy to produce and to recycle
- and it is just as easily cleaned and sterilised.

It's not glass. It's not just any plastic. It's safe and durable. It's Nalgene ... Naturally!

Contact: Kate Olsen,
Medic Watson Victor, Medic Corporation Ltd
Freephone: 0800 508070
circle number 22 on the reader reply card

BIOLAB BEGINS IN SCIENCE

BIOLAB

Biolab Scientific signalled the start of a new era in science distribution in New Zealand recently with the opening of a new distribution facility in Albany.

The new facility which comprises 2200 m^2 of warehouse space and 1600 m^2 of office space includes meeting room and training room facilities, with ample off-street car parking.

At a function to mark the opening on Friday 11 September, Mr Bruce McKinnon, Biolab's Chief Executive said "Our brief to the architects was to create a building which was no more expensive to operate from than our previous facility but far more functional. Three elements of the brief were critical: 1. the warehouse had to be on one level with a dangerous goods facility which exceeded the current legislative requirements, 2. our operational people needed to be located on one floor to break down the traditional departmental barriers and 3. the design had to inspire the staff to excel in their servicing of the customers' requirements". Ashton Mitchell Architects were chosen to complete the task and Neil Developments managed the design and build. "Together we have achieved all the objectives we set out to achieve", according to Mr McKinnon.

Biolab took the opportunity at the opening of it's new facility to launch it's electronic commerce capability, LabDirect, to key customers. Based on the installation of a new IT system which services both Australia and New Zealand, the company is utilising the capabilities of Masterpack V7 software coupled with Internet enabling software written by Glazier Systems to provide electronic commerce capability via the Internet. "We have put 'functionality ahead of form' in the design of LabDirect. We wanted a very practical product," says Marketing and Operations Manager, Catherine Calarco, "and were determined to be the leader in this part of the world in offering e-commerce to our customers. There are several retail Internet ordering systems already operating in Australasia," she said "but there are very few business to business systems and even fewer which close the loop to include electronic payment. When you have this full capability, you can really offer your customers significant savings in their back office functions".

Above: *Biolab Scientific's new facility in Albany on the North Shore of Auckland*

A NEW ERA DISTRIBUTION

"We are entering a 'global era' in the distribution of scientific products" said Mr McKinnon. Traditionally local distributors added value to the customers because they controlled the information and international contacts required to access, import and distribute scientific products. "The Internet has changed all that. The information is available to everyone. Our customers now have access to all the information we have access to". The new system gives customers 24 hours a day, seven days a week Internet-based access to buy any of some 50,000 lines of laboratory consumables, glassware, chemicals, and benchtop equipment. A further 40,000 products from the Sigma Biochemicals catalogue will shortly be added to the database.

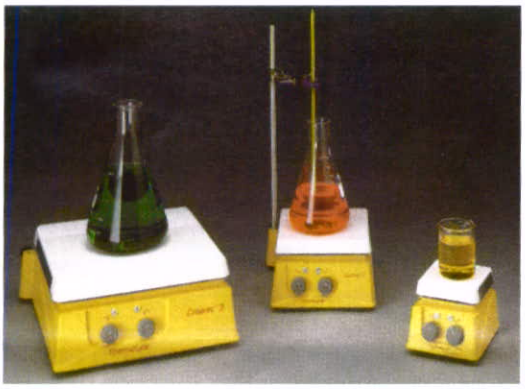
The system will be made available to both New Zealand and Australian customers running on a Windows NT-based server at the new Albany facility.

Mr McKinnon said the combined markets gave the company the critical mass necessary to embark on its e-commerce investment. The system enables payments by either Biolab's billing system (paper and electronic invoices) or by credit card using the Glazier-developed Epas (electronic payment authorisation server) which clears transactions on-line via bank clearing house ETSL.

BIOLAB

The new building at Albany was officially opened by the Hon. Maurice Williamson who stated: "Biolab and its staff have taken on the goals of 'The Foresight Project' and implemented them in today's competitive global market. By applying new technologies and systems they are using knowledge to create innovation that will enable them to better respond to customer needs in the ever evolving global market. Biolab is poised to leverage their knowledge base and successfully compete in the new era of knowledge based business".

THERMOLYNE HOT PLATES, STIRRERS AND STIRRING HOT PLATES



Thermolyne has a wide range of units to choose from, depending on the customer's requirements.

The Cimarec range (pictured above), offer units that have a fast heat up with a solid ceramic top for easy cleaning and chemical resistance. Heating range is 150 °C to 538 °C, with stirring speed from gentle to vigorous (100-1000 rpm), and units available in three different top plate sizes.

Options of aluminum or cast iron top plates are also available, depending on the criteria such as accuracy/stability, volume, viscosity, range and uniformity requirements.

The MIRAK range offers very accurate heating and stirring control with digital read-out via electronic feedback controls. The closed loop PID also allows very accurate temperature reading of solutions via a temperature probe into the vessel.

Thermolyne also offer an "Explosion-Proof" range for use in hazardous environments. For applications of heating and stirring flammable substances, these quality, highly engineered units reduce the risk of damage and personal injury.

Contact: Ian Goode, Product Manager
Medic Watson Victor, Medic Corporation Ltd
Free Phone: 0800 508070
circle number 23 on the reader reply card

MILESTONE'S NEW ETHOS MICROWAVE LABSTATION

Milestone has launched the new ETHOS, the Advanced Microwave Labstation that enables up to eight different applications to be run on the one instrument.

The ETHOS's flexibility enables open and closed digestion, vacuum drying, evaporation/concentrations, hydrolysis, extractions, batch-type organic reactions and continuous flow organic reactions.

ETHOS is ideally suited to the dairy industry laboratory for sample preparation. Safety, performance and durability are what sets the Milestone apart in the manufacture of microwave work horses for the laboratory.

Many laboratories wanting to speed up sample preparation try using a kitchen microwave to do rapid digestions and/or evaporate water for their milk powder analyses. Although this is the cheapest way of obtaining a microwave to speed up sample preparation (simply because a kitchen microwave costs less than a laboratory microwave) there a very good reasons why a laboratory microwave costs more than a kitchen microwave.

Milestone build into their ETHOS Microwave System safety through mechanical design. Already some EPA methods (e.g. EPA method 3052) state "Laboratories should not use domestic (kitchen) type microwave ovens for this method. There are

several significant safety issues". The ETHOS is not a kitchen type nor a commercially modified kitchen type microwave.

Milestone are the only Microwave manufacturing company that designs many of the microwave's components including the magnetron specifically to be used for sample preparation applications in the laboratory. The entire oven is manufactured out of 18/8 stainless steel, 1.5 mm gauge including the door!

The door is a critical component of the microwave hardware. Mechanical strength and perfect sealing of the cavity to prevent microwave leakage now and after many years of use are the only acceptable standard for Milestone. The ETHOS's door design has four heavy duty spring-loaded, high strength steel bars enabling instant release of over pressure generated inside the oven cavity utilising the "movable wall" concept that is used in today's autoclaves.

Each oven is tested to 8 bar of instantaneously generated pressure in the 43 litre cavity. This equates to a 9000 kg load on the door, (compare this to a kitchen-type microwave with a sudden release of 30 bar that will generate a 90 kg load on the door) and this will tear the door off a kitchen-type microwave's hinges and rocket the door through the laboratory. The ETHOS has ten micro switches to ensure the highest safety conditions during operation.

Further safety options are available like the NOx monitor to automatically detect, alarm and if desired shut down the microwave if these toxic gases are produced during a digestion procedure.

Safety is great only when performance is not compromised so Milestone have been very particular about the magnetron, microwave oven hardware, and rotor design. ETHOS has two industrial 800 W magnetrons to ensure generation of up to a maximum of 1600 W microwave power. Coupled with this is a patented microwave feed/distribution system to ensure even spread of power throughout the chamber. The magnetrons are guaranteed for two years. The chamber has 13 microwave leakage protected, inlet/outlet connectors to enable complete flexibility of applications now and for the future.

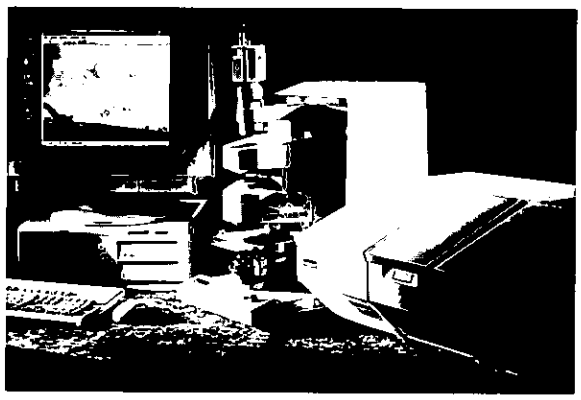
ETHOS' microwave platform is designed to emit microwaves into the oven via the back wall instead of the top. This allows the use of organic reactors, both batch and continuous flow reactors, and use with rotors with advanced magnetic stirring devices. Now the ETHOS can be upgraded with suitable rotors, modules or accessories to carry out all the above applications.

With the use of strong acids such as HNO_3, H_2SO_4, HCl, H_3PO_4, HF all the components need to be protected from these acids or housed where these vapours can never reach. It is for this reason that all stainless steel used is coated with Teflon. Further the cavity stainless steel walls including the door are plasma-coated with five layers of Teflon applied at 350 °C on both inside and outside surfaces. This is also used on the stainless steel that makes up the chassis that acts as a Faraday cage to prevent the microwave interfering with any other instrument in the laboratory. You only have to see a Milestone microwave next to a kitchen-type microwave to see how the construction differs. It is also very easy to see which will last in a laboratory environment with constant use with strong acids at high temperature and pressure.

Milestone designed rotors so that digestion can be carried out in complete safety even if too much sample is accidentally weighed into the vessel. Milestone's MDR rotor vessel technology is so advanced the venting of over-pressurised vessels is done in a completely controlled way. No damage to the microwave oven or disruption to the other samples is possible. The sample can even be used for analysis after venting has occurred, if you desire. Compared to rupture disc membrane vessels (commonly called bombs for very obvious reasons), where after a vessel vents most operators are extremely reluctant to go near the microwave oven if the door is still attached.

Contact: Alphatech Systems
P O Box 37-583, Parnell, Auckland
Phone: (09) 3770392, Fax: (09) 3098514
Email: sales@alphatech.co.nz, and arrange for an evaluation or ask to talk to Milestones users in the dairy industry.
circle number 24 on the reader reply card

NEW ENTRY-LEVEL MULTISCOPE FT-IR MICROSCOPE OFFERS USERS THREE SAMPLING MODES



The new MultiScope Fourier Transform-Infrared (FT-IR) Microscope from Perkin-Elmer is an entry-level, problem-solving tool for laboratories that need a rapid, simple method for screening, inspecting and identifying a wide range of micro-samples. A high performance, low cost FT-IR microscope designed for composition verification and contamination identification, the MultiScope system is the only one in its class to offer users three sampling modes: Transmission mode for powders, films, laminates, fibres and crystals; reflectance mode for surfaces, coatings and thin films on metals; and Micro-ATR mode for black rubbers; filled polymers and paper.

A variable aperture on the MultiScope system allows the ability to mask down onto a sample to the diffraction limits of 10 x 10 µm. Permanently aligned optics enable high-performance/no-alignment operations, making sample identification possible in seconds.

The MultiScope FT-IR microscope has fewer and simpler controls based on those of a standard laboratory optical microscope. Simple setup makes it easy for entry-level users. In addition, a high quality viewing system, which includes a video camera and multimedia software provides on-screen viewing and saving of visible images.

The new MultiScope system is designed for easy upgrades, with options that include an automated stage, advanced multimedia software, purge capability, infrared and visible polarisers for orientation analysis of crystals and polymers, and a microsampling accessory kit.

For more information about the new MultiScope FT-IR Microscope system,

Contact: Peter Hall, Perkin-Elmer Pty Ltd
Free Phone: 0800 776767, Free Fax: 0800 776000
Email: perkin-elmer@clear.net.nz
Website: http://www.perkin-elmer.com
circle number 25 on the reader reply card

CINTRA 5 . . . THE NEW 'ALL-IN-ONE' UV-VISIBLE SPECTROMETER FROM GBC

GBC Scientific Equipment has released an exciting high performance, low cost UV-visible spectrometer - the Cintra 5.

This compact instrument is a high speed scanning, double beam, fully automatic spectrometer which covers the full wavelength range from 190 nm to 1100 nm.

The Cintra 5 is designed around an 'all-in-one' package including a large back-lit LCD screen for easy viewing, membrane keyboard, mouse and Pentium® microprocessor with Windows® 95 operating software.

The Cintra 5 is exceptionally capable for an entry level instrument - operations such as fixed wavelength measurements, standard curve fitting, wavelength scanning, time studies and instrument performance verification can be quickly and easily performed. Spectrum processing, exporting of data and report generation are other features included in the software.

The GBC Scientific Cintra 5 is a neat and complete package - with a surprisingly low price tag!

