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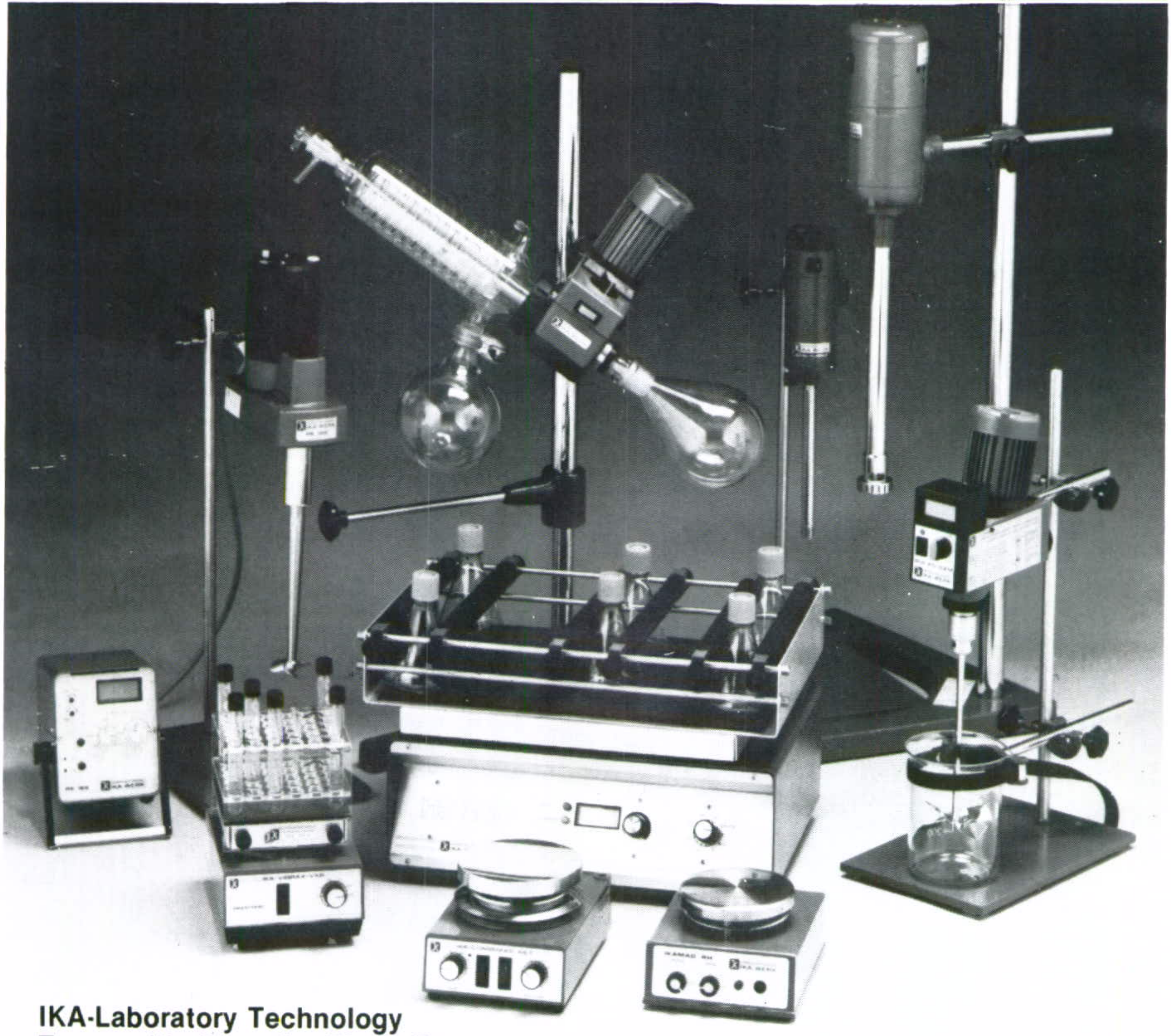

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Front Cover Story

Introducing a new era in Gas Chromatography with the 8000 series models from Perkin-Elmer. See p. 121.

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Science and Technology Review

The Government has instituted a review of its role in science and technology with special regard to broader Government policy and the place of science and technology in economic and social development of New Zealand. **Sir David Beattie** is to chair the Working Party which has requested written submissions by 11th August as the Minister of Science and Technology has requested an early report.

Branches have been asked to send copies of any written material sent to the Beattie Committee to the Chairman of Council's Public Affairs and Science Policy Committee, Dr Halton, and the undersigned. It is hoped to arrange for the PA and SP Committee to make a presentation in person.

The terms of reference have been advertised in the Press. They range widely and include the need for a science and technology policy and how it could be implemented taking into account the user-pays principle. It will be concerned with activities of all agencies associated with research, how to ensure they can operate most effectively, and which is the best way to fund them. Of special note is the need to encourage R and D in industry.

NZIC Annual General Meeting

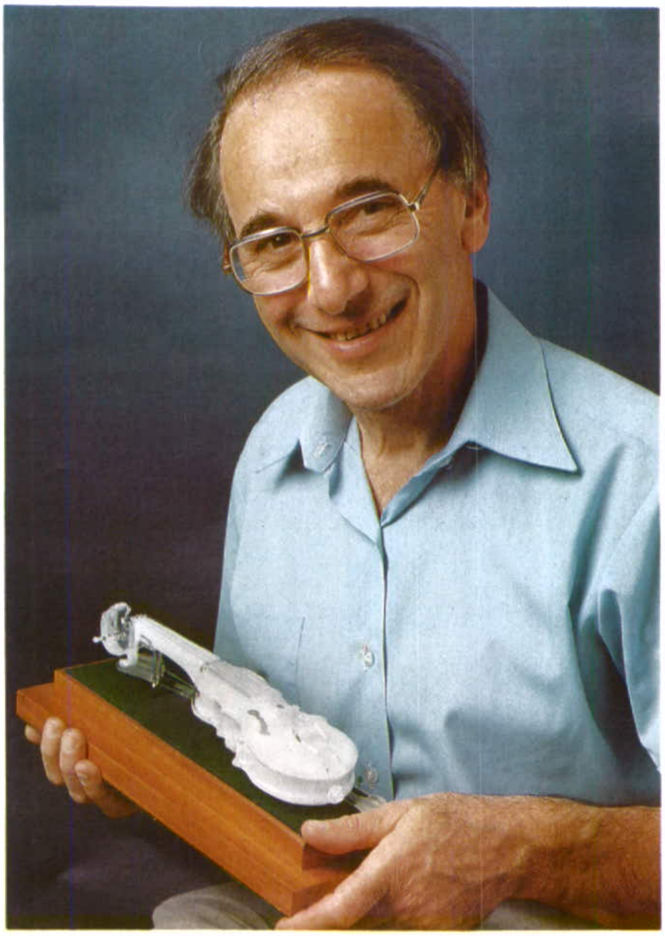
The Annual General Meeting of the New Zealand Institute of Chemistry will be held at 5 p.m. on Tuesday 26 August 1986 in the Archway Lecture Theatre No. 1, University of Otago.

Agenda

1. Welcome by the President, Professor G. B. Petersen.
2. Apologies.
3. Minutes of 1985 AGM to be confirmed.
4. Matters Arising.
5. Annual Report 1985/86: see this Journal.
6. Finance — 1985/86 Statement of Income and Expenditure, 1985/86 Balance Sheet: see this Journal.
7. Election of Officers: President, First Vice-President, Second Vice-President, General Secretary.
8. Awards and Prizes: Easterfield, ICI, Shell, Student Essay, Student Paper, Chemical Education.
9. General Business.

J. Rogers Honorary General Secretary.

PEOPLE



Dr Peter Rothbaum proudly holds a tiny viola made out of pure quartz. Made by the Division's Glassblowing Department, this special retirement present combines Peter's interests in geochemistry and music.

DSIR, Chemistry Divn, Gracefield

Dr Peter Rothbaum, Deputy Director, has recently retired after 40 years with the Division. Peter's research at Chemistry Division has covered a wide range of subject areas over this time, including fertilisers, the physical properties of wool, and the control of pollution from geothermal energy production. He has been a member of the management committee of the New Zealand Fertiliser Manufacturers Research Association since 1981.

During his long career Peter has held several research awards, including a New Zealand National Research Fellowship (1954-56), and the British DSIR Senior Research Fellowship at the National Physical Laboratory, London (1964-66). Peter is a Fellow of the NZIC, and was awarded the ICI Prize in 1967, and the Industrial Chemistry Prize in 1980.

A notable entry in the 1986 Queen's Birthday Honours list was that of **Professor Hugh N. Parton,** who was awarded the OBE for services to New Zealand science. Professor Parton was Editor of this Journal from 1940 to 1946, and President of the NZIC in 1961.

Professor Parton's academic career covered periods on the staff at Canterbury University College (1930-1954) and Otago University (1954-1972). He was appointed Emeritus Professor at Otago in 1972. Other activities have included periods on the University Grants Committee (1961-67) and the UGC Research Committee (1972-1983). In his eightieth year, Professor Parton has recently commemorated the achievements of another august member of the chemical establishment with his publication: The First Eighty Years. Chemistry at the University of Canterbury (C.U. Press, 1985).

As announced in the June issue, the NZIC prize for the student gaining the highest marks in 1985 for stage V NZCS (Chemistry) has been awarded to **Verily L. MacMillan** of Whangarei. For the last 5½ years Verily has worked as a technician in the Animal Health Division of the Ministry of Agriculture and Fisheries, initially in the Histology department, and latterly in Biochemistry. Prior to that she spent 2 years as a student at Massey University.

Verily's current position with MAF involves her in a range of chemical and biochemical determinations utilising an auto-analyser, atomic absorption, colourimetry, and radio- and enzyme immuno-assays. She is particularly interested in instrumental analytical techniques and in organic chemistry, and would like to pursue these interests further. For the time being however, her thoughts are turned towards a five month trip through Africa, followed by a working holiday in London.

Professor Charmian J. O'Connor has recently been elected to the Fellowship of the Royal Society of New Zealand. Professor O'Connor is a graduate of the University of Auckland, has been on the staff at Auckland since 1958, and at the beginning of this year she was promoted to a Personal Chair.

Professor O'Connor's early research interests were in the reactivity of organic compounds of biological interest — carboxylic acids, esters, amides and ureas — and she has made extensive studies on the acid catalysed hydrolysis of these compounds. A particular interest was, and still is, in the use of stable and radioactive isotopes as a means of monitoring these reactions.

Since 1972 the emphasis in her research has been in membrane mimetic chemistry, i.e. in the use of aggregates of amphiphilic compounds to simulate *in vitro* the reactivity so dramatically demonstrated *in vivo*. Many of her researches have used reversed micelles (aggregates which encapsulate a water pool of restricted environment, but heightened reactivity in a non-polar solvent) and 10-million fold enhancements have been observed. More recently the theories which she has helped develop have been applied to the reactivity of the naturally occurring bile-salt amphiphiles, and particularly to the ability of these steroids to act as co-factors in the enzymic catalysis exhibited by bile-salt-stimulated human milk lipase. This enzyme plays an important role in infant nutrition.

Dr Sally Davenport, a recent graduate of Victoria University, has been awarded the meritorious scholarship given by the International Federation of University Women, in recognition of her outstanding Doctoral work on the structure of Australasian coals using solid Carbon-13 n.m.r. spectroscopy, under the joint direction of **Dr G. R. Burns** (of V.U.W.) and **Dr R. Newman** (of DSIR). Sally will shortly be taking up this scholarship to enable her to carry out postdoctoral work at Oxford University.

RSC GRANTS AND FUNDS

Associate Professor J. E. Packer, University of Auckland, advises that at the beginning of the year he took over from **Professor P.B.D. de la Mare** as the New Zealand local member of the Royal Society of Chemistry.

New Zealand receives a limited amount of money each year from the Royal Society of Chemistry which can be used to help to pay some of the expenses of visiting members of the Society visiting and giving lectures in New Zealand, or to help New Zealand members of the Society to attend conferences or meetings in some way related to the Society. This finance is divided into three portions, and **Professor C. E. Phillips** at Canterbury and **Professor R. J. Ferrier** at Victoria disperse the allocation for the South Island and lower North Island respectively.

In addition to this, a number of other grants and funds are available for which New Zealand members of the RSC may wish to apply. These include:

The RSC Research Fund, to assist members in their research by the provision of grants for e.g. the purchase of chemicals and equipment, running expenses, etc.

The Corday-Morgan Memorial Fund, to assist members to visit chemical establishments in another Commonwealth country — usually as an additional stopover to an existing trip.

Grants for Visits to Developing Countries — similar to the Corday-Morgan Memorial Awards, but for visits to developing countries.

For further information on the above, or other matters relating to the RSC, contact Associate Professor J. E. Packer, Chemistry Department, University of Auckland, Private Bag, Auckland.

GUEST EDITORIAL

Hosting the Annual Conference of the New Zealand Institute of Chemistry or the Combined NZIC/NZBS group is quite a familiar event in the calendar of the chemists in Dunedin. I recall helping with the 1949 Conference and since then I have held various offices on organising committees including that of chairman of the 1959 Conferences. And now looking back, I find it difficult to explain why in 1986 I am saddled with the job of chairman of two conferences simultaneously. Had the normal rotation of the conferences taken place it would be reasonable to assume that the meeting would be in Auckland in 1986 but I believe that a desire to promote a specialist meeting on Genetic Manipulation at Hanmer Springs led to a southerly change of venue. Also the Australian and New Zealand Society for Mass Spectrometry, which meets about every eighteen months — two years, expressed an interest in meeting in New Zealand in 1986 with Dunedin as a possible venue. We were faced with a problem. Is it easier to run two conferences at different times of the year, or should we have the two meetings arranged so that participants could attend both should they wish? Having made the decision to run the two virtually simultaneously the wisdom of that decision will soon be tested.

Those who have read the list of overseas plenary speakers must admit that we have the potential for an outstanding meeting. For the two conferences there are at least twenty such plenary speakers, each a specialist of international acclaim. To what do we owe our success in attracting these people?

In the past year or so there have been tremendous developments in the use of the new generation of nuclear magnetic resonance spectrometers in New Zealand and the installation or planned installation of six instruments. The manufacturers and their representatives have therefore recognised the conference as a rather special event, and have been extremely generous in combining to support four plenary speakers for a special one day symposium on Applications of Nuclear Magnetic Resonance Spectroscopy. These lectures, supplemented by contributions from New Zealand scientists active in the field, should ensure that Monday 25 August will be a day to remember for those with an interest in that field. It is an opportunity of a lifetime to hear and meet some outstanding contributors to the development and use of NMR spectroscopy.

In the week preceding the Conference there is to be a Symposium on Genetic Manipulation at Hanmer Springs, and the biochemists have managed to entice quite a large group of overseas speakers to vacate the healing waters and come on to Dunedin to contribute, in particular, to a special symposium on Molecular Evolution and Genetics. It is appropriate that this symposium should be held in Dunedin at a time when Professor George B. Petersen, Professor of Biochemistry at Otago, is President of the New Zealand Institute of Chemistry. Others will contribute to a special symposium to mark the retirement of Professor Howard after a long and distinguished career at Lincoln College.

The Australian and New Zealand Society for Mass Spectrometry has met once before in New Zealand, at Wellington in 1977. This is normally very much a specialist meeting of those dedicated to mass spectrometry. But the applications of mass spectrometry are extremely wide. It may be applied to problems in toxicology and pollution, in biochemistry and natural product chemistry, in highly sensitive analytical chemistry, and in medicine. What better opportunity is there to display the potential of mass spectrometry to possible users than at the annual assembly of NZIC and NZBS members. Again, excellent support from instrument manufacturers and representatives has enabled us to bring a distinguished team of plenary lecturers to Dunedin. When the organising committee initially asked several people if they would be free to come to Dunedin, in every case the answer was yes, we would be delighted. Unfortunately we have not been able to support all who had expressed an interest in attending, but rather than be left out some have raised their own funds. To them we are extremely grateful.

The task of the organising committee is to bring people together in an atmosphere which will provide discussion and fellowship among those of similar interests. We have done our best to achieve this and now it is over to the participants to seal the success of this the 1986 Combined Conference.

A. D. Campbell
Conference Chairman

LETTER TO THE EDITOR

NZCS Syllabus — A Reply

Sir,

A letter by G. Naish in the April issue of Chem. in NZ showed a disturbing lack of research and consultation before it was written. I shall consider here two of the subjects that were discussed in this letter.

The electrogravimetric method is still important for the analysis of copper and lead in brass, according to Colin Tapsell, chief chemist at McKechnie Bros. Ltd., New Plymouth. Up to ten analyses are undertaken each day at this brass foundry using this method, particularly on low-lead brasses. Two spark source AA analyses are done on each heat (i.e. up to fifty analyses per day, depending on the work load) from samples obtained before and during the pouring of each billet. This information was obtained from a short phone call to the Company.

The answer to; "— who uses black and white photography apart from journalists?" is obviously "scientists and cartographers". Consultation with a local DSIR photographer would readily provide this information. While one must admit that most photographers, both amateur snapshot and commercial (e.g. those specialising in portraits and weddings) use colour photography exclusively, there are few colour photographs published in scientific journals. One exception to this may be "Scientific American". Until results from copiers are generally accepted by journal editors, there will be a use for black and white photography in reproducing most diagrams and graphs. Also, there is a wider range of black and white films available (and of better definition) than of colour ones. I believe that it would be difficult to adequately discuss the chemistry of colour photography without mentioning black and white photography as both processes are based on reactions of silver salts.

Cecil B. Johnson,
Branch Editor, Manawatu.

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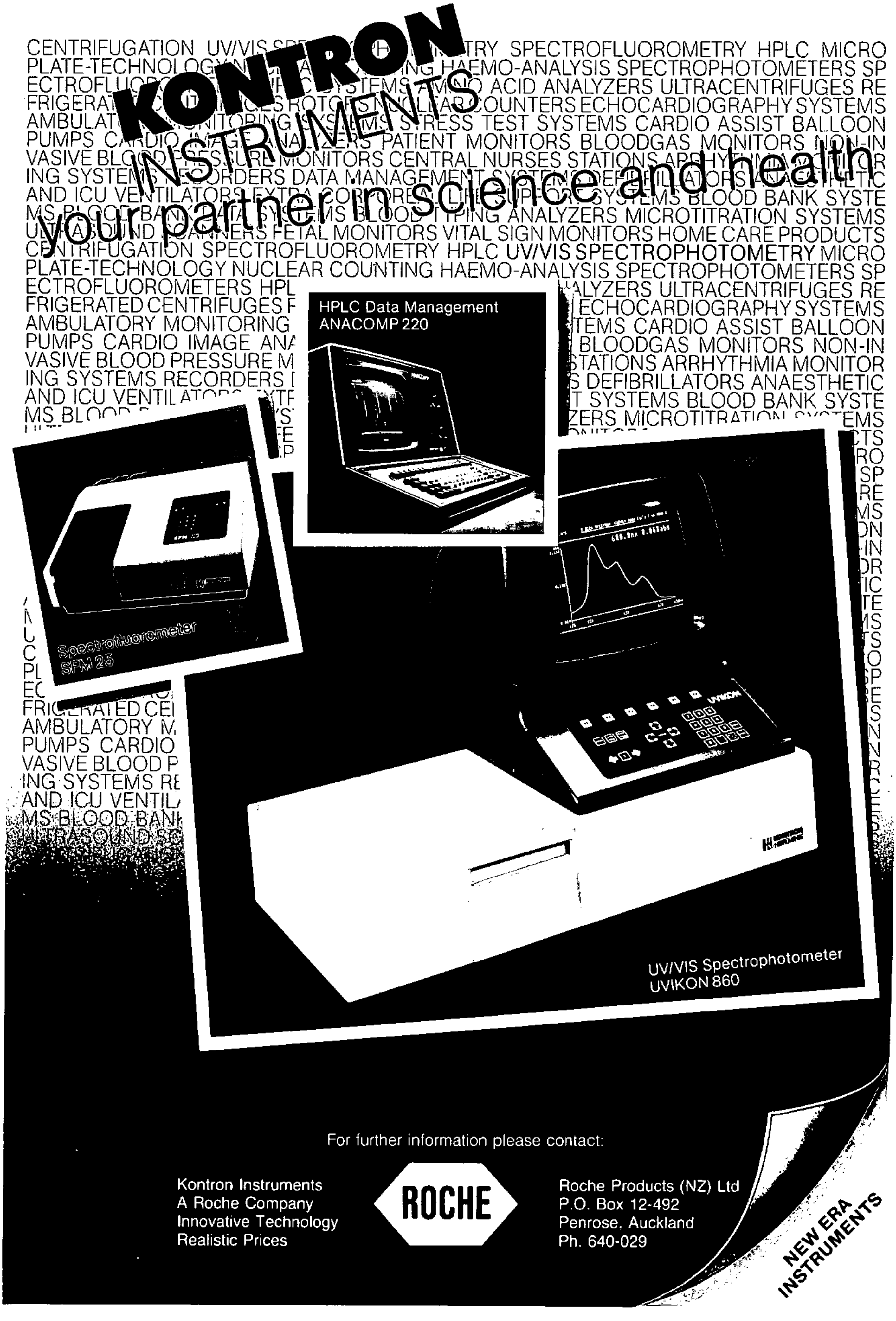

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NMR Pulse Sequences for Structural Studies: THEIR VARIETY AND VALUE

John Ralph and Sally Ralph
Forest Research Institute, Rotorua

John Ralph is a scientist in the Wood Chemistry group of F.R.I.'s Wood Technology Division. He received a BSc Honors (1976) in Chemistry from the University of Canterbury, New Zealand, and while in the USA on a National Research Advisory Council Scholarship, a PhD (1982) from the University of Wisconsin-Madison. His major research is on pulping chemistry, with particular emhasis on mechanisms of anthraquinone-catalysed delignification and on quinone methide reactions. He has been responsible for the purchase of two supercon NMR instruments, one at the U.S. Forest Products Lab and, more recently, the F.R.I. instrument on which the following work was done.

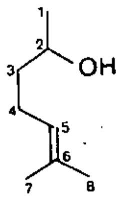
Sally Ralph is a technician in the Chemistry Group of F.R.I.'s Forest Health and Improvement Division. She received a BSc Tech (summa cum laude, 1980) from the University of Wisconsin-Platteville. Prior to entering New Zealand she worked as an organic chemist at the U.S. Forest Products Laboratories on natural products. At F.R.I. her main interest has been the identification and synthesis of Platypus apicalis aggregating pheromones.

Abstract
The NMR pulse sequences for homonuclear COSY, double quantum filtering, DEPT, carbon-proton J-resolved $^{13}C/^{1}H$ correlation, RELAY, and INADEQUATE experiments are illustrated using sulcatol.

Introduction

NMR has long been recognised as one of the most valuable structural identification tools for organic chemists. Its power is increasing rapidly as advances in hardware and software make multipulse experiments easily accessible.

The purpose of the present paper is to acquaint chemists with the type of experiments that are readily performed on modern FT-NMR instruments to extract structural information from compounds of interest. Only a handful of the hundreds of pulse-sequences and variants in existence will be mentioned — chemists are encouraged to explore other useful pulse experiments.



