October 1983 Volume 47 No. 5

Chemistry in new zealand

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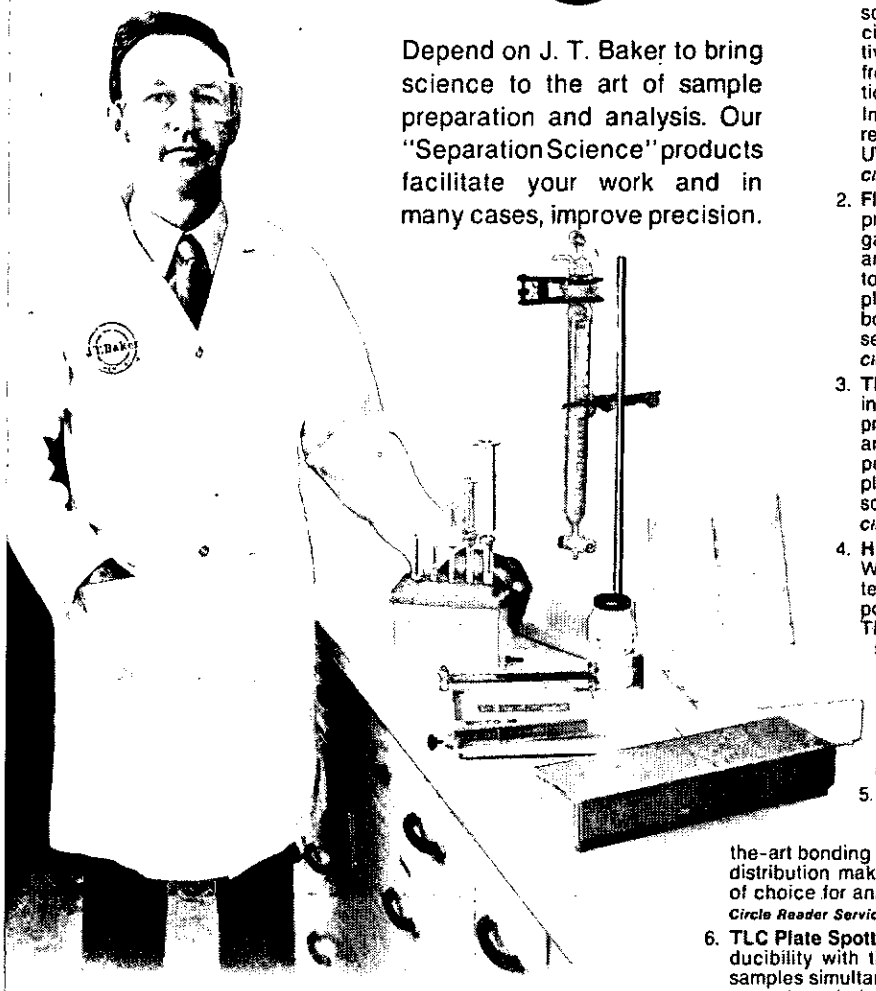

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FRONT COVER
The front cover features the new NZIC logo, recently unveiled at the AGM. Designed by Anita Vink and Glenn Jameson of the ATI Graphic Design Class, the logo will be used on Institute stationery and possibly on a tie and scarf.

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Chemistry in new zealand

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EDITORIAL

The marque of a successful conference — members of the organising committee sitting at the registration desk with absolutely nothing to do.

POST CONFERENCE HOMILIES

Hamilton lies in that rather blank stretch of New Zealand between parochial Auckland where I live and sleepy Dunedin where I was brought up. However, it is only 90 minutes drive and there was no real excuse for not attending the N.Z.I.C.'s annual get together.

Entering Hamilton from the North is an experience in itself after an hour and a half of "dog eat dog" driving one suddenly finds oneself in the middle of the greatest concentration of second hand tractor yards in the world. The left turn towards Ruakura brings a sense of wrenching spatial and temporal displacement.

Suddenly little square fields sprout labels such as "Dairy Unit No.5" and each beast of the field appears to be tagged "Ewe Equivalent No. 3245."

However, the conference. When I was younger and thought my Nobel prize only a matter of time, I attended with the masochistic intention of hearing as many papers as possible. The results were awful, I selected by topic rather than author and ended the day a nervous wreck enriched only by a set of incomprehensible scribbled notes.

These days I enjoy the N.Z.I.C. Conference much more. It is not the conferences that have changed, let's face it whatever the theme, 80% of the papers are virtually indistinguishable from those of the previous year. It is the other 20%, those speakers who have the ability to make the topic of chemistry alive and fascinating, speakers like Weiss and Fensham who can rekindle my belief in chemistry for another twelve months. In a country the size of New Zealand there are precious few opportunities to listen to high calibre speakers or to talk with colleagues who hold similar interests and generate fresh ideas. The old saying "It's not the conference itself that is so important but the chance to talk to people" is not just self-justification for a week away. Conferences need not be measured in terms of the units of information they impart but should be evaluated in terms of the attitude changes they catalyse. I must agree with the overheard comment "I was surprised, despite all the fancy titles on the papers, it was a damn good conference."

Tony Herd

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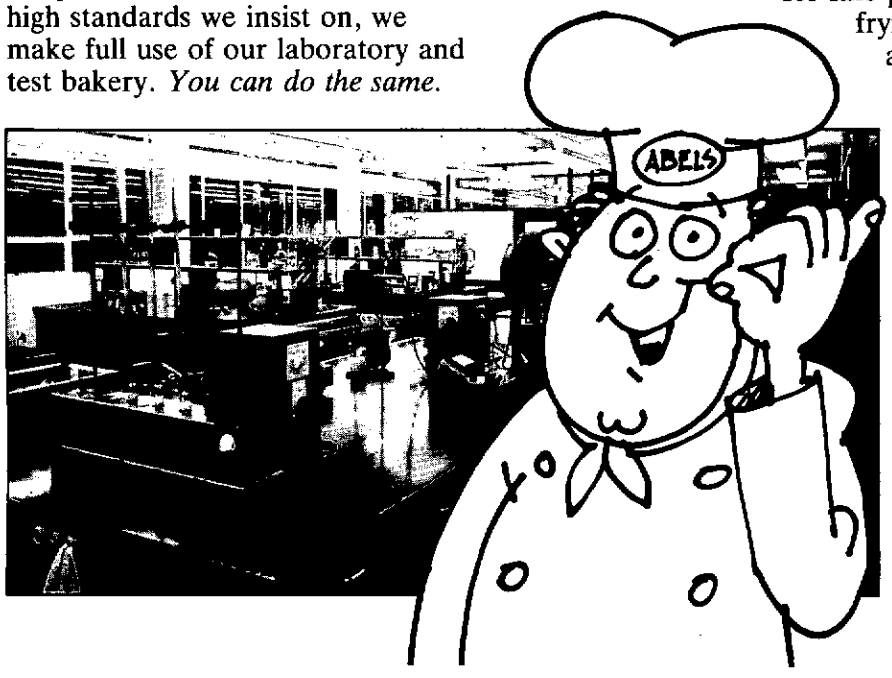

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ADHESIVES SYMPOSIUM

A highly successful symposium on 'Adhesives' organised by the late *Arthur Kennett* was held by the Polymer Chemistry Group of the Institute in Auckland on the 7 and 8 April 1983. It attracted 84 participants, 83 percent coming from industry (34 companies) and the remainder from 3 Government Departments, the Auckland Technical Institute and a Research Association. The enthusiam to attend was such that by the 31 March no further applications could be accepted without changing the venue which was virtually impossible at such a late stage and Easter imminent. In addition, the conference room at the Accident Compensation Corporation was considered, and found to be, ideal for the purpose.

The Symposium was officially opened and closed by *Dr John Rogers* for the N.Z.I.C. Council. In his opening speech he expressed the Institute's concern to gain the interest, confidence and participation of chemical industry through activities such as this symposium arranged by one of the Institute's 14 Specialist Groups and to stimulate recruitment of industrial chemists to N.Z.I.C.

The programme was as follows:-

"Adhesives and Adhesion Theories" by *Owen Brett* — Ados Chemical Co. (presented by Tom Hackney — Oregon Paint Co)

"Adhesives for Wood" by *Dr Ron Maylor* — A.C. Hatrick Ltd.

"The Chemistry and Application of Formaldehyde Based Adhesives for Wood" by *Dr Arnis Kazakevics* — I.C.I. (NZ) Ltd

"The Use of Starch in Adhesive Applications" by *John Beishuizen* and *Ivan Erceg* — N.Z. Starch Products.

"Quality Control of Polymer Mortar Surfacings" by *I.D. MacGregor* and *Dr Wayne Sharman* — B.R.A.N.Z.

"Health Hazards of Adhesive Manufacture and Use" by *Dr Robert Winchester* — Health Department

"The Chemistry of Adhesives" by *Arthur Kennett*, Chemistry Division, D.S.I.R., Auckland.

"The Analysis of Adhesives" by *Neil Edmonds* — A.T.I.

"Testing of Adhesives" by *Owen Brett* — Ados Chemical Co. (presented by Tom Hackney — Oregon Paint Co.)

"Aspects of Pressure-Sensitive Adhesives" by *Dennis Hills* — CIDD, D.S.I.R.

"Sealants or Mastics" by *Bob Wakelin* — Expandite Ltd.

"Six Years Natural Weathering of Sealants" by *Dr Wayne Sharman, J.I. Fry, R.S. Whitney* — BRANZ

"2-Component Solvent-free Laminating Adhesives" by *Tony Sewell* — B.J.N. Holdings N.Z. Ltd.

There was considerable interest in the papers on wood adhesives and particularly in Ron Maylor's paper which included tables summarising the properties of natural and synthetic adhesives. Another paper which created interest was that presented by Dennis Hills on pressure sensitive adhesives. On a somewhat different 'tack' the two papers on sealants by Bob Wakelin and Wayne Sharman produced many questions from the audience, and discussion between the authors! The chemistry presented in the papers was accepted calmly by both chemists and non-chemists alike. As expected, there was considerable interest and discussion on the paper given by Robert Winchester about health aspects, strangely enough, not most being concerned with 'glue sniffing'.

In addition to the papers, a poster showed the necessity for good 'wetting' between adhesives and adherends to give effective bonding and there were practical demonstrations on the measurement of bond strength and cohesion of plastics materials. Another poster showed the developments in adhesives from lime and bitumen used at the time of Christ to the more recent cyanoacrylate and 'ladderlike' polymer adhesives.

The Symposium took on a pleasant social atmosphere for the concluding hour of the first day. The consensus of opinion expressed by *Mr T.D. Humphries* of the Adhesives Manufacturer's Association at the final session was that a good time was had by all.

There are a limited number of pre-prints available at $20 per copy for those who were unable to attend the symposium. Applications should be made to R.J. Norris, c/o Chemistry Division, D.S.I.R., P.O. Box 2224, Auckland.

PEOPLE

PROF. R. D. BATT

NEW NZIC PRESIDENT

The new President, Professor Dick Batt, is Dean of the Faculty of Science and heads the Department of Chemistry, Biochemistry and Biophysics at Massey University. He was appointed to one of the two foundation chairs when the Faculty of Science was established at Massey University in 1965 and he has been Dean of the Faculty almost continuously since that time.