Cintra 5 features:

- Large back-lit LCD display, membrane keypad, Windows 95-based operating software and mouse to ensure a clear and user-friendly operation interface.
- Data and graphics can be stored on the in-built hard disk drive or on the 1.44 MB 3.5" floppy disk drive.
- Double beam optical system with dual detectors, <2 nm bandwidth and high resolution holographic grating provide superior optical performance.
- Selectable wavelength scan speed from 60 to 3,600 nm/min allow complete analysis to be done quickly and accurately.
- Wavelength range from 190 to 1,100 nm
- Modern and appealing design
- Flexible Windows 95 operating software which allows
  - Fixed wavelength measurements
  - Wavelength scanning
  - Standard curve fitting
  - Time studies
  - Instrument performance and verification
  - Spectrum processing such as addition, subtraction, and 1st and 2nd derivatives
  - Exporting of data to 3rd party software
  - Report generation and printing of results to any Windows 95 compatible printer
  - Storage of methods, graphics, sample files, results and calibration data.

Contact: GBC-AEC
P O Box 68-330, Newton, Auckland
Phone: (09) 3600928, Fax: (09) 3600683
Email: gbcaec@xtra.co.nz
circle number 26 on the reader reply card

RAPID RELIABLE KINETICS ASSAYS WITH CARY UV-VISIBLE SPECTROPHOTOMETER

Application notes published by Varian demonstrate that ultraviolet spectrophotometry enables laboratories to perform kinetics assays with increased accuracy and efficiency. In a study of sorbitol dehydrogenase (SDH) concentration, accurate enzyme rate results were obtained for six samples simultaneously in only three minutes.

Varian conducted the study using the Cary 300 Bio UV-Visible spectrophotometer with the Thermostattable 6x6 Multicell Holder accessory and the Cary Routine Kinetics software application.

Enzymatic assays for SDH concentration are used in some medical laboratories to detect liver damage. The ability to run kinetics assays quickly on several samples simultaneously results in significant savings of time and labour for laboratories that routinely perform these tests.

Contact: Mark Albertson
A.i. Scientific (NZ) Ltd
P O Box 35579, Browns Bay, Auckland
Phone: (09) 4781351, Fax: (09) 4781360
Email: aiscinz@ihug.co.nz
circle number 27 on the reader reply card

ANTON PAAR'S NEW PORTABLE DENSITY, SPECIFIC GRAVITY, AND CONCENTRATION METER, THE DMA 35N

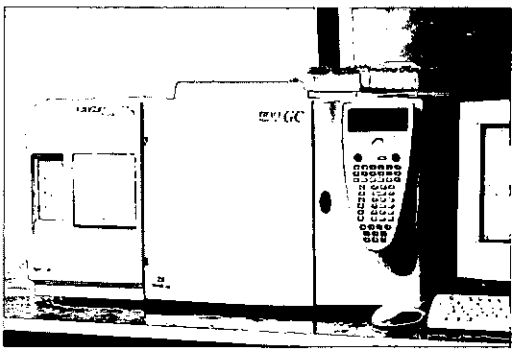
Anton Paar has introduced a powerful, yet very lightweight portable density meter. Weighing only 270 grams (10 ounces), the new DMA 35N is sturdy enough to operate in the harshest industrial environments and a wide range of applications.

The new DMA 35N is based on the same oscillating tube technology used in Paar's successful DMA 35, but that is where the similarity ends. Every component has been redesigned for optimal ease of use and reliability, and the combination of the new software and user interface make it the most user-friendly hand-held density meter available. Once the sample is loaded the new LC display shows all the necessary sample parameters like temperature (°C or °F), density, specific gravity or percent concentration. Several density to concentration functions are built into the software, and customers can even add their own proprietary function.

Up to 1024 data points can be stored in the instrument's memory and downloaded later to a printer or a personal computer. For this purpose, the DMA 35N provides an optional RS232 interface that fits to its optical data port and terminates in a standard 9-pin connector.

Contact: John Morris Scientific Ltd
P O Box 6348, Wellesley Street, Auckland
Free Phone: 0800 651700, Fax: (09) 3663060
Email: sales@jms.co.nz
circle number 28 on the reader reply card

INTRODUCING THE NEW TRACE GC FROM C E INSTRUMENTS

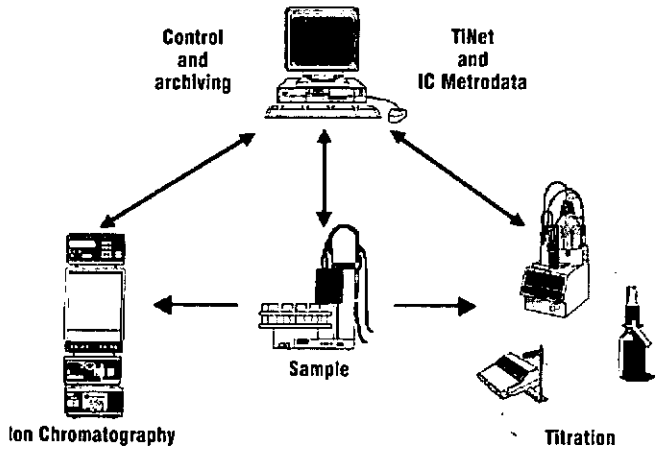


TITR-IC - THE UNIQUE METHOD COMBINING TITRATION AND ION CHROMATOGRAPHY IS CREATING NEW OPPORTUNITIES IN SIMULTANEOUS ION ANALYSIS

What is Titr-IC?
Titr-IC is a combination of titration and ion chromatography. Metrohm has always been at the forefront of development in the whole field of electrochemical ion analysis. Titr-IC is a logical consequence of this development. A 730 Sample Changer can be used for the automatic transport and preparation of the samples. Last but not least, a PC equipped with the TiNet and IC Metrodata programmes controls the set-up and archives results, instrument settings and additional data such as time, date and instrument identifications.

What are the benefits of Titr-IC?
Quite simply: comprehensive ion analysis by combining different electroanalytical methods in a single automated system. Applications such as water analysis or wine analysis require the determination of many parameters using various analytical methods. The combination of titration and IC brings clear advantages which only Metrohm can offer:

- Sample preparation can be performed in a rational way.
- All methods are from one source, which means simpler installation and service.
- You save time.
- The total investment cost is reduced.
- At the end of the determinations there is one comprehensive report which contains all the parameters analysed.



Titr-IC is ideal for analysing large sample series and for the determination of whole ranges of ions or ion balances.

Contact: John Morris Scientific Ltd
P O Box 6348, Wellesley Street, Auckland
Free Phone: 0800 651700,
Fax: (09) 3663060,
Email: sales@jms.co.nz
circle number 29 on the reader reply card

Launched at the recent Pittcon is the all new TRACE GC 2000.

TRACE is an elegant, well designed, modular instrument engineered to be easily handled, while providing extensive automation and productivity, all at a low cost.

Some of TRACE's unique system capabilities:

- Heats from 50 °C to 450 °C in 6.5 minutes. And cools down from 450 °C to 50 °C in 4 minutes, with an oven temperature stability of 0.05 °C of actual temperature
- Four-line display for all necessary data to be clearly shown
- Automatic leak checking
- Automatic column characterisation
- Digital pressure and flow control for two independent carrier gas lines. This coupled to automatic column characterisation eliminates any improper set up of columns.
- Switching to the second channel takes less than 1 minute to start up
- Electronic control of detector gases that is capable of accepting any detector without having to change electronics
- Splitless injector capable of operating with all column types from capillary to packed. Also designed without compromise in performance
- Cold on-column injector enables liquid samples introduced to capillary columns at the temperature of the GC oven and controlled by the GC oven. The main body of the injector is permanently cooled, while the point of injection is only cooled during injection without the use of cryogenics. The injector is also septum-less and allows quantitative, automated volumes up to 250 µl with solvent venting during LVI
- PTV injector capable of heating rates up to 15 °C/sec and cooling of 7 °C/sec without cryogenics even at 300 °C initial oven temperature
- Detectors are all fully interchangeable in less than 2 minutes without pneumatic and electronic changes. Stackable detectors, and able to operate 3 detectors simultaneously.

Alphatech are offering a free PC with the first five TRACE GCs purchased.

Contact: Stuart Tyler, Alphatech Systems
Phone: (09) 3770392, Fax: (09) 3098514,
Email: sales@alphatech.co.nz
circle number 30 on the reader reply card

ENVIRONMENTAL CONCERN OVER MTBE SPAWNS NEW GC PRODUCT FOR CHEMICAL ANALYSIS

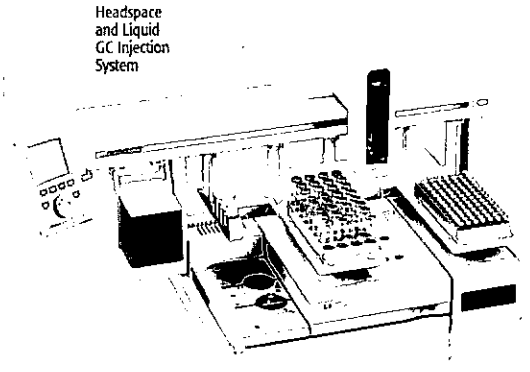
J&W Scientific, the world's largest manufacturer of high resolution capillary GC columns, offers a new column for the positive identification of Methyl-*tert*-butyl Ether (MTBE) in environmental samples. This important product for gas chromatographers is featured in a new Application Note published by J&W Scientific.

Amendments to the 1990 Clean Air Act (USA) have led environmentalists to examine the existence of the contaminant MTBE in drinking water and underground water systems. This chemical component is a result of oxygenated fuel additives introduced in an effort to combat air pollution. Leaking underground storage tanks and the use of recreational vehicles on lakes and reservoirs have increased the existence and corresponding environmental hazards of MTBE.

J&W's GC column DB-MTBE is designed specifically for chemists to successfully resolve MTBE from the common pollutants 2- and 3-methylpentane. The column is effective for EPA Method 8020 utilising a photoionisation detector (PID) and a flame ionisation detector (FID). The GC column is available in a 30 metre length, with two inner diameters of 0.45 mm and 0.53 mm.

Contact: J&W Scientific
91 Blue Ravine Road, Folsom, CA95630,
Phone: (+1-916) 9857888 or contact your local J&W distributor.
Web Site at http://www.jandw.com
circle number 31 on the reader reply card

COMBINED LIQUID/HEADSPACE GC AUTOSAMPLER



The CombiPAL is a Liquid and Head Space Injection system from CTC Analytics of Switzerland which can be made to interface with any major GC/GC-MS system. It's unique design mounts on to the top of the GC saves bench space and reduces costs. The syringe-only concept of CombiPAL combines the exact manual sample injection procedure of an experienced chromatographer with the precision and throughput of an automated sampling system. In Headspace mode, the robotic vial processing operation allows the user to analyse samples in a straightforward and simple way. Complicated operations such as vial pressurisation, valve switching, loop filling or transfer lines are avoided. For maximum throughput, the intelligently controlled vial transfer into the incubator oven ensures that a sample is always ready to be injected when the previous run is completed. In Liquid Injection Mode, every single injection step, such as fill/inject speed, hot needle injection, solvent plug, large volume injection or standard addition is individually controlled through the CombiPAL's advanced software package.

Contact: Mark Albertson
A.i. Scientific (NZ) Ltd
P O Box 35579, Browns Bay, Auckland
Phone: (09) 4781351, Fax: (09) 4781360
Email: aiscinz@ihug.co.nz
circle number 32 on the reader reply card

NEW PRODUCTS

LOW-COST, HIGH-PERFORMANCE GC FROM VARIAN

Varian is introducing a low-cost, high-performance, entry-level gas chromatograph. Designated the 3380 GC, the instrument series is directed to the single injector/single detector market segment as typified by academic, government, and basic chemical laboratories.

Based on Varian's highly successful 3800 GC, the 3380 is also compatible with the 8200 Autosampler and Solid Phase Microextraction (SPME), with the Star Chromatography Workstation, and supports Ethernet communications. The 3380 is produced in four injector/detector configurations: Split Splitless/FID, Packed and 0.53 mm/FID, Split Splitless/ECD, and Packed and 0.53 mm/TCD.

Contact: Mark Albertson
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Email: aiscinz@ihug.co.nz
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NEW NALGENE VENTED UNITARY SAFETY WASH BOTTLE RELIEVES PRESSURE, KEEPS CHEMICALS IN BOTTLE

A unique vented closure on the new Nalgene Vented Unitary Safety Wash Bottle keeps chemicals inside the bottle as pressure builds.

The Unitary design, where the spout is built into the side of the bottle, prevents cross-contamination when refilling. This design also provides a steady, strong dispensing stream. No tipping or shaking is needed to dispense contents.

Every bottle is clearly printed with safety information that includes: chemical colour codes, chemical name and formula, hazard codes, NFPA codes, and target organs and effects and route of entry information. Using these bottles assists with compliance to the US OSHA Hazard Communication Standard (Right-To-Know). Closures on all wash bottle sizes are colour-coded for easy chemical identification.

Vented Unitary wash bottles are available for six chemicals: acetone, ethyl alcohol, methanol, isopropanol, distilled water and sodium hypochlorite (bleach). There are three sizes: 250 mL, 500 mL and 1 L.