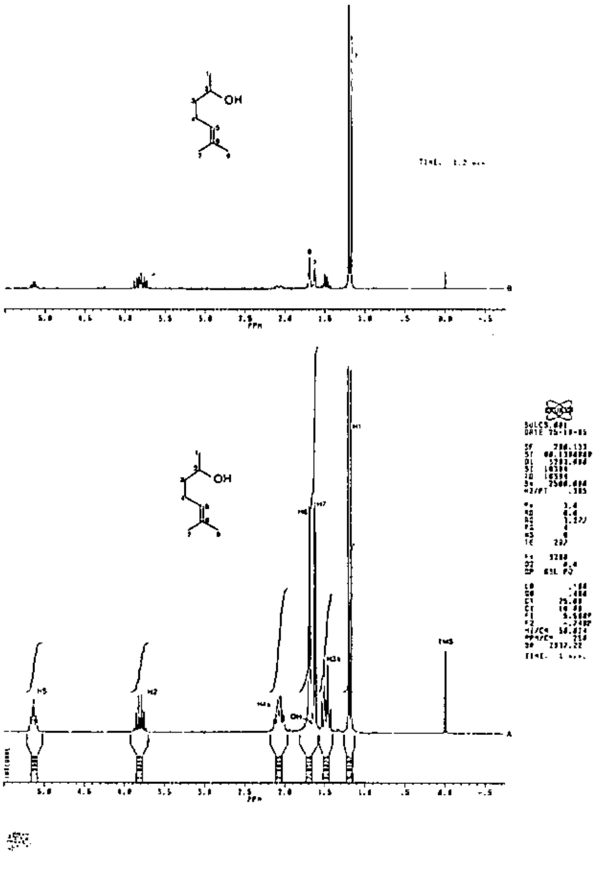
Sulcatol, **1**

A single compound, sulcatol **1**, was chosen to illustrate most of these techniques. This compound is of interest at the Forest Research Institute because of its presence in the aggregating pheromone complex of *Platypus apicalis*, a pin-hole borer. Although use of a single compound makes it easier to understand the way in which different experiments can contribute to building up a total structural picture it has the drawback that a chosen experiment may not be ideally illustrated using this compound. Where appropriate, the wider applications and limitations of a given experiment are discussed. For convenience, a selection of references are included, but this should not be considered a review. For an excellent review on modern pulse methods in high resolution NMR, see reference 1. Further detail on 2D experiments is available from reference 2.

Proton NMR Experiments

The standard proton NMR spectrum of sulcatol in $CDCl_3$, with assignments, is given in Figure 1A. It is clear that each proton or group of protons is well resolved although the protons H3 and also H4 are not magnetically identical and produce complex spectral patterns. The exchanging hydroxyl proton is broad and in the H7/H8 region. The unambiguous assignment of C7 and C8 methyl protons was made on the basis of experiments that follow.

Figure 1: Proton NMR spectra of 1 in $CDCl_3$. A. Normal proton spectrum. B. DQF spectrum with 7-Hz filter. Time: 1 min.



Proton 1-D Double Quantum Filtering[3] (DQF)

This simple experiment can be extremely useful even though the very mention of the word 'quantum' tends to turn away all but avid physical chemists. Basically a double quantum filter discriminates between coupled and non-coupled protons and allows coupled proton signals through while eliminating or suppressing signals from uncoupled protons. This means that solvent peaks such as uncoupled H_2O, HOD, dioxane, $CHCl_3$, DMSO or acetone singlets may be effectively removed by DQF experiments. The discrimination against singlets is especially valuable, for example, in the highly crowded methyl region of a steroid or triterpenoid, where methyl singlets and doublets overlap.

Although the utility is not well illustrated with sulcatol, the general effects of the experiment are clear from Figure 1B. The methyl singlets 7 and 8 are quite well suppressed while the methyl doublet, H1, remains intense. Residual signals from 7 and 8 arise primarily because these 'singlets' are in fact long-range coupled to H5.

In the DQF experiment, the coupling constants which can optimally pass through the filter are selected[3] (J ~ 7 Hz for the above methyl singlet/methyl doublet discrimination).

Proton-Proton 2-D Shift Correlation (COSY)

A 2-D COSY experiment gives, in a single experiment, all the information obtainable from a complete series of decoupling experiments, i.e. all pairs of coupled protons (that is protons which share a coupling J) are revealed. It is a remarkably robust 2-D experiment[5] and works reliably even if pulses are not set exactly. The number of possible artifacts in the spectrum is very small provided the system is at equilibrium before each sequence (hence the use of two or four dummy scans).

A simple COSY-45 spectrum of sulcatol is shown in Figure 2. A mixing pulse of 45° rather than the 90° pulse of the standard COSY experiment gives reduced diagonal peaks and is the favoured variant. For the reader not familiar with these 2-D spectra, start with H1 which is unambiguously assigned as the only methyl doublet. It is clearly correlated with H2 as evidenced by the correlation peak labelled (a). Similarly H2 correlates with H3 (b), H3 with H4 (c), H4 with H5 (e), and H5 with H7 and H8 (d) (due to longer-range allylic coupling). When the proton spectrum is well resolved, as is the case with sulcatol, it is sufficient to use even lower resolution — all the correlations are perfectly clear when 512 points are used in the F2 domain[6] and 128 zero-filled to 256 in F1.

Although the number of variations of this experiment are enormous, the most popular are:

1. Simple homonuclear shift-correlated 2-D NMR experiment: COSY, as in Figure 2, results in a symmetric matrix with shifts and couplings in both dimensions (F1 and F2)[6]; off-diagonal peaks correlate spins which share a coupling J. If sufficient resolution is used in the COSY-45 variant, relative signs of coupling constants can be deduced by direct observation of the COSY-45 spectra[2].
2. COSY with F1 decoupling: This results in a matrix in which the F2 projection is the normal proton NMR spectrum while F1 is a proton-decoupled proton spectrum; i.e. each proton or group of equivalent protons appears as a single peak, without coupling. Since it is physically impossible to actually perform a 1-D experiment where you acquire the proton spectrum while decoupling all the protons, these 2-D methods which yield decoupled proton spectra as projections are often valuable. However, they work well only for weakly coupled systems and, since extra pulses are involved, the experiment is more prone to artifacts.
3. COSY with DQF: COSY with double (or multiple) quantum filtering eliminates solvent peaks and/or discriminates between coupled and non-coupled protons.
4. Long-Range COSY. In the long-range COSY experiment, delay periods in the pulse sequence are chosen so that long-range couplings (ones greater than the normal 2- and 3-bond coupling interactions) are emphasised; i.e. protons coupled by long-range coupling also give rise to strong off-diagonal correlation peaks. In this experiment with sulcatol, the spectrum is similar to that of Figure 2, the only difference being the greater intensity of the correlation peaks (labelled d, Figure 2) between H5 and H7/H8 (4-bond coupling).

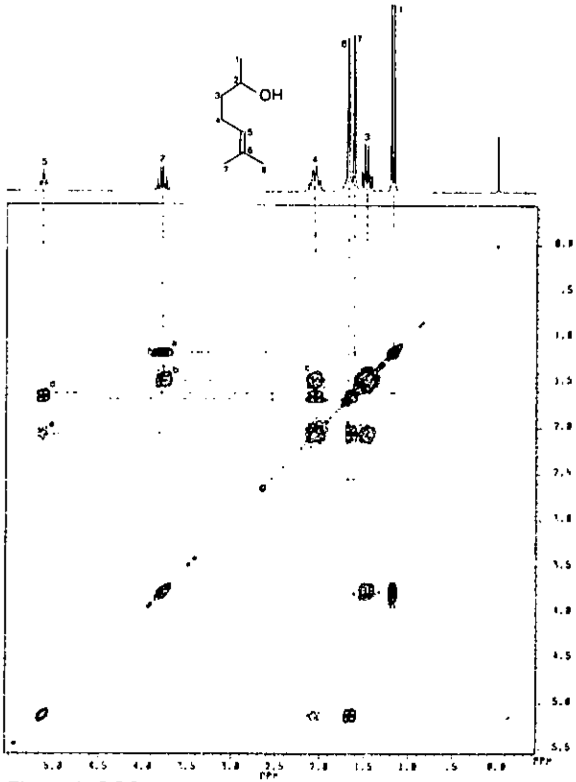


Figure 2: COSY-45 spectrum of sulcatol. (1024 by 256 zero-filled to 512). Time: 3.3 hr.

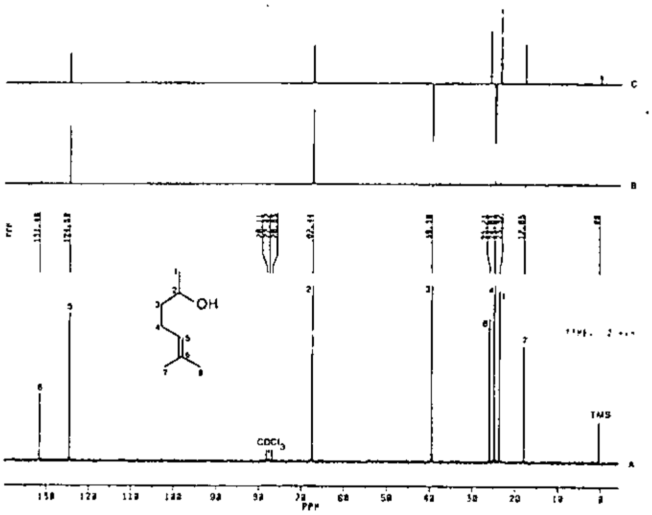
5. Others: Other sequences include simultaneous solvent suppression using presaturation, and a series of sequences which result in phase-sensitive spectra with[7] or without[8] DQF. Such sequences are particularly useful in analysing complex spectra since they provide good axial-peak suppression (which allows identification of cross-peaks very close to the diagonal) and improved spectral resolution. They are however more demanding on disk space. It is also possible to combine the COSY experiment with the NOESY experiment in a so-called CONOESY experiment and concurrently obtain information on protons which are near each other in space.

^{13}C and ^{13}C/^{1}H NMR Experiments

Standard and Edited Spectra

The standard ^{13}C spectrum of sulcatol **1** along with two DEPT spectra are shown, with assignments in Figures 3A to

Figure 3: ^{13}C spectrum, 32 scans, WALTZ-decoupled, 32K. A. Standard ^{13}C spectrum. Time: 2 min. B. DEPT-90 experiment — CH's only. C. DEPT-135 experiment — CH, CH_3 positive, CH_2 negative.



3C. Each spectrum is a result of 32 scans, using WALTZ rather than broadband proton-decoupling. Figure 5B is from the DEPT experiment using the variable multiplicity section ^{1}H pulse of 90°. This gives rise to an edited spectrum in which only carbons bearing a single proton (CH's) have significant intensity while other (C, CH_2 and CH_3) carbons are suppressed. It is instantly apparent that sulcatol contains two CH's. Figure 3C is from the DEPT experiment with a 135° editing pulse. This results in positive signals for CH's and CH_3's, CH_2's with negative intensities, and, since this pulse sequence transfers polarisation from the proton to the attached carbon, suppression of quaternary signals (carbons with no attached protons, e.g. C6). It is again instantly clear that sulcatol contains two CH_2's. There are also five CH's plus CH_3's (neglecting TMS at 0 ppm), three of which must be CH_3's (since Figure 3B shows two CH's).

The DEPT pulse sequence[9] is probably the most widely used for this type of spectral editing. It is less sensitive than the earlier INEPT sequence to differences in C-H coupling constants and to incorrectly set pulse angles and is consequently a very "forgiving" experiment.

There are many variations of DEPT spectral editing procedures. Linear combinations of DEPT 45°, 90° and 135° spectra can give essentially pure CH, pure CH_2 and pure CH_3 spectra. However, the information is adequately contained in three spectra; normal carbon, DEPT-90, and DEPT-135, as shown in Figure 3. The differentiation of CH_3's from CH's is often trivial and in practice it is often sufficient to run only the DEPT-135 variant (Figure 3C) to identify the CH_2's. Recently Pegg and Bendall[10] have published a nice variation which actually acquires CH, CH_2 or CH_3 spectra with little breakthrough from the other components. This sequence was found to work very well in our laboratories and is particularly valuable for mixtures.

Spectra containing only resonances from quaternary carbons can be obtained by a variety of techniques, the most popular being the method of Bendall and Pegg.[11]

Carbon-Proton J-Resolved

While the above DEPT sequences are excellent for determining carbon multiplicity (i.e. the number of protons attached to each carbon) and have completely replaced older methods based on single-frequency off-resonance decoupling, the ^{13}C-^{1}H coupling constants are not extractable from these spectra. It is possible, in favourable instances to obtain coupling constants from fully coupled spectra (i.e. spectra obtained without proton decoupling) but spectral crowding, long-range coupling, and second-order effects often make the determination difficult. Directly bonded (i.e. one-bond) C-H coupling constants are ideally measured by the 2-D carbon-proton J-resolved experiment.

A 2-D heteronuclear J-resolved spectrum is given in Figure 4A. The multiplicities (or number of attached protons) are quickly apparent (6 is C, 5 is CH, 2 is CH, 3 is CH_2, 8 is CH_3, 4 is CH_2, 1 is CH_3, and 7 is CH_3). Note that the F1 scale[6] represents J/2, not the full coupling J. The coupling constants can be measured directly off the 2-D contour plot but it is normal to make projections parallel to F1 through each carbon from which interpolation and measurement is easier.

^{13}C/^{1}H Correlation

One of the most useful of all 2-D experiments, ^{13}C/^{1}H correlation is a brilliant experiment which allows ^{13}C chemical shift data along one axis (F2)[6] to be correlated with ^{1}H data along the other (F1) via an INEPT-like polarisation transfer from ^{1}H to ^{13}C. An example is shown in Figure 5A. The correlation peaks (contours) in the figure show that C6 has no attached protons, H5 is attached to C5, H2 to C2 etc. It is from this experiment that the assignment of H8 and H7 can be made in the proton NMR. Although these two methyl singlets have very similar proton chemical shifts (and one would not confidently assign them from their shifts) the ^{13}C NMR chemical shifts are substantially different; C7, being *trans* to a proton is predictably at higher field than C8, *trans* to a carbon side chain[12]. Once C7 and C8 are assigned in the ^{13}C NMR, the correlations allow unambiguous assignments of H7 and H8 protons in the proton NMR.

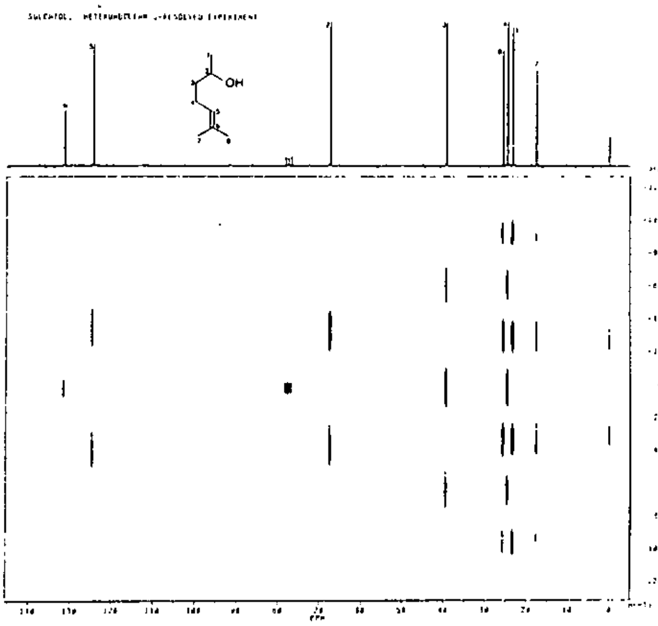
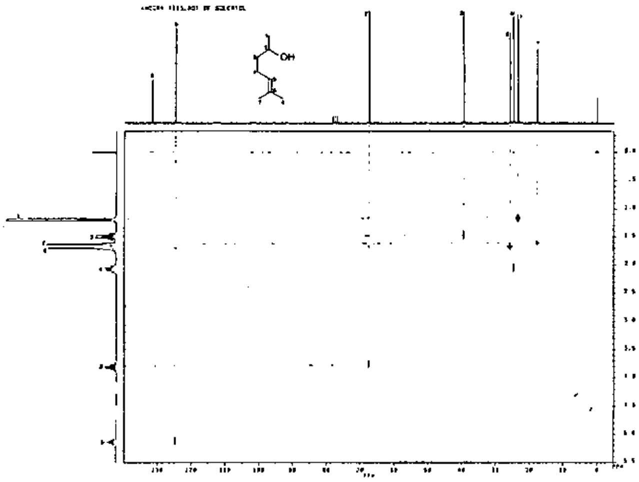


Figure 4A: 2-D Heteronuclear J-resolved spectrum of sulcatol (2K by 64 zero-filled to 128). Time: 2 hr.

The ^{13}C/^{1}H correlation experiment has a number of valuable features in addition to aiding assignment. Because ^{13}C resonances are sharp and dispersed over a large chemical-shift range, peaks seldom overlap in ^{13}C spectra of normal-sized molecules. Proton resonances however often overlap. Hence, the ^{13}C/^{1}H correlation experiment can be used to thoroughly disect the proton spectrum. Projections through the carbon peaks (i.e. parallel to F1) give proton spectra of only the proton(s) attached to that carbon. For sulcatol, there are no overlapping resonances so the projections (Figure 5B) are no more revealing than the proton spectrum itself (and are of course of lower resolution). With more complicated molecules where the proton NMR spectrum is far from fully resolved but the ^{13}C spectrum is well resolved (for example with steroids and terpenoids), the projections give a series of fully resolved proton spectra. They effectively separate out all the overlapping proton resonances, a feat which may not be achieved in a normal proton spectrum even at 800 MHz or more! Only protons which are tightly coupled and have close chemical shifts will not be fully interpretable.

As with the COSY experiment, there are numerous variations, some of which are exceedingly useful. Firstly, equivalent DEPT-like versions exist, and there is therefore the possibility,

Figure 5A: ^{13}C/^{1}H 2-D correlation. (1K by 512 zero-filled to 1K). Time: 5.3 hr.



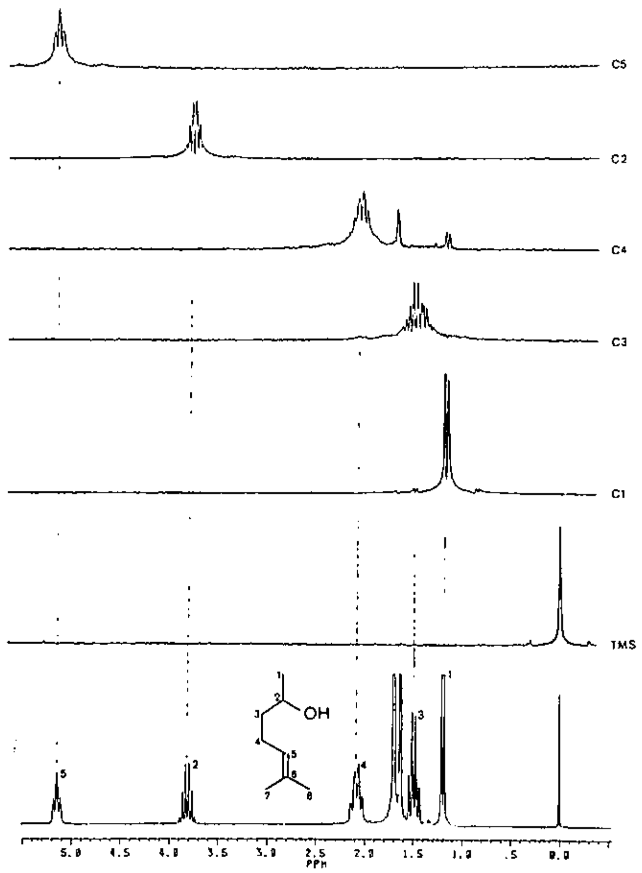


Figure 5B: Projections parallel to F1 through the indicated carbons in the 2-D $^{13}C/^{1}H$ correlation experiment.

by choosing the variable multiplicity selection pulse of a) 45°, b) 90° or c) 135°, of obtaining 2-D spectra with a) CH, CH_2 and CH_3's all positive (as for Figure 5A), b) CH's only or c) CH and CH_3's positive and CH_2's negative as for the 1-D DEPT experiments in Figure 3. A decoupled version gives a correlation map with the carbon spectrum (as normal) in the F2 dimension and a proton-decoupled proton projection in the F1 dimension Note that only couplings between spins not attached to the C3-H3 correlation peak. This procedure gives not only another method for obtaining the proton-decoupled proton spectrum but also enhanced sensitivity over the normal correlation experiment due to the fact that correlation signals are no longer smeared over proton multiplets.

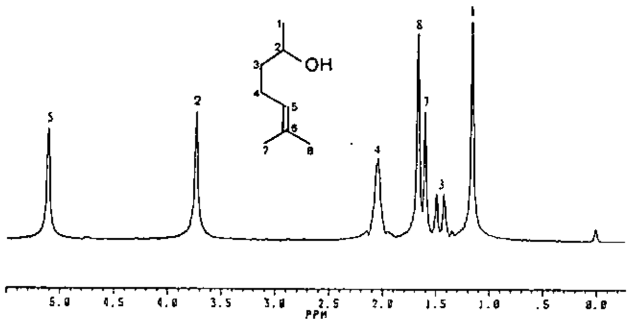


Figure 5C: F1 projection from proton-decoupled 2-D $^{13}C/^{1}H$ correlation experiment.

An exciting alternative to the above sequences for $^{13}C/^{1}H$ correlation appeared in the literature[13] as this manuscript was being completed. Reynolds *et al* claim enormously greater sensitivity and reduced accumulation times (as little as 10 minutes) to achieve similar results (with lower proton resolution) to the proton decoupled version of the $^{13}C/^{1}H$ correlation experiment. This new sequence should enable $^{13}C/^{1}H$ correlations to be run as routinely as normal spectra and is likely to become a welcome addition to the library of valuable pulse sequences.

By appropriate choice of delay times it is also possible to obtain correlations for long-range ^{13}C-^{1}H couplings. Such an experiment additionally gives valuable correlations with quaternary carbons (e.g. C6). Another experiment, RELAY gives H to H to C connectivity information.

These correlations from more distant protons can be valuable in determining carbon-carbon connectivities and often are ideal alternatives to the insensitive INADEQUATE experiments. The RELAY example shown in Figure 5D was far from optimised but even at this level gives the C1 to C2 connectivity as well as C4 to C5 and C3; C8 and C7 weakly to C5 (long range), C3 to C4 etc.