His initial training was in Chemistry at the University of Otago, from 1942-1947, and he was one of the first two graduates to complete the degree of Doctor of Philosophy when it was reintroduced by the University of New Zealand in the late 1940s. His research work for both the M.Sc. and Ph.D. degrees was on the essential oil from the New Zealand cedar, under the supervision, initially, of *Dr C.H. Hassall* and subsequently *Prof. S.N. Slater.*

For part of 1948 he was a Junior Lecturer on the staff of the Chemistry Department at Otago prior to taking up a Nuffield Departmental Demonstratorship in the Department of Biochemistry at Oxford University. During the 4½ years he spent there, he completed a B.A.(Hons.) degree in Physiology and a D.Phil. degree in microbial metabolism, supervised by *Prof. D.D. Woods.* In 1952, he returned to a teaching position in the Department of Biochemistry at the Otago Medical School and during the 12 years until he was appointed to the Chair of Biochemistry at Massey University he continued work on the micro-organism he had isolated at Oxford University through an enrichment culture using pyrimidines as substrates.

With the move to Massey University came the opportunity to promote biochemistry teaching and research in a close association with chemistry within the small but rapidly growing Department of Chemistry and Biochemistry. From an academic staff of 7 in 1974, the combined departmental staff, to which the Physics group was subsequently added in 1972, had increased to 47 by 1983 with a technical and secretarial staff totalling a further 42.

Protein chemistry and biochemistry has become the major research theme for the department and, in recent years, there has been a very active promotion of new industrial developments based on potentially valuable research findings from the department.

In 1972, Prof. Batt with others was instrumental in establishing the NZ Biochemical Society and over the years an harmonious and mutually beneficial association has been consolidated between the Society and the Institute. It is propitious that Prof. Batt should be both President of the Institute and Chairman of the NZ Biochemical Society during the forthcoming year.

Prof. Batt was elected to the Fellowship of the Institute in 1962 and Fellow of the Royal Society of NZ in 1979. In 1976 he was awarded the MBE "for services to scientific research."

NEW D-G FOR DSIR

DR. G. W. BUTLER

Dr Graham Butler has been appointed Director-General of the DSIR, taking up his position upon *Dr David Kear's* retirement in late October.

Born in Auckland, Dr Butler completed an MSc degree in chemistry at Auckland University. Two further degrees, including his doctorate, were gained at the University of Lund in Sweden.

Dr Butler was previously director of DSIR's Applied Biochemistry Division at Palmerston North. He is currently an Assistant Director-General of the department with responsibility for formulating DSIR's science policy relating to agriculture and biological research.

Dr Butler is a member of the Massey University College Council, and deputy chairman of the boards of the Cawthron Institute trust, and the Wool Research Organisation. He is a fellow of the New Zealand Institute of Chemistry, of the NZ Institute of Agricultural Science and of the Royal Society of New Zealand.

P.J. GALLAHER

Phil Gallaher has retired from his position as leader of the Fertiliser Chemistry Section, New Zealand Fertiliser Manufacturers' Research Association. Apart from a very brief spell in the timber industry, Phil spent his working career in the fertiliser industry. After graduating B.Sc. from Auckland University in 1945 he joined the Te Papapa works of New Zealand Farmers' Fertiliser Co. Ltd in 1946. In 1954 he was appointed chief chemist and acid plant superintendent. Three years later he joined the Research Association as the senior chemist and headed the Fertiliser Chemistry Section until his retirement. He filled many roles over the years frequently acting as Officer in Charge in the Director's absence.

Phil became a member of the Institute of Chemistry in 1948 and was elected a fellow in 1969. He served as an Auckland Branch Committee member 1955-67 including 4 years as treasurer and 2 years as chairman.

O.E. CLINTON

Mr Owen Clinton retired from the Ruakura Agricultural Research Centre on 31 August after 40 years service. Approximately half of this time was spent working with the late *Eric Allan,* who was a pioneer in the use of atomic absorption spectroscopy in the 1950s. Mr Clinton designed and constructed many novel analytical devices in the Spectrochemical Laboratory at Ruakura. He was also responsible for the development of a number of new or improved methods of determination for major and trace elements in a variety of agricultural samples. His extensive experience and sound judgement will be greatly missed by his colleagues. Mr Clinton has been Waikato Branch Treasurer since 1977.

J.D.B. FEATHERSTONE

Dr John Featherstone has been appointed chairman of the Department of Oral Biology at the Eastman Dental Centre, Rochester, New York.

Dr Featherstone, who came to the Centre as a senior research associate in 1980, is a native of New Zealand. He took his B.Sc. with a joint major in mathematics and chemistry at the University of Wellington. He then studied in Manchester, England, for an M.Sc. in chemistry, and returned to Wellington for a Ph.D. in the chemistry of dental decay.

Dr David Rands has been appointed General Manager/Director of Taubmans in New Zealand. Dr Rands joined Taubmans in 1976 as Production Manager and has held several executive positions with the company both here and in Australia.

R. Nath, formerly Group R&D Chemist with Oasis Industries Ltd, has joined NZ Cosmetic Laboratories as Chief Chemist.

OBITUARIES

DR M. KINGSFORD

Michael Kingsford, aged 46, Government Analyst and Officer in Charge, Chemistry Division, D.S.I.R., Auckland, died in Auckland in July.

Dr Kingsford was educated at King's College, Auckland (Dux 1953) and the University of Auckland (M.Sc. with 1st Class Honours in Chemistry, 1958, PhD 1963). He was elected an Associate of the NZIC in 1958, and a Fellow in 1972. In 1975, he was elected member of the Australian Society of Clinical and Experimental Pharmacologists (ASCEP).

From 1961-66 he was a foundation tutor in pharmaceutical chemistry at the New Zealand School of Pharmacy, Lower Hutt. In 1966, he was appointed Leader of the Food and Drug Section, Chemistry Division, D.S.I.R. at Gracefield, Lower Hutt. There he built up the division's pharmaceutical interests, introducing analytical services for the Health Department which led to substantial improvements in the quality of pharmaceutical products. He was also instrumental in expanding environmental and drinking water quality work within the Division and played a leading role in numerous projects including early surveys on the Waikato River and Lake Horowhenua, the introducing of inter-laboratory analytical testing for New Zealand Water Laboratories and compounding documentation of the Nation's drinking water supplies.

By 1977 he had assumed the role of Group Leader, being responsible for the division's Forensic, Food, Water and Toxicology and Pharmaceutical interests at Gracefield. In 1982 he was appointed Government Analyst and Officer in Charge of the Chemistry Division Laboratory in Auckland.

His research interests covered a wide range within these fields, with publications resulting from his work in Food, Water and Pharmaceutical Chemistry. At the time of his death, Dr Kingsford had 3 papers on pharmaceutical chemistry in press. Readers of his journal will also be aware of his contribution to public affairs, with his contribution on the Official Information Act (Chemistry in New Zealand 47 (3) 55 1983) and may or may not be aware of his role as the originator of the Sceptical Chemist.

Outside of the D.S.I.R., he was active in the New Zealand Institute of Chemistry, being Branch Chairman at Wellington ar serving on numerous subcommittees.
In private life he was actively involved in both Church and classical vocal music. From being chorister to choirmaster he was, in more recent years, leading bass and soloist at Wellington Cathedral, where he gave solo recitals.

He is survived by his wife Jeanette, a son Douglas, 16, and daughter Michelle, 10.

P.E.N.

DR A. METCALFE

The death has occurred in Christchurch of Dr Alan Metcalfe, a senior lecturer in the Chemistry Department of the University of Canterbury, whose work for the underprivileged won him the respect of his colleagues and a wide section of the community.

Dr Metcalfe was 45. He is survived by his wife and six children.

A dynamic and well-liked man with a delightful sense of humour, a ready wit and a fund of stories, Dr Metcalfe was involved in a wide range of family, professional and social activities. As a Justice of the Peace he often sat on the Bench of the District Court on Saturday mornings. He became familiar with the law and legal proceedings as a result and some years ago he decided to extend his knowledge and abilities by studying for an LL.B. degree in addition to his other commitments. He planned to complete that degree this year.

Dr Metcalfe was a graduate of Bristol University and he completed his Ph.D. there in 1963 after research in the field of heterogeneous catalysis. Post-doctoral work at Dalhousie University followed and he was appointed a lecturer at the University of Canterbury in 1964 and promoted to a senior lectureship in 1971. He was able to maintain his links with Canada when he was appointed to a fellowship at Queen's University, Kingston, Ontario while on study leave in 1974.

At the University Dr Metcalfe much enjoyed responsibility for a special course, Chemical Process Technology, which was taught in conjunction with the Department of Chemical and Process Engineering and which opened a window for students on the industrial applications of chemistry.

His enjoyment was understandable because Dr Metcalfe had numerous contacts outside the University — indeed for many people he was the Chemistry Department. One of his principal professional preoccupations was acting as an industrial consultant or as an expert witness. It was said that whenever a manufacturer telephoned the department seeking advice on why his product was not up to scratch or a little old lady called with deep suspicions that her cat was being poisoned, a call went up for Dr Metcalfe. He was often able to solve such problems.

Dr Metcalfe was successively chairman and secretary of the Avonhead branch of the Labour Party and also chairman of the party's Yaldhurst electorate selection committee. He was a former chairman of the Sumner Round Table.

E.T.B.

THE SCEPTICAL CHEMIST

After enjoying a pleasant Conference Dinner at Hamilton this year, I was saddened and appalled to hear after-dinner speaker Dr Jim Sprott supporting nuclear weapons and the "protection" afforded by America's nuclear umbrella. I was saddened because Dr Sprott has in the past lent his authority to more worthy causes and I was appalled because here in 1983 we were being reminded of World War II and asked to draw parallels for today.

But those fireballs in 1945 marked a turning point in human history. Before those awful days, defence against bomber and invasion was realistic — one could so weaken the enemy's fighting capacity without enormous damage to one's own, that victory in war was possible.

Is that still possible? Today the USA and the USSR each possess the explosive capacity of half a million Hiroshimas. The nuclear powers in their 50,000 warheads contain the equivalent of 4 tonnes of TNT for each and every one of the earth's 4,500,000,000 inhabitants. Such mind-numbing figures defy comprehension, but they are the realities we live with today — and could die by tomorrow.

The very real possibility exists today of the destruction of civilisation in a nuclear holocaust. We risk the destruction not only of the art, learning and science built up over the millenia, but of the very highest human values and ideals.

I do not argue for unilateral disarmament, but people the world over must use their energies to reduce and finally to remove these weapons of terror and mass destruction, and go beyond this in working to remove the causes of tension between nations.

The Council of the American Physical Society in a series of resolutions (Physics Today, March 1983, 63) calls on the nuclear powers "to intensify substantially ... and with a sense of urgency ... efforts to achieve agreement between the USA and USSR". The Executive Board of the International Council of Scientific Unions has called on member countries of the UN "to make every effort to save mankind from the threat to its very existence. It is imperative to take urgent measures ... in the banning ... of nuclear weapons". The NZ Institute of Physics "urges the NZ Government to call for an agreement to halt the testing, production and deployment of nuclear weapons and nuclear weapons delivery systems".

And the N.Z.I.C.? Well, we're rather upset by those butter ads on the telly.

Brian Davis

REFLECTIONS ABOUT QUALITY ASSURANCE

W. J. PASSL

Chemistry Division
Department of Scientific
and Industrial Research

Wolfgang Passl graduated M.Pharm in Vienna in 1958 and was registered as a practising pharmacist in 1960. A Fulbright Grant enabled him to spend a year doing research and teaching at the School of Pharmacy, University of North Carolina. After receiving his PhD in Vienna in 1963 he worked as a retail pharmacist for two years. He then became involved in the management of pharmaceutical companies, being responsible for production, quality control and packaging. Since joining the Pharmaceutical Section, Chemistry Division, DSIR, in 1970 he has been closely involved with the assessment of the quality of pharmaceuticals in New Zealand.