Nalgene Vented Unitary Safety Wash Bottles are available immediately from authorised Nalgene labware dealers.

Contact: NNI Documentation Centre,
Sevenoaks, Kent TN14 5XA, England, United Kingdom
Fax: (+44-1732)-453166
circle number 34 on the reader reply card

VARIAN INTRODUCES NEW MULTI-ELEMENT HOLLOW-CATHODE AAS LAMPS

Two new multi-element hollow cathode lamps for atomic absorption spectrometry (AAS) are being announced by Varian Associates, Inc. Available in Al/Ca/Mg and Ag/Cd/Pb/Zn configurations, spectroscopists can now measure seven commonly determined elements by purchasing just two long-life lamps.

The hollow cathodes in the two new lamps are made from custom-designed alloys specially developed for Varian. The cathodes are machined from solid billets of alloys and result in lamps that are bright, stable, sensitive, and will provide thousands of hours of reliable operation in typical usage. The multi-element lamps also exhibit less drift than currently available single-element lamps.

Varian guarantees its hollow-cathode AAS lamps for 5000 mA hours. One of the many processes Varian applies to lamp manufacture resulting in this level of performance is to heat treat the cathode under vacuum. This ensures that all adsorbed gases are removed. In addition, the zirconium lamp anode is subjected to ion bombardment that vapourises a small amount of zirconium that is deposited on the lamp envelope. This zirconium film acts as an efficient scavenger of oxygen and other molecular gas traces that might otherwise reduce lamp life.

After evacuation and filling with high purity neon or argon, the lamps are operated under controlled conditions for aging purposes. This "settling in" process occurs at the factory prior to warranty, and ensures that laboratories receive lamps ready for immediate use.

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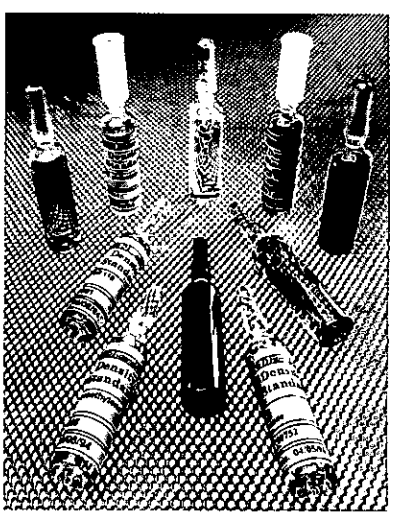
DENSITY STANDARDS WITH NAMAS APPROVAL



A liquid density standards service for users of density meters is available from Paar Scientific. All standards have been tested on a purpose-built rig which is traceable to the national standards and has NAMAS approval.

The liquids available from stock cover densities from 690 to 1620 kg/m^3 over a range of temperatures from 10 °C to 50 °C. These include 2,2,4 trimethylpentane (iso octane), cyclohexane, xylene, tetrachloroethylene, and several liquids with higher viscosities such as dimethylphthalate and some base lube oils. Most standards have an uncertainty of 0.021 kg/m^3, with calibration certificates valid for nine months.

The density of these certified reference materials is determined by hydrostatic weighing. A sphere of glass ceramic, the density of which has been determined relative to water, is weighed in a thermostatically-controlled cell holding the liquid under test.

Only liquid which has passed through the hydrostatic weighing system is sold. The standards are supplied in 10 mL ampoules stored together with the certificate in a protective sleeve.

Contact: John Morris Scientific Ltd
P O Box 6348, Wellesley Street, Auckland
Free Phone: 0800 651700, Fax: (09) 3663060
Email: sales@jms.co.nz
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ADVANTAGES OF ZIRCONIUM NITRATE, NICKEL NITRATE AS MODIFIERS FOR GRAPHITE FURNACE SPECTROMETRY OF BORON

Scientists at the Laboratorio Chimico have found several benefits to using a combination of zirconium nitrate and nickel nitrate as modifiers in the determination of boron by graphite furnace atomic absorption spectrometry using the Varian SpectrAA-250 Plus Atomic Absorption Spectrometer.

According to the application note, the advantages of this method include increased sensitivity, shorter analysis time, no memory effect, longer life of the graphite tube, and no pre-treatment of the tube.

This technique has been successfully applied to the determination of boron in river water, drinking water, and sewage samples.

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FAST, SIMPLE, AT-LINE BEER ANALYSER REDUCES QUALITY CONTROL COSTS FOR ALCOHOL CONTENT AND GRAVITY TESTING

A new at-line beer analyser from Perkin-Elmer is designed to turn brewer production floors into satellite laboratories, resulting in significant cost savings and streamlined operations. The Identicheck Beer Analyser for alcohol content and gravity characteristics is an easy-to-use, at-line beer analyser for fast, cost-effective analysis of alcohol by volume (ABV), original gravity (OG) and present gravity (PG) to increase the efficiency of the beer brewing process.

The new Identicheck Beer Analyser is designed to test beer at critical control brewing points to increase plant throughput and decrease analytical laboratory costs. The system helps manufacturers gain a competitive advantage by speeding and simplifying the quality control process in brewing.

The Identicheck Beer Analyser is fast, accurate, and temperature insensitive, with stable calibration and essentially maintenance-free operations. The system is so easy to use that there is no need for sample preparation or special training for operation and data interpretation.

Contact: Peter Hall, Perkin-Elmer Pty Ltd
Free Phone: 0800 776767, Free Fax: 0800 776000
Email: perkin-elmer@clear.net.nz
Website: http://www.perkin-elmer.com
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SRS-ULTRA SUPPRESSOR PROVIDES SUPERIOR DETECTION LIMITS

A.i. Scientific introduce the Dionex SRS-ULTRA Self-Regenerating Suppressors. The SRS-ULTRA suppressors represent a major advance in eluent suppression technology, especially for trace-level ion chromatography. The suppressors make their own regenerant - continually and automatically - from deionised water using built-in AutoSuppression technology. The suppressors provide superior out-of-the-box performance with excellent baseline stability and sensitivity, fast start-up times, and low backgrounds and noise. SRS-ULTRA suppressors eliminate the need to handle acids or bases. SRS-ULTRA suppressors for anions (ASRS-ULTRA) and cations (CSRS-ULTRA) are direct replacements for previous models - the ASRS-II and CSRS-II. The new ULTRA suppressors have been optimised for use with the EG40 Eluent Generator and DX-500 analyser.

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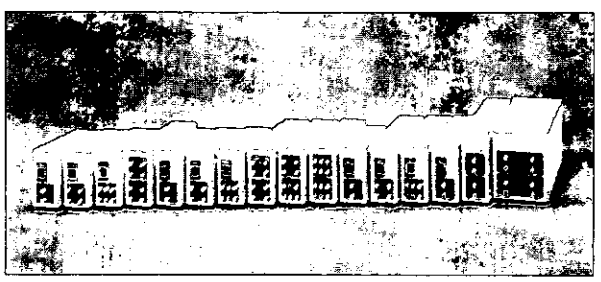
MKS INTRODUCES A WIDE RANGE GAS BOX RATE-OF-RISE *IN SITU* FLOW VERIFIER

MKS Instruments, Inc, announces an expanded-range Gas Box Rate-of-Rise (GBROR) *in situ* Flow Verifier covering flow ranges from 100 sccm to 20 slm. The new flow verifier was designed to address the needs of flat panel display CVD equipment and high-flow semiconductor manufacturing applications. The new verifier retains the superior calibration accuracy of 1% reading of the original GBROR, which operates in the 2 sccm to 2,000 sccm range.

The MKS GBROR includes a gas stick with a patented Baratron capacitance manometer and a calibrated volume and is incorporated as part of the tool gas box. Mass flow controller (MFC) calibration can be performed as part of scheduled preventive maintenance without removing the MFC from the process tool. The GBROR provides a means for quick, automatic MFC calibration for all process tools that use mass flow controllers.

Contact: MKS Applications Engineering Group
Phone: (+1-800) 2778766,
or visit the MKS Web Site at http://www.mksinst.com
The GBROR data sheet can be downloaded at
www.mksinst.com/pdf/gbror.pdf
circle number 40 on the reader reply card

ON-LINE DEGASSERS FROM SANWA TSUSHO



Sanwa Tsusho have extended their range of On-line Degassers to 16 models for applications ranging from micro HPLC to preparative analysis. Degasys on-line degassers consistently remove dissolved air from the mobile phase as each mobile phase solvent comes in contact with the inert, gas permeable fluororesin membrane within the degasser vacuum chamber.

Contact: Alphatech Systems
P O Box 37-583, Parnell, Auckland
Phone: (09) 3770392, Fax: (09) 3098514,
Email: sales@alphatech.co.nz
circle number 41 on the reader reply card

CARY SPECTROPHOTOMETERS YIELD ACCURATE, AUTOMATED MEASUREMENTS OF MICROSOMAL PREPARATIONS

The Cary 300 Bio system, manufactured by Varian, has automated the measurement of cytochrome P-450 and *b*5 concentrations for maximum accuracy and ease of operation. Varian's application note demonstrates that the excellent photometric stability and noise performance specifications of the Cary double-beam instrument have overcome the difficulty of measuring high absorbance, turbid solutions.

Rapid, reliable spectrophotometric detection and monitoring of cytochrome P-450 concentrations is important for many laboratories concerned with biochemistry, pharmacology, and toxicology.

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A.i. Scientific (NZ) Ltd
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THE NEW OASIS HLB EXTRACTION COLUMN

The new Oasis HLB Extraction Columns from Waters are designed to analyse a specific drug or metabolite in plasma or serum with an analysis time of just 1.2 minutes per sample. No off-line sample preparation is needed: just dilute the sample and inject. Despite the fact that straight plasma is injected into the system, the Oasis HLB columns are very rugged and can tolerate as many as 300 injections of plasma before any noticeable deterioration of peak shape occurs. The columns are packed with the unique water wettable copolymer Oasis HLB sorbent which can be used without prior conditioning and effectively retains both polar and non-polar compounds.

Contact: Alphatech Systems
P O Box 37-583, Parnell, Auckland
Phone: (09) 3770392, Fax: (09) 3098514,
Email: sales@alphatech.co.nz
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NEW PRODUCTS

ACETONITRILE FOR LC-NMR

Even when an efficient separation method is available with HPLC, structure eludication is usually not possible when detecting separated compounds with the commonly used UV-detector.

Thus NMR-spectroscopy which gives a high amount of information on structure and stereochemistry, represents a universal detection method. Therefore it seems reasonable to connect it directly to a HPLC-system and to use it as a detector. This technique has already been established and is called LC-NMR. As separation by HPLC is related to a high consumption of solvents, it is advisable to avoid the usage of deuterated solvents.

LC-NMR solvents are needed, as these meet the high purity requirements of HPLC and show an extremely high purity during proton-NMR.

Riedel-de Haen's Acetonitrile NMR Chromasolv, combines the excellent purity of Acetonitrile G Chromasolv Super Gradient Grade for HPLC, with an exactly defined purity in the proton NMR.

Contact: Anna Civadelic, Sigma Aldrich Pty Ltd
Free Phone: 0800 936666, Free Fax: 0800 937777
Email: sigmaa@ibm.net
circle number 44 on the reader reply card

STOKO EMULSION UNDER-GLOVE PROTECTION CREAM

Stoko Emulsion, is an under-glove protection cream from Stockhausen, distributed exclusively in New Zealand by NZ Safety Limited.

Stoko Emulsion prevents excessive perspiration, which can lead to dermatitis.

Do you wear gloves for a long period of time?

Do you experience discomfort due to excessive sweating and softening of the skin?

. . . Stoko Emulsion can help.

Stoko Emulsion is a special protection cream, which is rubbed into your hands before donning gloves (and after breaks) and helps to prevent excessive perspiration and softening of the skin and decomposition of sweat.

Stoko Emulsion contains the skin protection agent EURCORIOL, whose astringent properties lead to increased strengthening of the upper layers of the skin (horny layer) thus excessive swelling of the skin is prevented and at the same time, decomposition of sweat and associated smell is reduced.

The effect of the skin protective agent EURCORIOL is noticed subjectively by a matt feeling of the skin shortly after rubbing in the product.

Directions
The skin should be thoroughly washed and dried before starting work and also after every break. Stoko Emulsion is then carefully rubbed onto the endangered parts of the skin and also between the fingers and on the finger nails.

It really works!

Anyone who wears gloves for long periods of time can benefit from this product - laboratories, chemical industry, dental technicians, medical assistant staff, etc.

Available in 250 mL bottles and 1000 mL soft bottles (used with dispenser).

For samples and further information about this product and the other Stockhausen skin protection, skin cleaning, and skin care products,

Contact: Sarah Heine,
Product Manager Skin Care, NZ Safety Ltd
Phone: (09) 5792880
circle number 45 on the reader reply card

SUPELCO CHEMICAL STANDARDS FOR AIR MONITORING

Supelco offers a variety of chemical reference standards for the quantitative calibration of air monitoring and industrial hygiene equipment. These standards are available in both liquid solutions and gaseous blends to accommodate calibration of today's variety of air monitoring and analysis equipment and methods. Each standard includes a Certificate Of Analysis summarising the testing data.