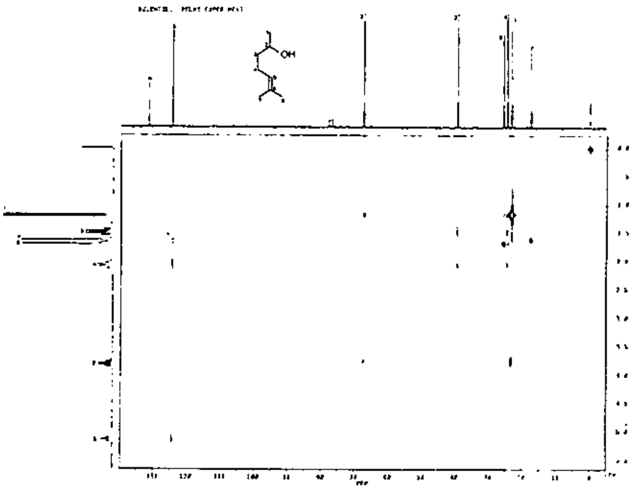
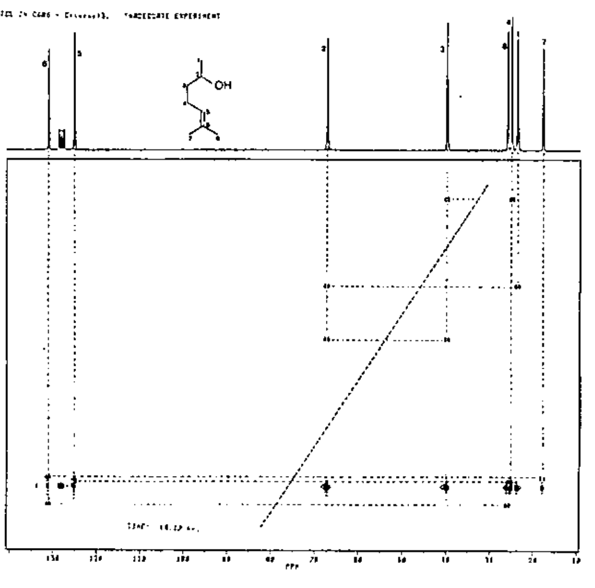


Figure 5D: $^{13}C/^{1}H$ Relay experiment. (1K by 512 zero-filled to 1K). Time: 5.3 hr.

Carbon-Carbon Coupling

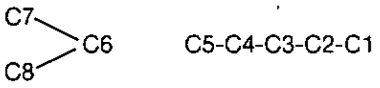
It is generally possible, by use of the preceding experiments, to obtain full connectivity information far more quickly than can be accomplished using the insensitive 1-D and 2-D INADEQUATE experiments. INADEQUATE experiments detect ^{13}C-^{13}C coupling and, since ^{13}C is only about 1% abundant, the sensitivity for this experiment is quite low. INADEQUATE experiments require either a high sample concentration or long data-accumulation times and are best for small molecules or those isotopically enriched with ^{13}C. However, they do yield unambiguous and straightforward connectivity information. The 2-D INADEQUATE experiment takes a little

Figure 6: 2-D INADEQUATE spectrum of sulcatol (1K by 256 zero-filled to 512). Note that the centers of each coupled pair all lie on a diagonal straight line (dotted). Time: 14.17 hr.



more time than the 1-D experiment but avoids the problems of overlapping lines and spectral congestion present in the 1-D spectrum of even a relatively simple molecule.

For the INADEQUATE experiment a 90% solution of sulcatol in benzene-d_6, containing a few milligrams of chromium (III) acetylacetonate (relaxation reagent) to reduce the recycle delay, was used. The INADEQUATE plot, Figure 6, shows nearly complete connectivity.



Because the delay time was chosen to compromise between the optima for sp^3-sp^3 and sp^3-sp^2 ^{13}C-^{13}C coupling constants (40 Hz), the C5-C6 correlation peak is not present; sp^2-sp^2 couplings are typically about 70 Hz.

Experimental

Materials: Sulcatol 1 was obtained from Aldrich Chemical Company and used without purification. For Carbon and 2-D experiments, a 25% solution in $CDCl_3$ was used.

Spectra: All spectra were run on a Bruker AC-200 FT NMR spectrometer equipped with a 5-mm ^{13}C/^{1}H dual probe using standard Bruker pulse programmes and software. The 90° pulse widths were: ^{1}H observe, 7.8 μs; ^{1}H decouple, 13.8 μs; ^{13}C observe, 8.3 μs. The INADEQUATE experiment was run on a 10-mm broad-band multinuclear probe. Some conditions are indicated in the figures.

Times shown on the figures are actual acquisition times but should not be considered minima or even representative — the signal to noise ratio is often far greater than is necessary. All Fourier transform times are less than 3 minutes with just an FT processor. An instrument equipped with an array processor would perform any of these 2-D transforms in well under a minute.

Further details, other experiments, and listings of acquisition parameters are available from the authors.

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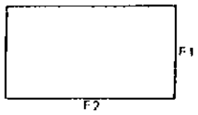
4. Since J-modulation is present in the resulting spectrum, processing is favoured by software which can easily perform resolution enhancements (e.g. sine-bell, sine-bell squared, or Gaussian) and a magnitude calculation.
5. See the work of Alex Bain and his use of the program "SIMPLTN" for examining pulse-sequence artifacts. A. D. Bain, Bruker Spectrospin (Canada) Ltd. CANADA. The PASCAL program SIMPLTN is available from the ABACUS Bruker Users Group.
6. The convention for 2-D spectra is



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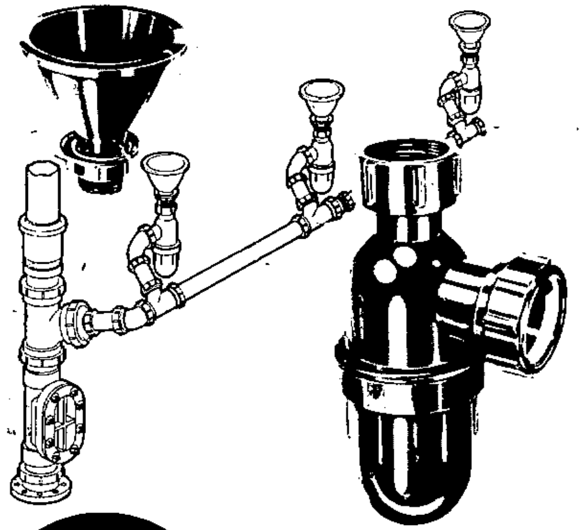

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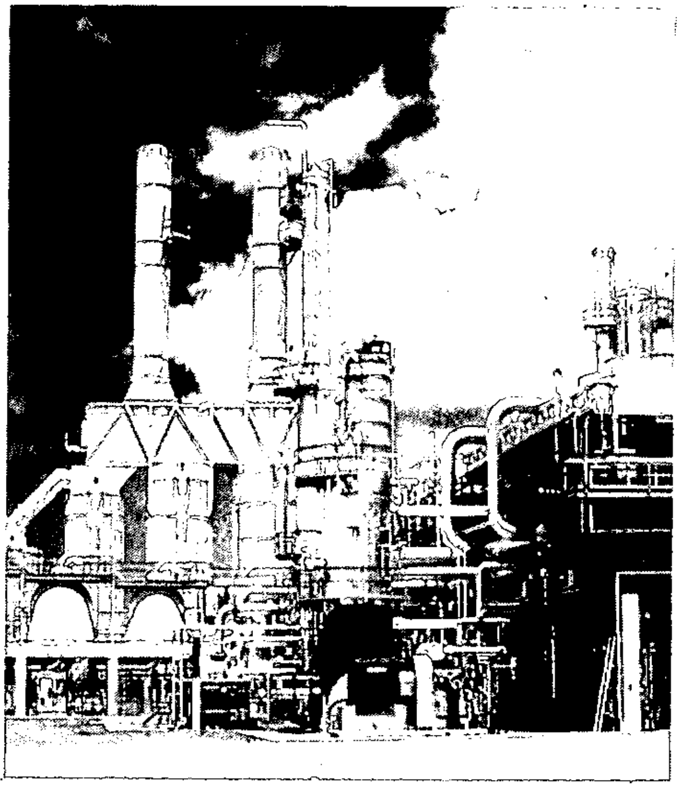

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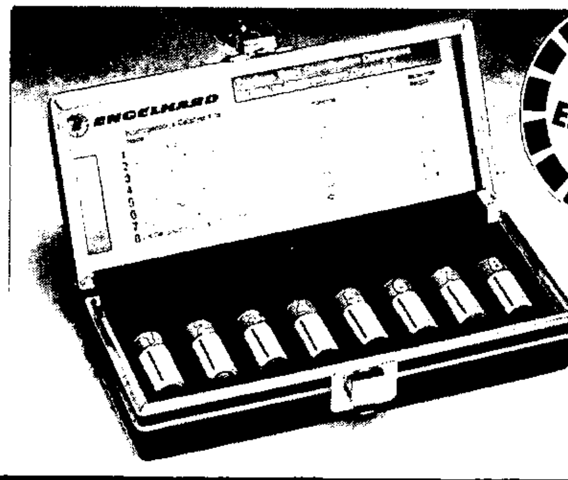

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LEAD IN THE ENVIRONMENT IN NEW ZEALAND

R. J. Ferrier, Victoria University, Wellington.

Since the question of environmental lead in New Zealand has often in recent years burst out in public rash-like, and has been dealt with in many articles in the scientific and public press, readers can be excused for asking "why another rehash, and is there anything new?". Perhaps the recent completion of a report by a Royal Society of New Zealand Reviewing Committee, who carried out what was intended to be a comprehensive survey of the subject under the above title, offers a reason for responding to an invitation to revisit the topic, and I may be able to bring to attention some newer aspects which may not yet be well known.

The 130-page Review discusses general features of lead as an environmental pollutant and its biological effects, and then covers all the 80 or so papers which have been published from New Zealand laboratories, as well as some unpublished material. This brief survey (the fully referenced Review is available from the Royal Society of New Zealand at $12) aims to outline the main features of the Review and to indicate the conclusions to which the Committee came. These briefly are: that the situation with regard to lead pollution in New Zealand should not, with some exceptions, give cause for alarm; neither, however, should it be treated with complacency, and every effort should be made to remove all dangers associated with lead and its compounds in the environment. The Committee feels unanimously and firmly that health should be given the benefit of any real doubts and that New Zealand is not as clean as it should be; some members of the community are at risk. Nevertheless, even being immersed in the subject for about a year, has not blinded the Committee to the fact that we are thankfully not yet in the land of the long black cloud.

Council of the Royal Society of New Zealand, at the invitation of Mr Tizard as Minister of Science and Technology, undertook to have the subject reviewed and asked the following to attend to the task: Dr R. B. Davis, Director, Applied Maths Division, DSIR; Prof. I. R. Edwards, Director, MRC Toxicology Unit, University of Otago; Mr D. M. Fergusson, Principal Investigator, Christchurch Child Development Study, Christchurch Clinical School; Dr R. D. Reeves, Reader in Chemistry, Massey University; Prof. P. J. Scott, Head of Department of Medicine, University of Auckland; Dr C. D. Stevenson, Dominion Analyst, Chemistry Division, DSIR. I was asked to convene the group. We did not represent — and for good reasons — the front-runners in lead research in the country; we did, however, include people with direct expertise and others with ranges of experiences of the kinds needed to cover such a complex topic. Some of us were "outsiders". From the outset we were well aware that we were entering "hot" territory, but we did not expect it to heat up quite so far so quickly. Criticism of our appointments was immediately released to the Press, and correspondence received referred to our "political masters" and "whitewashes", but quite the best prose was used to describe the Committee as having been "conceived in ignorance, suckled in prejudice and nurtured in obstinacy". We thought scientists were fair-minded and objective and I, for one, was left to wonder sadly and a little sorely about some scientists' perception of science, other scientists, and the senior scientific body in New Zealand. We, as a Committee, are content now to be judged on the basis of our Report.

Sources of Lead in the Environment

The source which has caused most concern although, other than in unusual circumstances, it has not resulted in overt over-exposure, is of course lead in petrol. Tetra-alkyl derivatives have been used for 60 years to enhance the octane rating of fuels and hence reduce the costs of petrol refining. In New Zealand the annual rate of usage of lead in this way was about 1700 tonnes until reductions were recently introduced.

Vehicles emit the majority of the petrol lead in the form of fine highly mobile particles of oxides and halides (derived from organo-halides used in the petrol to inhibit the deposition of oxides within the engine), and also lesser amounts of uncombusted organoleads in the vapour phase. Air lead levels are highest above roads and they fall off rapidly with distance — levels at about 50m range being a quarter of the road values. The lead is both dispersed — a proportion over long distances — and deposited, and again deposition falls off rapidly with distance, but the exact pattern is not known. From overseas data it could be assessed that perhaps 10-20% of petrol lead falls within about 100m of roadways and some, perhaps as much as half, is dispersed and deposited over large distances — including outside the country. On a global basis petrol is the source of about 90% of atmospheric lead, and it has resulted in the covering of all parts of the Earth with a surface layer of lead-bearing deposits.

New Zealand has just seen the first major reductions in the use of lead compounds in petrol. As from the beginning of July levels in both Regular and Premium petrol were lowered from 0.84 g/L to 0.45 g/L. In addition, at the beginning of 1987, lead-free Regular petrol made partly from synthetic fuel will replace leaded Regular and these steps, together with the moves already taken to lead-free CNG and LPG, mean that an overall reduction in the use of petrol lead of about 60% will have been achieved. The above steps follow Government planning as announced shortly after the change in Government in 1984, at which time the intention to further reduce the lead content of Premium petrol to 0.15 g/L by 1990 was indicated. A main point of our Report emphasises that this intention is not at this stage backed by any specific planning, and we recommended that firm planning be initiated. Most developed countries now use lead in petrol at the levels of 0.4 g/L or 0.15 g/L (or, in some cases e.g. USA and Japan, very much lower), and there is a general trend towards reduced levels driven by both the direct health-related factor and the incompatibility of leaded fuel with the catalysts of catalytic converters where they are in use.

Paint — or particularly old paint — is the other major worrisome and specific source of environmental lead. The health hazards associated with lead-based paints have been recognised for decades, but nevertheless they were widely used in house painting for the first half of the century. Traditional pink primers commonly used until about 20 years ago comprised mainly white lead (basic lead carbonate) and red lead (an oxide mixture), while white lead was the major pigment employed in top coat paint till 1945, since when it has been replaced by titanium dioxide. Other salts, including the sulphate (white) and chromate (yellow) have also been used as paint pigments and, in addition, organolead derivatives have found favour as drying agents in oil-based paints.

In New Zealand the use of "white lead" in paints has been banned, the sulphate is no longer in use (although it is not banned), and red lead wood primers are also no longer employed. On the other hand, steel primers with large proportions of red lead and galvanised steel primers containing calcium plumbate are still used for reasons of cost effectiveness. The paint industry also manufactures "lead chromes" for use as light-fast yellow, orange and red paints particularly for the car industry, and oil-based paints may still contain lead, often as naphthenates, as drying agents.

About a quarter of New Zealand's million or so houses are clad in timber carrying some leaded paint, and in any year perhaps 5000 of them are extensively stripped by scraping,

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burning or sanding. It is these old properties which represent a health hazard, either to inhabitants exposed to the old crumbling paint or to dust or fumes produced in the course of the stripping. This is quite well recognised and, for example, the Department of Health has played a part in advertising the dangers, and the Housing Corporation provides appropriate advice to people entering old properties with their financial support. Nevertheless, there have been an appreciable number of instances of poisoning associated with old paintwork, and especially with its removal. Sandblasting is particularly dangerous causing perhaps 50-150 kg of lead-rich paint to be converted into finely divided forms and then distributed, not just throughout the house but into wall cavities (which represents a reservoir for ongoing contamination) and also over surrounding garden areas to distances of several metres.

Sandblasting is in consequence highly dangerous and has effectively ceased, following its use for a few years in the late '70s and early '80s. Extensive sanding is also dangerous, and several cases of severe poisoning of workers, inhabitants and their pets have been recorded. The recommended way of stripping extensive areas of timber carrying lead-based paint is with hot air or radiated heat from an electric stripper.

There are risks of over-exposure to workers and of environmental pollution associated with industries which handle lead or lead-containing metals. Awareness of the need to control exposure to lead and its compounds in the work-place is longstanding in New Zealand, the Lead Process Regulations having been drawn up in 1950. In 1982 the Departments of Health and Labour produced guidelines for the protection of lead workers in a booklet entitled "The Control of Lead at Work" and, at least as far as the major users are concerned, we conclude that control is tight. For example, each of the three lead-acid battery manufacturers in the country has appointed a medical officer and a full-time occupational health nurse, and each carries out its own air and blood lead monitoring. Levels of blood lead in workers are determined before work is commenced and at regular intervals, and "action" and "suspension" levels are enforced. Each of the associated smelters is required to use a bag filter to control flue effluents and to monitor effluent gases, and trucks entering the sites are washed to inhibit the spread of lead-bearing soils and dust. It appears to us, therefore, that these aspects of the operations are carefully controlled, but we did not learn that effluent water is adequately pure to prevent environmental pollution, and consequently river sediments around the factories are considerably contaminated with lead. In one case, at least, efforts to rectify this problem have had beneficial effects.

Transmission of Lead to and its Effects on People

Air, dust, soil and water are the media by which environmental lead is transmitted to people, and plants and animals may serve as links in that they form mankind's foodstuffs. The best estimates available indicate that food represents the source of just over half of an urban adult's intake and that air is the next most important source. For young children the food proportion is roughly unchanged, but dust and soil are very important sources also.

Several attempts have been made to determine the proportion of lead intake which is derived from petrol lead, including a very interesting experiment carried out in Turin in 1974-1980 when the ratio of $^{206}Pb/^{207}Pb$ used in petrol was altered for the purpose. The results of the different analyses are variable, but it seems now to be generally accepted that 30% can be taken as a reasonable minimum figure.

The effects of overt over-exposure to lead in humans are dramatic whether the poisoning is acute or chronic. In the former case they include nausea, vomiting, abdominal cramps, anorexia, insomnia, mood disturbance and co-ordination loss, and may progress to coma and death; survivors of severe poisoning frequently exhibit permanent brain damage. On the other hand, early symptoms of long term poisoning at lower levels include headache and loss of energy which may progress to internal disturbance, anorexia and constipation. Anaemia then develops together with damage to the peripheral nervous system causing lack of co-ordination and reduction in the sense of touch. Children first show irritability and clumsiness together with behavioural changes.

Probably the main initiating biochemical reaction which results in the observed effects is the binding of lead ions to the thiol groups of the cysteine components of proteins — especially enzymes important in, for example, haem synthesis and neurotransmission.

Effects are felt by specific organ systems. Electrocardiographic changes have been correlated with lead-induced inhibition of haem synthesis, but of greater potential effect on the cardio-vascular system is the evidence linking chronic lead exposure to progressive elevation of blood pressure. This evidence, however, is controversial, but the U.S. Environmental Protection Agency have accepted it and have assessed the financial benefits of reducing lead in petrol as enormous consequent upon the influence this will have on hypertension and its medical and social effects.

Lead accumulates throughout life in the kidney cortex, the bone and in teeth, and although kidney damage can result, these more frequently act as reservoirs from which levels in soft tissues can be maintained should overall exposure to lead be reduced. Changes in nerve function follow over-exposure to lead, and at high blood lead levels encephalophy and cerebral damage can ensue — especially in children.

The question arises, and it is a key question in the assessment of environmental lead, as to whether low levels of exposure cause small effects of the above kinds, and the issue of possible effects on the brains of children is paramount. We have been able to find no evidence that there is a threshold below which lead can be considered non-toxic to humans, and the limited available direct evidence, e.g. that relating the effects of low lead levels to the electrical activity of the brain, indicates the absence of a threshold. This and the suggestive findings of ten major studies of cognitive and behavioural functioning in children with different body lead burdens have persuaded us that it is wisest to assume that low-level lead exposure (of the kind to which urban children in New Zealand may be subject) does have subtle harmful effects.

Environmental Lead Levels in New Zealand

To assess the type of exposure to which New Zealanders are subject it is now necessary to look at analytical data on the levels in the media by which lead is transmitted to people i.e. air, dust and soil, water and food.

New Zealand's air is, of course, of high quality when the country as a whole is considered, and this is important to some extent directly, but more significantly in the context of the probable lead levels in food (which at various stages of production can be contaminated) and hence human exposure to lead from food. What is of major significance, however, is the air quality in the population centres.

The most extensive studies have been carried out by the Department of Health who in 1983, following studies over several years of air in Queen St., Auckland, established a "national lead in air monitoring survey" of twelve sites selected to indicate the exposure to which New Zealand urban dwellers are subject. The results show strong seasonal trends with relatively high levels being recorded in calmer winter months and averages over the May-July quarter being almost double the annual figures. For reference it should be noted that the USEPA standard and an EEC directive limit are 1.5 $\mu g/m^3$ (averaged over 3 months) and 2.0 $\mu g/m^3$ (annual average), respectively. Some of the 1984 New Zealand data (annual and May-July averages) are as follows: Mt Eden, Auckland, 0.3, 0.6; Palmerston North, 0.2, 0.3; Naenae, Lower Hutt, 0.2, 0.2; Dunedin South, 0.4, 0.8 $\mu g/m^3$ and these compare with levels in air from comparable residential locations overseas and are well below the international limits. When, however, inner city working condition and near motorway air levels are considered it can be seen that these limits are approached or significantly exceeded: Queen St, Auckland, 1.4, 1.7; Manchester St, Christchurch, 2.0, 3.1; Ellerslie, Auckland, 2.2, 3.1 $\mu g/m^3$. The Ellerslie site beside the Southern motorway is particularly noteworthy because 70 residential properties were observed in the vicinity which were as close to the motorway as was the monitor. It would be expected that the recent reductions in the levels of lead used in petrol would reduce all of these air lead values by almost half, but even then the largest of them would be close to the US limit.

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The above data relate to particulate aerosol lead which is measured by air filtration methods. In addition, however, air contains tetra-alkyl leads which are emitted from petrol vehicles in unchanged form. Typically these represent about 10% of city air lead levels, and in the only pertinent study so far reported New Zealand gave results which were comparable with overseas levels: Auckland (Queen Street), aerosol lead 1.56, volatile lead 0.14; Los Angeles street (1977) 1.79, 0.10; Antwerp Street (1980) 0.66, 0.14; Leigh (Northland) 0.023, 0.007; Lancaster (coastal, 1980) 0.17, 0.019; Outer Hebrides, 0.009, 0.003 $\mu g/m^3$.

Typically soil lead levels are below 40μg/g, but these can be appreciably enhanced by contamination from mining or other industrial activity, from old paint or from vehicle emissions. New Zealand's only lead mine operated until 1973 for about a decade during which there was some localised dispersion of lead-rich dust and, similarly, soils in the neighbourhood of some industrial plants which use lead have been found to contain elevated levels. In one study dust-contaminated vegetation collected 150m from an Auckland battery factory was found to contain 1000-3000μg/g, but these situations are well recognised and the hazards are localised and not of major concern.

The next source of lead in soil i.e. old paintwork is also localised, but now this issue is of appreciable concern because of the number of instances and the closeness of the contamination to people — especially children who may play in the contaminated soil and ingest lead via dirt. Lead levels in soils and dust around older housing reflect the use of lead-containing paints, and around houses painted (perhaps several times) with these paints can contain lead at levels exceeding 1000 μg/g. The removal of such paints by weathering or scraping, burning or sandblasting can make massive further additions to the lead content of surface soils within several meters of the buildings, and this is reflected in the corresponding household dusts. In one study normal lead levels were found in soils underneath affected houses but the house dusts were highly contaminated (400-1730 μg/g). There is thus a clear correlation between lead levels in soils and housedust and type of housing. Dusts produced by sanding old houses are a major health hazard (see below).