Over the past few years New Zealanders have become more or less aware of the meaning of Quality Assurance (QA) and have taken notice that this term is connected with well defined, concerted efforts that have been going on for decades overseas, particularly in Asia and North America, and are about to conquer the world. However, what is happening is nothing short of a revolution that is reshaping our ideas of product and service quality and our concepts of management; for the individual worker it may mean a drastic change comparable to the Industrial Revolution. Eyewitnesses of these developments in Asia lament the complacency and ignorance still found in New Zealand management circles, because we have to compete with the Asian countries and are not even trailing them on their path to success.

Discussing QA as Chemistry Division's QA Coordinator and as an office holder of the New Zealand Organisation for QA (NZOQA), I still find myself repeating explanations of the meaning and scope of QA and hence I would like to reach a larger forum through this journal. If it should appear that I include common knowledge, I apologise, countering that common knowledge only exists in the eye of the beholder, or, if you wish, in the mind of the initiated.

Definitions and Perspectives

The most appropriate description of QA, I suggest, appears in British Standards BS 4778:1979,[1] where it is defined as "embracing all activities and functions concerned with the attainment of quality." It should be added that these activities and functions include measures to secure the minimum use of materials, equipment, staff and time, because satisfactory quality cannot be seen as the highest attainable level of perfection but as a combination of all those attributes of a product or service that render it fit for a specific purpose.

Figure 1 shows how the total costs of making a product or providing a service are influenced by failure costs and QA expenses. As the quality level is raised, losses due to failures decrease and QA costs rise. A point is reached above which further reduction of the failure rate increases the QA expenses unduly. Ideally the quality level at the minimum of total costs is identical with the optimum quality specified in the original concept. The British Standard[1] defines quality as the "totality of features and characteristics of a product or service that bear on its ability to satisfy a given need".

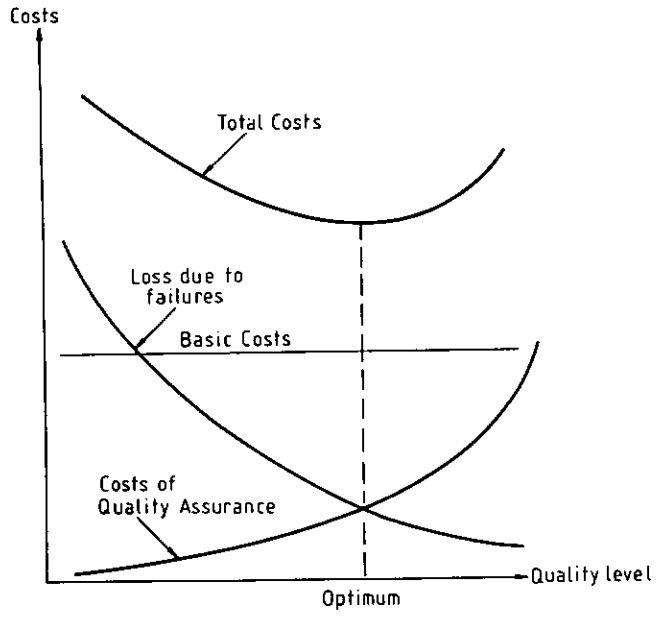


Fig. 1: Quality Costs

It is hence obvious that quality cannot be inspected into a product or service or put into it at some stage of the production or during execution of a service; it has to be designed into it.[2] At the very development stage, it must be assured that a product offers optimum performance for its purpose at the lowest cost. Besides, it must be safe and convenient to use, be reliable within its shelf life, comply with the relevant standards and be compatible with the machinery and with any materials with which it may be associated.

This approach does not negate the importance of the Quality Control (QC) measures that accompany all opera-

tions. QC is, in fact, part of the overall QA and defined[1] as "all operational techniques and activities that sustain product or service quality to specified requirements". Often these QC techniques and activities are located in the Analytical Laboratory. Outside the Laboratory, Process QC[1] involves the "maintenance of process variability within the required limits".

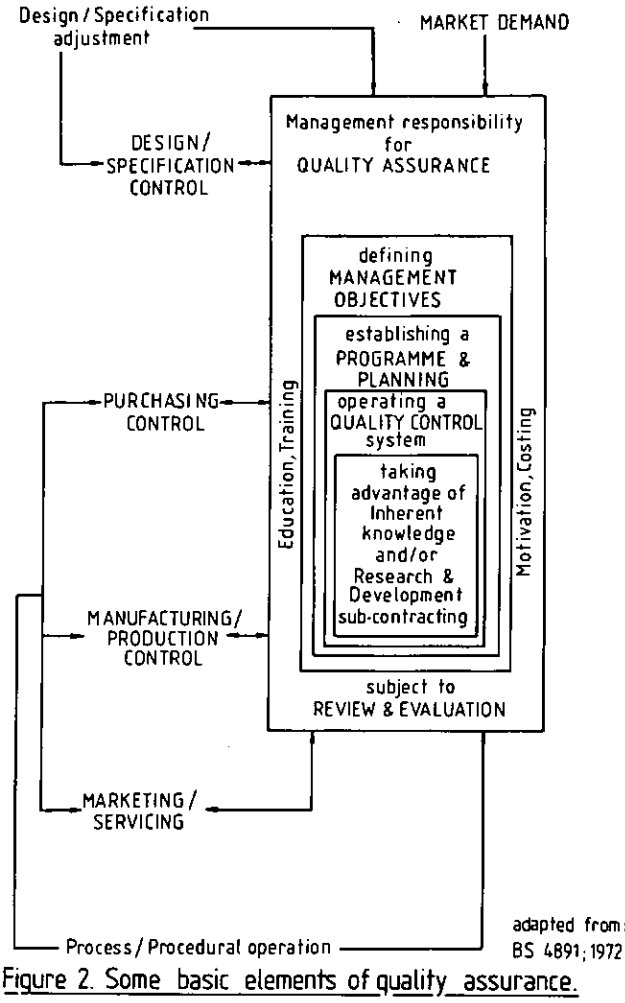


Figure 2. Some basic elements of quality assurance.

Quality Assurance Pervading Manufacture

Since QA starts at the original concept, it is bound to grow with the realisation of this concept, pervading all operations as a system established and supported by management.[3-6] Figure 2, adapted from BS 4891:1972, depicts the basic elements of a manufacturer's QA system. It shows the wide range of QA, starting from Research and Development and extending to Marketing and Servicing. QA is clearly a management tool. Management is responsible for the definitions of the QA objectives, the establishment of a QA programme and the operation of the QC system, as well as for the consideration of existing know-how together with the new insight provided by Research and Development. Thus QA is inseparable from good organisation and is laid down in Codes of Good Design Practice, Good Manufacturing Practice and Good Laboratory Practice.[7, 8] It is monitored by record auditing and by using QA check-lists.[9-12]

Quality Assurance Involves Everyone

The all-pervasive nature of QA makes it everybody's business. Responsibility for quality is delegated to every single member of the work force, and this results in a new concept for the workers as creators and occasional innovators, replacing the traditional image of them being mere cogs in a machinery. I must admit this change of role is helped by the exciting prospects of eliminating repetitive, repugnant or unhealthy work by installing computerised machinery.

Apart from stimulating the individual worker's initiative and imagination for improvements, group action in the so-called Quality Circles[13] is promoted by many companies. These self-motivated, brainstorming groups of workers who have acquired the habit of continuously searching for improvements are particularly popular in Japan, where they may be found virtually everywhere — in banks, insurance companies, hospitals, travel, transport, construction, civil engineering and, of course, in manufacturing. It has been reported[14] that Japan now has 104,000 registered Circles with 10 million members.

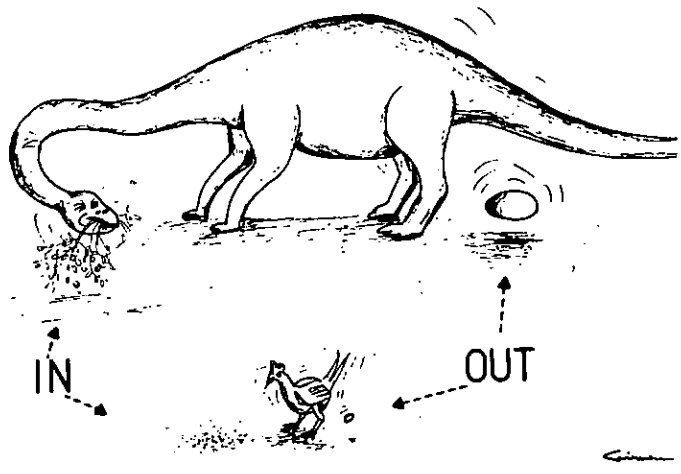
Recognition Through Quality Assessment

A well-planned and executed QA System provides customer, manufacturer and government authorities with a high degree of confidence that the item or service meets specified requirements and is appropriate for its intended use. This confidence may be further substantiated by assessments through an external agency, like the Testing Laboratory Registration Council, TELARC, which now also administers the new Quality Assurance Accreditation Programme.[15]

For particularly critical commodities like foods, pharmaceuticals and water supplies most governments maintain testing programmes. For such functions I suggest the term "quality surveillance", to distinguish them clearly from the internal QA.

Laboratory Quality Assurance

The term Quality Control has had several connotations in the Analytical Laboratory and this has led to some confusion. One reason for it is that most analytical laboratories consider themselves as QC laboratories. Yet Good Laboratory Practice demands adequate control of the laboratory operations, so to speak QC of QC. It would be desirable if the term QA were used universally for this QC of QC. Superimposed on Laboratory QC is another step of control which I suggest calling QA Reliability Assessment. Let me illustrate these three layers of QC with an example from the Pharmaceutical Industry. In the production of intravenous fluids it is necessary to assess (and limit) the extent of particulate contamination. This may be called QC work. Calibration of particle counters and validation of the counting are the QA operations. The adequacy and reliability of these procedures themselves must be verified or reviewed in the light of new developments. This is QA Reliability Assessment.



Quality Assurance in Research

Our previous example of the manufacturing industry can be transposed to institutes of research and development, because essentially the same QA systems can be established in any organisation. As living organisms they take matter in and put matter out — parallel to nature, as illustrated by the cartoon. By the way, the eggs have been drawn in to exclude misconceptions about the nature of the output. A research institute receives information, re-

quests, samples, materials and equipment, and produces statements, certificates, letters, reports and scientific papers. Still the application of QA in chemical research has remained a controversial topic. The more theoretical the research the more convincing becomes the aura of infallibility surrounding the researcher whose inventiveness must not be impeded by outsiders. Indeed, the very essence of research is curiosity associated with rigid scepticism. Nevertheless, there are good reasons for external interest in the nature and the extent of QA in research: rising scepticism of an increasingly better-educated public, justification for funding, pressure to constrain the flood of information and concern about the misrepresentation of data or even about downright cheating.[16-18]

QA functions in research include the establishment of research proposals and protocols, adequate protocol modification, adequate recording and evaluation of results, identification of any significant problems that are likely to affect the integrity of the study and scrutiny of the final report or paper to assure that it adequately describes the methods and operating procedures and that the reported results accurately reflect the raw data of the study. At present the most popular QA operations are the establishment and review of protocols for research projects (although this is not the rule) and the refereeing of publications.

All these QA functions may be taken care of by QA units which are independent of the research department. The US Federal Drug Administration (FDA) already asks for such units in their Good Laboratory Practice regulations for non-clinical studies.[8] However, the establishment of an internal QA unit or the employment of an external agency for validating or endorsing research results still remains generally a matter of prestige. In the more distant future there may be some incentive for this kind of endorsement, when scientific publishers of a high standing may wish to stem the flood of publications by not relying on their referees but giving preference to those publications that are endorsed by a recognised independent QA unit.'[9]

Quality and Effectiveness of Communication

Whatever the nature of communication, its QA saves time or money, or simply prevents loss of good will. Our clients may be persons or departments inside or outside our own organisation. Failure to establish their needs, failure to find an adequate approach for dealing with the problem and failure to effectively communicate the result of our work in such a way that it can be grasped and used, may lead to substantial waste of resources. Even assuming excellent workmanship at the laboratory bench or in the pilot plant, the end result may be tantamount to scrap. I would like to illustrate this by quoting a report I have come across:

> "The biota exhibited a 100% mortality response. However, after thorough consideration of the conditions, that constituted the premises of the experiment, it may be concluded that, in practice, certain aspects of the base of the operations may inadvertently affect the results of an investigation like this one to a significant extent."