Each standard in solution is provided in a flame-sealed amber ampoule. Each gaseous standard is provided in a transportable cylinder, for ease of use in either the laboratory or the field.

A brochure containing products for Calibration of Air Monitoring and Industrial Hygiene Equipment and Methods, is available from Sigma-Aldrich. It includes:

- Volatile Organic Sampling Train (VOST)
- Compendium of Methods for the Determination of Toxic Organic Compounds in Air (TO)
- Compendium of Methods for the Determination of Air Pollutants in Indoor Air (IP)
- Analysis of Carbonyls in Ambient Air
- American Society for Testing and Materials (ASTM) Methods
- NIOSH and OSHA Methods for Workplace Atmospheres
- Air Monitoring Standards for General Use
- Custom Standards.

Contact: Patrick Wesley, Sigma Aldrich Pty Ltd
Free Phone: 0800 936666, Free Fax: 0800 937777
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PROFESSOR SIR DEREK BARTON

Michael P Hartshorn, Chemistry Department, University of Canterbury, Private Bag 4800, Christchurch

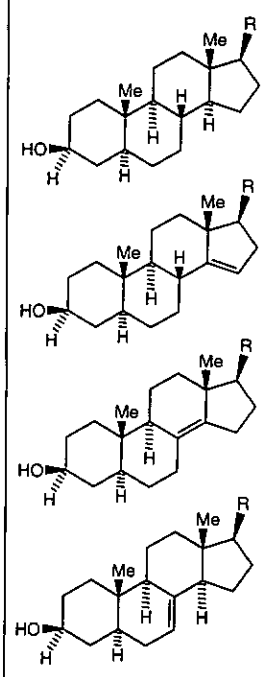
Professor Sir Derek Barton, FRS, Nobel Laureate in Chemistry (1969), was born in Gravesend, Kent on 8 September 1918, and died in his laboratory at Texas A&M, College Station, Texas on 16 March 1998. He was a remarkably productive research chemist throughout his lifetime, his 1041 publications appearing at a rate of one every 18-19 days of his career. His work ethic is aptly illustrated by his statement: "the older you are, the harder you have to work because the time left to work is diminishing". Recently the following comment appeared about his work habits in the introductory section of *Chemical Society Reviews*, 1996, 237. "His current schedule of 3.00 am to 8.00 pm, seven days a week is probably at his limit, pending transfer to another celestial laboratory where perhaps you can work for 24 hours a day forever! Imagine what the literature must be like!"

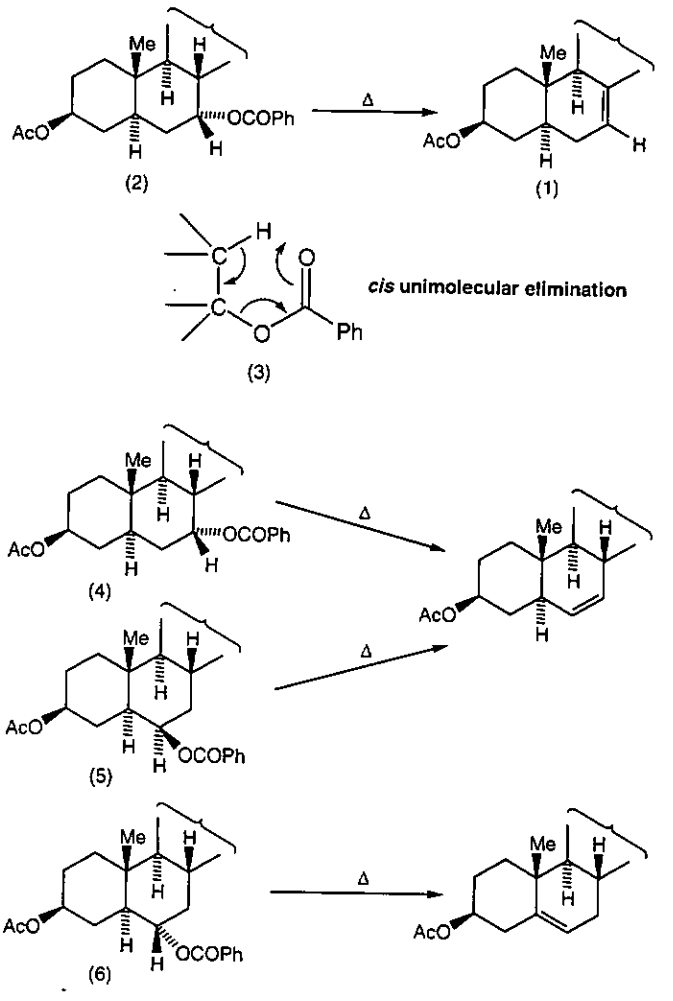
By necessity, the following commentary on his chemical contributions must be selective, but is offered as an illustration of the chemical life of a remarkable man.

Derek Barton's education at Tonbridge School was disrupted by the death of his father, and for a period of time he joined the family carpentry business. That soon palled and in his words "after doing my share of manual labour in the wood business ... I felt that there must be something more interesting in life". This led him first to Gillingham Technical College (1937-1938) to gain university entrance qualifications, and then to Imperial College, London, where he obtained his BSc with First Class Honours and PhD degrees by 1942. His PhD research was on the pyrolysis of chlorinated hydrocarbons, nominally an organic chemistry topic, but with a considerable physical chemistry flavour. During the war years at Imperial College he was excused night-time fire duty when a medical examination deemed his heart to be weak. After two years with military intelligence, working on secret inks for use on skin behind enemy lines, and subsequently a year in industry with Albright & Wilson, he returned to Imperial College initially as an Assistant Lecturer in Inorganic and Physical Chemistry(!), but subsequently with the inherent academic freedom of an ICI Research Fellowship. Now, his independent chemistry could start.

In retrospect, the period 1945-1949 at Imperial College was significant because Derek Barton became deeply involved in the steroid and triterpene literature, much of which was at the time often confused or misleading. The motivation was to correlate the molecular rotation differences of steroidal and triterpenoidal alcohols, their acetates, benzoates, and the ketones derived by their oxidation. Some of this data for unsaturated steroids are given in Table 1.[1] This led him to recognise that Plattner *et al.*[2] had assigned the wrong structure (1) to the product of pyrolysis of the 7α-benzoate (2) – it simply could not be the Δ^7-alkene (1) because the molecular rotation differences did not fit for that alkene location. The truth was that the pyrolysis reaction proceeded by a cyclic transition state (3), which demanded that the benzoate group and the neighbouring hydrogen atom being eliminated be *cis* to each other. The *cis*-unimolecular elimination reaction was recognised for compounds (4-6).[3]

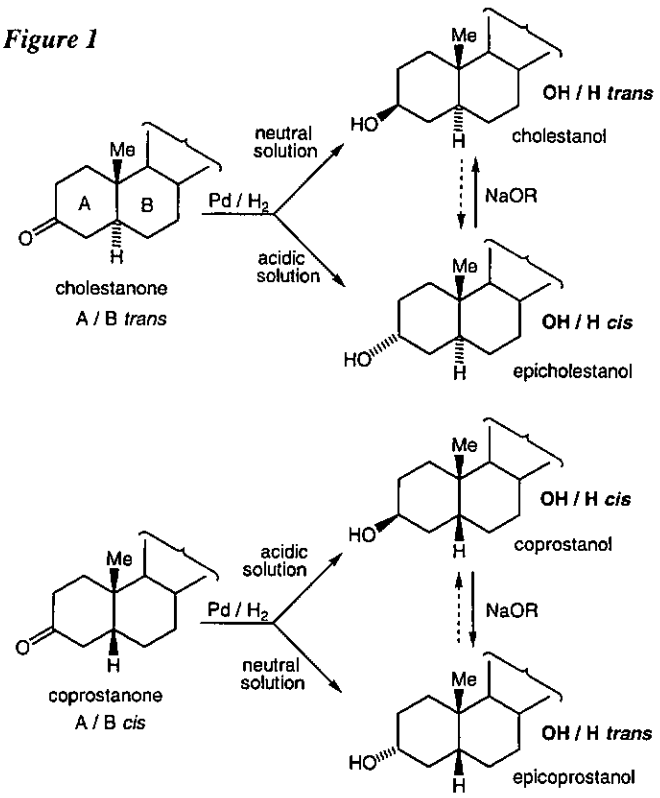
Table 1: ***Molecular Rotation Differences***





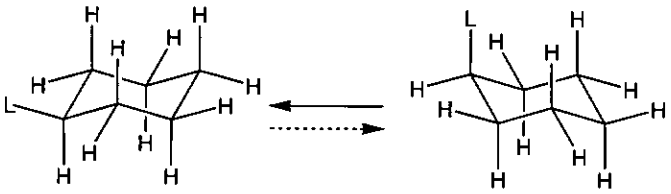
For the academic year 1949-1950 Barton was invited to Harvard University by Louis Fieser to act as a replacement lecturer for Robert B Woodward who was on sabbatical leave. That year was to be a spectacular one for Barton. In the course of his work on molecular rotation differences Barton would have had to deal with the sort of data given in Figure 1,[4] and he would

Figure 1



have been aware of the work of Odd Hassel and his collaborators in Oslo in which they had demonstrated by electron diffraction techniques that cyclohexane derivatives existed in the chair form and with any large group in the equatorial orientation, Figure 2.[5] In Harvard, Barton brought together his Imperial College

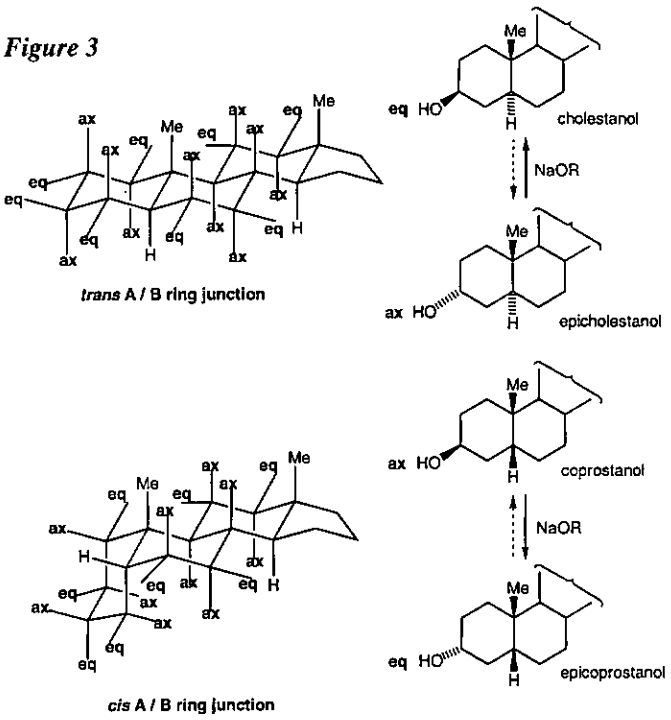
Figure 2



background in the steroid and triterpene literature into the context of Hassel's results – Conformational Analysis was born, which led to the joint award (with Odd Hassel) of the Nobel Prize in Chemistry in 1969. Now much of the steroid and triterpene literature could be rationalised.[6] For example, the base-catalysed equilibria in Figure 3 were seen in terms of an energetic preference for equatorial hydroxyl groups,[6,7] and the markedly differing dehydration reactions of the epimeric alcohols (7) and (8) reflecting the consequences of the interaction of molecular shape and reaction mechanism.[7]

Derek Barton was appointed to a Readership in Organic Chemistry at Birkbeck College, London on his return to England in 1950, and subsequently promoted to the Organic Chair at the same institution in 1953. During his time in Birkbeck College (1950-1955) he applied the principles of conformational analysis to a range of triterpenoid structural problems[8-10] and to the remarkably labile sesquiterpene, caryophyllene,[11] Figure 4. He was elected as a Fellow of the Royal Society in 1954.