Urban houses which are free of leaded paint may also contain dust with considerable lead contents; in two studies average figures of 220 and 460μg/g were recorded, and of this it is estimated that 90% is of automotive origin, partly from direct deposition of emitted petrol-based aerosols and more from remobilisation of lead-rich roadside dusts.

Roadside dusts from urban situations in New Zealand have been found to contain 400-10,000 μg/g lead, whereas such dusts from rural roads have concentrations close to those of normal soils (10-50 μg/g). Lead levels in soil samples taken beside rural roads are strongly dependent on traffic densities and wind direction, on distance from the roads and on depth of sampling. Since there is little tendency for downward transport high levels are found on the surface and consequently it can be concluded that lead is accumulating in such situations. Surface soils 10m from highways carrying 5000-50,000 vehicles per day have shown mean lead levels of 200-3000μg/g. Similarly, levels up to 1000μg/g dry wt. have been found in the bark of trees and in plant leaves grown beside highways, and in verges 20m from roads plant levels may be 10-100 times the levels for the same species 100m away.

In rural circumstances relatively large proportions of lead emitted from cars appear to accumulate in the soil within metres of roadsides, but in cities it gets into city dusts, which during rains are cleared by way of the sewers and storm drains, and settles in the sewage sludge or at the outfalls of the drains. Sewage sludges with up to 570μg/g lead have been measured in New Zealand, but part of this will be attributable to lead from industrial discharges. Particulate material in stormwater has been found to contain 900μg/g and in sediments at stormwater/sewage fallouts up to 6740μg/g (Pencarrow, Wellington). This, no doubt, contains a substantial industrial component; and the 900 μg/g found in Kaiwharawhara (Wellington Harbour) sediments probably reflects better the effects of accumulated petrol-contaminated dusts.

Water is a negligible source of human lead intake in New Zealand because natural water levels are well below accepted limits, lead piping has never been used for water supplies, and the Department of Health requires that capillary-soldered pipe fittings use lead-free solders. Lead can dissolve from PVC piping; but only a tiny fraction of surface material is available for leaching and it is removed after short periods of service.

The upper limit for permitted lead intake from all sources set jointly by the Food and Agriculture Organisation and the World Health Organisation in 1972 is 430 μg/day, and 1978 and 1985 estimates of lead in typical New Zealand diets were 412 and 316 μg/day suggesting that we are inappropriately close to this limit. This, however, in the view of our Committee is not so, because we believe the estimates to contain appreciable positive errors largely because of the difficulty in determining very low lead levels in food materials and the use of methods with relatively high detection limits. Most recent figures based on very sensitive analytical procedures from USA and UK suggest that intakes are well below the set limit, and if this is so in these countries there is no reason to suspect that current levels in New Zealand will be higher. We are advised that the next New Zealand survey will be carried out with methods which will provide a more realistic assessment of the actual situation.

An interesting feature of lead intake from the diet is that relating to the contribution derived from canned foods. New Zealand played a pioneering role in the removal of lead-soldered seams in food cans, which since 1981 (1973 for baby foods) have been largely replaced by welded-seams, and less dietary lead is therefore now coming from this source both for this reason and also because plastic-lined cardboard containers are to some extent replacing cans.

Lead in People and in Animals

Although knowledge of environmental lead levels is important for the assessment of human exposure and the consequent risks involved, of more significance from the public health point of view is an appreciation of the body burdens of the population generally and of exposed people in particular.

The most comprehensive study of blood lead levels in New Zealanders has been carried out at Princess Margaret Hospital, Christchurch, and although it does not represent a truly cross-sectional analysis of the population, there were enough inbuilt safeguards to persuade us that the dramatic trends indicated are real. Within the decade from 1974 average blood lead levels for males 17 years and over dropped by 40% from 20 to 12 μg/100 ml, and there were analagous reductions at slightly lower levels for females and for children over 9 months. Levels for infants did not change. The current average level for males is 10.4 μg/100 ml which is very similar to the most recently available comparable British and American figures.

Decreases in blood lead levels have been noted in both Germany and USA following the reduction in lead levels in petrol, but over the decade in question petrol lead usage has remained effectively constant in New Zealand, and therefore the reductions have to be attributed to improvements in lead control in the workplace, to better handling of old leaded paint and, particularly we feel because they would have more general effects on the population, to reductions in the use of canned foods and the removal of lead-based solders from the cans. In this context it seems relevant that from 1974-1984 blood lead levels in infants remained constant and that lead solder was removed from their food cans prior to this time.

It is now pertinent to ask the question "is there evidence that lead levels in the body in New Zealand are causing adverse health effects?" and it is not easy to find a definitive answer especially as there is no threshold of exposure or of blood lead levels below which lead can be taken to cause no damage. A very recent study reporting blood lead levels for 579 eleven year old Dunedin children reported an arithmetic mean of 10.8 μg/100 ml with a range of 3.8-48 μg/100 ml. Only 10 children had levels above 22 μg/100 ml and of them 9 had been exposed in their homes to paint stripping activity. In Auckland 15 children living near the Southern Motorway were found to have average levels of 19.9 μg/100 ml which is markedly in excess of the expected figure, but at this stage the enhancement cannot be safely attributed to exposure to petrol lead because knowledge was not available to us on the possibility of their having been exposed to other sources of lead (and old paint would be the primary suspect). Whatever the cause, the Department of Health are correct in planning to pursue the matter. The single study so far completed to assess possible relationships between body lead burden and measurements of intelligence, reading skills and behavioural factors was also carried out on the Dunedin eleven-year-olds, and found a slight but statistically significant correlation between the blood lead levels and the behavioural factors after confounding variables had been allowed for.

Lead absorption (blood lead levels above 56 μg/100 ml for adults) is a "notifiable disease", and the following numbers of instances were reported on the general population to the Department of Health in recent years: 1980, 1; 1981, 4; 1982, 2; 1983, 6; 1984, 9. It is clear that the great majority of cases notified were associated with old paintwork, and especially its removal, but other instances have resulted from drinking fruit juices which had been stored in lead-containing glazed ornamental jugs and from petrol inhalation. Data on the role played by petrol-based lead in this context are somewhat surprising, and we are not aware of any cases of very high blood lead levels which are directly attributable to this source (other than in instances of petrol sniffing). A survey of industrially exposed workers, again carried out at Princess Margaret Hospital, Christchurch, revealed that people exposed to vehicle exhausts and to petrol fumes (pump attendants) showed no significant blood lead enhancements. In contrast, however, several groups of industrially exposed people showed appreciably elevated levels — e.g., scrap dealers, muffler and radiator repairers, panelbeaters, spray painters and several others.

Some very significant results were obtained following the grazing of sheep for 6 months along a roadside verge (5,000 vehicles/day). Their bone, kidney cortex and liver contained very significant lead levels (30, 150, 20 μg/g, respectively) while control levels were below 1 ug/g in each case. Removal of the sheep to a remote area for 6 months caused appreciable lowering of lead levels in most tissues except bone, but such were the initial elevations that levels in most tissues would not return to background levels during the remainder of the animals' natural lives. Blood lead levels rose from average figures of 20 μg/100 ml to 90 μg/100 ml and then slowly subsided without returning to the initial levels in 6 months. Fortunately, muscle tissue does not accumulate lead to the same extent as do the kidney, liver and bone.

Conclusions

The Committee's conclusions are that, in specific situations, as indicated above, there is too much lead in the New Zealand environment, and that in some it is accumulating. We accept that there is a possibility that some people — especially sensitive children — may be suffering slight health impairment, and we note that there are no thresholds below which the acceptedly toxic lead is known to be safe. We therefore support the steps that have so far been taken to reduce lead usage in petrol, to control the use of leaded paints, to diminish health and pollution factors associated with lead in the workplace, and to remove lead-soldered seams from food cans. In the first three areas however — and the first remains a particular concern — we feel further steps can and should be taken. We retain these views despite the reductions which have occurred in population blood lead levels.

Our conclusions are based entirely on health considerations, but we also feel that tourism and aspects of the export industry could be adversely affected if New Zealand does not have clean air and does not send 100% of its food exports in an acceptably lead-free condition. At least until we have a clean environment we would be wrong to advertise it as such.

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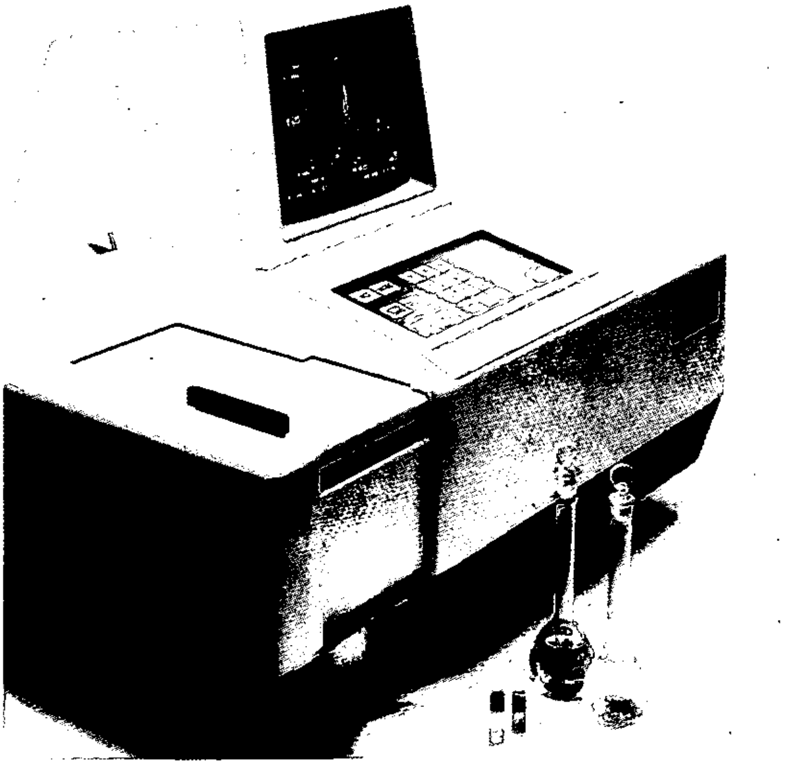

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NZIC ANNUAL REPORT 1985-86

On behalf of the Council we have pleasure in presenting the Annual Report for 1985-86.

Introduction. The election of the Principal of Riccarton High School, Terry Hitchings, as Vice-President illustrates NZIC's growing involvement with Chemical Education in schools. To extend the scope of the Chemistry Syllabus Committee formed in 1981 Council established the Chemical Education Committee in Wellington and the Chemistry Syllabus Committee in Hamilton. Council, through the Waikato Branch, assisted Mark Perkins of Cambridge High School with the NZIC Chem 13 News examination competition which he began in 1980 at Nayland College, Nelson. Council also assisted all three pupils of Riccarton High School who won the 1985 ICI New Zealand Science Fair Premier Award to attend the International Science Fair in San Diego, USA. Council continues to fund Chem NZ — the Newsletter of the NZIC Chemical Education Group — published since 1978.

Council plans to make the first election to an award for Chemical Education for teachers in Secondary Schools in 1986. A Chemical Education trust fund is under consideration for promoting the teaching of Chemistry in Secondary Schools.

It is pleasing to note a greater increase in membership this year. However, 41 is still too few. Recruitment of chemists qualified to join NZIC is of continuing concern to Council, as was noted by Alan Mackney last year, and the brochure about NZIC is to be upgraded. A recruitment package was designed for distribution at Branch meetings in July 1986 and Branches are asked to make recruitment a regular feature of their programmes.

The Finance Committee established in February 1985 held two meetings to review Council policies and their future funding. Since 1975 regular increases in subscription have steadily raised NZIC accumulated funds. Despite inflation, economies have allowed Council to budget for $3000 annually for students to attend conferences, $3000 for the Prince and Princess of Wales Award Scheme, the NZIC-RACI Visiting Speaker Award, the Chemical Education Award and to provide members with a Yearbook containing a List of Members as an issue of the Journal.

To provide for the continuation of current services to members in the 1990's when changes in, and increased cost of, our secretariat are anticipated, Council has accepted the recommendation of the Finance Committee to start a "development fund" with $30,000 from present reserves and from 1986/87 an annual addition of at least $5 per member above the grade of Student Member. Consequently subscriptions will rise over 20% to cover GST and inflation as well. The new rates remain modest as professional body subscriptions go.

Prizes. Institute Prizes were awarded as follows:

ICI Prize. Dr J. M. Coxon, University of Canterbury.

Shell Industrial Chemistry Prize. Mr R. G. Stewart, Drs C. T. Page and A. J. McKinnon, Wool Research Organisation of New Zealand.

Chemical Essay Prize. Mr R. M. Hartshorn, University of Canterbury.

Student Paper Prize. Miss V. Sumpter, University of Otago.

Chemistry V AAVA Prize. Miss V. L. MacMillan, Whangarei.

A. C. Kennett Memorial Award. Mr S. Witorek and Mr F. W. Kolodziej, Australian Iron and Steel Pty Ltd, Port Kembla. (This Award is co-sponsored with the Australasian Corrosion Association).

NZIC-RACI Visiting Speaker Award. Professor B. J. Welch, Department of Chemical and Materials Engineering, University of Auckland, will visit Australia in 1986.

Conference — 1985. The Institute thanks Dr Bill Swallow (Chairman) and Dr Peter Harland (Secretary) and the Committee for organising a joint Conference with the NZ Biochemical Society and NZ Association of Clinical Biochemists at the University of Canterbury 26-30 August.

The theme of the Conference "Chemistry becomes Computerised" was illustrated in many of the papers presented as well as at the computer workshops supported by companies represented at the trade display.

Poster sessions, the Easterfield address by Dr Tom Brittain, a Symposium to mark the retirement of Professor Vaughan and a Seminar on the changing role of forensic science organised by the NZ Forensic Science Society were features of a meeting attracting 300 registrants and producing a profit of $4,785.

Membership. During the year Council was pleased to confer Honorary Fellowship on Emeritus Professors P.B.D. de la Mare, A. L. Odell and J. Vaughan.

The President of the Royal Australian Chemical Institute, Dr J. H. O'Donnell, was elected an Honorary Fellow during his term of office. Professor G. B. Petersen was pleased to receive a similar honour from the RACI.

The Royal Society of New Zealand made the first award of its Thomson Medal and Fund to Alan Mackney in recognition of his outstanding contributions to the organisation, administration and application of science. This body also awarded Professor de la Mare the Hector Medal, elected Professor Petersen as a Fellow and provided Young Scientist Awards to Miss S. J. Davenport, Mr G. L. Gravatt, and Mr K.A.J. Walsh. Dr D. G. Smith received a Prince and Princess of Wales Award. Dr Stuart Letham was elected an Honorary Member of the Royal Society of New Zealand. Dr G. W. Butler was awarded a QSO, and Mr I.R.C. McDonald OBE and Mr J.A.D. Nash OBE in the Queen's New Year Honours. Mr Nash served as General Secretary of the Institute 1941-44.

The concern expressed by Alan Mackney, that the Institute has little appeal to chemists in industry and seems to be losing the interest of such members, remains. The Auckland Branch continued to ask Council to review the non corporate status of holders of the New Zealand Certificate of Science, who regard as inferior and inappropriate to the role many of them play in industrial chemistry, the unfortunately named Technician grade open to them. The proposals for change stress there should be no lowering of the professional requirement for admission to corporate membership of chemists with either NZCS or University qualifications.

That major growth of membership is attainable is shown by the 34% rise since 1983 in Waikato's numbers. Otago and Wellington had 1% or less with other Branches less than 10%. If the overall increase had been 33 instead of 7 percent since 1983 our present membership would be 2,000. There is much ground to be recovered and in 1986 Branches plan more effort with a package of the June issue of "Chemistry in New Zealand", an invitation from the President etc., plus Branch incentives. The proportion of members in the north continues to rise and more Fellows are being elected from Branches there.

After exploring the interest of a group of chemical manufacturers in a form of company membership of NZIC, Council is examining the alternative of seeking industry support for a NZIC trust to promote Chemical Education, in particular the teaching of Chemistry in schools.

Publications. "Chemistry in New Zealand", our flagship publication, has developed further under Dr Bruce Graham, Editor, and Publisher, Allan Breckell, the high standards set previously. Discussion continues on the containment and reduction of costs and more frequent publication between May and November. Dr Andrew Brodie and his team in Palmerston North produced another four issues of "Chem NZ" during the year.

By popular demand "Chemical Processes in New Zealand", Volume I, was reprinted and is available at $30 from M.G.C. Gibson, 27 Galaxy Drive, Mairangi Bay, Auckland. Volume II is expected to be published late in 1986. Copies of the Golden Jubilee book "Chemistry in a Young Country" may be obtained from Branch Secretaries and the Registrar at $10 each.

The papers presented at the Chemical Fire Hazards Symposium organised by the Auckland Branch in October are available for $60 from G. M. Ryburn, PO Box 51213, Pakuranga. From R. J. Norris, PO Box 2224, Auckland, for $50 copies may be obtained of the papers presented to a six week course arranged by the Polymer Group on the selection and application of adhesives.

International Chemistry. During the year the following overseas chemists spoke to Branches under the sponsorship of Council's Overseas Visitors' Fund: Dr D. H. Napper, University of Sydney, September 1985; Dr R. L. Williams, Metropolitan Police Forensic Science Laboratory, London and Professor H. Schmidbaur, Technical University of Munich, February 1986; Dr A. F. Thomas, Firmenich, Geneva, March 1986; Professor Y. Masur, Weizmann Institute, Israel and Dr R.D.H. Murray, University of Glasgow, April 1986.

Dr Robert Maclagan was appointed to liaise with the RACI committee in Hobart organising the Joint Conference to be held there in January 1988 as part of Australia's bicentenary celebrations. Dr Maclagan visited RACI head-

THE NEW ZEALAND INSTITUTE OF CHEMISTRY (INC.)

BALANCE SHEET AS AT 30TH APRIL 1986

1984/5 $				1985/6 $
	CURRENT ASSETS			
3,026	Bank of New Zealand	5,283		
	Petty Cash on Hand	285		
1,393	Prepaid Travel Account	645		
2,807	Subscriptions in Arrears	5,400		
100	Prepayments: Re Future Conferences	500		
3,148	Sundry Debtors	176		
—	Stock of Wallcharts on Hand	180		
4,014	Stock on Hand — Ties & Scarves	3,724		
14,488				16,193
	INVESTMENTS			
	B.N.Z. Deposits — Various Terms	11,591		
24,623	Equiticorp Debenture	30,099		
3,000	Fletcher Challenge Ltd			
500	Lyttelton Harbour Board Stock 6.25% 1.7.98	500		
1,000	Royal Society of N.Z. 15% 30.11.86	1,000		
3,550	U.D.C. Group Holdings Ltd 16.75% 19.8.86	4,192		
32,673				47,382
	FIXED ASSETS: At cost			
2,330	Office Equipment	2,330		
1,235	Less Accumulated Depreciation	1,590		
1,095			740	
822	Films	822		
580	Less Accumulated Depreciation	716		
242			106	
267	Presidential Chain		267	
1,604				1,113
$48,765				$64,688

1984/5 $			1985/6 $
	CURRENT LIABILITIES		
5,507	Sundry Creditors	5,237	
466	Subscriptions in Advance	597	
5,973			5,834
	SPECIAL ACCOUNT		
567	Easterfield		567
	ACCUMULATED FUNDS		
39,810	Balance 1.5.84	42,225	
2,415	Add Excess of Income over Expenditure for Year	16,062	58,287
42,225	Balance 30.4.85		
$48,765			$64,688

These accounts must be read subject to the attached notes

AUDITOR'S REPORT

We have audited the financial statements of the New Zealand Institute of Chemistry (Inc.) in accordance with accepted auditing standards, and have carried out such procedures as we considered necessary. At date of Auditors Report Financial Statements relating to the 1985 Conference Surplus included in the Institute's Accounts had not been audited. Notwithstanding the above, in our opinion, the financial statements give a true and fair view of the financial position of the Institute as at 30 April 1986.

Shanahan, Winder, Tomlin & Co.
Chartered Accountants

CHRISTCHURCH:
26 June 1986

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quarters in Melbourne and Hobart. The resignation of Mr Peter Woodhouse, Executive Director of the RACI, after ten years service, is noted with regret. Members will recall his participation in our Golden Jubilee.

In May Dr John Rogers visited Dr R. D. Guthrie, Secretary General of the Royal Society of Chemistry, in London. Dr Guthrie resigned in January to become President, New South Wales Institute of Technology, Sydney. The RSC is concerned that only about 50% of the chemists qualified for membership belong to the Society. The Corday-Morgan travel fund of the RSC is available to NZIC members.

Contact in July in Frankfurt with Dr W. Fritsche, General Secretary of the German Chemical Society, revealed that his estimate was 70% of qualified chemists in West Germany were members of the Society.

Twenty members of NZIC became IUPAC Affiliate members when this scheme was introduced in 1986 at a subscription of $NZ20.

The Institute offered its congratulations and best wishes to the recently founded Chemical Society of the South Pacific based at the University of the South Pacific, Suva, Fiji.

Public Affairs. Council forwarded the submission prepared by its Environment and Hazardous Chemicals Committees to the Working Party set up by the Environmental Council to look at the use of 2,4,5T in New Zealand.

The Environment Committee in its Annual Report to Council asked for more significant and rapid input from Council and NZIC Branches, more active support from the Public Affairs and Science Policy Committee and from the Editor in publishing its concerns in "Chemistry in New Zealand".

In response Council has authorised the chairmen of the Environment and Hazardous Chemicals Committees to make statements to the media after consultation with the President.

A Symposium on Chemical Fire Hazards organised by the Auckland Branch in October filled a need for information about and discussion of problems arising from fires at Revertex Industries Ltd and ICI's Mt Wellington warehouse. Attendance had to be restricted to 180, about 25% being NZIC members. One of the 12 speakers was an NZIC member.

The services of a professional organiser were used and Branch funds benefited from a handsome profit. As important was the bringing together of the companies involved with the Fire Service, the Department of Labour, the Commission for the Environment, the National Poisons Centre, the transport industry, suppliers of labels, safety and fire equipment and Union representatives.