Unfortunately I cannot disclose the background of this case because it has become the personal property of the client, so that not even the Official Informations Act[20] will make it possible to unveil the author of this monstrous message. Incidentally, it means that all the test organisms died under the conditions of the experiment, but that the experimental conditions were not relevant anyway.

New Drug Applications — Shopwindows of a Company's QA

I may be allowed to conclude with an example of poor QA that is of immediate concern to me as a member of Health Department's Drug Assessment Advisory Committee. Unbelievable as it may sound, this example is connected with the Pharmaceutical Industry, an industry leading in QA. When applying for permission to market a new drug in this country some companies, including some of great prestige, submit information marred by errors, contradictions and omissions. Sometimes it has obviously been thrown together, by uncaring clerks, from material previously submitted to overseas authorities. Sometimes it is uncoordinated, unindexed, without consecutive numbering and with references that lead nowhere. Irrelevant information is included, blurring the issue, and inadequate results are presented without any explanation. Often I cannot but wonder what such a company's QA organisation is like, who the company's QA manager is and whether he is indeed in control of all aspects of QA. A submission for the marketing of a new drug is a shop window into a company's QA. How do the expenses of employing persons of adequate calibre for the compiling and auditing of a submission compare with the loss of revenue caused by a marketing delay of at least several months? I leave this question to the imaginations of company managers and their accountants.

Implementation of QA is not so much a matter of resources and time as of awareness. If we discover where and how much we can benefit from the introduction of appropriate QA functions we are almost certain to initiate the necessary arrangements.

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APOLOGIES

Because of the strict deadline on the extra-large pre-conference issue of Chemistry in New Zealand the final stages of publication of the August issue were rather rushed.

The editor wishes to apologise to those authors and contributers whose articles suffered. To Drs Lauren and Holland for the typographical errors, to Drs Ainscough and Brodie for the transposition of Figs 3 and 6 and to John O'Neill of Alphatech Systems for the misplacement of a section of text, in his article Integrated systems of automated acquisition and control. The text *"All options plug into an APPLE computer . . . are available for low level signals"* should have followed *". . . are the norm rather than the exception."*

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NZIC PROMOTION OF CHEMISTRY THROUGH THE SYLLABUS COMMITTEE

Members of the Institute will no doubt be aware of Council's active interest in the teaching of chemistry in Forms 1 to 7 following the publication of part of the Penfold Report in the December 1981 Journal. The Report made three recommendations which were endorsed by Council.

1. The committee *recommends* that Council should seek discussions with the Department of Education and with the Universities Entrance Board with a view to the New Zealand Institute of Chemistry becoming formally involved in the curriculum development activities of both these bodies.
2. The committee *recommends* the Council should set up its own *Advisory Panel* to deal directly with the SCEB and UEB once formal links have been established. It is suggested that the Advisory Panel should be the particular responsibility of the Wellington branch. Its membership should be drawn from outside the teaching profession (including University staff) but it would need to have the benefit of advice from secondary and tertiary teachers.
3. The committee *recommends* that Council assign high priority to providing assistance and encouragement to local branches to ensure that senior pupils from schools in their area are well informed on the value of including chemistry in their studies for reasons of (a) its importance in modern society, (b) its essential support function for other sciences, (c) the career options, especially in the teaching profession, open to those who undertake advanced study in the subject.

The President then wrote to the Director General of the Department of Education (D of E) and to the Chairman of the Universities Entrance Board (UEB) expressing interest in being formally involved in the curriculum development of chemistry. A positive response was received and the Wellington Branch, at the request of Council, set up a Chemistry Syllabus Committee (CSC) to consult officers of the D of E and the UEB.

UE Chemistry

The CSC has become involved in proposed changes to the 1977 UE Chemistry prescription, the aim of which is to preserve the role of Form 6 chemistry in preparing students for tertiary study and at the same time to take greater account of the needs of that large majority of pupils entering the examination who will take no further study in the subject. In the words of the UEB Subject Convener, "It is designed to be reasonably complete in itself and to provide a more rounded treatment of chemistry which will be of benefit to citizens at large."

The CSC has studied the draft prescription and amendments and made a submission to the Subject Convener. In its submissions the CSC has expressed its support for the objectives and believes these would be enhanced by giving some guidance as to the teaching approach, and by giving emphasis to basic concepts, discipline and chemical literacy. Some of these aspects could be outlined in a Teachers' Guide.

Role of Practical Work

The committee realises that parts of the prescription are not amenable to practical work, but strongly supports emphasis of the essential role of practical work and has made some suggestions to highlight this activity, for example, by requiring a certificate for each student that the practical work has been satisfactorily completed, to be signed by the Teacher and/or HOD Chemistry. Also, the procedures required for "good laboratory practice" should be spelled out in explanatory notes.

Course Structure and Content

The CSC has particular reservations about two proposed changes:

1. The removal of the treatment of gases.
2. The division of the prescription into a core and an optional section.

The first appears to be inconsistent with the idea of presenting a rounded treatment of chemistry as it inhibits an understanding of one of the three states of matter. This would increase the difficulties in comprehending a wide variety of practical applications of chemistry in industry where a knowledge of the behaviour of gases and of gaseous reactions is paramount, e.g. petroleum and gas fuel industry, production of methanol, ammonia, urea and sulphuric acid. The CSC has therefore recommended the retention of a study of gases.

Division of the prescription into a core and an optional section introduces the risk that important relevant material in the options may be seen as of secondary importance and be omitted on the grounds that it was not in the core. Whether it is intended or not, the use of options automatically downgrades the value of the material they contain. The CSC has recommended that material in the options considered to be of value be incorporated in the core, and that flexibility be retained by providing a suitable range of material within the individual sections.

Teaching the Course

The committee believes that the aims and objectives can best be achieved by stating some unifying principles so that teachers can then exercise their professional skills to develop a logical organisation and explanation of modern chemistry from the text of the prescription. It was recommended that a statement to that effect be included:

e.g. "Amongst the basic ideas to be stressed include the chemical bond, periodicity of behaviour, the quantum mechanical model of the atom, molecular structure, types of chemical change and the concept of the mole. Into this basic fabric must be woven the observable chemistry of community activities and the laboratory to bring vital colour to, and generate enthusiasm for the subject of chemistry."

Prescription Content

The CSC has made a number of specific suggestions on topics in the core sections; for a full listing of the comments, those interested should write to the Wellington Branch Secretary.

Promotion of Chemistry

As a result of discussions with officers of D of E, the Wellington Branch has now embarked on several activities:

1. The compilation of a resource list of chemists who would be willing to speak to schools and teachers' colleges on their speciality. The purpose of this and the following activity is to offer the opportunity for pupils and teachers to be in contact with practicing chemists.
2. The compilation of a list of chemical and related works which would be prepared to allow school groups to view processes which show chemistry in action, and to talk to the personnel involved.
3. An analytical chemistry competition has been launched in the Wellington Branch region and the initial response from schools has been good. A prize of $50 has been offered, the award being judged on results together with the laboratory report and method chosen.

4. The possibility of sponsoring a thesis entitlted "Chemistry at Work" is being explored. Such a thesis would include details of chemical processes used in New Zealand, and discussed in relation to the UE Chemistry course. The advice of the Publications Committee has been sought.

Any comments or suggestions as to further projects which would promote an understanding of chemistry and the work of chemists in the community would be appreciated. Please write to the Wellington Branch Secretary.

Chemistry Syllabus Committee, NZIC
J.B. Butchers (Convener)
W. Freitag
Dr. D.C. Weatherburn
Dr. L.P. Aldridge
Dr. H.J. Percival

PROFESSOR PENFOLD COMMENTS

When the preceeding NZIC syllabus committee's submissions were received by the Journal, the committee suggested that Professor Penfold be invited to comment.

In commenting on the submissions of the NZIC syllabus committee I would first make the point that the essential function of a University Entrance subscription is to define coverage for an examination. The introduction to the prescription does contain important statements on aims and objectives, the role of practical work and general teaching emphases, but the prescription is not the place for specific teaching guidance and resource material. These are properly to be found in separate Teachers' Guides for which the Department of Education accepts responsibility.

The suggestions on specific content made by the syllabus committee would, if acted on, increase the total amount of material to be faced by students. This would be strongly opposed by the great majority of schools. Concerning gases, I cannot accept that the absence of the very limited treatment of gases which can be given at Form 6 is really going to hinder seriously a student who leaves to work in industry or any other occupation. The omission of this formal treatment is consistent with our deliberate intention to de-emphasise conceptual theoretical material and to add more reaction chemistry.

It would be naive to suggest that the prescription core contains a unique body of material which can be labelled "essential" as distinct from other material, including the optional topics, which is "non-essential". It was particularly because no single prescription content is appropriate to all classes from all backgrounds and for all teachers that options have been introduced, although in a very modest way. Teachers will know that each option will be examined alongside the core material so I do not understand the claim of the committee that because some material is included in the options it has been "automatically downgraded". Their alternative suggestion of achieving flexibility by incorporating more material in the core would inevitably mean a heavier teaching and learning load.

I would have found the committee's comments of greater value had they been more concerned with the broad role of school chemistry courses from the professional chemist's point of view rather than with matters of detail primarily to do with teaching — matters on which a subject convener never lacks advice.

B.R. Penfold

THE USE OF VERTICAL ROTORS IN DNA PREPARATION

AUDREY W. JARVIS

NEW ZEALAND DAIRY RESEARCH INSTITUTE, PRIVATE BAG, PALMERSTON NORTH

Audrey Jarvis has been Research Officer at the New Zealand Dairy Research Institute since 1968, during which time she completed a masterate degree and Ph.D. in microbiology on staphylococcal enterotoxins. Since 1975, her main interest has been in lactic streptococci and their phages, and she is now studying the molecular biology of these organisms.

With the current expansion in the use of molecular biological techniques there has been an increased need for improved separations of prokaryotic and eukaryotic DNA. A recent development has been the introduction of the vertical rotor for use in high speed — and ultra-centrifuges. In the vertical rotor the tubes remain vertical during centrifugation and the contents of the tube reorient vertically. This reduces the path length as compared to the swing-out bucket type rotors, and fixed angle rotors. The path length in the vertical rotor is the diameter of the tube, generally 10-25mm, resulting in rapid gradient formation and banding of the sample. This allows a significant decrease in the centrifugation time. Vertical rotors also offer better resolution, since the components are spread across a larger cross-sectional area than in a swing-out or fixed angle rotor.

As the speed decreases below 1000 rpm the gradient reorientates, so that vertical bands become horizontal bands, with increased separation between the bands. This reorientation of the gradient should not disrupt the shape of the gradients if the acceleration and deceleration are slow and even. This was accomplished in our case with the L5-65 centrifuge by manually adjusting the acceleration control. Alternatively for centrifuges which do not have a 'slow start' program it is possible to obtain a slow acceleration accessory.