Figure 3



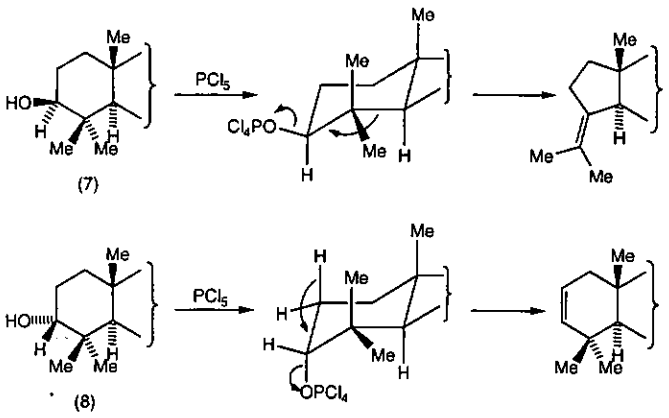
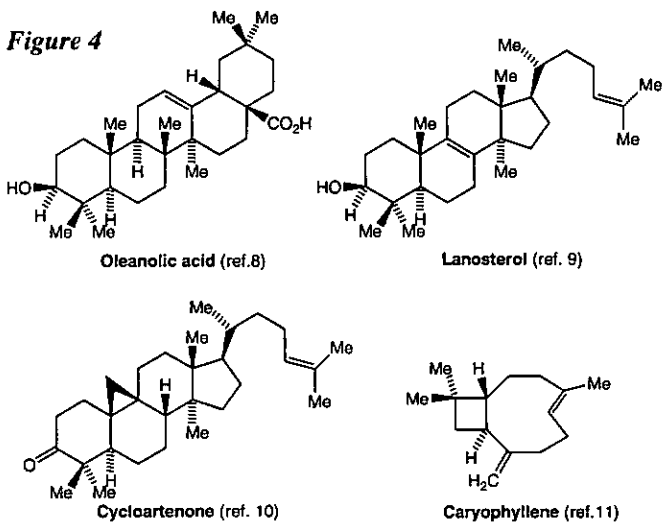


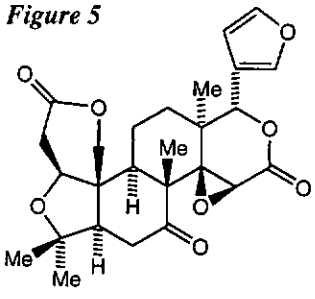
Figure 4



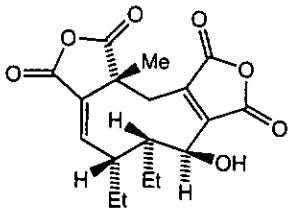
1953-1955 was a period of substantial change in the occupancy of organic chemistry chairs in the United Kingdom. Professor J W Cook went from Glasgow University to be Vice-Chancellor at Exeter University, Professor Sir Robert Robinson retired from Oxford University, to be replaced by Professor E R H Jones from Manchester University, and the Hofmann Chair became vacant when Professor R P Linstead moved internally to the

Rectorship at Imperial College. In the event, Derek Barton moved to the Regius Professorship at Glasgow University in 1955, where he stayed until 1957 when he was appointed to the Hofmann Chair of Chemistry at Imperial College. During the time in Glasgow and in the subsequent early years back at Imperial College, Derek Barton continued with structural problems in natural products, some of which are illustrated in Figure 5. With the steady improvements in computers in the early 1960s which made degradation studies of natural products less competitive with the X-ray crystallographic technique, Derek Barton moved away from such degradative studies towards a range of other topics, including the study of the phenomenon of conformational transmission, phenolic coupling reactions related to the biogenesis of some alkaloids, and to a variety of photochemical reaction studies.

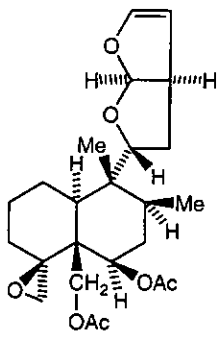
Figure 5



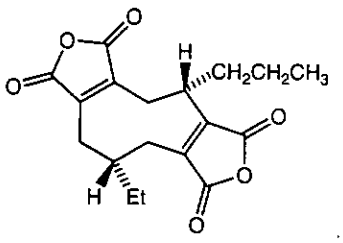
Limonin (ref. 12)



Glauconic acid (ref. 13)



Clerodin (ref. 14)

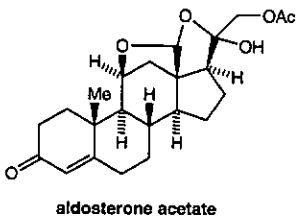


Byssochlamic acid (ref. 15)

One photochemical study was associated with the synthetic challenge of aldosterone acetate (Figure 6), a compound previously available only in milligram quantities. Derek Barton's solution lay in the photochemical stimulation of nitrite esters, which allowed the functionalisation of an angular methyl group in the sequence of reaction steps given in Figure 6.[16]

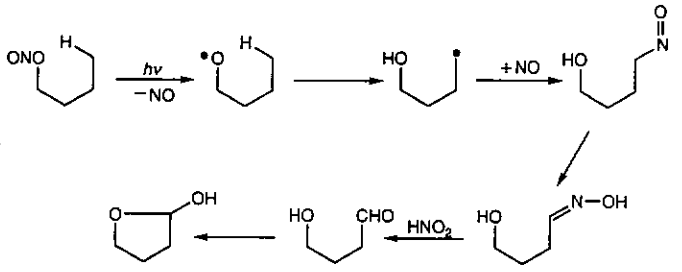
Figure 6

A Synthetic Challenge



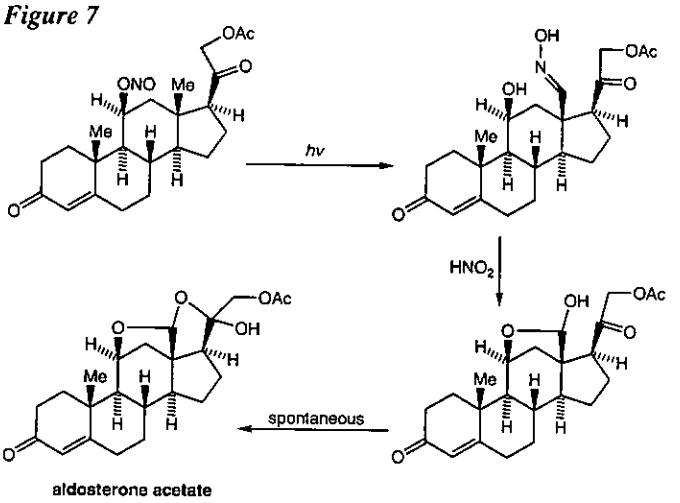
aldosterone acetate

Barton's Solution



The final reaction sequence is given in Figure 7.[17] Analogously, lanosterol was converted into cycloartenol, Figure 8.[18]

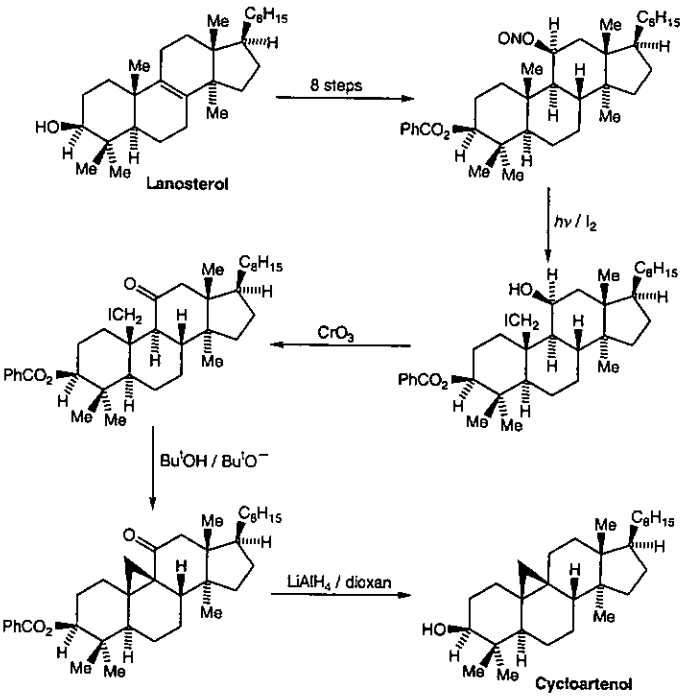
Figure 7



aldosterone acetate

Figure 8

Cycloartenol from Lanosterol



Lanosterol

Cycloartenol

Derek Barton became a Knight Bachelor, and was awarded a Royal Medal by Her Majesty The Queen in 1972. He retired early from Imperial College and took up his appointment as Directeur de L'Institut de Chemie des Substances Naturelles du CNRS at Gif-sur-Yvette in 1978, a position which he held until 1986 when he was appointed as Distinguished Professor at Texas A&M University. Later in 1995 he became Dow Professor of Chemical Invention, also at Texas A&M. During his time in Gif and subsequently in Texas until the time of his death, Sir Derek Barton explored the problem of selective substitution in saturated hydrocarbons – the so-called Gif Reactions. Typical of these reactions is the functionalisation of adamantane (Figure 9).

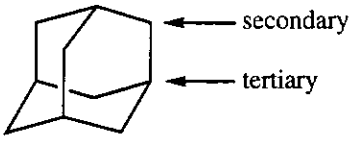
Figure 9

Gif Reactions - Unfinished business
Selective substitution in saturated hydrocarbons

Gif^{IV} - system: Fe^{II} - pyridine - AcOH - Zn^0 - O_2

substitution: secondary/tertiary 10-20 times

Adamantane



Much remains to be discovered about these reactions, which were reviewed relatively recently by Sir Derek Barton in 1998.[19]

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PACIFICHEM 2000 UPDATE

Pacifichem 2000 will be held in Honolulu, Hawaii, between December 14 and 19, 2000. It will follow a similar format to the highly successful meeting held in 1995. The organising committee met in mid-December 1997 to assess the many proposals received in the first round. About 135 proposals were accepted and these will take up about 60% of the available time. While sessions have been allocated for general papers in each area (see below) *proposals for new symposia are needed - can you assist by organising a symposium for the congress?* Two co-organisers each from a different Pacific Basin country are needed to enable the proposal to be considered and it must fall within one of the ten broad areas of chemical science listed below.

Deadlines for proposal submission have been revised and are:

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

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

Further information and symposium proposal application forms are available from:

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

CHEMICAL PROCESSES IN NEW ZEALAND

Second Edition

A New Zealand Institute of Chemistry Educational Publication

Edited by Associate-Professor John Packer (University of Auckland),
Dr John Robertson (Auckland Institute of Technology) and
Heather Wansbrough (University of Auckland)

This NZIC publication is a new edition of the original book produced in 1978 and the second volume produced in 1988. Almost every school in New Zealand acquired a copy of the first edition, as well as many tertiary institutions and professional chemists. The new edition of 101 articles in 17 sections has 931 pages. In addition to chemistry the book covers aspects of technology, biotechnology and the environment. It will be invaluable to secondary school students and teachers, tertiary education institutions, general libraries, companies, and a wide range of scientists and technologists.

It is available in both loose-leaf and bound formats. The loose-leaf version can be stored in a ring binder and is suitable for teachers wishing to photocopy articles for classroom use, while the two-volume bound version is more suitable for individual use and libraries.

Orders should be posted, faxed or emailed to:

Chemical Processes in New Zealand
c/- John Packer
Department of Chemistry
University of Auckland
Private Bag 92019
AUCKLAND

Fax: +64-(0)9-3737422
Email: j.packer@auckland.ac.nz

Cheques should be made out to: NZIC Chemical Processes Publication

Chemical Processes in New Zealand Order Form

Name: _____ Company/School Name: _____

Address: _____

_____

Phone Number: _____ Fax Number: _____

Email address: _____

Number of copies loose leaf (@ $67.00* + $3.50 postage) _____

Number of copies bound in two volumes (@ $77.00* + $3.50 postage) _____

*Prices include GST

NEW ZEALAND INSTITUTE OF CHEMISTRY

MESSAGE FROM THE PRESIDENT

Now that you have all received NZIC subscription notices it is a good time to reintroduce the people in the NZIC secretariat in Auckland. The secretariat is run out of the Ancat Holdings Ltd office, the publisher of *Chemistry in New Zealand*. Robert Lyon has set up the new business systems in the NZIC office and Michelle Keesing has been handling most of the day to day interaction with members. They have put a lot of work into the office and have managed to keep things running smoothly in the transition. I am sure we all appreciate the effort that has gone into the change. Those of you who have any problems or queries can get in touch with the office by telephone, fax, email, mail or the internet. Thanks Robert and Michelle.

The NZIC has been active in a variety of areas this year and I would like to highlight some recent examples of members enthusiastic endeavours.

John Packer has edited a new edition of 'Chemical Processes in New Zealand' with Heather Wansbrough and John Robertson. John and Heather toured the branches on a pre-publication promotional tour in the last few months and have had an excellent response. It is a very extensive publication and deserves a wide readership.

Denis Hogan and Bryce Williamson of the Canterbury Branch have produced an 80th birthday tribute to C J Wilkins with articles by colleagues and students. Another excellent publication which is extremely well presented. Those interested should contact Denis Hogan through the Canterbury Branch.

Robert Maclagan of the Canterbury Branch managed another successful Chemical Olympiad team, a very large undertaking.

The Manawatu Branch Chemical Quiz has grown to over 2000 students from 50 schools this year, much of the success being due to the efforts of Mark Patchett and Grant Boston.

Waikato Branch ran a successful Analytical Competition and Otago was very involved in the recent International Science Festival in Dunedin. Wellington has run the Chem13 examination for secondary schools.

This month Owen Curnow is co-ordinating the National Chemistry Week as NZIC' s part of the International Chemistry Celebration. We look forward to seeing these activities.

It is good to see such a wide area of involvement. There are many other activities which I have not had the space to mention. Please let me, or the Hon Gen Secretary, know of events which you feel deserve a wider audience or publicity.

Back to the membership subscriptions, a prompt membership renewal will help us have the facilities to continue backing new initiatives, both at the branch and the national level.