Council has indicated its support of the desire of the New Zealand Chemical Industry Council to harmonise and strengthen the industry's activity with particular emphasis on health, safety and protection of

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Hydrofluoric acid	(50%)	0	1	3	3	0.5	3	0.5	3
Hydrochloric acid	(Conc)	1	3	3	3	1	3	2	0
Hydrochloric acid	(20%)	0	3	3	3	1	3	2	0
Nitric acid	(Conc)	1	3	0.5	0.5	3	3	2	3
Nitric acid	(20%)	0	3	0.5	0	1	3	2	2
Sulphuric acid	(98%)	3	3	3	3	3	3	3	3
Sulphuric acid	(20%)	0	3	3	2	1	3	3	2
Perchloric acid	(60%)	0	3	3	2	3	3	2	0.5
Perchloric acid	(12%)	0	3	0	0	3	3	0.5	0
Phosphoric acid	(85%)	0	2	0	0	2	3	3	1
Phosphoric acid	(17%)	0	3	0	0	0.5	3	3	0
Glacial acetic acid		0	0.5	0	0	1	0	1	0
Phenol	(5%aq)	0	0	0.5	0	3	0.5	0.5	0
Resorcinol	(Sat.aq)	0	0	0	0	0	1	0.5	0
Sodium hydroxide	(Sat.aq)	0.5	1	0	0	3	2	0.5	1
Sodium hydroxide	(20%)	0.5	0	0	0	3	0.5	0.5	0.5
Potassium hydroxide	(30%)	2	1	0	0	3	1	0.5	1
Potassium hydroxide	(10%)	0.5	0	0	0	3	0.5	0.5	0.5
Alcoholic Pot. hydrox	(30%)	0	0.5	0.5	0	3	0.5	1	1
Ammonia	(0.890)	0	0	0	0	0	0	0.5	0
Di-methyl-aniline		0	0	0	0	0.5	1	3	0
Di-methyl-ethanolamine		0	0	0	0	0.5	0	0.5	0
Acetone		0	0	0	0	0	0	3	0
Dichloromethane		0	0	0	0	0	0	3	0
Chloroform		1	0	0	0	0	0	2	0
Carbon Tetrachloride		0	0	0	0	0	0	2	0
Toluene		0	0	0	0	0	0	2	0
Iso-propl-alcohol		0	0	0	0	0	0	0	0
Methyl alcohol		0	0	0	0	0	0	0	0
Tetra hydro furan		0	0	0	0	0	0	3	0
Ethyl acetate		0	0	0	0	0	0	3	0.5
Di-ethyl ether		0	0	0	0	0	0	2	0
Styrene		0	0	0	0	0	0	2	0.5
Methyl ethyl ketone		0.5	0	0	0	0	0	3	0.5
Bleach (NaOCl, household)		0	0.5	0.5	0	1	0	0	0
Hydrogen peroxide	3%)	0	0	0.5	0.5	0.5	0	0	0
M.E.K.P. Peroxide	(60%D.M.P.)	0	0	0	0	2	0	1	0.5
Iodine	(3.5%aq.)	0	0	0	0	0.5	1	0.5	0
Bromine	(Sat aq.)	0	0	1	0.5	0.5	0	0	0.5
Pot. Permanganate	(Sat.)	0	2	1	1	0.5	3	1	3
Sod. Dichromate	(20%)	0.5	0	0	0	0.5	3	0.5	0.5
Ferric chloride	(25%)	0	2	3	3	0.5	2	2	0
Silver nitrate	(5%)	1	2	0	0	3	3	0.5	0
Lead acetate	(Sat aq.)	0	0	0	0	3	0	0	0
Stannous chloride	(20%)	0	0	2	1	2	0	0	0
Writing Ink	(Comm)	0	0	0.5	0.5	1	2	2	0
Gentian voilet	(1%aq.)	0	0	0.5	0.5	1	3	2	0
Rhodamine 6G	(1%aq.)	0	0	0	0	2	3	2	0
Methyl orange		0	0	0	0	0	0	0.5	0
Motor Oil (SAE 30)		0	0	0	0	0	2	0.5	0
TOTALS		11.5	39.5	29.0	23.5	57.0	62.0	69.5	24.5

0 – no effect 0.5 – faint mark 1 – noticeable mark 2 – obvious mark 3 – severe marking

chmark for laboratory work surfaces

charred while the Euroform surface suffered only faint discolouration.

However, it is recommended that when a bunsen or other heating apparatus is used in conjunction with a windshield, or in any other manner where excessive or continuous heat build-up may occur, the Euroform should be protected with an insulating or reflective mat.

In another series of tests to establish resistance to dry heat, an aluminium pot containing oil at various temperatures was left standing on the Euroform for 20 minutes. The standard allows a slight loss of gloss at 180°F. Euroform retained its gloss to 220°C.

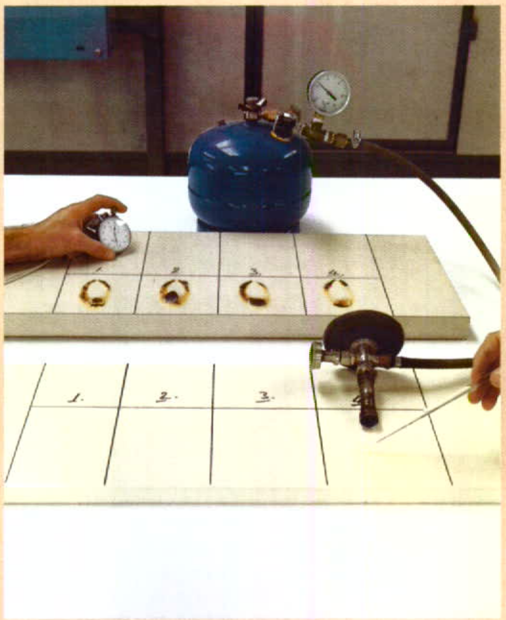
SURFACE WEAR

Euroform is one of the hardest wearing laboratory surfaces available anywhere. In a series of scratch, scrub and chip resistance tests, Euroform's performance far exceeded specifications.

TOTALLY HYGIENIC

How it's made and what it's made from. Both contribute to hygiene. Because Euroform is a one-piece high density slab manufactured from non-toxic mineral fillers and polyester resins, problems of delamination from benchtop substrates and lifting of surface finishes is completely eliminated.

Where there is more than one section of Euroform, the epoxy jointing technique will not support bacterial growth, mould or other hygiene hazards.



The smooth gloss finish is easily cleaned by wiping down with a damp cloth and occasional use of a household cleanser **containing no abrasives.**

THE DESIGN CONCEPT OF EUROFORM

The range of Euroform profile options includes an integral anti-spill edge which, while adding a distinctive design element to laboratory work surfaces, effectively stops glassware rolling off benches and prevents spilt acids and chemicals from splashing onto clothes or down cupboard fronts.

The raised wall upstand is another convenience feature aiding laboratory hygiene by helping prevent reagents, bacteria, etc, getting in behind the benchtop.

Euroform profiles have been developed to answer all laboratory requirements, especially where aesthetics coupled with chemical, heat and wear resistance are important considerations.

STANDARD AND CUSTOM COLOURS

Euroform brings new concepts in colour to laboratory design with four neutral tones – including white – together with a full range of accent colours. At reasonable additional cost, Euroform can be manufactured to your colour specification.

WORKING WITH EUROFORM

Although it is recommended that Euroform be installed by trained personnel, the material is easily sawn and drilled with conventional tools. Because it is a high-density one-piece slab it requires no worktop substrate. Full installation instructions are available on request.

MAJOR APPLICATIONS

Since its development, Euroform has been used in numerous major applications including the Atomic Research Centre in Malaysia; Philippines University, Leyte; Dow Chemical (Aust) Ltd, Melbourne; Armstrong Nylex Laboratory, Melbourne; Blood Transfusion Centre, Auckland; N.Z. Steel Laboratories, Glenbrook; ICI Tasman Laboratories, Wellington.

An example of Euroform versatility is its use as benchtop material in the Cordon Bleu Cookery School, Auckland.

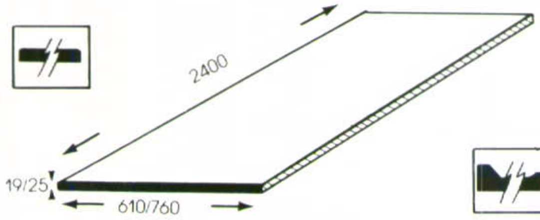
* Euroform, formerly marketed under the brand name Aakride, is now manufactured and distributed by AHI Benchline Industries

PHYSICAL PROPERTIES

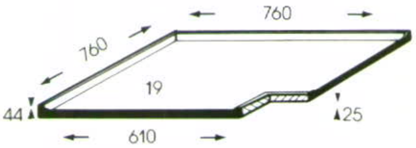
Test	Method Employed	Result
Tensile Strength	BS 2782 320C – 1976	17MPa (2.5x10³psi)
Elastic Modules	BS 2782 320C – 1976	22x10³MPa (3.2x10⁶psi)
Compressive Strength	BS 2782 303 – 1970	123 MPa (8x10³psi)
Surface Hardness	Rockwell M Scale	82-89
Impact Resistance	A 38mm diam. steel ball (225gm) was dropped onto 600x600x19mm panels from heights up to 2.0 metre	No fracture occurred. Slight surface indentation.
Water absorption	A 328.5 gm sample was immersed for 72 hours at 21°C ± 2°C	No absorption measurable
Flame Resistance	BS 2782 508D A 17mm cup was mounted 25mm below centre of Euroform. The cup was pre-warmed and 0.3 ml of absolute alcohol was poured into the cup and ignited.	Glowing time: 0 secs Discolouration: 90mm Charred Surface: 30 sq mm Burning Material dripped: 0
Flammability Tests	AS 1530 Part 3: 1976 Early Fire Hazard of Materials	Ignitability Index (0-20): 10 Spread of Flame (0-10): 8 Heat Evolved Index (0-10): 7 Smoke Evolved Index (0-10): 7
Screw holding strength.	6g self-tapping screw inserted 10mm into 3.0mm hole: 6g self-tapping screw inserted 16.5mm into 3.0mm hole:	Pull out load: 1.7kN (380lb) Pull out load: 2.2kN (495lb)
	8g self-tapping screw inserted 10mm into 3.7mm hole: 8g self-tapping screw inserted 16.5mm into 3.7mm hole:	Pull out load 2.6kN (585lb) Pull out load 3.5kN (785lb)
	10g self-tapping screw inserted 10mm into 4.2mm hole: 10g self-tapping screw inserted 16.5mm into 4.2mm hole:	Pull out load 2.7kN (605lb) Pull out load 4.3kN (965lb)
Av. density	Physical measurements of 1 kg samples.	1.95 gm/cc (122lb/cu ft)
Average weight per lineal metre (ft).	Profile 508 U19 610 U19 610 P12 610 P19 610 P25	21.9 kgm/m. (14.7lb/ft) 25.7 kgm/m. (17.3lb/ft) 14.3 kgm/m. (9.6lb/ft) 22.6 kgm/m. (15.2lb/ft) 29.7 kgm/m. (20.0lb/ft)

* All tests except density and weight per lineal metre have been conducted by independent laboratories. These results are typical but do not constitute a specification.

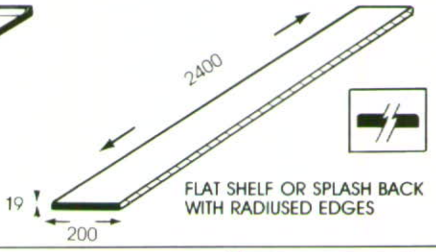
PROFILES



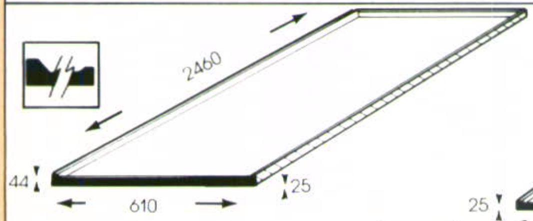
FLAT BENCH TOP WITH RADIUSED EDGES



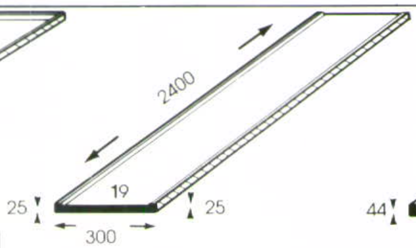
RIGHT ANGLE INTERNAL CORNER WITH COVED UPSTAND AT REAR AND ANTI-SPILL AT FRONT.



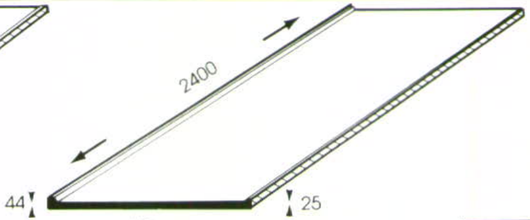
FLAT SHELF OR SPLASH BACK WITH RADIUSED EDGES



BENCH TOP WITH COVED UPSTAND AT REAR AND ANTI-SPILL AT FRONT AND ENDS.



SHELF WITH ANTI-SPILL AT FRONT AND REAR



BENCH TOP WITH COVED UPSTAND AT REAR AND ANTI-SPILL AT FRONT.

~~EUROFORM~~

~~LABORATORY WORK SURFACES~~

NB: EUROFORM NAME
CHANGE TO:
"EUROTECH"
EFFECTIVE FROM NOW!

AHI Benchline Industries

Benchline Industries P.O. Box 14-138 Auckland 6 Phone 574-079

AHI Martin Printing Company

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 30 APRIL 1986

1984/5 $			1985/6 $
	EXPENDITURE **ADMINISTRATIVE & SUNDRY EXPENSES**		
1,260	Accountancy/Audit Fee	1,000	
	Branch Expense Grants		
9,390	— Re Capitation Fees	9,793	
3,000	— Re Student Travel	3,000	
872	Computing, Address Labels etc.	800	
352	Conf. Registrations — Council	0	
	Donations		
0	— Prince & Princess of Wales Science Awards Scheme	3,000	
8,128	Honoraria and Allowances	8,818	
600	I.U.P.A.C. Conf. Contribution	0	
1,141	Overseas Visitors Expenses	2,417	
1,118	Overseas Travel	0	
4,218	Printing, Stationery, Stamps	6,073	
150	Prizes	900	
	Subscriptions		
382	— Royal Society of N.Z.	653	
125	— S.A.N.Z.	140	
50	— I.P.E.N.Z.	50	
683	— F.A.C.S.	0	
50	— N.Z. Futures Trust	60	
247	Ties & Scarves (Net cost)	0	
8,163	Travelling Expenses	5,407	
491	Depreciation	491	
40,420			42,602
	PUBLICATIONS		
18,804	Journal-Publisher	19,580	
1,500	-Editor	1,900	
485	Chem. N.Z.	1,030	
1,000	List of Members	382	
1,339	Sundry Publications	3,380	
23,128		26,272	
1,613	Less: Publication Sales	1,413	
21,515			24,859
61,935	**TOTAL EXPENSES**		67,461
2,415	**EXCESS OF INCOME OVER EXPENDITURE FOR YEAR**		16,062
$64,350			$83,523

1984/5 $			1985/6 $
	INCOME		
55,612	Subscriptions		67,829
	Interest Received:-		
1,173	— Bank of New Zealand	2,249	
0	— BNZ Finance Ltd.	1,771	
1,623	— Equiticorp Ltd.	5,476	
540	— Fletcher Challenge Ltd.	540	
84	— Local Body Stock	31	
1,289	— Marac Holdings Ltd.	0	
150	— Royal Society of N.Z.	150	
493	— U.D.C. Group Holdings	642	
5,352			10,859
0	Donation Received		50
	Conference Surplus		
0	— Canterbury		4,785
3,386	— Wellington		
$64,350			$83,523

These accounts must be read subject to the attached notes

THE NEW ZEALAND INSTITUTE OF CHEMISTRY (INC.)
NOTES TO FINANCE STATEMENTS

STATEMENT OF ACCOUNTING POLICIES:

General Accounting Policies

The measurement base adopted is that of historical cost. Reliance is placed on the fact that the Institute is a going concern.

Accrual Accounting is used to match expenses and revenues.

Particular Accounting Policies

Subscriptions in Arrears and Sundry Debtors are stated at expected realisable value.

Depreciation has been charged using the straight-line method based on the estimated 5 year economic life of the assets concerned.

Investments are stated at cost or, where applicable, with the addition of interest compounded to date.

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the environment. NZIC's Environment, Hazardous Chemicals and Public Affairs and Science Policy Committees are likely to be associated with this important new grouping of importers, transporters, storers and users as well as manufacturers of chemical products. NZCIC held its first Annual General Meeting in Auckland in September.

Council reported to Branches a letter from a Fellow to the President drawing attention to the problem of factual and accurate reporting in the media of matters involving chemicals. The listing in the main centres of NZIC members to whom questions might be put or by whom statements could be checked by members of the public as well as the media is under consideration.

"The Image of Chemistry" is a matter of concern in the profession. At a meeting of Presidents of Chemical Societies in France last September it was the subject of a round table discussion, a summary of which is to appear in "Chemistry in New Zealand".

The President of the American Chemical Society, Professor George Pimentel, was chairman of the committee whose 352 page report "Opportunities for Chemistry", the product of a three year study, was published by the National Academy of Sciences. Council has asked our Vice-President Terry Hitchings to report to it on the implications of this document for NZIC and Chemistry in this country.

Finance. Unexpected income and expenditure below budget raised accumulated funds to $58,000 and produced the $16,000 surplus shown in the balance sheet instead of $2,500 budgeted. This very good result will boost Council's plan to create a substantial development fund to prepare for the cost of inevitable administrative changes facing the Institute.

High interest rates and a large surplus from the 1985 Conference raised budgeted income. Expenditure was less because Journal costs did not rise as much as anticipated, spending on careers and general publicity was below budget and presidential travel costs were not paid in this period.

In the coming year interest rates are expected to be lower. The strong financial position of the Institute gives confidence that the cost of the challenge of improving services to members can be met. The value of NZIC prizes for the Student Essay, Student Conference Paper and best student in Chem V AAVA has been increased to $100.

Thanks. Finally, to all those members who have assisted in many ways to fulfill the objects of the Institute we offer sincere thanks. Please consider in what way you can help our Institute to serve you and your colleagues by sharing the load in our Branches and Committees and Specialist Groups is our request to those not currently involved.

G. B. Petersen, President
J. Rogers, Secretary.

NZIC OFFICERS AND MEMBERSHIP 1985/86

NZIC Elected Officers

President: Prof G B Petersen, 1st Vice-President: Dr B Halton, 2nd Vice-President: T R Hitchings, Hon. General Secretary: Dr J Rogers.

Branch Delegates to Council

Auckland — Dr G R Clark, Waikato — Dr D R Llewellyn, Manawatu — Dr K R Whittle, Wellington — P G Best, Canterbury — Dr J R Cretney, Otago — Dr R A J Smith.

Officers Appointed by Council

Registrar — D J Hogan (31/12/87), Admin. Secretary — Mrs N E Wignall (31/12/87), Journal Editor — Dr B W L Graham, Hon. Librarian — Dr E W Ainscough, Archives Officer — Dr R F C Claridge (31/12/86).

Obituary

We record with regret the deaths of the following members: W L Barr Hon. Fellow (O/S), J I Graham (O/S), J H Goodey (Auckland), Dr A G Freeman (Wgtn), I G McIntosh (Wgtn), I A Rowland (Canty), O K Sewell (Manawatu), S A Tse (Wgtn), W G Whittlestone (Waikato), W Williams (Auckland).

Membership

During the year the following changes in membership have taken place:

Changes in Status

Honorary Fellows elected 3, Members elected to Fellowship 25, Associates elected to Membership 2, Graduates elected to Membership 20, Technicians elected to Associate 5, Students elected to Graduate 5, Students elected to Technician 2.

Recruitment

New members 31, new associates 3, new graduates 28, new students 22.

Losses

Deaths 7, resignations 21, struck off 15. Nett Gain — 41.

COUNCIL COMMITTEES

Standing

President (Prof G B Petersen), Delegate from President's Branch (Dr R A J Smith), General Secretary (Dr J Rogers), Registrar (ex Officio).

Finance and Honours

President, 1st Vice-President (Dr B Halton), 2nd Vice President (T R Hitchings), General Secretary, Registrar (ex officio).

Membership

Dr J H Garside (until 31/12/86), R H Hopgood (until 31/12/87), Dr G J Wright (until 31/12/88).

Publications

Dr J R Cretney, Dr H K J Powell.

Editorial

Editor (Dr B W L Graham), Dr A C Herd, Dr W A Denny, Dr J H Garside, Dr P E Nelson, Dr R Whiting, C L H Stonyer, Miss D M Fenton.

Public Affairs and Science Policy

Dr B Halton (until 31/8/87), A A Turner (until 31/3/88), Dr D E Wright (until 31/3/88), The President — (ex officio).

Chemistry Education

G W Valpy (Convener), P G Best (Council Rep), W Freitag, Dr W R Sharman, Dr W C Tennant.

Chemical Syllabus

M M Cosgrove (Convener), Dr C E Devine, Dr M A Carr, P J Tree, Miss V Kirkwood.

Environment

Prof R Laverty, Dr R A Smith (Council rep), Dr G F Laws, Prof A D Campbell, Dr K A Hunter, Dr W A Temple, Dr D A Cowan (Waikato corres. M.), Dr S J de Mora (Auckland corres. M.).

Hazardous Chemicals

Dr W A Temple, Prof A D Campbell, Prof G B Petersen (Council rep), A N Scrymgeour, Assoc. Prof M R Grimmett, R H Hopgood (Auckland corres. M.).

REPRESENTATIVES TO OTHER BODIES

AAVA

W Freitag (until 31/3/88), N R Edmonds (Deputy, until 31/3/88).

SANZ

Dr H J Percival (until 31/3/88).

RSNZ Member Bodies Management Committee

Dr H J Percival.

MEMBERSHIP STATISTICS: APRIL 30 1986

BRANCH	HON.F.	FELLOW	MEMBER	ASSOC.	GRAD.	TECH.	STUDENT	TOTAL
Auckland	9	75	261	34	25	8	12	424
Waikato	5	21	101	8	21	1	7	164
Manawatu	0	32	96	8	8	2	5	151
Wellington	5	74	240	3	25	1	1	349
Canterbury	8	68	105	4	17	1	12	215
Otago	1	42	66	3	15	3	1	131
Overseas	3	26	149	2	15	0	0	195
Total	31	338	1018	62	126	16	38	1629

BRANCH MEMBERSHIP:

April 30	1983	1984	1985	1986
Auckland	401	404	406	424
Waikato	122	138	148	164
Manawatu	138	143	148	151
Wellington	345	338	344	349
Canterbury	199	215	214	215
Otago	131	128	133	131
Overseas	191	195	195	195
Total:	1527	1561	1588	1629

SPECIALIST GROUPS:

GROUP:	SECRETARY	NZIC	non-NZIC	TOTAL
Analytical	D J Hogan	53	3	56
Chemical Education	D T Howarth	173	334	507
Chromatography	Dr P G Robinson	122	166	288
Electrochemistry		32	28	60
Geochemistry	Dr B W Robinson	39	91	130
Organic Chemistry	Dr P J Steel	86	5	91
Polymer Chemistry	R J Norris	52	30	82
Thermodynamics	Dr G R Hedwig	18	3	21
X-Ray Crystallography	Dr G J Gainsford	23	2	25
Inorg & Organometallic	Prof K M Mackay	80	28	108
Fats & Oils	Dr S F Hobbs	29	15	44

UNIVERSITY NEWS

Auckland

Professor J.H.M. Hill of Hobart and William Smith College, Geneva, New York, will be visiting the University until September. He is working with **P. S. Rutledge** on the synthesis of biologically active molecules with chemotherapeutic potential.

Professor Q. R. Peterson of Central Michigan University will be working with **Professor R. C. Cambie** from August 1986 until June 1987.

Dr P. Healy of Griffith University will be working with **Dr G. A. Bowmaker** from September for a few weeks.

Professor H. W. Heine of Bucknell University, Pennsylvania, will be working with **Dr D. L. McLennan** from September 1986 until January 1987.

Victoria

Professor R. J. Ferrier is visiting the United States and Europe in August, and will be presenting a paper at the 13th International Symposium in Cornell.