The more shallow the angle in a fixed angle rotor, the greater the pressure which is applied from the liquid in the tubes to the caps of the tubes during centrifugation. A critical factor therefore in the use of vertical rotors is the sealing of the tubes, as the seal must be able to withstand extremely high pressure during centrifugation. The simplest procedure is to use tubes which have narrow necks and are heat-sealed after filling. This removes the need for a cap and also makes it easier to ensure that the tubes are completely filled. If any air-space is left in the tube it is probable that part of the polyallomer tube will indent during centrifugation. An individual cap or spacer is screwed into each rotor pocket after the tube is inserted, to hold the tube in place.

The experience of this author is in the use of CsCl self-forming gradients to purify intact phages, and to purify DNA from these phages. This has generally been achieved by mixing the sample with a solution of CsCl in buffer, having a refractive index of 1.3815 (D 1.5), and carrying out centrifugation at 43000 rpm for 16-18 h in a fixed angle rotor (Beckman Ti50). In Palmerston North earlier this year, a demonstration model of a vertical rotor (Beckman VTi 65) was available. Preparations of phages and phage DNAs in CsCl-buffer, D 1.5, were subjected to centrifugation at 65000 rpm for 4h. The separations obtained compared favourably with those obtained by the longer centrifugation in the fixed angle rotor. The same centrifugation was applied to a solution containing four plasmids and these were resolved into four distinct bands. Our conclusion was that the use of the vertical rotor gave good separation of plasmid DNA, phage DNA and phage particles in a greatly reduced centrifugation time which would readily allow the completion of centrifugation within the working day.

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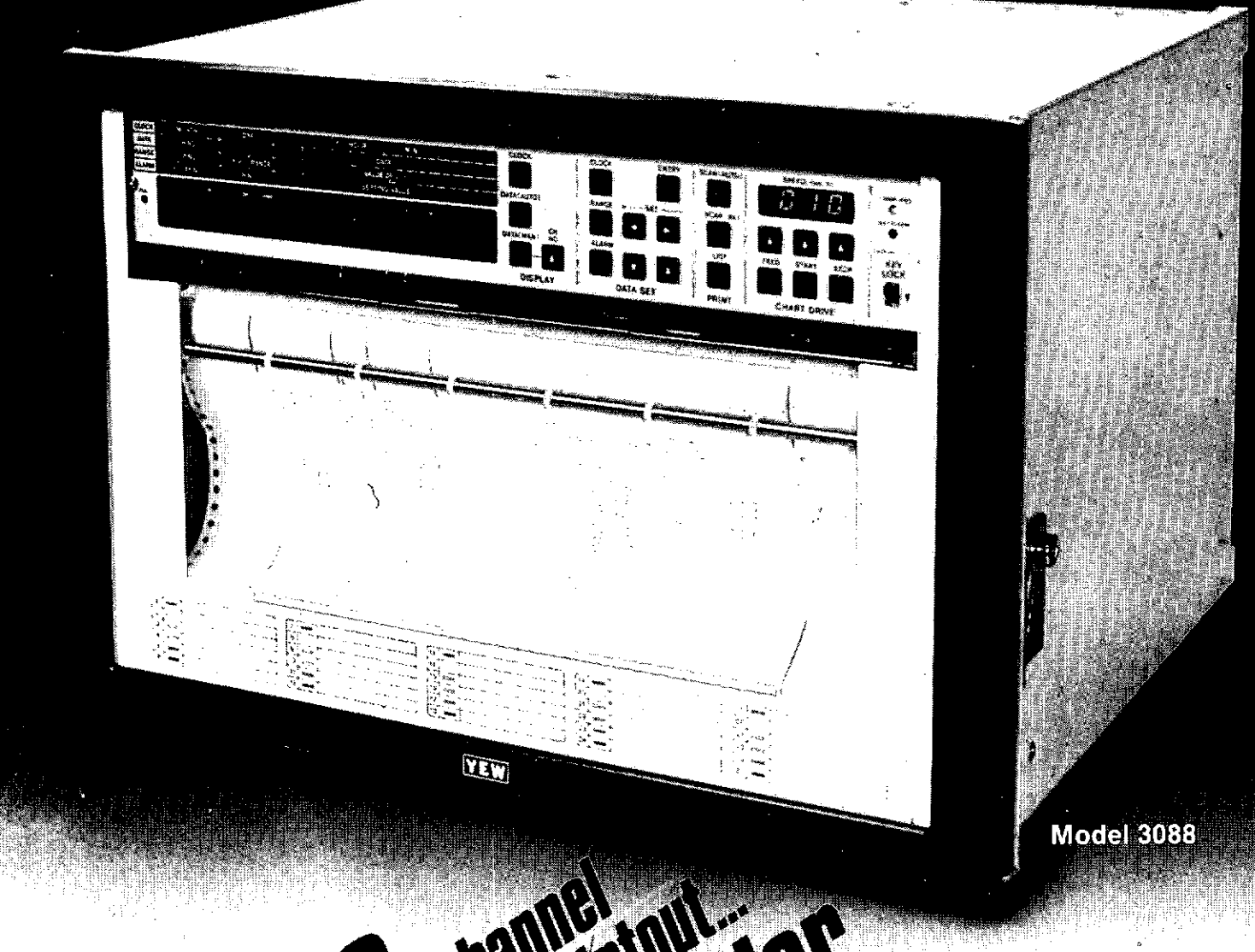

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REACTIONS OF ORIENTATED MOLECULES IN CROSSED MOLECULAR BEAMS

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Peter Harland is a Senior Lecturer at the University of Canterbury. He graduated B.Sc. (Hons) from the University of Wales, Aberystwyth and completed a Ph.D. in Chemical Physics at Edinburgh University in 1971 when he was awarded a Fulbright Scholarship for the United States. This was taken up with a Post-Doctoral Fellowship in the Chemistry Department at Rice University, Houston, studying the energetics of electron-molecule collisions. This was followed by three years as a Research Scientist in the Molecular Collisions group of the Physics Division, CSIRO in Sydney before joining the Chemistry Department at Canterbury in 1976. Study Leave during 1982 was spent with the Rice Quantum Institute at Rice University, Houston, working on the dynamics of orientated molecular beam-scattering. Research interests are the study of ion-molecule reactions, electron capture processes and gas phase ion transport properties.

We have all been exposed to the Simple Collision Theory of Bimolecular Reactions in which Trautz[1] and Lewis[2] coupled the activation energy concept of Arrhenius[3] with the bimolecular gas collision frequency to yield the following expression for the rate constant, k ;

$$k = Z_{AB} \exp(-Ea/RT)$$

where Z_{AB} is the gas kinetic collision frequency, E_a the activation energy, R the gas constant and T the absolute temperature. It became apparent soon after its proposal that the rate constants calculated from this expression were too high. The discrepancy was eventually rationalised in terms of a geometric or steric requirement for a successful collision and the equation adjusted by the introduction of p, the steric factor;

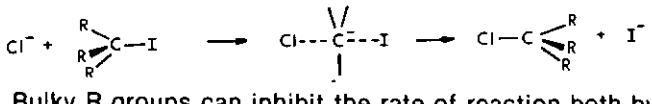
$$k = Z_{AB}\, p \exp(-Ea/RT)$$

The steric factor is therefore simply k(expt)/k(calc), which tells us a great deal about the usefulness of the calculated rate constants in the absence of an independent determination of p.

That p is indeed due to a geometric requirement is plausible for simple reactions for which p = 0.1 to 1.0 but becomes more difficult to sustain for complex reactions for which p can be as low as 10^{-6}.[‡4]

In such cases it becomes more appropriate to interpret p in terms of Transition State Theory as $p = \exp(\Delta S^{\ddagger}/R)$, where $\Delta S^{\ddagger}$ is the entropy of activation.[5] So, how important is the steric contribution?

The qualitative concept that chemical reactions are dependent on spacial orientation pervades our teaching of chemical kinetics and organic reaction mechanisms. Most of our ideas concerning steric requirements in chemical reactions come from observations in solution, this can be most easily illustrated by the classical S_N2 type bimolecular substitution reaction:



Bulky R groups can inhibit the rate of reaction both by shielding the carbon atom and preventing the inversion taking place. However, the use of such systems to investigate the collision dynamics is precluded by solvent interactions and the general nature of the bulk system in which Boltzmann distributions of energy states prevails and all possible molecular orientations occur. Ideally, we should like to take the isolated reactant molecules in preselected quantum states and push them together with a well defined spacial orientation. For the Walden Inversion used above this would be equivalent to an experiment in which only collisions between Cl^- ions and the CR_3-end (tails) of the halide molecule could occur, the experiment being repeated for reactions of Cl^- on the I-end (heads) of the molecule. Although such experiments could not be performed in solution they can now be achieved in the gas phase using the technique of crossed molecular beams incorporating an orientated molecular beam selector. Over the past decade several experiments have been carried out using gas beams of spacially orientated molecules which have conclusively demonstrated the existence of the steric factor for simple reactions, they have also served to test our chemical intuition with interesting results.

Molecular Beams

Classical chemical kinetic methods are characterised by multiple collisions, Boltzmann thermal distributions and energy degradation of products. All geometric orientations are possible and solvation effects (for solution phase) are an added complication interfering molecular collisions and solvation effects can be eliminated using the gas phase technique of crossed molecular beams. The reactants are prepared in the form of molecular (or atomic)

beams with internal pressures low enough to preclude collisions, typically 10^{-6}-10^{-8} Torr. The two separately formed beams intersect in a small well-defined scattering region maintained under ultra-high vacuum, $\sim 10^{-8}$ Torr. The products are detected using insitu physical techniques such as surface ionization or mass spectrometry. The molecular beams are either generated in an effusive oven source, which provides a low intensity diffuse beam with a thermal (oven temperature) energy distribution, or a supersonic nozzle beam source which provides a well-collimated, high intensity beam with a narrow velocity distribution.[5] There is an obvious choice between these two sources providing the budget extends to the high speed pumping required for the latter. A typical molecular beam machine is illustrated in Fig. 1 where the vacuum chambers separating the beam source regions from the scattering chamber would contain quantum state selection, orientation device or velocity selectors. The number and type of devices which can be incorporated into any single experiment is restricted by the low beam intensities and the detection of even smaller product signals. The surface ionization detector is a particularly sensitive device for alkali metals[6] and their halides and for this reason most groups have concentrated on alkali metal plus halide reactions, i.e. M + RX where M is Na, K, Rb, Cs and X is F, Cl, Br, I. However, these systems have been successfully utilised to provide a great deal of previously unknown information on molecular dynamics and reaction mechanisms[7], including the steric factor.