Best wishes,

Alastair MacGibbon
NZIC President 1998

Advance Notice

1999 NZIC Conference

"Chemistry in New Zealand - a showcase of activities and opportunities"

November 29 - December 1, 1999
at
Victoria University of Wellington

Contacts:
Chairman of organising committee:
Associate Professor Jim Johnston VUW
Conference Office:
School of Chemical and Physical Sciences VUW
Email: Margaret.Brown@vuw.ac.nz
wwwlvuw.ac.nz/chemistry/nzic99

NZIC COUNCIL NEWS

A publishing problem prevented Council News from appearing in the last issue of *Chemistry in New Zealand*. Summaries of the March Council meeting and July Standing Committee meeting are presented below.

MARCH COUNCIL MEETING

The NZIC Council met on 31 March 1998 in Auckland and the meeting is summarised below. The full minutes of the meeting are available from your branch delegate or the Honorary General Secretary (Secretary@nzic.org.nz).

Financial
The Treasurer presented a provisional budget for 1998 that projected a small surplus for this year. Once the 1997 accounts are available it is hoped that the full branch capitation fee will be paid this year.

Rule Change
- Rule 6.1 was amended to read "A candidate must pay on application such fees are as due before membership is confirmed".

Business Plan
Council were introduced to the members of the "Virtual Secretariat" and shown the facilities available to the NZIC. The new NZIC phone number is 09 5356495, email NZICOffice@nzic.org.nz and address is P O Box 39-283, Howick, Auckland. The office is open from 8:30 am to 5.00 pm, Monday to Friday.

The NZIC has also expanded its internet presence with the establishment of its own domain name and email addresses for branch secretaries and the elected Council members. The NZIC Web page is located at http://www.nzic.org.nz, branch email addresses use the branch name followed by "@nzic.org.nz", for example, Otago@nzic.org.nz and Council addresses use the title followed by "@nzic.org.nz", for example, 1stVP@nzic.org.nz. Refer to the Web page for the full list.

Council plans to increase the use of email for fast and efficient communication with NZIC members.

Membership
Council admitted 6 new fellows and welcomed 24 new members to the NZIC. The full list is below.

MEMBERSHIPS

FELLOWS

Auckland	Dennis Karl
Auckland	James Metson
Auckland	Peter Schwerdtfeger
Auckland	Malcolm Smith
Auckland	James Wright
Manawatu	Kath Fletcher

MEMBERS

Auckland	Larraine Barton
	Paul Harris
	Anthony Hockings
	Gillian Horner
Waikato	Julian Cook
	Wade Mace
Manawatu	Geoffrey Jameson
Wellington	Bernd Becker
	Paul Chapman
	Andy Falshaw
	Deborah Traynor
Canterbury	Michael Edmonds
	Chris Ferguson
	James Gardiner
	Sarah Hickford
Otago	Anna Barlow
	Alison Daines
	Nicola Daly
	Amar Flood
	Paula Godfrey
	Jenness Guthrie
	Thomas Kirchlechner
	Simon Page
	Anand Prasad Sewak

Council delegates will be approaching branches for ideas to attract new members and retain existing members. If you have a suggestion please contact your branch secretary or the Honorary General Secretary.

Royal Society of New Zealand
The recent elections for the Council of the Royal Society New Zealand resulted in the election of three NZIC members, Professor C O'Connor, Professor G Petersen and Dr N Milestone.

Publications
The publication of the 3rd edition of Chemical Processes in New Zealand is planned for June 1998. Council congratulated John Packer and his team and urged all branches to support the launch of the new edition of this popular book.

Denis Hogan and his team are close to completing the book "Chemical Milestones". Council congratulated the team and offered their support with publication.

Conferences
Council congratulated the Fats and Oils Group for their successful conference Pacific Oils 2000 held in November 1997.

The Chemistry Department of the University of Auckland are holding a conference to honour Warren Roper on the occasion of his 60th birthday. Organometallic Chemistry in the South Pacific will be held in Auckland from 24-28th January 1999.

The Inorganic Specialist Group and the Inorganic Division of the RACI are holding the IC'99 conference in Wellington from 31 January - 4 February 1999.

NZIC Council Elections

Rule 14.2 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 31 October 1998".

Please forward nominations to reach the NZIC Office by 31 October 1998.

P O Box 39-283
Howick
AUCKLAND
Fax (09) 5353476

G Boston
Honorary General Secretary for Council

JULY STANDING COMMITTEE MEETING

The Standing Committee of the NZIC met on 9 July 1998 in Lower Hutt and the meeting is summarised below. The full minutes of the meeting are available from your branch delegate or the Honorary General Secretary (Secretary@nzic.org.nz).

Financial
The Treasurer tabled the 1997 provisional accounts.

New Members
Eighteen new members were welcomed to the NZIC, the full list appears below. The resignations of two members and the deaths of two long standing members: Dr C B Johnson (Manawatu) and Mr A H Wooff (Canterbury) were noted.

MEMBERSHIPS

MEMBERS

Auckland	Alan Craig
	Lawerence Eyres
	Michael Q Xu
Waikato	Wendy Jackson
	Anisur Rahman
	Tanya Stewart
Manawatu	T B K Dissanayake
	Simon Fielder
	Shamus Husheer
	Michael Lilly
Wellington	Chris Monigatti
Canterbury	James Anderson
	David Fairley
	Daniel Milligan
	Glenn Rowland
	Aaron Thorpe
Otago	Matthew Polson
	Paul Smith
Resigned	Fiona Miller
	Jan Gregor
Deceased	Cecil Johnson
	Alan Wooff

Capitation grants
The meeting resolved to immediately pay a preliminary amount to branches and a final payment will be made to branches after the October Council meeting based on paid-up membership as at 30/09/98.

Operation of the Virtual Secretariat
The committee were pleased with the first 3 months operation of the Secretariat and suggested a number of improvements.

Other Matters
Professor Slyvia Rumball was re-nominated as the Science Member for the New Zealand National Commission for UNESCO.

The Committee agreed to provide financial support for the following: a loan to assist publication of Chemical Processes in New Zealand; support for the Organometallic Chemistry in the South Pacific conference to be held in Auckland in January 1999; support for a PhD student to attend Pacifichem 2000.

Grant Boston
Honorary General Secretary

AWARDS

Gareth Wilson won third prize for his essay "Redefining the self" in the Seventh Chemistry and Industry Essay Prize. Gareth is working towards a Master's degree in Chemistry at the University of Canterbury.

1998 CHEMISTRY OLYMPIAD

At the 30th International Chemistry Olympiad held in Melbourne, Australia (5-14 July, 1998), Tien Huey Lim, a student of Diocesan School for Girls, Auckland, won a bronze medal. Tim King, a student of Wellington College gained a Special Certificate for gaining full marks for a task. The other two students in the New Zealand team were Francis Reid, a student of Westlake Boys' High School, Auckland, and Tanya Ronson a student of Otago Girls' High School. 47 countries competed in the Olympiad. This was the first time the Chemistry Olympiad has been held in the Southern Hemisphere. The Olympiad was hosted by the Royal Australian Chemical Institute. While the Australians were the hosts, there was a strong New Zealand connection: the Executive Director of the RACI, Dr Susan Cumming, who carried the main administrative burden for the Olympiad, is a New Zealand graduate; Dr Simon Petrie, a Canterbury graduate, was a member of the Scientific Committee and was responsible for many of the preparatory problems; and Malcolm Lowe, a bronze medallist in the 1997 New Zealand team was acting as guide for the Swiss team. As well as the 2 five hour examinations (practical and theoretical)

Could You Compete at a Chemical Olympiad?

A QUESTION FROM THE RECENT CHEMICAL OLYMPIAD

A PhD student has received a consignment of all six C_4H_8 isomers (which are gases at room temperature). Unfortunately, during shipping the labels have become detached from the gas cylinders and she cannot correctly identify them. She labels the cylinders as "A" to "F" and sets about trying to deduce the contents of each cylinder. She makes the following observations:

(i) A, B, C and D are seen to decolourise bromine rapidly (even in darkness) while E and F do not.

(ii) The products of the reactions of B and C with Br_2 are found to be stereoisomers of each other.

(iii) A, B and C all give identical products when reacted with H_2 over a Pd catalyst.

(iv) E has a higher boiling point than F.

(v) C has a higher boiling point than B.

Identify the contents of the six cylinders.

Answers on Page 47

the teams and mentors sampled Australian culture: a model gold mining town, a sheep station, the Abbotsford brewery (2 million bottles a shift!), the National Gallery of Victoria and a classical concert featuring the President of the RACI, Professor David Black. Next year the Chemistry Olympiad will be held in Bangkok, Thailand. The New Zealand Chemistry Olympiad team, along with those from Mathematics and Physics, received significant support from the Science and Technology Promotion Fund of the Royal Society of New Zealand. Financial support was also received from Rohm and Haas, New Zealand Refining Company, and Nuplex Industries.

NZIC BRANCH NEWS

AUCKLAND

The Auckland Branch has had a busy few months. Dr Alistair MacGibbon gave an interesting view of chemistry right under our noses in his Presidential Address on "A Chemist's View of Butter Making". July also saw the prelaunch of the 2nd Edition of Chemical Processes in New Zealand, edited by John Packer, John Robertson, and Heather Wansbrough. The lead-off lecture on Emulsion Polymerisation was given by Andries Popping, General Manager, Rohm and Haas NZ Ltd.

Our next meeting was the Australasian RSC Lecturer Mike Paddon-Row, who gave a very interesting seminar on new insight into electron transfer, including an overview of the most recent controversy over the rates of electron transfer through DNA. Most recently, about thirty members visited the Tegel Analytical Laboratory, hosted by Dennis Karl, to see their current analytical facilities and listen to presentations on how Tegel's new near-infrared spectrometer will increase throughput and decrease turnaround time for analysing poultry feeds.

Gordon Miskelly

WAIKATO

Waikato Branch members continue to travel - Bruce Morris has recently completed his DPhil under the supervision of Dr Michele Prinsep, and gave a talk on "New metabolites from New Zealand marine bryozoans" at the IUPAC Conference on Marine Natural Products, Townsville, July 1998, and was assisted by a travel grant from the Branch. Bruce is now working as a research associate at HortResearch, Mt Albert, with Stephen Foster.

Brian Nicholson and Buck Rogers attended (with another 13 New Zealanders) the ICCC conference in Florence, Italy, and the sponsorship of social events by a well-known burger chain did not go unnoticed - no doubt members of other branches will have noted the same thing. Like all big conferences, the problem was the number of good overlapping sessions. Brian is currently on an extensive "European Tour", having attended the Organometallic Conference in Munich, before spending 6 weeks at the Norwegian Institute of Science & Technology in Trondheim, Norway and returning via Adelaide, c/o Professor Mike Bruce. Bill Henderson also recently returned from a trip to Singapore and Japan with MSc student Louise McCaffrey, funded by the Asia 2000 Foundation of New Zealand. Michael Mucalo, current Waikato Branch Treasurer, will be winging his way to the USA this November to attend the Bioceramics 11 Conference to be held in the New York University College of Dentistry in New York City. There, he will be making a poster presentation on recent FRST-funded research being conducted at Waikato on the processing of waste cattle bone into materials suitable for biomedical applications such as xenograft implants and feedstocks for plasma spraying.

Former Branch Secretary Ian Graves is now working for the pharmaceutical company Pfizer in the UK. Maarten Dinger recently completed his DPhil and is now working as a postdoc at the University of Florida, while Scott McIndoe has recently started as a FoRST postdoc at Cambridge University, working with Professor Brian Johnson.

The Waikato Branch is involved in various publicity activities this year; two prizes for the best (Junior and Senior) exhibits on a chemistry theme at the NIWA Waikato Science Fair were given in August. The Branch will also provide prizes for the Crystal Growing Competition being held as part of the National Chemistry Week celebrations, together with a contribution towards the prizes of the Chemquest quiz for 6th form chemistry students, this year to be held at the end of October.

The branch very much enjoyed hearing about the chemistry of butter making from the President, and the electron transfer talk given by the RSC Lecturer Mike Paddon-Row. We are looking forward to the visit by Paul Anastas, and are in the process of organising a visit to Forest Research to catch up with activities of the Bay of Plenty Sub-branch members.

Bill Henderson

MANAWATU

The annual "Dead Chemists: meeting was held this year on Wednesday 15 July 1998 in the cafeteria of the New Zealand Dairy Research Institute. This meeting was preceded by the launch of the revised edition of the book "*Chemical Processes in New Zealand*" edited by Associate Professor John Packer (University of Auckland), Dr John Robertson (Auckland Institute of Technology) and Heather Wansbrough (University of Auckland). The original book was published in 1978 and a second volume added in 1988. John Packer and Heather Wansbrough described the process of producing the new edition and those members present at the launch were impressed with prepublication samples of the book. To start the "Dead Chemists" meeting,

John Packer & Heather Wansbrough at the launch of "Chemical Processes in New Zealand".