Canterbury

Three Visiting Erskine Fellows have been in the Department this year. They were **Professor John Ridd,** University College, London, **Professor Fritz Schaefer,** University of California, Berkeley and **Professor Douglas Ryan,** Dalhousie University, Halifax. **Professor Merle Battiste,** University of Florida will be a Visiting Erskine Fellow in the Department next year.

Dr Bryce Williamson joined the staff earlier this year as a lecturer in physical chemistry. His research interest is in the field of magnetic circular dichroism. **Dr Chris Easton** has resigned to take up a position at the University of Adelaide. His replacement will be **Dr Andrew Abell,** who is currently a Postdoctoral Fellow with **Professor Alan Battersby** at Cambridge University. Dr Abell's interests are in the general area of biological organic chemistry.

Dr Colin Freeman is currently on special leave at the Australian Atomic Energy Commission at Lucas Heights. **Professor Leon Phillips** recently presented a paper at the ACS meeting in Denver and attended an informal meeting on photochemistry in Boulder. **Dr Kip Powell** has been awarded an Erskine Fellowship and will visit laboratories in Australia, North America and Scandinavia and will attend a Humic Substances Conference in Oslo and, with **Dr Vicki McKee,** attend the International Co-ordination Chemistry Conference, in Athens. Dr McKee will also attend the International Symposium on Macrocyclic Chemistry in Florence. **Dr Murray Munro** will present a paper at the Natural Products Symposium in The Hague.

Otago

In the Nutrition Department, **Dr K. Kailasapathy** has arrived from the U.S.A. to take up a three year post-doctoral fellowship to work with **Dr Laurie Melton** on the processing of food wastes.

Dr R. H. McKeown (Pharmacy Department), who has recently returned from study leave at Kings College, London, has been elected to Fellowship of the Royal Society of Chemistry. While returning, he lectured at the University of Kansas

R. H. McKeown

From the Chemistry Department, **Professor Arthur Campbell** has indicated that he would be pleased to receive a new prayer mat following the hassles which have accompanied the acquisition and installation of a new Varian VXR 300 NMR machine in the Department. Also, he will be attending meetings of the Bureau of IUPAC in Oxford in September. In conjunction with the installation of the NMR, **Drs Rex Weavers and Mervyn Thomas** attended a course for NMR operators at the Australian National University in May.

Dr A. J. McQuillan has also been travelling. He presented a paper at the International Conference on Corrosion and Electrochemical Behaviour of Metals in Non-aqueous Solutions in Italy in June. He also visited several laboratories in electrochemistry in the U.K. **Professor B. H. Robinson** will be on leave between August and January 1987. He will spend two months in Vancouver and shorter spells in the U.S.A., U.K. and Europe. He has been awarded a travel grant for the purpose from the National Science and Engineering Research Council of Canada. Also in August, **Dr C. G. Pope** will be visiting Japan where he will present a paper at the 7th International Zeolite Conference in Tokyo.

BRANCH NEWS

Auckland

The Auckland branch held a lunchtime meeting on May 27. The meeting started with a three course lunch at the ATI training restaurant, followed by an address by **Mr Bill Davies** of Morgan and Banks. The title of the talk was "Employment Prospects for Chemists in New Zealand and Australia". This

NZIC President **Professor G. Peterson** gave his Presidential address to the Auckland branch on June 11. The talk was entitled "Chemistry, Computers and Molecular Genetics".

On the 3rd of June **Professor D. R. Williams** gave an address to the branch on the topic of "The Environmental Chemistry of Radioactive Waste Disposal".

Manawatu

At a meeting on 4 June, **Professor George B. Petersen** presented the Branch's prizes to students gaining the highest marks in 300 level chemistry **(Miss Jennifer J. Gibson)** and biochemistry **(Misses Talesa A. Ellery** and **Rachel A. Page)** at Massey University. After this presentation Professor Petersen gave his Presidential Address entitled "DNA: Tackling the Megamolecule." He gave a most interesting description of the development of methodology for sequencing DNA molecules, many of the techniques used having been developed relatively recently. Because sequencing has been developed into a routine so that units containing many thousands of bases may be determined within a short time, Professor Petersen showed how interest is now developing in studies of functional aspects of DNA structures. Professor Petersen also presented his address in New Plymouth (23 June) and Napier (25 June).

At a special General Meeting in May the Manawatu Branch of NZIC finally launched its Chemical Education Awards Scheme. The aim of this scheme is to foster, promote and encourage the teaching of chemistry in secondary schools within the Manawatu Branch region by supporting various projects. Any teacher of chemistry in the Branch region may apply and any project consistent with the aims of the Awards scheme will be considered. For 1987 it is envisaged that grants will be limited to $200, save in exceptional circumstances.

At the 1986 Manawatu School Science Fair held during 20-23 June in Palmerston North, the Branch prize for the best exhibit in chemistry by a secondary school pupil was won by **Nikki Osborne** (Palmerston North Girls' High School) for her project "Colour Analysis". In her display, Nikki demonstrated the use of paper chromatography for the separation and identification of coloured components in materials as diverse as silver beet leaves and ball point pen ink.

Wellington

At a branch meeting in June an audience of approximately fifty members attended the 1986 Presidential address delivered by **Professor George Petersen** on the sequencing of DNA Molecules. This was followed in July by a talk by **Professor Robin Ferrier** on the subject of "Lead in the Environment in New Zealand", which was also well attended (see elsewhere, this issue).

Otago

Professor Bill Cullen, who graduated from Otago, and is presently at the University of British Columbia in Canada, visited Otago in June and lectured to a joint meeting of the Local Branch of the Institute and the University Chemistry Department. He presented much novel chemistry under the title, "Organic Syntheses with the aid of Group VIII Metals".

The annual R. E. Corbett lecture, held on the 12th June, was also an occasion for a joint meeting of the Local Branch and the University Chemistry Department. **Dr R.D.H. Murray,** who is nearing the end of a six month sabbatical leave at Otago from the University of Glasgow, lectured to the meeting on the topic, "Coumarin Chemistry at Glasgow University".

The Annual Dinner of the Branch was held in the Medical School Common Room in May when the new Rector of Otago Boys High School, Mr Michael McMillan, was invited to address the gathering. He chose to talk on the topic, "Science Teaching — Action and Reaction".

GOVT DEPTS AND RESEARCH INSTITUTES

Rt Hon R. J. Tizard (third from left) watching a test of a Firedoor at BRANZ.

Building Research Association

The **Rt Hon R. J. Tizard,** Minister of Science and Technology visited the Association's head office and laboratories on June 24. The Minister's visit was to update his understanding of the work the Association does to benefit the community by direct assistance to the building industry. Topics discussed were: processes used for cost recovery for work undertaken for specific clients, and the subsidy by BRANZ using levy funds for work which is not of immediate benefit to the individual builder but more in the interest of the community.

NZ Coal Research Association

Dr Trevor Matheson has been appointed Chief Chemist at the Coal Research Association.

Department of Health

Mr Jim Waters of the toxicology section is to attend a conference on "Chemistry in Occupational Hygiene and the Environment" in Darwin from July 7-11 1986.

Dr Keith McLea of the toxicology section has taken up an appointment as scientist in the Department of Labour where his skills and experience in industrial chemical toxicology should prove invaluable.

DSIR, Mt Albert

Dr Robin Mitchell, Division of Horticulture & Processing has returned from 3 months at the Dept. of Chemistry, University of Calgary, Canada where he was working with **Professor M. H. Benn** on the synthesis of the bacterial toxin, phaseolotoxin.

Dr David Buisson of the Fish Processing Research Group has been appointed Professor of Food Science and Dean of the Faculty of Home Science at the University of Otago. He will

Institute of Nuclear Sciences

Dr Alfred Hirner from the Mineralogy-Petrology Institute, University of Munich is working for six months at INS with **Dr B. W. Robinson** on the stable isotopic composition of New Zealand oils and possible source rocks. It is hoped that the sulphur

DSIR, Applied Biochemistry Division

Dr Dave Greenwood recently returned from a month-long holiday in the United Kingdom, during which time he met with researchers working with bumble bees, including **Dr Sydney Cameron** (University of Manchester), **Dr Rick Fisher** (University of Oxford) and **Dr Paul Williams** (British Natural History Museum). He also attended the A.G.M. of the International Bee Research Association, held at Kew Gardens, and visited Rothamsted Experimental Station at Harpenden.

Dr Richard Biggs will be travelling to Freiburg, West Germany, in September under the auspices of the New Zealand — Federal Republic of Germany Science and Technology Co-operation Programme. The purpose of the visit is to study the prenyltransferase enzyme of bean with **Professor Hans Grisebach.**

N.Z. Dairy Research Institute

Dr Bob Lawrence was an invited guest speaker to the American Dairy Science Association's Annual Conference. The topic of his paper was "Effect of Maturation on Cheese Texture".

Dr Kevin Pearce has gone on study leave to the Western Regional Research Centre in Albany, California.

Mr M. F. Parkin, Head of Effluent Technology Section has left the Institute to take up a managerial position at the Waikato Dairy Co-operative.

Chemistry Division, Christchurch

David Walker, Head of the Food Section, South Australia Government Analysts laboratory, is working in Chemistry Division for 3 months on an Anzac Fellowship. He is studying NZ food law, and food laboratory operation and administration. Another recent visitor to the laboratory was **Mr Fadzil Othman,** a WHO Fellow from Malaysia who is to set up a new food laboratory in Penang.

Barbara Thompson has completed a six month appointment in the Water Section following her return from three years in Canada.

Peter Cropp the current Wellington Branch Chairman has transferred to the Christchurch Forensic Section.

MAF

Dr Doug Wright recently spent two weeks in Australia visiting State Departments of Agriculture and various CSIRO Divisions. His visit had the objectives of seeking collaborative research opportunities with the Agricultural Research Division of the Ministry of Agriculture and Fisheries.

Public funded research in Australia is under similar constraints to that in New Zealand with decreased funding and increased pressure towards commercialisation of technology. While visiting the CSIRO

DSIR, Industrial Processing Division

A milestone for the Division was achieved at the end of June with a move into a new building. However since the complex is not completely finished it will be some months before all staff have been relocated.

Pilot plant developments and investigations are given strong emphasis and are especially catered for with a large flame proof pilot plant laboratory equipped with distillation, digestion, evaporation and extraction equipment. Other speciality facilities include corrosion, metallurgy, fermentation, mineral processing and food technology laboratories. Support services of workshop, toolroom, draughting office and chemical analysis laboratories are also included.

BOOK REVIEW

Detectors and Chromatography

Ed A.J.C. Nicholson,
Australian Scientific Industry Association, Melbourne, 1985.
$(Aus) 19.00

"Detectors and Chromatography" is a collection of selected papers presented at an International Conference held at the University of Melbourne, May/June 1983. The conference celebrates the 25th anniversary of the invention of what is now the single most important detector used in gas chromatography today, the Flame Ionisation Detector (FID). The history of the development and some insight into the mechanism of the FID is given in a paper by the inventor, I. G. McWilliam. Another paper contains a more in-depth study on the mechanism of the FID.

The book also contains reviews and papers on other types of detectors, both for gas and liquid chromatography. Some of the less familiar detectors mentioned include the non-specific far-UV absorbance detector, the flame photometric detector and the highly specific mass-selective detector from Hewlett Packard. The latter (which is currently gaining tremendous popularity in gas chromatography analytical laboratories in New Zealand) is basically a dedicated quadrupole mass spectrometer, operated in the selective ion monitoring mode. Novotny and Gluckman in their paper had a word of caution to the unwary on this method of detection; high specificity needs high mass spectral resolution. Discussions on liquid chromatography detectors ranged from the more traditional LC detectors (refractive index, UV absorbance, etc) to new types still in the developmental stages e.g. ion-selective electrode detectors.

The attachment of on-line high speed analytical instruments, e.g. mass spectrometer and FT infrared, to chromatographs are also mentioned.

This book will be of interest to the experienced practitioner who wants to get some understanding of the mechanism of detectors, the FID in particular, and to the novice who needs to get an overview of the current state of chromatography detector technology.

H. Young
Divn of Horticulture and Processing, DSIR, Auckland.

SAFETY PRODUCTS

An answer to the hazards of perchloric acid

As a commonly used reagent in many industrial processes and laboratory tests, perchloric acid in its various forms is very widely known. That it is also one of the most dangerous of chemicals is also widely recognised, more particularly by those who work with it. The potentially lethal nature of this substance is clearly illustrated by a major Los Angeles explosion in 1947, when 15 people were killed and 400 injured.

Everett and Gray (C.R.C. Handbook of Laboratory Safety, 1971) say that "... the most disturbing features of accidents involving perchloric acid are —
1. The severity of the accidents
2. That the persons involved are, in the majority of cases, experienced workers." — and in the appendix to this highly informative treatise they catalogue 18 different accidents. Too detailed to report here, the circumstances varied widely from the dropping of a bottle, the patching of hoods with the wrong substances thus setting up an explosive situation, and the use of heat in circumstances which appeared normal; two workers who had safely dried 11,000 samples of hydrocarbon gas with magnesium perchlorate over seven years, when an undetected impurity literally "blew them up"; wooden floors which had soaked up drips and dilute washings over a period of years exploded into flame . . . and so on. Nobody in their right senses could deny the potential danger even in the face of prolonged accident-free experience.

Aware of the wide use of perchloric acid in New Zealand, Thermoplastic Engineering Limited set about designing a fume cupboard specifically to minimise the hazard. Holder of the Designmark, it was a winner in the Sheet Products section of the Annual Award Competition held by the Plastics Institute of New Zealand in 1983 and a place-getter in that same year in the Prince Philip Award for New Zealand Industrial Design. It also holds the P.I.N.Z. award for elegance of design.

Safety in operation, total sealing against escaping fumes, complete fume extraction and ease of operation even under conditions of emergency are among this fume cupboard's most important features. One of the unique safety features is that the hand shower control is of a different shape and size from the other controls. An operator unfortunate enough to receive acid in the face or eyes could identify and use the hand shower by feel alone.

A second important feature is the fully closing door. In older types it was necessary to leave an air gap under the door to allow air ingress necessary for subsequent fume extraction. This gap became a point of hazard and accidents did occur. In the Thermoplastic cupboard air enters through louvres at each side and is drawn through double walls.

The cupboard floor is of armour toughened 10 mm thick glass which is both non-absorbent and impervious to perchloric acid. Beneath the glass base is a shallow sink with central waste outlet. This allows for immediate drainage of any acid either spilled or resulting from container breakage. The pitched roof of the cabinet provides efficiency of airflow and prevents dead spots where gases could accumulate.

Research into many types of plastic revealed PVC plate as presenting the triple advantages of excellent acid resistance, self-extinguishing qualities in case of fire and ease of fabrication. Acrylic sheet replaces the old-type glass doors. Should an explosion occur the door comes out as one piece. Dangers from flying fragments are thus eliminated. Optical clarity is 97% and counterweighting provides a simple and virtually maintenance-free door system.

All controls are located externally and are ergonomically placed for ease and speed of operation even when the door is fully closed. The vertical columns have been set to an angle of 45°, not only to enhance appearance but to assist airflow when the door is open.

PVC is comparatively easy to form to the shapes required. It requires only simple machinery for cutting, welding, folding and finishing. The welding process eliminates joints, gaps and fissures. The versatility of the material permits the production of one-off designs without modification of machinery or method. No expensive moulds or dies are required. Work surfaces are easy to clean and require no painting. Because PVC plate is relatively expensive cabinets are normally designed to dimensions which fully utilise commercial sheet sizes, thus avoiding off-cuts and waste.

Executed in a pleasing cream and brown colour scheme, the Thermoplastic Fume cupboard gives today's technicians the two things they should demand — optimum safety and efficiency, plus an attractive appearance.

INORGANIC CHEMISTRY MEETING

The Inorganic and Organometallic and the Crystallography specialist groups held a successful sesqui-day meeting at Massey University in May, with participants from the six university departments and from DSIR. The aim was an informal, inexpensive meeting with maximum student participation, to discuss current work and plans so that all the members of these groups would have an up-to-date view of work in New Zealand. A major aim was to improve contact between students in the different universities.

The visit of **Professor Bill Cullen** from U.B.C. gave us a focal lecture on applications of modern NMR methods. Other major lectures were given by **Professor Warren Roper** who reviewed his fascinating halocarbene complexes chemistry, and by **Dr Vicki McKee** who showed that more traditional co-ordination chemistry is also unpredictable. There were overviews of crystallographic packages, an intriguing exhibition of CHEMGRAF, and lots of preparative and structural chemistry presented as survey lectures from each group and in detail on some posters.

About 42 Honours, Masters and Doctorate students attended with nearly all contributing posters. The general quality of these was highly praised by **Professor Cuth Wilkins** when presenting the prize for the best to **Mr Skelte Anema**, Waikato.

The participants felt that this format conference was generally successful and brought a large number of students into contact with the Institute. Our thanks go to **Brian Robinson** who arranged the programme and to the team of Massey hosts led by **Eric Ainscough, Ted Baker, Andy Brodie, Anna Wallace** and **Joyce Waters.**

K. M. Mackay

B. K. Nicholson

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Cover Story:-

PERKIN–ELMER 8000 SERIES CHROMATOGRAPHS

Sci-Med is delighted to be able to present, to the New Zealand gas chromatography community, the brilliant new 8000 series from the world's largest scientific instrumentation manufacturer, Perkin-Elmer. With their new models Perkin-Elmer have further refined many of the design concepts introduced in their previous gas chromatographs, resulting in the models 8400 and 8500, instruments with outstanding performance, exceptional reliability, ease of operation and flexibility, in a compact space saving machine.

All instrument parameters are established by using the simple keyboard in conjunction with the built-in, high resolution VDU screen. This allows only those parameters of immediate interest to be displayed, while retaining access to the wide range of parameters and values involved in a complete GC method. Up to ten analytical methods can be stored for subsequent recall and execution.

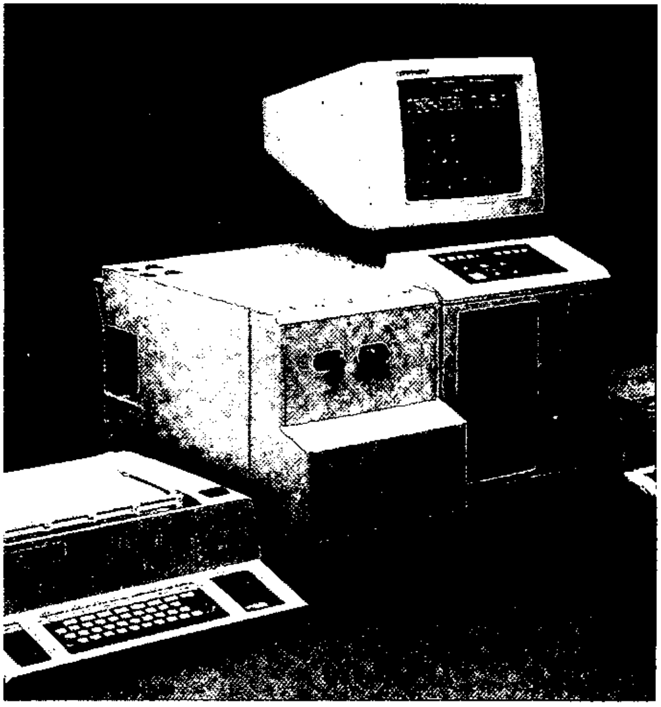
The screen graphics option displays the chromatogram as it develops. With the replot facility the chromatogram may be scaled and replotted. Further inclusion of the data handling and reintegration option provides a self-contained GC and data handling system which is economical, easy to use and exceptionally powerful.

The innovative 8000 Series oven is situated at the left hand side of the instrument, with the injectors positioned vertically above the detectors, in an analyser unit which forms the oven door. The analyser unit slides forward, pulling the columns out of the oven, an approach which provides all-round access to the column connections and at the same time allows the oven size to be kept to a minimum.

A unique air flow system which prevents ambient air from directly hitting the column also provides excellent thermal stability and extremely short cooldown and stabilisation times, resulting in exceptional retention time reproducibility. Up to four temperature ramps are provided, for analytical versatility and efficiency.

Automated Bleed Compensation (ABC) for ionisation detectors (flame, electron capture, and nitrogen/phosphorus) is an exciting feature which eliminates the need for dual column techniques. When a Bleed Calibration run is carried out on a conditioned column, the instrument stores all necessary calibration parameters for full bleed compensation during analytical runs. No other technique of compensation for column bleed is so powerful, flexible and easy to operate as ABC.

Interchangeable modular injectors are available for every application, including flash vaporisation, split/splitless, gas and liquid sampling valves, direct on-column injection or a combination of injection systems. Each injector is contained within its own module, complete with heater and temperature control sensor. Capillary injectors are supplied complete with the pneumatics necessary for their operation, in a single plug-in assembly.



Model 8500 with two LCI-100 Laboratory Computing Integrators.

Analogously, six detectors are available in interchangeable, self-contained plug-in modules, which when installed become fully integrated into the software control system of the instrument. The choice includes hot wire, flame ionisation, nitrogen/phosphorus, electron capture, flame photometric and electrolytic conductivity.

Instruments this good deserve the best possible support from their local distributors, a factor recognised by Perkin-Elmer. With a nationwide sales and service team, a long history of involvement with and within the New Zealand scientific community, and an expanding commitment to the area of chromatography, Sci-Med have been granted the privilege of appointment as exclusive New Zealand Perkin-Elmer representatives. A new era for scientific instrumentation has dawned in New Zealand.

Perkin-Elmer and Sci-Med

A new era of opportunity is dawning for scientists and analysts in New Zealand.

In line with world-wide corporate moves aimed at making the company a more responsive, efficient and competitive entity, Perkin-Elmer began an evaluation earlier this year of the particular requirements of the analytical instrument market in New Zealand, with the view of bringing to present and prospective users here, a level of service and technical support more in line with the level of excellence European and North American customers have learnt to expect.

Ensuing discussions between Sci-Med and Perkin-Elmer have resulted in a comprehensive plan for nation wide service, sales, and technical support of all Perkin-Elmer customers, new **and** existing. This, briefly will comprise support from service centres located throughout both the North and South Islands, national sales coverage, plus product/technical specialist support for all of the major Perkin-Elmer product Groups.

Furthermore, Perkin-Elmer's commitment to not only designing and producing high quality and technologically advanced instrumentation, but also to support of the whole instrumental technique in terms of applications and education, ensures that you, the user, will see regular visits from Perkin-Elmer product and application specialists thus keeping you fully abreast of new developments and innovations.

For its part Sci-Med is delighted to be associated with Perkin-Elmer. We see the relationship as further emphasising Sci-Med's central commitment to the whole area of analytical chemistry, biochemistry and biotechnology.

Sci-Med's philosophy of a focussed commitment to identified instrumental and analytical techniques couples well with Perkin-Elmer's "cutting-edge" position in the advancement of these technologies and their extensive resources available for total support of users employing these techniques.