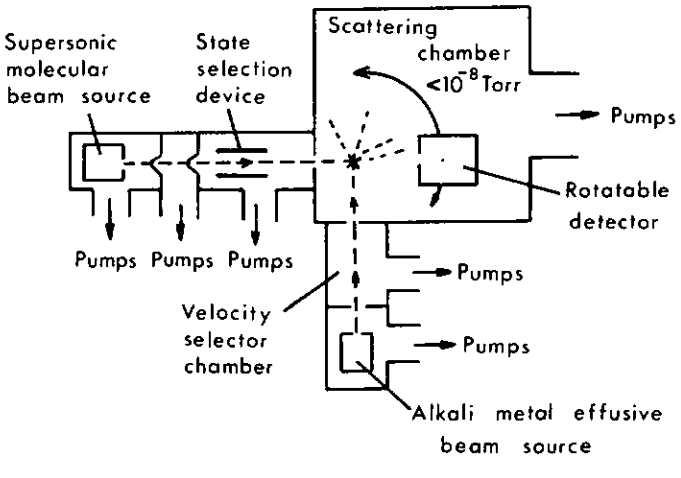


Fig 1. Crossed molecular beam machine

Orientated Molecules

The most direct method of studying steric requirements is through the reactive scattering of molecules which have been orientated prior to collision. This can be achieved for symmetric-top molecules which exhibit permanent dipole moments, such as CH_3I, using a series of electric fields. This technique has been used by two research groups, P.R. Brooks at Rice University, Houston and R.B. Bernstein at Columbia University, New York. Orientated molecules are selected by the removal of unwanted orientations. This filtering is accomplished by exploitation of the Stark effect, molecules in different orientations have different energies in an electric field. Molecules with dipole μ, at angle Θ to the electric field of strength E, experience a force W given by the classical equation:

$$W = -\mu E \cos\Theta$$

A quantum mechanical treatment would show that $\cos\Theta$ is quantised but to a good approximation it can be taken as continuous. The sign of the interaction energy depends on the sign of $\cos\Theta$. If a symmetric top molecule is placed into an inhomogeneous electric field, such as a hexapole rod assembly, it can minimize its energy by moving in the field. Those molecules for which $\cos\Theta$ is positive will move towards high field, toward the rods in a hexapole field, and those for which $\cos\Theta$ is negative will move towards low field, that is, the axis of the hexapole assembly where the local field is zero, Fig. 2. Theoretical treatments of inhomogeneous electric fields[8,9] show that a hexapole arrangement of rods alternatively biased to around 10kV is most suitable for this filtering process since it simultaneously brings the $\cos\Theta < O$ states to focus at the exit of a filter of appropriate length, approximately 50cm long. An obstacle is placed in the entrance of the filter to remove the on-axis segment of the beam to prevent transmission of the $\cos\Theta = O$ contribution which would otherwise pass through the filter undeflected to contaminate the focussed orientated beam at the filter exit. The focussed beam passes from the filter into a homogeneous field (via an intermediate transition field) created between two parallel plates so that alignment with respect to the second reactant beam can occur. Since the states transmitted by the filter are those which move towards low field it is of interest to note that once in the homogeneous field the molecules are aligned such that the negative end of the molecules point towards the negatively biased field plate. Changing the polarity of the homogenous field plates inverts the orientation of the molecules in the beam so that the opposite end is presented to the intersecting atomic beam.

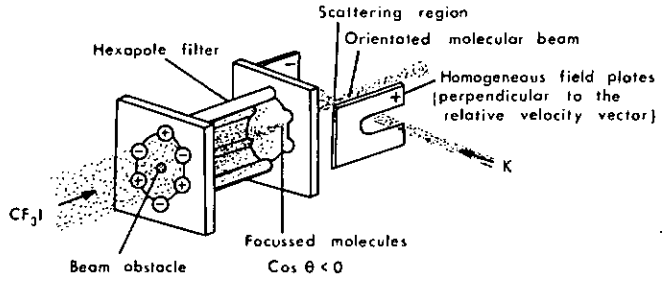


Fig 2. Hexapole inhomogeneous electric field filter for orientated molecular beam production. Transition field plates which are situated between the hexapole filter and homogeneous field plates are not shown.

Results

The first orientated molecule experiments performed involved the reactions of K and Rb with CH_3I and t-C_4H_9I[10-15]:

e.g. $K + CH_3\text{-}I \rightarrow KI + CH_3$ tails

$K + I\text{-}CH_3 \rightarrow KI + CH_3$ heads

The heads orientation was found to be more reactive for all cases, as chemical intuition would anticipate, this result also provided the first direct experimental evidence for a steric effect on chemical reactivity. Unexpectedly, reaction was found to occur, albeit less efficiently, for tails collisions. Imperfect orientation would undoubtedly contribute to a tails reaction, the filter produces a distribution of orientations so that the alkali metal atom may be able to get past the alkyl group to some degree. Despite this current limitation the steric factor p calculated from the data is in agreement with our intuitive ideas of steric hinderance by bulky alkyl groups, $p = 0.5$ for the $K + CH_3I$ case and 0.4 for the $K + t\text{-}C_4H_9I$ case. Despite this success there is a problem, in both heads and tails reactions the KI product is scattered back in the direction of the approaching K beam (in centre-of-mass coordinates), i.e. backward scattering occurs in both cases.

Heads	Tails
$K \rightarrow \leftarrow I\text{-}CH_3$	$K \rightarrow \leftarrow CH_3\text{-}I$
$\leftarrow KI\ CH_3 \rightarrow$	$\leftarrow KI\ CH_3 \rightarrow$

This non-intuitive result[16, 17] may be resolved when data becomes available from a machine recently modified to produce a more tightly orientated CH_3I beam.[18].

The reaction K + $CF_3I \rightarrow KI + CF_3$ provided another interesting challenge since reaction was found to occur with equal probability at both ends with the heads collision giving backward scattering of KI product and the tails collisions giving forward scattering. There are two equally plausible explanations.[17, 19] The first is the postulation of an electron-jump or harpoon mechanism in which the high electron affinity of CF_3I and the low ionization potential of K facilitate a long range (approx 0.5nm) electron transfer or jump from the K atom to the I-end of the CF_3I molecule The metastable molecular negative ion, CF_3I, instantaneously dissociates along the axis of the C-I bond propelling the I entity along the direction of the K beam where it picks up the lighter K^+ ion, Fig. 3. As shown in Fig. 3 a tails collision would result in forward scattering as observed experimentally.

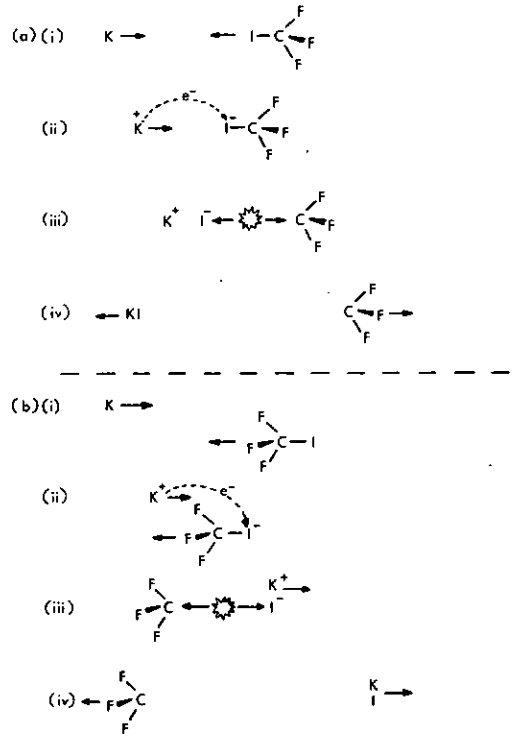


Fig 3. Pictorial illustration of the collision between a K atom and a)CF_3I in the heads orientation and b)CF_3I in the tails orientation assuming an electron-jump mechanism. Case a)gives rise to backward scattered KI and b) to forward scattered KI as observed experimentally.

Symmetric top molecules like CF_3I and CH_3I precess about their total angular momenta vectors, i.e. the molecules precess about the symmetry axis sweeping out a cone of motion. The frequency of precission for CH_3I is comparable to the reaction time and since the centre-of-mass lies close to the I atom the cone swept out by the CH_3I group is very broad effectively shielding the I atom from the incoming K atoms for perfectly orientated molecules, Fig. 4. The heavier CF_3I molecule exhibits a lower precessional frequency and since the centre-of-mass is displaced further away from the I end of the molecule the precessional cone swept out by the CF_3 group is much tighter. As the K atom approaches the tails end of a CF_3I molecule the CF_3 group will appear frozen in space leaving the I end vulnerable to an approaching K atom on a favourable trajectory. These explanations, depicted in Figs 3 and 4, may well be complementary for CF_3I but it is difficult to reconcile the backward scattering of the $K+CH_3I$ tails experiment with the harpoon mechanism.

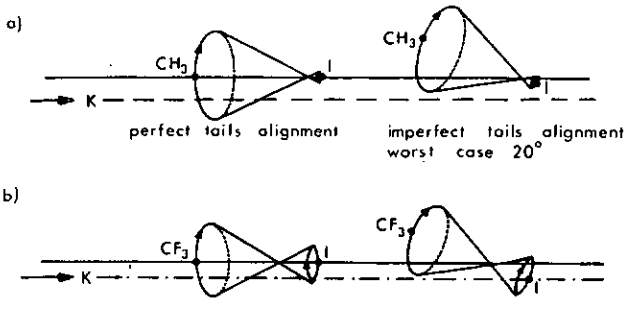


Fig. 4 Effect of imperfect alignment on protection of the iodine atom for CH_3I and CF_3I during a tails collison.

The Future

Current research is directed toward the production of orientated beams with narrower angular distributions.[18] The angular spread is dependent on the velocity distribution of the beam which in turn is a characteristic of the beam source and conditions. An effusive source gives rise to a thermal velocity distribution and is unsuitable as an orientated beam source, the supersonic nozzle source gives rise to a symmetric velocity distribution which is much narrower than the Maxwell-Boltzmann type, but is limited by the molecular weight of the source gas. The lighter the gas the greater the mean velocity and the narrower the distribution. A small fraction of a heavy species seeded into an inert gas beam (He or Ar) causes the heavier seed to assume the same velocity characteristics as the more abundant carrier thereby achieving narrower velocity distributions (and orientations) than would be possible with the pure gas. Seeded beams of symmetric top molecules in helium, argon and xenon are currently being investigated although data for reactive scattering are not yet available. Experiments are also underway to test the mechanisms which have been suggested to explain the K + CF_3I scattering, the molecules CF_3Cl and CF_3Br with CF_3I provide a series of molecules of approximately the same electron affinity but a large range in centre-of-mass and precessional frequency. Hopefully, data from these experiments will shed light on the mechanisms proposed and provide a more detailed understanding of the collison process.

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COUNCIL NEWS

Dr Douglas Wright presided over meetings of Council in Hamilton on Sunday and Monday 21 and 22 August.

ELECTION OF OFFICERS

From 1st September 1983 Prof. R.D. Batt was elected President, A.W. Mackney first Vice-President and Prof. G.B. Petersen second Vice-President. Dr J. Rogers was re-elected Honorary General Secretary.

PRIZES

Dr E.N. Baker, Massey University, was awarded the ICI Prize and P.D. Rawdon, BP Chemicals NZ Ltd, Wellington, the Shell Industrial Chemistry Prize. Barry R. Dent, Victoria University of Wellington, was presented with the Prize for the Student Paper competition at the Conference dinner.

No entries were received for the Chemical Essay Prize. At its meeting in February 1984 Council is to consider alternatives such as an award for the best paper published in "Chemistry in New Zealand" each year.

The award of the Hamilton Memorial Prize of the Royal Society of New Zealand to Dr D.G.A. Nelson, MNZIC, Wellington, was noted.

HONORARY FELLOWSHIPS

Dr R.E. Corbett, W.E. Russell and Dr S.H. Wilson were elected as Honorary Fellows.

FINANCE

The audited balance sheet for 1982/83 approved by Council showed income was greater than expenditure by $2235 instead of a budgeted $2500 deficit. Income exceeded budget as no provision was made for the Otago Conference surplus and the return of a $3000 loan plus $200 interest by the Oils, Fats and Waxes Conference, a total of $6910. Despite a disappointing increase of about $1000 to a total of $4000 for subscriptions in arrears, the Registrar considered the Institute was in a sound position.

Mr Hogan tabled a provisional budget for a $4000 deficit after increasing the subscription for members and fellows from $45 to $50 (less $5 rebate if paid before 31.8.84). Branch grants would increase from $6 to $7.50 per qualifying member. The General Secretary noted that about 12% of members and fellows were now life members and paid no subscription. This is similar to the proportion in the RACI membership. The 1983/84 budget includes $3000 for the first time for student travel to the NZIC and other Conferences approved by Branch Committees.