Mark Patchett enjoys his role as Hermann Staudinger.

there was a social mixing period for identifying the dead chemists among participants who had dressed in some way alluding to a dead chemist. A buffet dinner followed and then the main event of the evening was the eagerly awaited and now traditional "alchemy" quiz masterminded, as usual by Mike Boland of the New Zealand Dairy Research Institute. The quiz covered chemical elements, famous chemists of the past, some general chemical knowledge, as well as some knowledge of New Zealand Institute of Chemistry and it's officers. As in the past the contest was thoroughly enjoyed by all.

Justin Bendall's dress alludes to Plato at the Dead Chemists' Meeting.

The final act of the evening was to award the prize for the best dressed dead chemist. It is with great pride that I can reveal that this writer took the honour, after a number of years of trying.

A "Careers in Chemistry and Biochemistry" meeting sponsored by the Branch and organised by the Institute of Fundamental Sciences - Chemistry, Massey University was held at Massey University on Wednesday 29 July 1998. Andrew Brodie reports that around 60 second year and above chemistry and biochemistry students attended a Careers Information Session to hear about what some of the Massey graduates were up to in the job market. The four speakers were Peter Morris - a manager at New Zealand Pharmaceuticals Ltd, Jeremy Dombroski - a scientist in Hort Research, Janelle Morgan - a teacher at Palmerston North Boys' High School, and Daina Grant - holding a position with the New Zealand Dairy Research Institute. All spoke enthusiastically about their work and covered topics such as their qualifications, salaries, what they actually do and the value of their training for employment. The interesting thing was that 3 out of 4 speakers had not planned to major in chemistry or biochemistry when they started University but had decided to do so during their first year. The students found the session most useful and asked many questions.

On Thursday 13 August, Professor Michael N Paddon-Row from the School of Chemistry, University of New South Wales, and Royal Society of Chemistry (London) Australasian Lecturer 1998, presented his lecture on "An Overview of Recent Insights Gained Into the Most Fundamental and Ubiquitous of All Chemical Reactions, Electron Transfer" in the Lecture Room 1, Wool Building, Massey University. This was a joint meeting with the Institute of Fundamental Sciences - Chemistry, Massey University. A substantial audience attended to hear about electron transfer, in particular photoinduced electron transfer (where light energy is transformed into chemical energy). Professor Paddon-Row pointed out that over the past decade substantial progress has been made regarding long-range electron transfer. One exciting finding is that electron transfer can take place through saturated hydrocarbon bridges at extremely rapid rates over significant distances. Professor Paddon-Row presented a broad overview of electron transfer, including a discussion of electron transfer processes in the photosynthetic reaction centre, proteins and DNA. He emphasised how a judicious combination of organic synthesis, photophysical measurements and very simple theory can provide useful insights into the mechanism of electron transfer. This writer was impressed with the cost of the instruments required for the sophisticated photophysical measurements ($1 to 2 million!). Later that evening Professor Paddon-Row and his wife Enid had dinner at the Village Inn, Hokowhitu with members of the Branch Committee.

Also in August, there was a Taranaki sub-branch (of Manawatu) meeting on Wednesday 26 August at the new Combined Cycle Power Plant (Stratford Power Ltd), which is now the country's most efficient thermal power station. Twelve people turned up for the meeting and a number of people who were unable to make the meeting made their apologies. The host was Karen Whiteside, the plant chemist, who arranged a superb meal with a local caterer to start the evening meeting. Karen then gave a run down on the plant and its many chemical teething problems. This was followed by a video of the construction of the power plant. The topic prompted many questions, suggestions and substantial discussion. The second half of the evening was a presentation by Dr Steve R Vaughan, Head of the Ministry of the Environment. Steve went through the development of the Act for Hazardous Substances and New Organisms (HSNO), half of which came into existence on 1 July 1998. Using a number of current examples he showed the value of the new Act and how it will readily accommodate new ideas and ways of doing things but still maintain the essential properties of that which is to be superseded e.g. how the steel petrol tank has now given way to the plastic tank. Previous laws, many of which are still in operation, slide in with this new legislation until the second portion of the HSNO Act comes into operation about April 1999. The Act has a toolbox of various requirements that can readily be applied to any new situation or substance that may be presented. There is a team of eight experts of various fields that are brought together to assess a new material or organism and its effect on the New Zealand environment. Steve provided some articles to be copied and distributed. It was a very enlighteing evening with much discussion between the audience and the presenter.

The Manawatu Science and Technology Fair was held on 31 July - 1 August 1998, at the Civic Convention Centre, Palmerston North. In the Senior Secondary section, the NZIC Manawatu Branch Prize (The Alan Furness Memorial Prize) was awarded to Jessica Hardyment from Awatapu College for her project on "Iron in Silverbeet". A highly commended award went to Joanna McVeagh from Freyberg High School for her project on "Farm Fertiliser Factor". In the Intermediate section, highly commended awards from the Manawatu Branch went to Fabian Krivan from Hiwinui School "Silver into Gold" and Laura Knight from Carncot Private School "How Colourful is Your Butter?". In the Junior Secondary section, the Institute of Fundamental Sciences - Chemistry, Massey University, awarded a prize to Bridget Irving and Alicia McClenaghan from Freyberg High School "Irate Nitrates?".

Congratulations to Professor Ted Baker, FNZIC and FRSNZ, University of Auckland, for being awarded the 1997 Hector Medal for outstanding scientific research in chemical sciences. Much of the work for which he is recognised was carried out at the former Department of Biochemistry, Massey University.

This work focussed on the relationship between the structure and function of biological macromolecules, in particular proteins.

Also, congratulations (again) to Drs Tony Burrell and David Officer from the Institute of Fundamental Sciences - Chemistry, Massey University, for obtaining further funding for their research on synthetic porphyrin arrays aimed at developing a dye capable of imitating photosynthesis for commercial use in producing a cheap electricity source. This time they have obtained a Public Good Science Fund grant of $1.9 million over a period of six years. Well done!

Harry Percival

"Right wing governments in New Zealand and Australia are decreasing public science funding in real terms whereas left-wing governments in Canada, the USA and Britain are increasing funding" said Dr Peter Pockley at his lecture 'Oz and Kiwi Science - Drifting Together'.

Speaking at the first public lecture of the Massey Science Policy Unit on 2 July 1998 visiting Australian science commentator Dr Pockley compared the current situation with the recommendations made in the 1986 Beattie report "Key to Prosperity - Science and Technology", a report he believed warranted re-examination for its unfinished business and as a benchmark for comparing fresh ideas. He said that of the four recommendations made in the report, only the last - to create three Research Councils to distribute funding - was acted upon.

The fractionation of science started by the break up of the DSIR has led to a lack of national identity and response for science. Any collective national responses on science issues are all the more difficult to mount. This is further aggravated by the lack of science reporters in New Zealand which has only one full time science reporter. Overseas readers of *Science and Nature* are better informed about the state of science in New Zealand than are New Zealanders.

In Australia the CSIRO has a national awareness program and the Cooperative Research Centres have generated investment of 400 million Australian dollars. All this has happened without the trauma and structural changes wrought upon New Zealand science. New Zealand has no chief scientist of advisory body; a policy Australia's chief scientist, John Stocker has described as "New Zealand is shooting itself in the brain". Dr Pockley said "that the lack of direct access to Ministers, including the Prime Minister is at the root of the great tension among many scientists". He believed that scientists need to be more proactive with regard to the media and used the example of the poor access to the budget where no scientists were present at the pre-budget lockup and were thus unable to give an immediate considered response to the funding announced in the budget. Two days later when a response was prepared the budget was no longer news and the science community's concerns were largely unheard.

Dr Pockley was visiting New Zealand as a guest of the International Science Festival and is the Wilson Evans visiting fellow at the University of Otago .

Grant Boston

WELLINGTON

The August meeting of the Branch featured the excellent lecture delivered by Professor Mike Paddon-Row in all the main centres under the RSC/RACI/NZIC banner. The availability of only 4.30 pm on a Friday did seem to have a restrictive impact on the audience but those that attended were given a rare treat! The lecture serves to remind us that NZIC through its Branches needs to offer its members up to the minute perspectives in modern chemistry.

At the special August meeting, the branch chairman, Graham Murray, presented a fast moving demonstration lecture entitled "Chemicals for Fun and Fascination" to a large audience. The lecture also attracted the interest of Saturn Television who had a film crew to record the event. Graham has frequently expressed the view that chemistry, particularly at school level, is so restricted by resource and safety constraints, that teachers have few opportunities to demonstrate the full excitement of the subject, and his lecture was designed to correct this deficiency. He entertained the large audience with coloured solutions, exploding balloons, an LPG rocket, floating metals, singing test tubes, magic writing, a musical barbecue and with a hydrogen organ as a finale. Graham also introduced a unique "Shadow Box" for making solar observations, showing that his interests stretch beyond chemistry. The performance was interspersed with short discussions of the principles behind the experiments and it was encouraging to see the youngest members of an audience ranging from nine to ninety, actively discussing the demonstrations. If Graham's objective was to kindle an interest in chemistry then he certainly succeeded.

The September meeting is to feature the Branch's annual Mellor Lecture this year to be delivered by Dr David Officer of Massey University.

VICTORIA UNIVERSITY

Professor Brian Halton gave an invited lecture "Strained Molecules and Novel Ring Systems: Discoveries with Cycloproparenes" at the Ninth International Symposium on Novel Aromatics (ISNA-9) held in Hong Kong from August 2-7, 1998. He also spent a week in the USA appraising mass spectrometers with a view to upgrading the Victoria University's facilities. In October he will be attending the 1998 Pacifichem planning committee meeting and undertaking a short two week lecture tour in Japan.

Dr Rod Tilbury has been in Europe to attend the 10th International Symposium on Bioluminescence and Chemiluminescence in Bologna, Italy, and the Biophoton Conference in Neuss, Germany as well as visiting the laboratories of Professor Anders in Hanover. He presented recent results on bioluminescence that he and his group has evolved as a monitor and detector for specific types of human disease. Associate Professor Gary Burns remains on sabbatical leave at Montpellier, France, until February next year. Dr John Hoberg, the new Victoria University organic chemist has very recently arrived from Denver, USA, and is beginning to acclimatise to life in New Zealand.

Brian Halton

CANTERBURY

At a function at the University of Canterbury Staff Club on Wednesday 20th August, the New Zealand Institute of Chemistry launched the book "C J Wilkins - An 80th Birthday Tribute". This book recognizes the enormous contribution made to inorganic chemistry and to New Zealand chemistry in general by Cuth Wilkins, now Professor Emeritus and formerly Professor of Inorganic Chemistry at the University of Canterbury. The book consists of contributions - mostly research monographs - by chemists closely connected with Cuth. It is very much a Canterbury production: edited by Denis Hogan, formerly of DSIR and presently coeditor of *ChemNZ*, and by Bryce Williamson of the Department of Chemistry of the University of Canterbury, superbly produced by the University of Canterbury Printery, and published by the Canterbury Branch of the New Zealand Institute of Chemistry.

The book was formally launched by Professor Emeritus David Buckingham of the University of Otago, one of Cuth's first research students. David spoke about Cuth's life, and then the guest of honour himself regaled the 35-or-so attendees with some general reflections from his long and distinguished chemistry career.

Copies of this unique book are available at a modest price from Bryce Williamson, Phone: +64-(0)3-3642439
Email: b.williamson@chem.canterbury.ac.nz

Greg Russell

OTAGO

President's Visit

The visit of the President, Dr Alistair MacGibbon to the Otago Branch on June 25 was an opportunity to gain "A Chemist's View of Butter Making". Those of us who simply put it on our toast were treated to an eye-opening account of butter's complexity. Among other things we learned of the 2000-3000 triglycerides in milk fat, of the importance of the size of the water droplets to producing flavour and maintaining stability and of the importance of the crystal structure of the fats in controlling hardness. We also learned about spreadable butter, whey butter, cultured butter and salt-free butter. Through Alistair's talk we were able to appreciate something of the major contribution made by the 250 staff of the NZ Dairy Research Institute to the country's economy.

Following questions, Alistair was happy to discuss some of the issues facing the NZIC and his vision of its future. He described how he is trying to make the central organisation more efficient and more responsive to the Branches. He agreed that money from the national office should go to the branches that do things and felt the idea of branches submitting annual budgets for their proposed activities was worth considering. He also agreed on the need to spice up the Journal and suggested possible ways to do this were to allocate individual branches responsibility for certain issues and to introduce the idea of themes. In summary he felt the NZIC should remain autonomous rather than have us join up with the Aussies but that the Institute would only have a future if its members were prepared to get stuck in and make a contribution. Apathy was our greatest enemy.