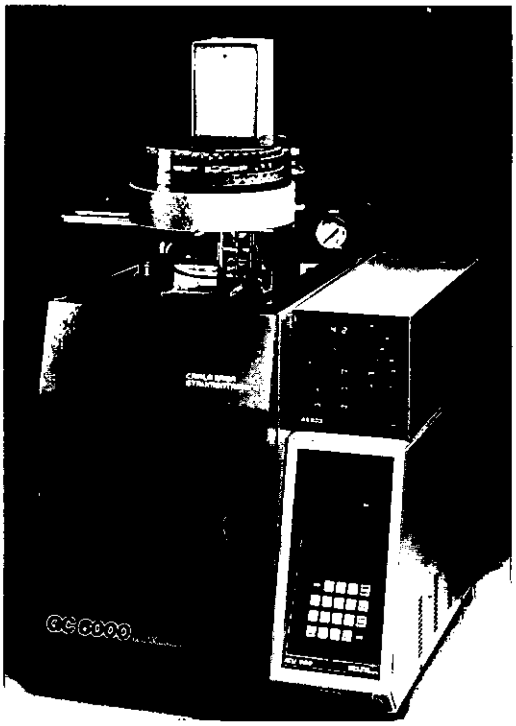
We believe this association will return Perkin-Elmer to a pre-eminent position in the New Zealand scientific instrument marketplace, and so we invite you to take advantage of the benefits offered by Sci-Med and Perkin-Elmer... together in New Zealand.

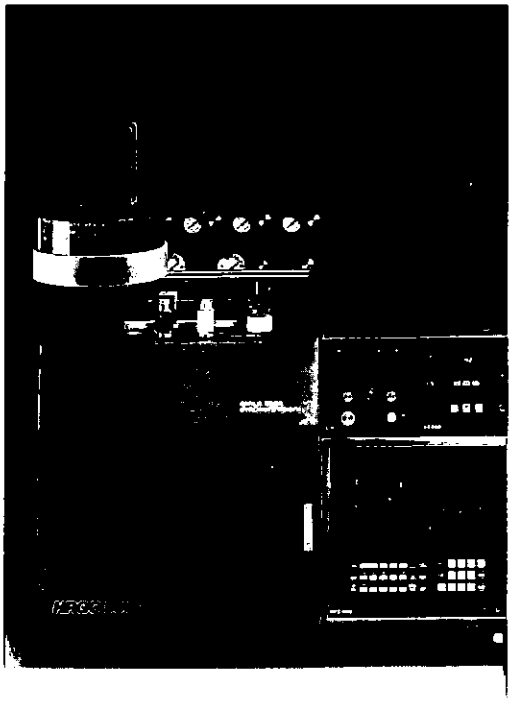
Sincerely yours

Bruce R Fraser
Market Development Manager
SCI-MED (NZ) LTD

CARLO ERBA

LEADERS IN GAS CHROMATOGRAPHY





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PRODUCT NEWS

Carlo Erba Auto Analyser

Only recently introduced to New Zealand, the name CARLO ERBA has already created a great deal of interest in the scientific community, with their capillary GC's and elemental analysers. Alphatech Systems are now pleased to introduce the CARLO ERBA Flowcomp microcomputerised flow analyser. Fully integrated with the most advanced microprocessor technology it will meet present and future lab requirements with unequalled operative simplicity and reliability. The Flowcomp 1510 has been engineered to process relatively small sample volumes with limited reagent consumption.

Flowcomp 1510 features:

- Unattended analysis of up to 100 samples
- fully automatic operation, auto calibration, auto diagnosis, electronic debubbling, and measurement/compensation for drift and carry-over.
- simultaneous determination of two parameters
- flexibility through a wide range of easily interchangeable, standard analytical sets
- complete hard copy report of the analysis from the built in printer.
- RS232C output as standard
- proven reliability and low operating costs.

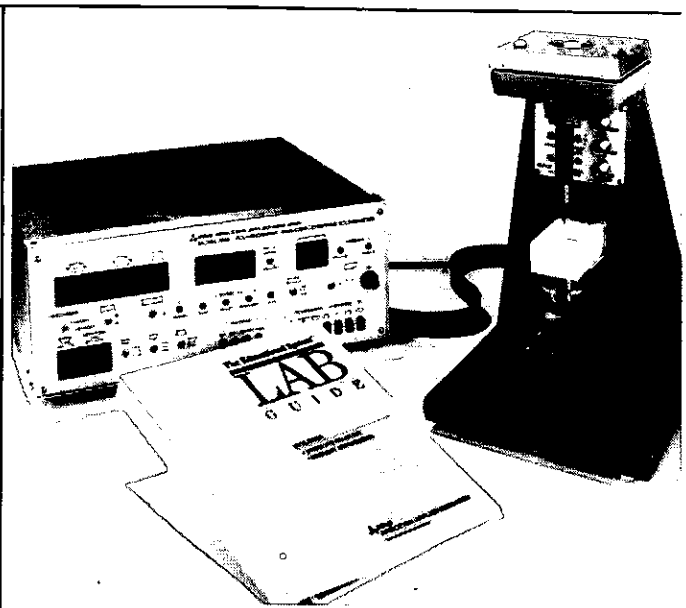
For further information please circle no. 32 on reader reply card.

The Model 264A-3 Educational System for analytical voltammetry

EG&G Princeton Applied Research has just announced the Model 264A-3 Educational System for analytical voltammetry. The Educational System is primarily designed for the undergraduate instrumental analysis laboratory course and is being offered at a special discount to educational institutions.

The system consists of the Model 264A Polarographic Analyser/Stripping Voltammeter, the Model 303A Static Mercury Drop Electrode, and a Lab Guide complete with instructor's notes.

The Lab Guide, which was written by Dr George Harrington at Temple University, is keyed to the popular text "Techniques in Instrumental Analyses" by Skoog. It presents several experiments which allow the student to compare the classical method of polarography to contemporary sampled-current and differential pulse techniques, for metals and organics determinations.



The Lab Guide also includes supplemental literature on more advanced experiments such as stripping voltammetry. The instrumentation is also useful for research projects and graduate level laboratory courses, since it is also capable of performing cyclic voltammetry, chronoamperommetry, normal pulse polarography, and a variety of stripping voltammetry experiments.

For further information please circle no. 33 on reader reply card.

NORTHROP INTRODUCES LOW PRICED INFRARED DETECTOR FOR GC

The new Hewlett Packard 5965A Infrared Detector (IRD) from Northrop Instruments & Systems Limited is a sensitive, compact, low-priced FTIR detector for capillary gas chromatography (GC).

This product is the first and only FTIR detector designed and built specifically for capillary gas chromatography. In contrast to current FTIR systems that work with GC and which cost much more, the HP IRD system prices start at $120,000.

The HP IRD is the first system to take advantage of the synergy between the complementary techniques of GC/FTIR and GC/MS. The system, which includes an HP IRD ChemStation analytical workstation, allows scientists to combine data from both techniques for better compound identification.

Scientists can display and compare GC/FTIR and GC/MS data on the same screen or in the same report. Data from a library search on an HP MS ChemStation can be loaded on an HP IRD ChemStation. It will integrate library-search results and produce a ranking of probable IDs based on hit quality and common matches.

Northrop expects the HP IRD to be used in all areas of analysis where GC is already employed, especially environmental; chemical; foods, flavours and fragrances; pharmaceutical; and forensic.

The HP 5965A consists of two compact units: the Detection Module and the HP IRD ChemStation for instrument control and data handling. The detector occupies fewer than eight linear inches of bench space and does not require a separate room or optical bench.

Detector Specifications

Unlike other GC/FTIR alternatives, the IRD was designed specifically for the detection and identification of capillary GC eluents. For example, this allows it to detect 5ng of isobutyl methacrylate at a signal-to-noise ratio of 20 to 1.

A short straight capillary-direct interface connects the IRD to the GC, eliminating the problems often associated with extra-column connections.

In addition, stable micro-optics provides exceptional immunity to vibrations, an important consideration in many GC laboratories where a number of instruments co-exist on the same bench. Finally, a new long-life, high-flux IR source contributes to instrument sensitivity and minimises maintenance.

HP IRD ChemStation for Control and Data Handling

The HP IRD ChemStation presents retention-time and structural information on self explanatory screens and offers single-stroke softkeys to simplify and expedite method development, instrument control and data handling.

Integration and quantitation of GC/FTIR chromatograms using standard methods can be automated. Multiple internal standards, peak ratios or multipoint calibration curves can also be used.

During an analysis the chromatogram can be displayed in real time. After an analysis, the software allows chromatograms and IR spectral data to be retrieved, displayed and manipulated in a variety of ways for interpretation and reports.

GC/FTIR set-up is simplified by an automated tuning programme that optimises the signal-to-noise ratio and assists in optical alignment. A fast library-search programme to compare acquired spectra with library spectra speeds compound identifications.

Optional sequencing software permits the HP IRD ChemStation to control the GC/FTIR system automatically with an autosampler in unattended analysis of up to 100 samples from injection through printed report.

Based on the recently introduced HP 9000 Series 300 Computer, the HP ChemStation is available with a colour or monochrome monitor.

With other software available from Hewlett Packard, the HP ChemStation can be used to control and handle data from an HP Liquid Chromatograph, or UV/VIS Spectrophotometer, or Mass Selective Detector (MSD). Another software package accepts data from multiple chromatographic instruments at once.

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For further information please circle no. 11 on reader reply card.

PRODUCT NEWS

What's in a name?

Euroform — the most complete laboratory work surface available on the market — is changing its name to Eurotech. This name change has nothing to do with the physical product as Eurotech will still be one of the hardest wearing surfaces available anywhere in the world and still manage to look stylish. It is well suited for all laboratory and commercial installations.

Well proven fabrication techniques enable standard profiles and flat sheets to be adapted for a wide range of installations and the joins maintain the physical properties of the bench. However, the joins are visible and where possible standard profile sizes should be used to achieve the perfect finish.

Eurotech is available in a range of colours and is cleaned and polished to a uniform high gloss surface after moulding.

Eurotech (previously Euroform) has been successfully installed in a number of commercial and laboratory situations including ICI in Lower Hutt, the Motonui Synthetic Fuel Plant and several branches of DSIR.

Elutip-d: The Minicolumn for rapid purification and concentration of DNA samples

Conventional methods for the purification of DNA samples after extraction from electrophoretic separation media can be time-consuming and often result in low recovery.

The S&S Elutip-d Minicolumn offers a rapid alternative, both purifying and concentrating DNA samples in minutes.

Features

The S&S Elutip-d Minicolumn is a small tapered plastic tube packed with a hydrophobic adsorption medium having a specific affinity for DNA. It is fitted on to the Luer slip of an injection syringe to give a pump and elution system.

The Minicolumn is first prewashed by forcing a high salt solution into it from the syringe, after which it is primed with a lower concentration buffer solution. The DNA sample in a second syringe is forced slowly through the Minicolumn, preferably through an S&S Disposable Filter Holder FP 030/20 "White Rim", containing a non-DNA adsorbing cellulose acetate membrane filter (pore size 0.45 um) fitted to the syringe, to remove any particles e.g. gel particles, from the solution. The flow should be slow to ensure complete adsorption of the DNA to the matrix in the column. Any remaining DNA is now washed from the syringe through the filter with a low concentration buffer solution. The DNA is then eluted from the column with a small quantity of high concentration salt solution.

The S&S Elutip-d Minicolumn can adsorb as much as 100 ug DNA.

Recovery rate is high. For 1 ug E-coli DNA in 5 ml 0.2 M NaCl buffer it is over 90% and for 10 ng it is over 80%.

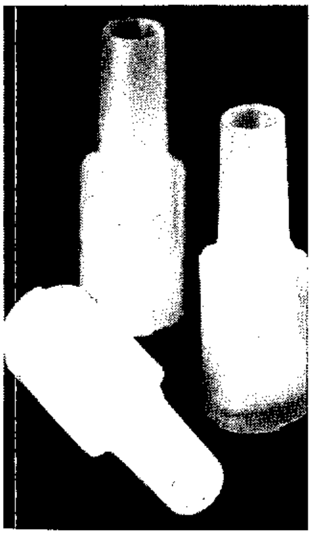
For further information please circle no. 30 on reader reply card.

Spartan 3 — disposable filter holder for HPLC separations

In the past, when filtering small volume (1 ml) HPLC samples, complete clarification was seldom aimed at because of the risk of losing valuable substances.

This very often had an adverse effect on the accuracy of analysis.

Spartan 3 in pore sizes 0.2, 0.45 and 5 um has been specially developed for clarification filtrations of small volume samples.



Features:

1. Retains particulate contaminants down to 0.2 um.
2. Both filter holder and membrane are made of Nylon 66 and can be used equally well for the clarification of aqueous or organic samples.
3. There are no wetting agents in the Nylon 66 filter (diam. 3 mm).
4. Minimal sample loss — less than 10 ul.
5. Luer lock connection for fast, secure fitting on the syringe.

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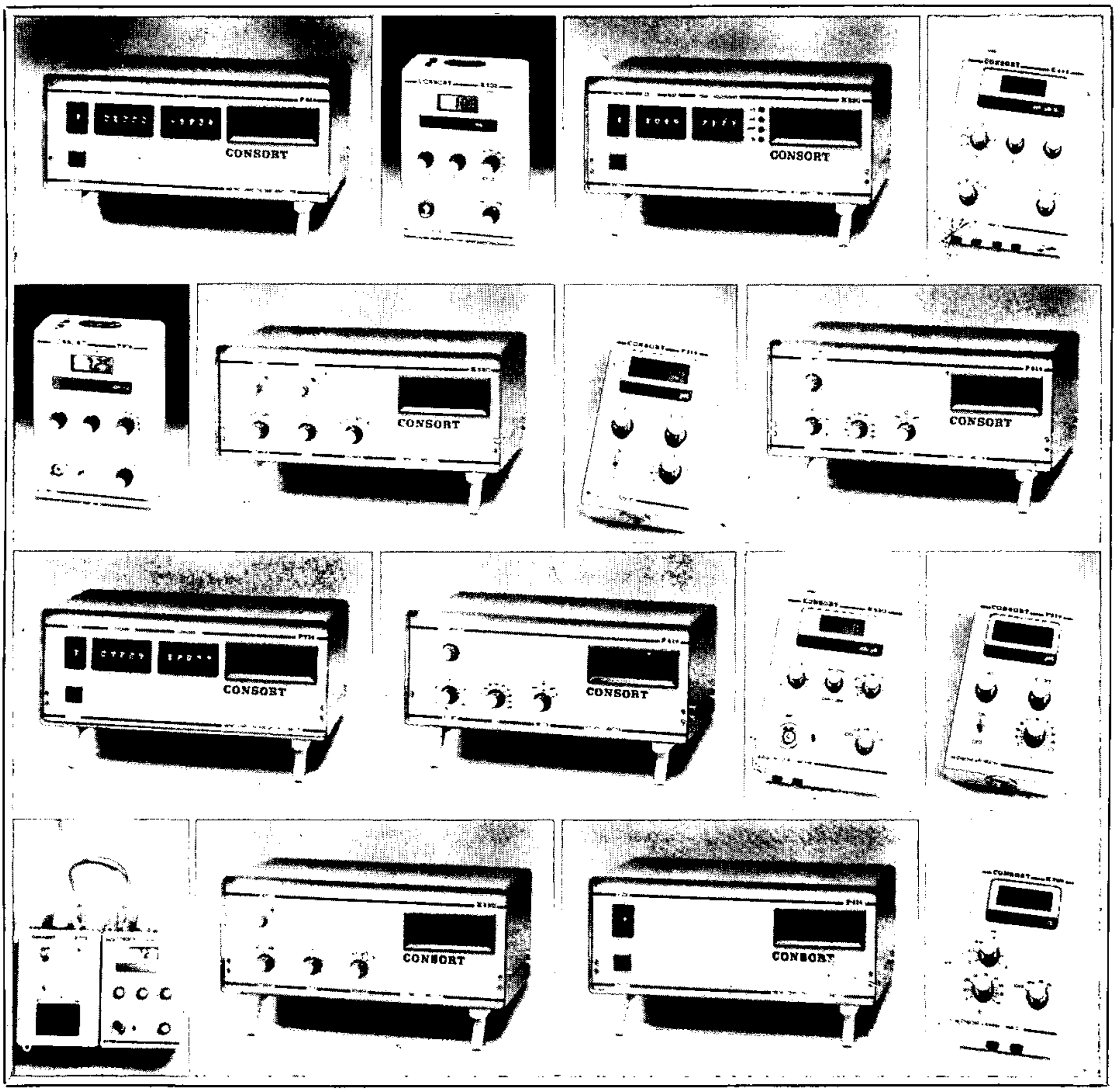

This wide range of instruments includes pH Meters (Bench top and Portable), Conductivity Meters, Conductivity/pH/Temperature in one meter, Dissolved Oxygen Meters, and Power Supplies.

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PRODUCT NEWS

Carter Chemicals acquire electrochemical instrumentation agency

Carter Chemicals have been appointed the exclusive New Zealand and Australia agent for the major Belgium instrument manufacturer — Consort.

Consort manufacture a wide range of instruments including pH Meters (both bench top and portable), Conductivity Meters, Conductivity and pH temperature in one meter, Dissolved Oxygen Meters and power supplies for electrophoresis. A large range of these Meters are now available ex-stock in New Zealand together with a good range of stocks of electrodes to go with the pH Meters.

Carter Chemicals have had their Representative, Cathy Heslop in the factory of Consort in Belgium for product training and she is now able to answer your questions and also able to call for sales enquiries and demonstrations.

The latest in the line with regard to power supplies is their Microcomputer Electrophoresis Units.

Model E654 is a microcomputer power supply specially designed for pulsed field electrophoresis. It features five fixed programs and seven sets of digital switches to control all known techniques for separating large sized DNA up to more than 1 MB. A conventional constant voltage or constant current operation is also possible allowing you to use this model for all classical work as well.

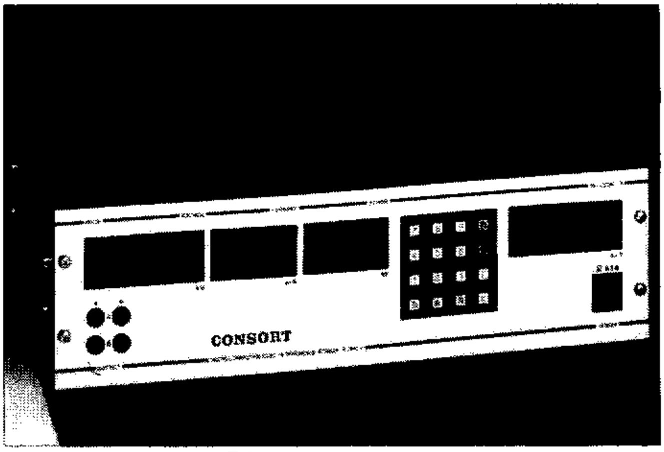
There are no buttons or switches to worry about, just preset the desired parâmeters on the thumbwheels and the instrument will automatically start one of the following modes:

Conventional electrophoresis, linear pulsed electrophoresis, reversed linear pulsed electrophoresis, crossed field pulsed electrophoresis, or reversed crossed field electrophoresis.

Models E614 (1000 volt), E632 (3000 volt), E651 (5000 volt).

Here is the revolutionary electrophoresis power supply specially designed to make your separation work fully automatic.

It features a unique triple volt hour integrator system, which is microcomputer controlled and automatically presets the instrument for constant power, current, or voltage.



There are no buttons or range switches to worry about, just tell your power supply the desired parameters by simply typing them on the keyboard. Up to three sets of different values for voltage, current, power and volt hours can be programmed into the memory. By recalling these programs sequentially, the instrument automatically changes the parameters after each preset value of volt hours.

Four bright LED displays continuously show the output voltage, current, power and volt hours. At any time the preset parameters can be recalled and changed without interfering with the run.

Of course, there is also an autoranging provided on the current and power readings, which enables you to read up to 0.1 mA or 0.1 W extra precision when running an experiment in the lower ranges (less than about 30 W).

For further details of these instruments contact Carter Chemicals. One final note for quality-conscious buyers — **all** Consort instruments come with a **3-year** guarantee against defective material and workmanship. Surely this offer is without equal!

For further information please circle no. 25 on reader reply card.

Flash Chromatography M&B May&Baker

To facilitate the widespread use of Flash Chromatography, May & Baker have introduced a new precision engineered range of low-cost, simple to operate columns with the ability to separate compounds with an R_f difference of only 0.1. In addition the columns incorporate many unique features:–

● Special design end fittings	– Eliminate deadspace and maximise column efficiency for precise component separation.
● New grease free PTFE/Glass seals	– Eliminate contamination and extend the range of organic solvent systems that can be used.
● Robust screw couplings and joints	– For reliable column operation under pressure with easy connection to UV/IR detectors.
● Wide range of column sizes	– Enables a variety of small and large scale samples to be separated.
● Plastic column sleeve	– For increased user safety at operating pressures.

May & Baker Flash Chromatography Columns – the high performance solution to your separation problems.

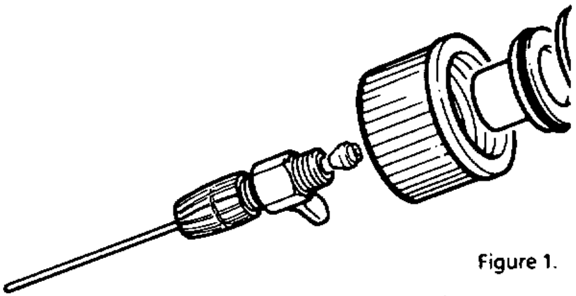


Figure 1.

May & Baker Special Design Column End Fitting

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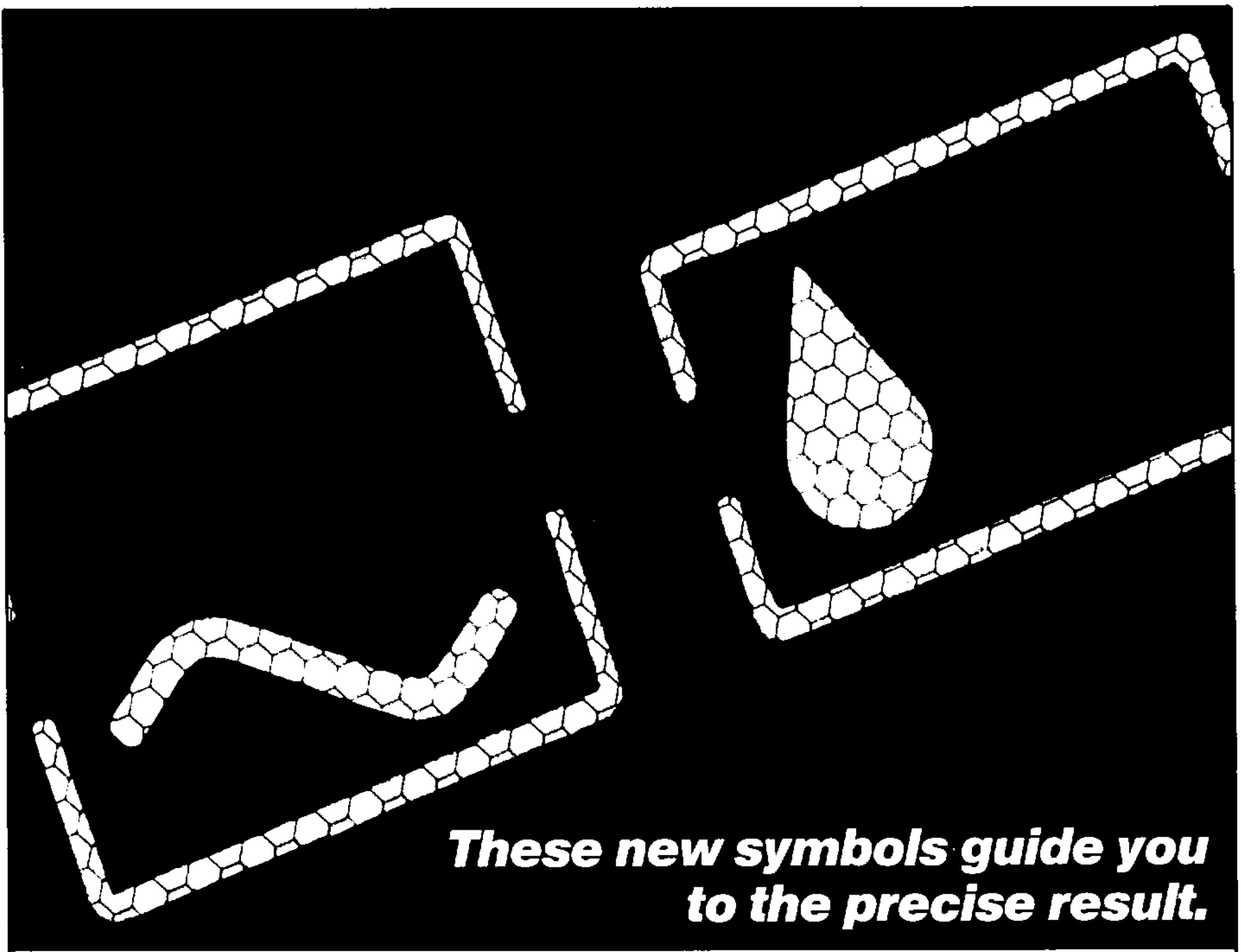
Telephone: Wellington 678-629 Auckland 793-091



Introducing the new Mettler PM with DeltaTrac

This new precision balance gives you precise results, even in an unstable environment.