This proposed budget was based on zero growth in membership, which is a matter of concern. Currently corporate members subsidize non-corporate ones. The ratio of expenses to total number of subscribing members of all grades in 1982/83 was about $45. The subscriptions of associated members are $35, graduate and technician members $22 and student members $10.

The Council approved the following terms for underwriting Chemical Seminars and Conferences.

(1) Grants will be considered as loans and the meeting organisers will be expected to budget to repay the loan with an appropriate rate of interest.
(2) If the NZIC Council is the sole underwriter of the meeting, all conference surpluses, over the loan **plus** interest, will be required to be paid to the Council.
(3) If other funding bodies share the underwriting of the meeting, the Council will require that its share of conference surpluses will be directly proportional to its share of the total initial grants.
(4) Where publications are proposed, following the meeting, the Council would require further discussions on its involvement as an alternative, in part or totally, to the repayment of the loan **plus** interest and appropriate share of surpluses.

GUIDELINES FOR NZIC COMMITTEES

The President and Dr Percival tabled a report setting out 9 principles. These were accepted by Council as follows. Each committee should be established on a 2-year basis, should have clearly defined objectives, should include a Council member and should rotate round the Branches with, ideally, members drawn from one Branch, the convenor being identified by Council who liaises with the Branch to appoint other members. Rotation of committees round the Branches should be encouraged by Council which at its August meeting will receive their reports and review the relevance and value of the work done by them. Council may disestablish existing committees or establish new ones.

It was resolved to disestablish the Energy and Chemical Materials Resources Committee and the Archives Committee, replacing the latter with an Archives Officer, Dr R.F.C. Claridge. The Standing, Honours, Membership, Publications, Environment, Hazardous Chemicals and Chemical Syllabus Committees are to continue. It was resolved to incorporate the Public Affairs Committee into a new Public Affairs and Science Policy Committee with Professor Batt as Chairman for 1983/84 and thereafter the Chairmanship to rotate between Wellington and Manawatu Branches at 3-year intervals.

The following also were appointed convenors and members of Council committees:

Membership: Dr H.J.K. Powell.
Publications: Dr J.R. Cretney, Dr Powell (member).
Environment: Professor R. Laverty, Dr J. McKenzie (member).
Hazardous Chemicals: Dr W. Temple, Professor G.B. Petersen (member).
Chemical Syllabus: Mr J.B. Butchers, Dr H.J. Percival (member).
Honours: President, Vice-Presidents and General Secretary.
Standing: President, Dr E.N. Baker, General Secretary and Registrar (ex officio).

ANNUAL GENERAL MEETING RESOLUTIONS ON BUTTER ADVERTISING

On the motion of Dr A.C. Herd, seconded by N.R. Edmonds, the following resolutions were passed at the Annual General Meeting on 27th August:

(1) That the New Zealand Institute of Chemistry strongly deplores and condemns the current NZ Dairy Board campaign for butter in that it is insulting to the profession of chemistry, that it is misleading in its treatment of food processing and food technology and that it represents a form of "knocking" advertising that should neither be condoned nor encouraged.
(2) That this Annual General Meeting supports the activities of the NZIC Council and its officers in expressing concern to the NZ Dairy Board, and in presenting the viewpoint of the NZIC to the media.
(3) That this AGM congratulates Dr Kitson of Massey University for his media activities on behalf of chemists.

MEMBERSHIP

The following applications and changes of status were approved, resignations accepted, deaths noted with regret and members struck off for non-payment of 2 or more years of subscriptions.

Dr Rogers tabled a summary of the current grades of NZIC membership and the progression through them, the minimum ages required for admission to them, the subscriptions and the numbers of members in each grade. The paper recommended Council confirm its decision of February for a sub-committee of the President-elect, Mr Mackney, Mr Thom and the General Secretary (convenor) to consider the recommendations of a paper on Associate Member credentials and also the establishment of a company member (or subscriber) grade. Comments had been received from the Auckland and Wellington Branches on the paper presented in February.

Council asked the subcommittee to examine the feasibility of:

(1) Amalgamating the technician and graduate with the associate grade of non-corporate membership.
(2) The full rebate of subscription for Chemistry V NZCS and Stage 3 B.Sc. Chemistry students.
(3) Establishing a company member grade.

PRINCE AND PRINCESS OF WALES SCIENCE AWARDS SCHEME

Council resolved on the motion of Professor Batt seconded by Mr Mackney to donate $2000 as a member body of the Royal Society of New Zealand for these awards for scientists and technicians to travel overseas for periods up to 2 months. Applications for the first awards are currently being sought. The possibility of further donations is to be reviewed in August 1984.

OILS AND FATS SPECIALIST GROUP

Council welcomed a proposal from Dr Laurence Eyres, Chairman of an interim committee for the formation of an Oils and Fats Specialist Group of the Institute and agreed to make available to it the usual facilities.

Council resolved to revise its list of its specialist groups and their officers as published in the 1982/83 Annual Report. These will be included in the Institute's Procedures Manual to be revised in word processor format for distribution early in 1984 and in a Year Book — List of Members which it is planned to publish about March 1984 as an issue of "Chemistry in New Zealand."

ANNUAL CONFERENCE

Dr Pat Holland, Chairman of the Waikato Branch Conference Committee, reported that almost 300 registrations had been received for what was a most enjoyable and successful Conference. The New Zealand Society of Soil Science and the NZ Committee for Water Pollution Research and Control had joined with the NZIC and NZ Biochemical Society on this occasion. Dr D.E. Weiss delivered the inaugural NZIC-RACI Visiting Speaker Award address "Processing with Magnetic Particles — Application to Water Treatment."

Council congratulated the Wellington Conference Committee on the early distribution of an attractive brochure giving preliminary details of the programme planned for August 20-24th 1984. Dr Gordon Leary is Chairman and Dr Graeme Gainsford Secretary of the Committee.

TIE AND SCARF DESIGN

Dr Wright tabled the combination of designs from Anita Vink and Glenn Jameson of the ATI Graphic Design Class which had been awarded prizes in the $300 competition sponsored by the Institute for a design suitable for use on a tie and scarf and also on stationery. The President was authorised to cost the manufacture of ties and scarves. The new logo will be used on stationery printed for use from the new central office box number of which will be advertised in the December issue of "Chemistry in New Zealand."

The design is a hexagon within which a flask containing the letters NZIC represents man and the tools he uses to study and explore nature. Horizontal lines through the hexagon converging towards its top represent growth linking man and nature.

GOLDEN JUBILEE ISRAEL CHEMICAL SOCIETY

Dr Levanon, Chairman of the Organising Committee, has invited the President of the NZIC to attend the 50th Anniversary Meeting of the Israel Chemical Society to be held at the Hebrew University of Jerusalem on 10-12th April, 1984. The meeting will reflect the scientific and industrial achievements of the chemical sciences in Israel.

OVERSEAS VISITORS

Mr S.G. Brooker advised that the following scientists who would be participating in a seminar arranged by the Centre for Continuing Education on the Interaction between Food and Packaging 26/27 October 1983 at the University of Auckland could be available to address meetings of NZIC Branches — Dr L.H. Adcock, Packaging Industries Research Association; Mr J.H. Briston, Consultant; Dr W.T. Crosby, Laboratory of the Government Chemist, London and Dr D.W. Shorten (BP Chemicals, SA, Geneva).

UNESCO POSITIONS OVERSEAS

Dr G. Burns advised that NZIC members interested in serving as UNESCO experts overseas should contact Marilyn Porteous, National Commission for UNESCO Secretariat, Department of Education, Wellington.

MEMBERSHIP

HONORARY FELLOWS:

CORBETT, Dr Robert Edward, Emeritus Professor, Otago.

RUSSELL, William Ernest, Consultant, N.Z.F.F. Co. Ltd., Auckland.

WILSON, Dr Stuart Henry John, retired, Wellington.

FELLOWS:

MITCHELL, Dr Robin Edward, Divn. of Horticulture and Processing, Mt Albert Research Centre, Auckland.

SOUTHWARD, Charles Ramsey, N.Z.D.R.I. Palmerston North.

CRETNEY, Dr John Robert, Christchurch Polytechnic, Canterbury.

SWALLOW, Dr William Henry, Chemistry Divn. DSIR, Christchurch.

MEMBERS:

BRUNTON, Wayne George, The Lactose Co. of NZ, Kaponga.

CORDINER, Stephen John, Chemistry Divn. DSIR, P.B. Petone.

EASTON, Dr. Christopher John, Chemistry Dept., University of Canterbury.

FOSTER, Dr Stephen Paul, Mt Albert Research Centre, Auckland.

MARSDEN, Dr Karen, Dept of Food Technology, Massey University.

WINTER, Dr Hans-Wilhelm, Sprott Analytical Labs., Auckland.

GRADUATE MEMBERS ELECTED AS MEMBERS:

FRASER, Bruce Robert Victor, Sci-Med (NZ) Ltd., Auckland.

HEWITT, Peter Lifford, NRM Feeds Ltd, Auckland.

KNIGHTON, Derek Robin, Dept. Chem/Biochem/Biophysics, Massey University.

LOVELOCK, Brian Gilbert, KRTA, Phillipines.

MORRIS, George Clement, St Kevin's College, Oamaru.

PARKER, Linda Margaret, Chemistry Divn. P.B. Petone.

WATKINSON, Philip John, School of Science, University of Waikato,

ASSOCIATE MEMBERS:

CLARK, Michael Denis Thomas, Christchurch, Teachers' College.

ELLINGHAM, Peter John, Smith Biolab, Ltd., Palmerston North.

NIEDERER, Alan Fraser, M.I.R.I.N.Z., Hamilton.

GRADUATE MEMBERS:

BRAUER, Ralf Manfred, Dept. of Chem. Eng. Materials, University of Auckland.

COLDHAM, Jennifer Kathleen Joan, Chemistry Dept. Auckland University.

CUTHBERTSON, Alison MacAuley, School of Science, University of Waikato.

DAVENPORT, Sally Jane, Chemistry Dept., Victoria University of Wellington.

DUNN, Anthony Russell, Christchurch.

EDE, Richard Michael, School of Science University of Waikato.

GRAVATT, Gary Lance, Chemistry Dept., Victoria University of Wellington.

HERBERT, John Michael, Chemistry Dept. University of Auckland.

JANS, Ray, Dept. of Chemical & Process. Engineering, University of Canterbury.

LOONG, Paul Chom, Chemistry Dept. Victoria University of Wellington.

McDONALD, Armando Gabriel, Chemistry Dept. University of Otago.

MARTYN, Robert John, Chemistry Dept., University of Canterbury.

MILLS, Geoffrey Newton, Chemistry Divn. DSIR., P.B. Petone.

NAPIER, James Robert, Dept. of Chem/Biochem/Biophysics, Massey University.

RAM, Satyendra Parshu, Dept. of Biochemistry, University of Otago.

ROBERTS, Lynley Susan, Chemistry Dept., University of Auckland.

SIMS, Anthony William, School of Science, University of Waikato.

WALLACE, Margaret Lynette, Dept. of Soil Science, Massey University.

WEBBER, Rona, Dept. of Medicine, Auckland Hospital.

WESTON, Grant Campbell, Henderson & Pollard Industries Ltd., Auckland.

WHYTE, Andrew Robert, Chemistry Dept., University of Canterbury.

TECHNICIAL MEMBER ELECTED AS ASSOCIATE MEMBER:

BOYES, Glenn Martin, Chemistry Dept., University of Auckland

STUDENT MEMBER ELECTED AS TECHNICIAN MEMBER:

LOCK, Trevor James, Ruakura Agric. Research Centre, Hamilton.