Poster Competition

The annual postgraduate student poster competition was held on Wednesday 22 July 1998 and involved 22 entries from University of Otago students in the Departments of Food Science, Chemistry, and Biochemistry as well as the School of Pharmacy. Topics ranged widely from the colour of frozen peas to the biogeochemistry of the Otago continental shelf. The three Judges were Emeritus Professor Arthur Campbell (former HOD of Chemistry), Dr Tony Herd (Head of Science at Otago Polytechnic) and Associate Professor Rob Walker (Otago Medical School). The Judges were agreed on the very high standard of all the posters and it was only after much deliberation that they were able to award the following five prizes: Best Poster from an NZIC Member to Karl Bailey for "Bifunctional competitive substrates/inhibitors of catechol O-methyltransferase"; Best Overall Poster to Rachel Fleming for "Cold-adaptation of lactate dehydrogenase"; Second Prize to William Norris for "Compound 1080 adsorbents, *in vitro* and *in vivo* findings"; Third Prize to Gareth Thomas for "Exploring selective radical functionalisation of cyclic alpha-amino acids" and Most Aesthetic Poster to Geoff Low for "Calculated overtone spectra of small water clusters". The meeting was enjoyed by all thanks to the superb organisation of Andrea Clarkson and her success in obtaining sponsorship.

August Meeting

The meeting on August 12 1998 gave members a chance to ask "Has RCD been successful?" of Grant Norbury, a wildlife ecologist at Landcare Research in Alexandria. He told the meeting (kindly sponsored by Zenith Technology Corporation Ltd) that the kill produced by Rabbit Calicivirus Disease (more correctly called Rabbit Haemorrhagic Disease) had been very variable since its release. Rabbits had declined by >90% in the MacKenzie Basin but had experienced anything from an 85% decline to a 7% rise in numbers in North Canterbury and a 20-90% decline in Otago. Taking the Easter Bunny Shoot in Alexandria as an example, rabbits shot per shooter declined from 58 in 1997 before the release to 21 in 1998 after the release. Good kills seemed to be associated with natural spread of the virus by vectors like flies, wind, animal contact etc, whereas the process of biociding (putting a lot of virus about artificially) gave rise to disappointingly poor kills. Part of the reason for this is that, with biociding, more rabbits acquire immunity as a result of the large amount of dead virus lying around acting like a vaccine. Thus the best strategy appears to be to put out the virus as an inocculum and let nature do the rest. Grant outlined the many questions that remain to be answered about RCD and then went on to discuss whether it had led to an increase in predator pressure particularly from ferrets. Overall members were left with a greater appreciation of the complexity of the environment and of the interdependency of species. The talk was just one more illustration of the great service to continuing education provided by the NZIC for those who wish to avail themselves of it!

UNIVERSITY OF OTAGO CHEMISTRY DEPARTMENT NEWS

The Department has just become host to a Fulbright Scholar, Miss Kristin Averyt from the Department of Marine and Atmospheric Chemistry at the University of Miami. During her stay at Otago, Kristin will undertake research towards an MSc degree on "Copper toxicity to phytoplankton in Lake Manapouri" under the supervision of Professor Keith Hunter. Another recent arrival to the Department is Dr John Willard of Alberta, Canada who has come to spend his sabbatical in the Plant Extraction Research Unit with Dr Nigel Perry. John hopes

to gain expertise in the study of biologically-active natural products and use his newly acquired skills to set up a similar research laboratory back in Alberta. The department is also very pleased to welcome two new Kiwi postdoctoral fellows (fellowesses?) in Drs Helen Palmer and Caroline Coulter. Caroline, a member of NZIC, did her PhD at Canterbury and is now working with Associate Professor Rob Smith and Dr Mike Murphy (Biochemistry Department) on "Synthesis and testing of mitochondrial-targetted antioxidants". Helen, a PhD graduate from Auckland is working with Rob and Associate Professor John Leader (Physiology Department) on a Marsden funded project looking at "The relationship between water osmolytes and biological macromolecules".

One of our Otago Branch committee members was in the news lately (Otago Daily Times September 10). Dr Jonathan Kim of the Centre for Chemical and Physical Oceanography was able to contribute to a debate initiated by *Consumer* magazine aimed at warning pregnant women to avoid fish high in mercury. Jonathan backed up the warning based on his studies of freshwater fish in lakes near Rotorua which showed that large trout had high levels of mercury due to geothermal sources.

Other News

Congratulations are in order for Dr Wayne Temple, our Branch Chairman, and Dr Nerida Smith, Senior Lecturer in the School of Pharmacy for being jointly awarded a Kidsafe National Heros Award for their efforts in promoting prevention of child poisoning. They were presented with their award (signed by the Governor-General) at a ceremony in Auckland attended by the Minister of Health.

Paul Fawcett

CHEMICAL OLYMPIAD QUESTION ANSWER

The six isomers of C_4H_8 are 1-butene, *cis*-2-butene, trans-2-butene, methylpropene, cyclobutane and methylcyclopropane.

A, B, C and D decolorise bromine in the absence of light; this process is bromine addition to an alkene. Therefore, A-D are the four alkenes and E and F are the two cycloalkanes.

Methylcyclopropane possesses a dipole moment, while the dipole moment of cyclobutane is zero. Therefore, the boiling point of methylcyclopropane will be higher than that of cyclobutane. Since the boiling point of E is higher than that of F, E is methylcyclopropane and F is cyclobutane.

Hydrogenation of 1-butene or of either isomer of 2-butene, yields n-butane. This accounts for the same product arising from hydrogenation of A, B and C. The "odd one out" is D, which must be methylpropene.

Bromine addition to *cis*-2-butene produces the meso from of 2,3-dibromopropane, while addition to *trans*-2-butene yields the R,R and the S,S enantiomers. This accounts for the observation that B and C produce stereoisomeric products with bromine. By elimination (the deductive process NOT the organic reaction mechanism!) A is 1-butene.

Cis-2-butene should have a higher boiling point than *trans*-2-butene by virtue of the latter's zero dipole moment. Since the boiling point of C is higher than that of B, C is *cis*-2-butene and B is *trans*-2-butene.

From *Chemistry and Industry* 20 July 1998

NEW LITERATURE & MEDIA

FOOD AND DRINK
- GOOD MANUFACTURING PRACTICE:
A GUIDE TO ITS RESPONSIBLE MANAGEMENT

The institute of Food Science and Technology will launch the 4th Edition of its best selling *Guide to Good Manufacturing Practice* on 7th September 1998.

Said Ralph Blanchfield, Editor and Chairman of the group which produced the 4th Edition, "For over a decade, the IFST GMP Guide has been the comprehensive "authority" setting out the means to ensure that the manufacturing process delivers a food and drink product that is uniform in quality, free from defects and contamination and as safe as it is humanly possible to make it.

"The last Edition, published in 1991, has served its purpose well and has continued to receive international acclaim. The basic principles of GMP do not change, but science and technology develop and the context in which GMP principles are applied does change."

The 4th Edition of the Guide has been considerably revised and extended, to take account of important developments in both science and UK and EU legislation. The material on HACCP has been greatly expanded and enhanced. Two new chapters highlight the increasing interest in novel foods and processes and increased recognition of food allergens as an important food safety issue.

The new 4th Edition will be of wide interest to all in a managerial or technical capacity concerned with the manufacture, storage and distribution of food and drink. It will also be a valuable reference for those in food education and training and in food safety and enforcement within the remit of the new Food Standards Agency.

The normal price of the Guide will be £55.00. However, there will be a special pre-publication discount of £5 per copy on paid up orders received before 1st September 1998.

Copies can be ordered from IFST by sending a cheque, payable to IFST to:
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IFST, 5 Cambridge Court, 210 Shepherd's Bush Road,
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"More than ever, laboratory equipment and analytical instrument company executives need reliable competitor and market

information to survive, but tell us that many reports are too broadly-based for their needs", says publisher Dr Gordon Wilkinson of *Analytical Instrument Industry Report*. "We have listened to their suggestions and created a new information concept, *Market Briefings*, with the first collection covering the $2 billion separation sciences market."

Wilkinson explains that the first series of *Market Briefings* offer a comprehensive 5-year overview of the GC, HPLC, IC, SFC, CE, GC-MS, and LC-MS markets. Each report, drawn from the huge *AII Report* database, offers full-text extracts of relevant industry news events, market research studies, proprietary technologies, and corporate profiles in chronological order from now back to 1992, "an extremely valuable aid in market research and planning". Available on paper or diskette, reports in the *Market Briefings* Series 1, Separation Sciences collection are available in the $US95 to $US395 price range. *Market Briefings* Series 2 covers Spectroscopy and Series 3, Microscopy.

Contact: Judy Meek, Reports Manager
Analytical Instrument Industry Report
P O Box 78, East Grinstead, England RH19 2YW
Tel: (+44-1342)-835935, Fax: (+44-1342)-835935

NEW GC REFERENCE BOOK *ANALYTICAL GAS CHROMATOGRAPHY* AVAILABLE FROM J&W SCIENTIFIC

J&W Scientific, the leading manufacturer of high resolution GC columns worldwide, announces the availability of a new GC reference book by Walt Jennings, Eric Mittlefehldt and Philip Stremple. This revised (2nd Edition) book, titled *Analytical Gas Chromatography*, builds on the success and reputation of the original book with nearly 60% new material. It includes new methodologies for purge and trap, large volume and PTV injection and chiral phases, and incorporates advancements in PLOT and SCOT columns as well as all application areas. The subject material will appeal to all practising chromatographers from the most experienced to those with no training in gas chromatography.

"Eminently readable...," says Brian Bush, Wadsworth Laboratory, New York State Department in Analytical Chemistry. "... It is the sort of reference book that should be on the shelf of every laboratory that contains a gas chromatograph."

"The treatment is superb and complete. The authors'style of writing makes the book easy to read and interesting. Thus, if you desire a well-written, interesting treatment on the practical considerations involved in gas chromatography, emphasising the selection, installation, evaluation, application, and basis for the use of open tubular glass capillary columns, this book should be your choice." - Peter F Lott, University of Missouri - Kansas City, in the *Journal of American Chemical Society.*

Author Walter Jennings began his research career in 1952 and is co-founder of J&W Scientific Incorporated. Jennings has taught chromatography for more than 40 years, including graduate and regular course instruction at the University of California, Davis, and over 30,000 minicourses thoughout the world. Coauthor Eric Mittlefehldt is Senior Research Scientist and Manager of J&W's Custom Column Shoppe. An accomplished physical-analytical chemist, Eric's experience extends well beyond the practical aspects of capillary column gas chromatography, and he has made significant contributions to the characterisation of multicomponent polymeric stationary phases for gas chromatography.

Published by Academic Press, the new edition was released earlier this year and is available from J&W Scientific for US list price of US$55 (part number 900-1010).

For more information, contact:
Barbara Bogue, J&W Scientific
91 Blue Ravine Road, Folsom, CA 95630
Phone: (+1-916) 9857888, Web Site: http://www.jandw.com

C J WILKINS - AN 80TH BIRTHDAY TRIBUTE

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

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

The book is available to NZIC members for $27.00 including GST and postage from:
Dr Bryce Williamson
Chemistry Department, University of Canterbury
Private Bag 4800, Christchurch

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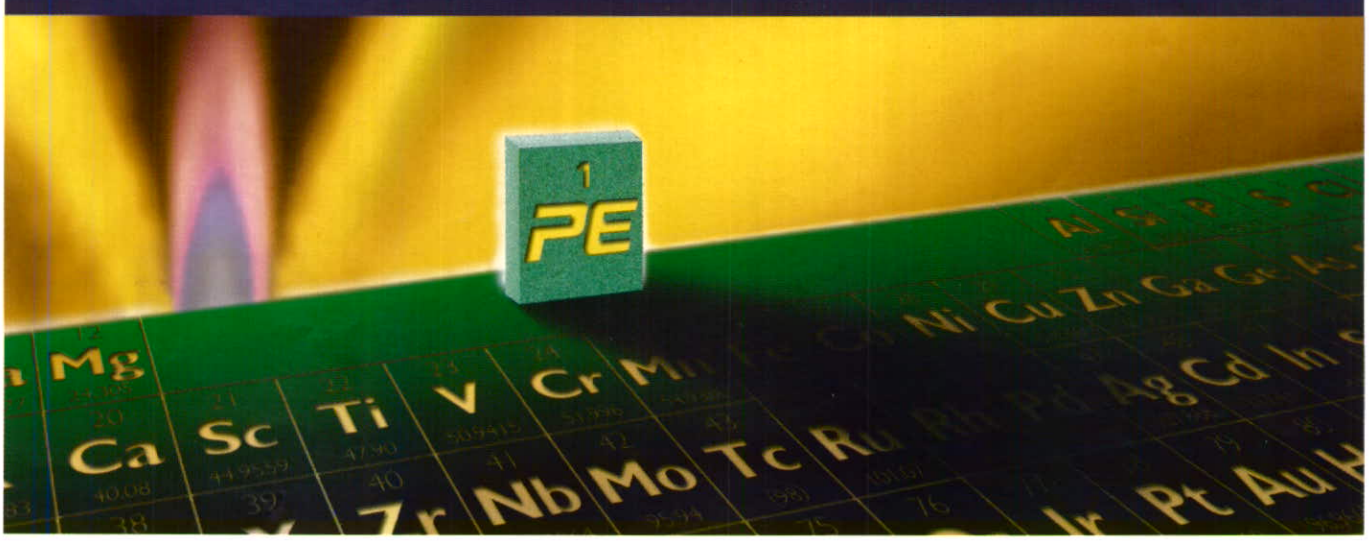

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Chemistry in New Zealand September 1998

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