The vibration adapter ∿ adjusts to suit your environment. The weighting process adapter 💧 adjusts to suit your task. Together these new symbols show you the status of your Mettler PM.

A touch of the control bar programs the new PM to fit your environment and your task. From fine dosing in the laboratory to checkweighting on the production floor — just set it and forget it. Because your PM can take care of itself. It adapts to its environment and application, so you get accurate reproducible results.

To help you adapt to your new PM, we've added Mettler DeltaTrac. This active display monitors balance capacity and guides you through the weighing process. Keeping you and your weighing on track.

The new Mettler PM precision balance with DeltaTrac, designed for the way you work. Wherever you work. Nine models, capacities from 110 to 4100 g, readabilities from 0.001 g to 0.1 g. For a copy of our 24 page PM series balance brochure contact:

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PRODUCT NEWS

New generation soft key pad — Crison pH meters

Crison have introduced the range of new generation 2000 Series microprocessor controlled, soft key pad pH meters. The total Crison range includes both a standard type portable Model 506 pH meter and the new Bench Top Micro pH 2000 Series pH meters.

A common problem found with traditional function keys is the accidental spilling of corrosive liquids and leaking of gases into the internal circuitry of the pH meter causing expensive damage. With the flat spill-resistant soft key pad this problem is eliminated.

The Crison 2000 Series pH meters incorporate the microprocessor key pad with self explanatory functions for classic simplicity. With only a few operating steps, the Crison Micro pH meters require no specialised knowledge of operation. In addition, Crison Micro pH meters also feature temperature compensation and are available in different accuracy readings.

They come supplied complete with an electrode with a handy, robust carry case.

For further information please circle no. 22 on reader reply card.

Liquid sorbent badges

Useful for in-plant or ambient air pollution studies, liquid sorbent badges offered by Northrop Instruments & Systems Limited are well suited for the monitoring of specific chemical hazards, and for survey work, in collecting a wide range of inorganic as well as organic compounds. These broad range collection dosimeters consist of a liquid-filled chamber, the sampling face of which is a bound-liquid membrane. The sample is brought into contact with the membrane by controlled diffusion through a diffusion barrier, independently of wind velocity effects. A variety of analytical methods can be employed after sampling.

The standard industrial hygiene model is 5 ml capacity and is available in sampling rates of 0.5, 5.0 and 50 ml/min, for personal monitoring applications. A special ambient environment model has an increased liquid capacity of 25 ml.

For further information please circle no. 23 on reader reply card.

Mettler DeltaTrac — unmistakable feature of a new generation of precision balances

The new Mettler precision balances of the PM series have a striking graphic display, the unique Mettler DeltraTrac. 60 segments arranged in a circle inform the user continually on how much of the weighing range is used and how much is still available. By reacting sensitively to everything happening on the weighing pan, Mettler DeltraTrac imparts visual substance to the weighing results. In addition, for plus-minus checkweighing it shows the deviations from target weight in percent with the correct sign.

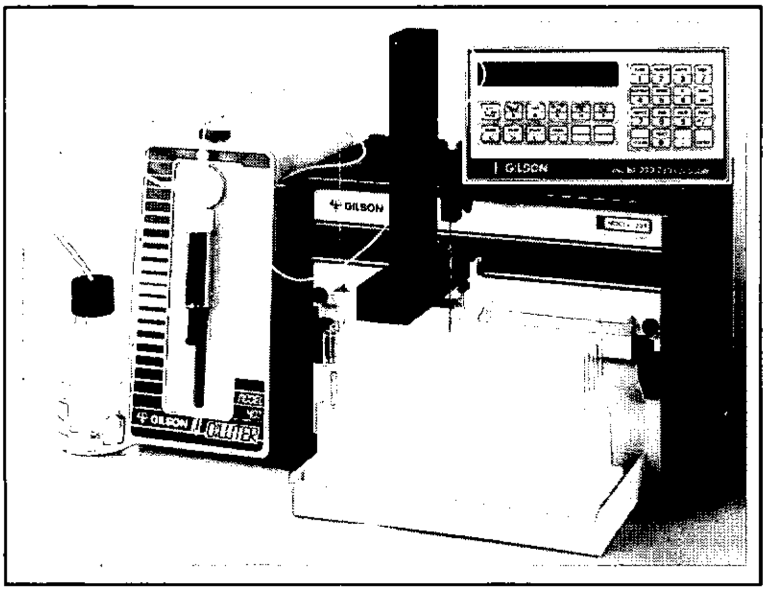
As a result, the exclusive Mettler DeltaTrac gives the user a completely new weighing feeling; the analog presentation is perceived faster and more dependably. Which means that the new Mettler PM precision balances will enable lab personnel to work not only faster and more accurately, but also with less fatigue.

A whole string of other features will help them do so. PM balances can be adapted to all sorts of situations by means of twelve adapter constellations, and they can be optimised in terms of speed or reliability for different ambient conditions and types of weighing. The weighing status selected for this by the user is shown by status indicators on the display. Standard solutions are available for common applications such as counting, percent weighing, plus-minus checkweighing, animal weighing and selection of weight units. Also standard equipment in every Mettler PM balance is a bidirectional RS232C/CL data interface.

For further information please circle no. 24 on reader reply card.

GILSON MODEL 221-401 & 222-401

AUTO-SAMPLERS FOR PREPARATION & TRANSFER OF LIQUID ANALYTES



These automatic samplers combine a sample-changer — Model 221 single rack or Model 222 multiple rack — with one Model 40 dilutor. Controlled from the same keypad or from a microcomputer, the system offers maximum flexibility. Gilson auto-samplers can be programmed to:

- **dispense fixed or variable volumes of reagent(s) in all or some of the vials**
- **dilute**
- **perform sequential dilutions along rows or columns of the rack**
- **mix by aspiration-delivery**
- **feed an on-line analyser, spectrophotometer or radioactivity detector.**

A choice of over ten different Gilson racks permits a wide variety of applications. In the event of special sizes, these samplers will also directly accept tubes of any manufacture. For complex sample preparation, several dilutors may be used simultaneously.

For further details contact

John Morris Scientific Ltd.

P.O. Box 6348
Wellesley Street
Auckland
Telex NZ 60114
Phone 444-5836

P.O. Box 30496
Lower Hutt
Phone 693-244

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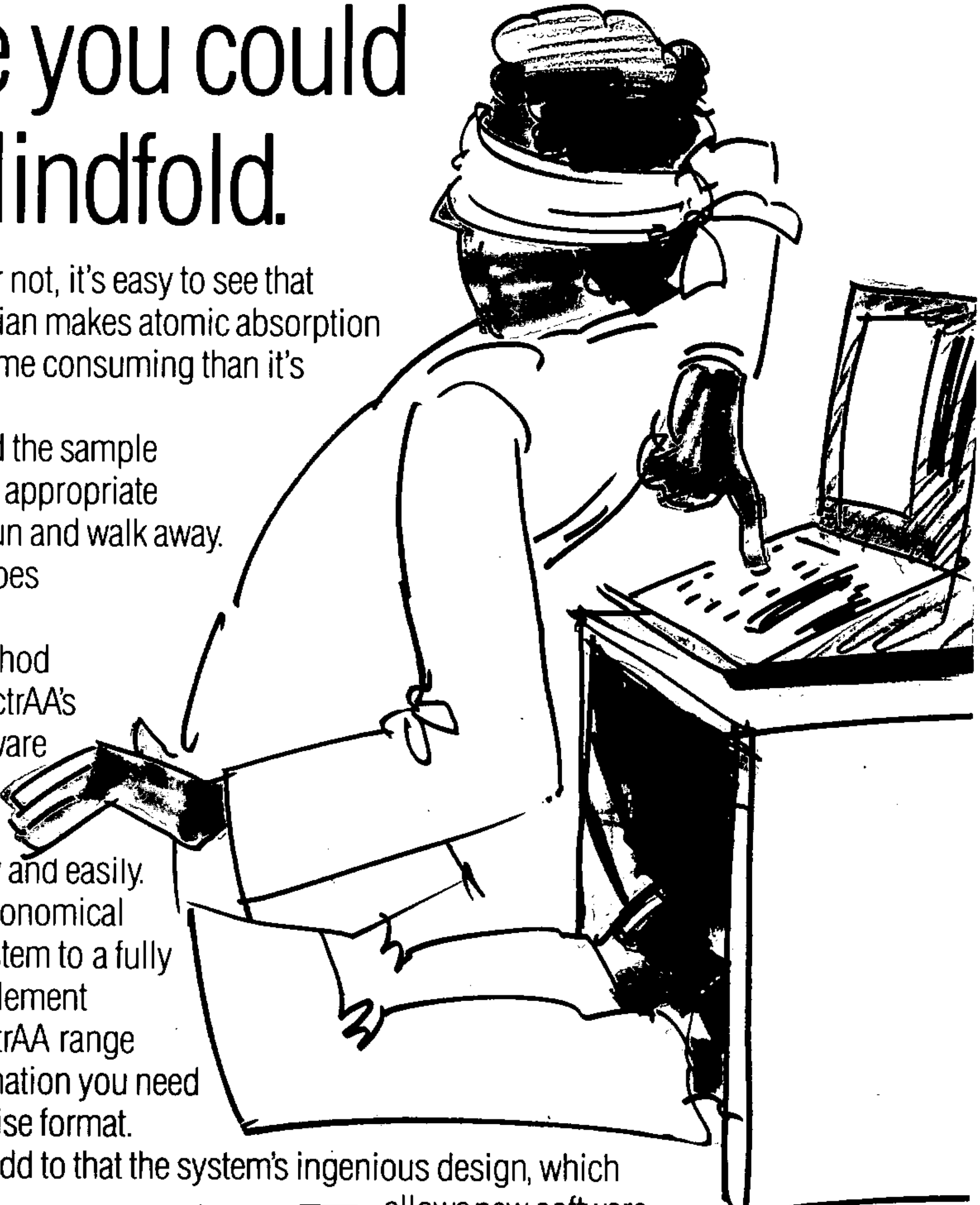
Atomic Absorption made so simple you could do it blindfold.



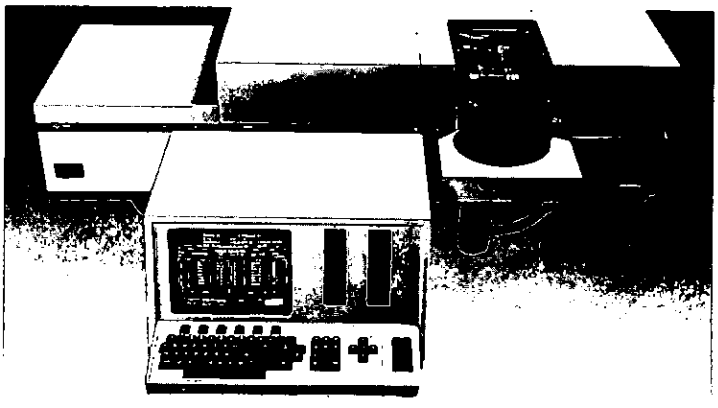
Blindfold or not, it's easy to see that SpectrAA from Varian makes atomic absorption simpler and less time consuming than it's ever been before.

Simply load the sample carousel, recall the appropriate method, start the run and walk away. SpectrAA does the rest.

Even in method development, SpectrAA's sophisticated software allows you to optimise analytical parameters quickly and easily.

From the economical single-element system to a fully automated multi-element analyser, the SpectrAA range presents the information you need in a clear and concise format.

When you add to that the system's ingenious design, which allows new software and accessories to be incorporated, SpectrAA will keep your AA capabilities ahead of the field for years to come.



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PRODUCT NEWS

A significant development in high resolution iso-electric focussing immobiline dry plate

LKB's twenty years experience with electrofocussing has shown that although well established, the technique based on carrier ampholytes has certain inherent limitations. For example; gradient drift can make it difficult to focus proteins at high pH values, or it can lead to conductivity gaps due to depletion of the ampholytes in some parts of the gradient; this can restrict usable pH gradients to 1 pH unit and thus set limits to the attainable resolution.

The introduction of Ampholine PAG plates went a long way to improving resolution. With a wide range of pH gradients, the PAG plate series offers convenience, reproducibility and easy handling. Despite the success of this method, biochemists analysing complex proteins needed a system which could be customised to meet their own specific demands. To fulfill these requirements LKB developed the IMMOBILINE System. Replacing conventional carrier ampholytes with immobilised pH gradients IMMOBILINE enables the buffering groups responsible for the pH gradient to become an integral part of the gel matrix. This unique feature allows the creation of any pH gradient required. For the first time IMMOBILINE gave researchers a completely free choice to tailor-make gradients in order to optimise resolution.

Giving extremely high resolution, in stable linear pH gradients as narrow as 0.1 pH units, IMMOBILINE has led to a wealth of previously unobtainable results. In genetics, forensic science and other interesting research areas, over 100 references demonstrate the outstanding versatility of the growing technique.

For further information please circle no. 26 on reader reply card.

The dry plate alternative

Ready-made gels transformed electrofocussing into a routine method accessible to all. LKB has now extended its gel programme in order to give the biochemist all the advantages of the IMMOBILINE system together with all the simplicity of PAG plates. The IMMOBILINE DRY PLATE is a technically more advanced product than any other being offered.

Fast, easy and reproducible, the Immobiline Dry Plate equips the user with an almost instant method for the routine analysis of even the most complex samples, including 2D work.

Moreover, a dried gel with an Immobilised pH gradient now offers a completely unrestricted choice of additives. A technique which can open the way to highly sophisticated electrofocussing. Since the gel is already pre-cast, additives can in no way affect polymerisation. This unique flexibility enables experimental conditions to be optimised by using any additive of choice.

Immobiline Dry Plate and the reswelling cassette have undergone exhaustive field trials and comprehensive pre-launch testing at numerous laboratories around the world. The valuable feedback obtained has enabled LKB to offer a product where standards of resolution, reliability, and versatility meet the most critical demands of today's protein chemist. The new computer controlled gradient generation used in the Dry Plate manufacturing process ensures a high standard of accuracy and minimises batch to batch variations considerably. This means the user is offered a guaranteed built-in reproducibility which enables results to be compared between different laboratories, regardless of the human factor.

For further information please circle no. 27 on reader reply card.

Gilson Model 221-401 & 222-401 auto-samplers for preparation & transfer of liquid analytes

These automatic samplers combine a sample-changer — Model 221 single rack or Model 222 multiple rack — with one Model 40 diluter. Controlled from the one key pad or from a microcomputer, the system offers maximum flexibility. Gilson auto-samplers can be programmed to:

— dispense fixed or variable volumes of reagent(s) in all or some of the vials
— dilute
— perform sequential dilutions along rows or columns of the rack
— mix by aspiration-delivery
— feed an on-line analyser, spectrophotometer or radioactivity detector.

A choice of over ten different Gilson racks permits a wide variety of applications. In the event of special sizes, these samplers will also directly accept tubes of any manufacture. For complex sample preparation, several diluters may be used simultaneously.

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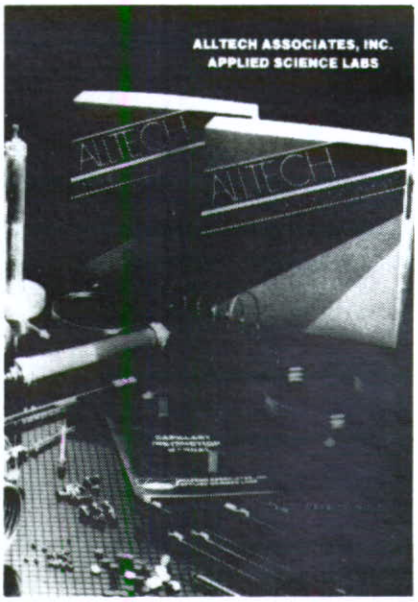
CHROMATOGRAPHY SPECIALISTS SPECIFY ALLTECH



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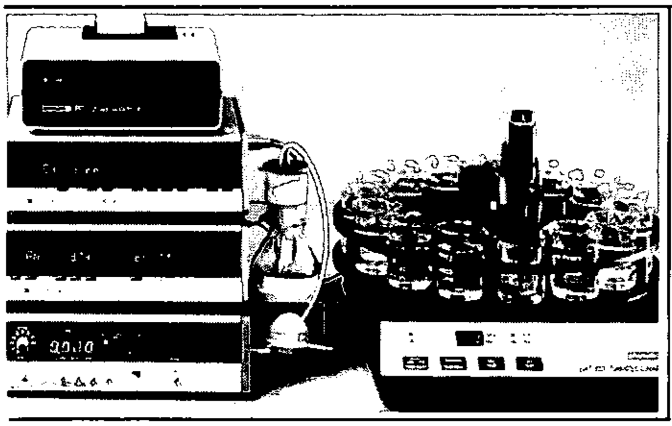
PRODUCT NEWS



Automatic system for water labs performs simultaneous analysis of several parameters

As part of the 800 series, Radiometer is now introducing a new analysis system, the DTS893 Water Analysis System, — capable of measuring pH and conductivity, and performing titrations automatically on up to 15 samples in a batch — all simultaneously. The titration method is pre-selected by the user and can be changed in seconds, as up to 31 different user-programmable methods can be stored in the microprocessor memory. The samples are processed in a sample changer with removable turntable, making sample preparation simple and convenient.

The system is particularly suitable for water analysis. A typical example of use is simultaneous determination of conductivity, pH value and alkalinity (m- and p-value) in mg/l. The system automatically titrates to one or two end-points, according to the start pH of the sample, without operator supervision.

For further details, please contact Radiometer A/S, Analytical Instruments Division, Emdrupvej 72, DK-2400 Copenhagen NV, Denmark.

For further information please circle no. 19 on reader reply card.

New liquid scintillation counter augments the LKB range

Sci-Med is pleased to announce the availability of the new Rackbeta Primo from LKB-Wallac. Designed with compactness and efficiency in mind, the Primo is just the instrument for the modern, very busy laboratory. Designed by Wallac, fine tuned by you so that Primo comes with the right combination of features for your specific needs in LSC. A totally reliable, dependable workhorse, which with the very minimum of effort, provides you with the high quality results you demand.

Here's why:

★ **Compact Instrumentation**
Primo has been designed to be operated without an additional terminal. It fits easily into your laboratory.

★ **Easy to Use**
Each step in the operation of Primo is simple and easy. The display gives the prompts and you push the keys.

★ **Reliability**
The design concepts in Primo are well established and proven. Reliability is built-in.

★ **Personalised Instrumentation**
Whatever your particular LSC requirements, Primo can be adapted. Your needs, your way. Further, as your LSC needs change with time Primo can change with them by making full use of the catalogue of options.

★ **Latest Technology**
The very latest technology is at the core of Primo. Multichannel analysis and chemiluminescence correction to name but two of the newer features.

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Sci-Med & LKB announce the visit to New Zealand of Anna Malm, HPLC Product Manager from LKB Bromma, 22-26 September 1986.

Seminars will be held in the following centres: Auckland, Palmerston North, Christchurch, Dunedin.

On topics selected from: New developments in HPLC detection technology, new HPLC instruments, new separation modes, approaches to biological purification.

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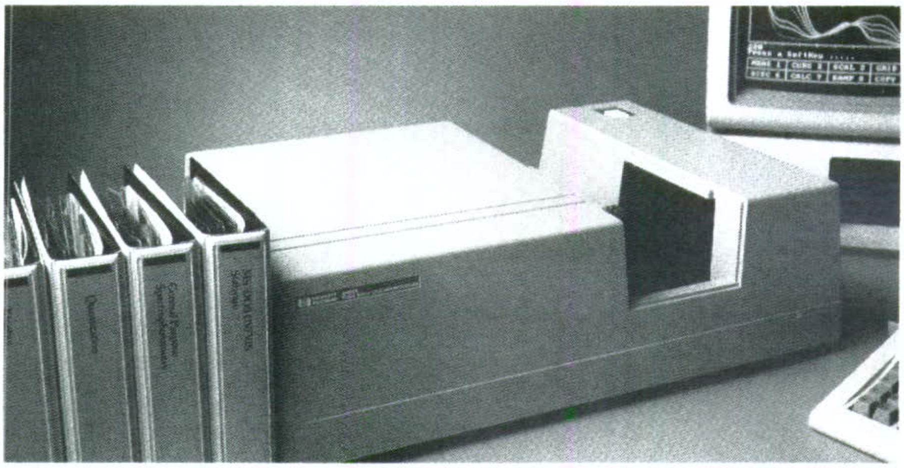
☆ New Hewlett Packard 8452A Low Cost Diode-Array Spectrophotometer with IBM PC Workstation.

HP's low-cost spectrophotometer is now available with a choice of controllers, so any lab, regardless of budget, can reap all the benefits of advanced diode-array technology. Greater precision and accuracy. More speed and reliability.



Now, any lab can afford a UV/VIS diode-array spectrophotometer.

☆ Hewlett Packard's new ChemStation, a versatile instrument controller/workstation with software for MSD (Mass Selective Detector), GC/MS, LC/MS, IRD (Infra-Red Detector for GC), Diode-Array Detector for HPLC, UV/VIS spectrophotometer, multi-instrument GC and LC data acquisition.

☆ Nelson Analytical Laboratory software for IMB PC including chromatography, communications to existing integrators, Laboratory Data Management.

☆ New Series 1000 modular HPLC system from Cecil.

Plus the Hewlett Packard 5890 G.C. teamed up with the HP3393 Computing Integrator and 7663 Automatic Sampler.

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