LIFE MEMBERSHIP:

A.A.T. Bailey (Auckland); R.W. Bailey (Manawatu); J.L. Grigg (Auckland); W. Kitt (Wellington); D.F. Nelson (Auckland); D. R. Perrin (OS); B. Pinsky (Wellington); D.J. Ross (Wellington); D.E. Sheat (Waikaro); A. Wratislav (Man.).

RESIGNATIONS:

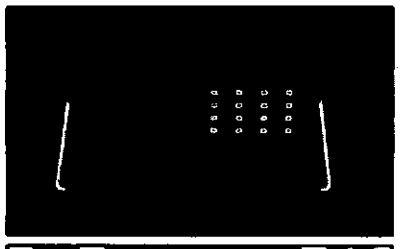
L.R. Darroch, C.J. Mackey, D.C. Rhodes (Auckland); A.P. Johnson, B.I. Johnson (Waikato); A.J.G. Milbank, R. Van Wyngadrden (nee Chitty) (Manawatu); G.J. Down (Wellington); C.J. Harrison (Canterbury), B.E. Guthrie (Otago); M.A. Wilson (OS).

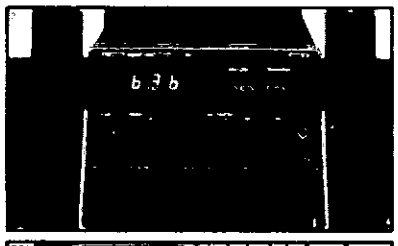
DEATHS:

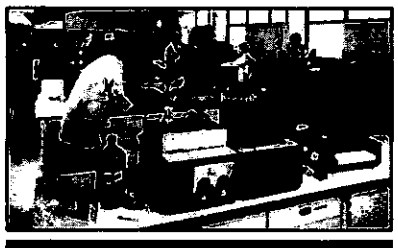
J.N. Breen (Waikato), W.L. Escher (Wellington); A.C. Kennett (Auckland); M. Kingsford (Auckland).

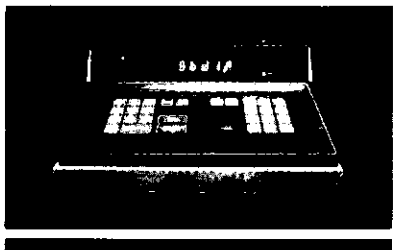
STRUCK OFF:

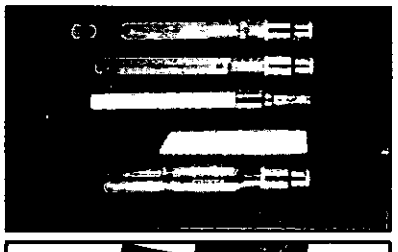
Auckland: L. Ames, R.T. Bell, H.N. Miller.
Wellington: N.D. Bhimjiani, J.C. Parnell.
Otago: S. Ude Shankar.
Overseas: V.J. Choy, M. J. Fuller, M.T. Hearn, C.E. Lim, J.W. McLean, R.H. Sumner, A.R. Thawley, H.L. Tran, W.J. Wilson.











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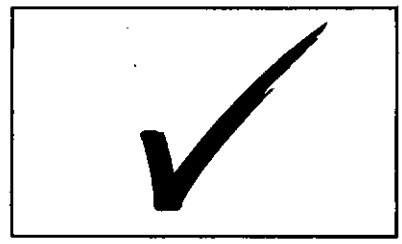

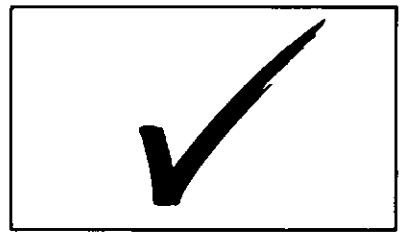

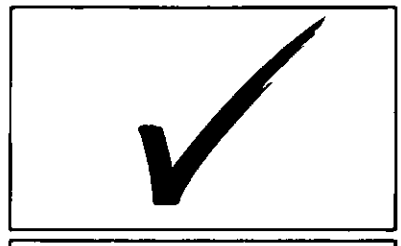

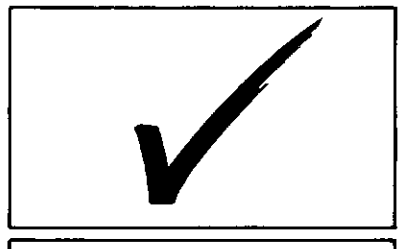

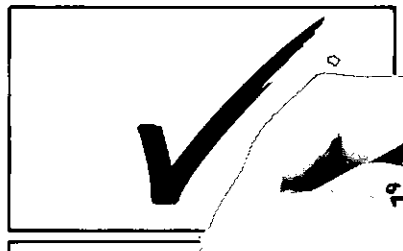

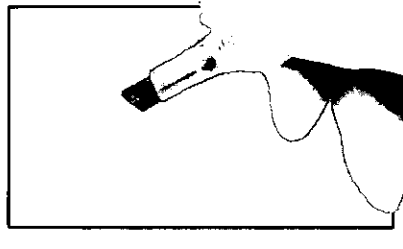

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BRANCH NEWS

WAIKATO

Dr Doug Wright presented his Presidential Address on "Energy from biomass" at the branch meeting held on 20 July. The audience included a number of his ex-colleagues from the Ruakura Agricultural Research Centre, who were very interested to hear about his current interest in energy production.

MANAWATU

A Branch Dinner, attended by about 50 members, and partners, was held on the night of Tuesday July 12 to welcome *Drs Neil and Joyce Waters* to the Manawatu. Held at the Massey University Staff Club (Wharerata) it proved an extremely enjoyable evening. In welcoming the guests of honour, *Dr Ted Baker* (Branch Chairman) referred to their high standing as chemists and their fine personal qualities. Dr Neil Waters replied and followed with an address in humerous and philosophical vein, commenting on the need to retain a strong experimental base in chemistry and to maintain vigour and vision.

A "chemistry afternoon" for 6th and 7th-form chemistry students from regional schools was held on 16 August at Massey University, jointly organised by the Manawatu Branch and by staff of the Department of Chemistry, Biochemistry and Biophysics. Attended by 220 pupils from 10 schools, the programme included a laboratory session (simple experiments in polymer chemistry), a chemical quiz for both students and teachers, with quizmaster *Dr Trevor Kitson*, the NZIC film "Chemistry in Agriculture", a magic show "performed" by *Dr Eric Ainscough*, and supper.

Dr Rick H. Cooper, Technical Manager of N.Z. Steel Ltd., on August 3rd presented a most interesting address to a Branch Meeting entitled "From iron sand to steel — a continuing saga of development". Dr Cooper introduced the topic with the history (and chemistry) of iron ore smelting in New Zealand. He then described the problems that foundries have experienced in using the N.Z. ore, in particular those associated with the small particle size of the ore and with the presence of titanium in it. Dr Cooper concluded his address with a description of expansion and new processing developments being undertaken at N.Z. Steel Ltd.

At a Branch meeting on 6 September, *Dr Tony C. Moffat* (of the Home Office Central Research Establishment, Aldermaston, U.K.) presented an interesting discourse on "The Interpretation of Tissue Concentrations of Drugs and Metabolites in Cases of Overdosage". Dr Moffat described the difficulties a forensic analyst experiences in deciding if a person died from an overdose of a drug, or from a combination of drugs.

WELLINGTON BRANCH NEWS

Dr Harry Percival, Wellington Branch Chairman, addressed the July meeting with the topic "Soil mineral formation and development — a thermodynamic imperative." He outlined the origin of many soil minerals and showed how the interpretation of soil mineral formation and development is greatly assisted by a thermodynamic analysis of the chemical reactions between minerals and soil solutions.

The August meeting took the form of a visit to Chemicals Manufacturing Co. Ltd at Seaview, Petone where surfactant raw materials for the domestic and industrial detergents market and also automotive chemicals such as antifreeze, brake fluid, greases etc. are manufactured. The visit commenced with a short introduction by *Dr G. D. Beresford*, Detergent Products Manager, and a tour of the plant followed.

Dr A. C. Moffat, a forensic scientist from the U.K. Home Office Central Research Establishment, gave a very stimulating talk entitled "The interpretation of tissue concentrations of drugs and metabolites in cases of overdose."

CANTERBURY

In July *Dr Doug Wright* delivered his Presidential Address on "Energy from Biomass". He dealt with research currently being done in New Zealand and the need for alternative fuels to be both price-competitive and compatible with current distribution systems. In particular he discussed possible sources of ethanol, some of the alternatives to diesel, and the implications of large scale land use for alternative fuels.

The August meeting of the branch was addressed by *Prof. K. L. Rhinehart* School of Chemical Sciences, University of Illinois who was visiting Erskine Fellow at Canterbury in July/August. In a lecture entitled "Applications of Fast Atom Bombardment Mass Spectrometry" he dealt with recent developments in mass spectrometry which facilitate ionization of species in the condensed state. Of the techniques available, fast atom bombardment appears the most generally useful and he dealt with the applications of this technique in mass spectroscopic studies of compounds such as glycosphingolipids, antiobiotics and peptides.

In the first of two additional lectures in September, branch members were addressed by *Dr D. W. Weiss*, President of the RACI and inaugural NZIC-RACI Visiting Speaker. Dr Weiss, spoke about processing with magnetic particles with particular emphasis on water treatment.

At the second meeting, the speaker was *Dr A. C. Moffatt*, Head of the Drugs and Toxicology Division, Central Research Establishment, Home Office Forensic Science Service, United Kingdom. A chromatographer with a world wide reputation he presented a lecture entitled "Optimization and Standardization of Chromatographic Systems for the Analysis of Drugs" and dealt with the use of TLC, GC and HPLC as screening procedures as well as for specific analyses.

OTAGO

In July, the Branch held a joint wine and cheese evening with chemistry high school teachers when they were addressed by *Mr Tom Brown*, Engineering Manager for Liquigas Ltd., Wellington, on the subject — "Liquified Petroleum-based Gases". The Branch also joined with the University's Chemistry Club for a visit to New Zealand Brewery's premises in downtown Dunedin. In August, *Dr Donald E. Weiss*, President of the RACI, visited and gave a well-researched lecture entitled, "Chemistry — the Enabling Science".

Prof. George Petersen, Head of Biochemistry at the University, has been elected Second Vice President of the Institute. *Prof. David A. Buckingham* and *Dr Jim Simpson* have relinquished posts as Chairman and Secretary respectively of the Institute's Inorganic and Organometallic Specialist Group — posts which they have held since the Group's inception.

The Branch sponsored two lectures to senior secondary school pupils this year. *Mr Stan Winter* from Southland Co-operative Phosphate Company gave a talk entitled, "The Chemist in the Role of Agriculture". *Assoc. Prof. M. G. Smith* lectured on "The Biochemical Revolution".

The Otago Science Fair, held this year at the Dunedin Teacher's College, attracted a large number of entries. *Mary Cornelius* from Otago Girl's High School won in the Senior Biological Experimental section and *M. Milner* of Bayfield High School won the Senior Physical Experimental prize. These two pupils will now take their exhibits to represent Otago at the National Science Fair.

Invermay Agricultural Research Centre is in the midst of a re-development programme. The new Animal Production Unit was occupied in January. This includes surgeries, analytical laboratories and service areas to be used for the study of fertility in sheep, deer and cattle. Rapid progress has been made in preparation of drawings for the Centre's main administration-laboratory complex which should be occupied by mid 1985.

On the industrial front, the South Oil Co., Invercargill, has recently commissioned its vegetable-oil extraction and refining plant. It is producing rape oil from seed grown in the Otago-Southland area. The oil, after refining, only needs de-odourising to raise it to food grade standard. However its primary use is as a direct substitute for diesel oil for use in farm vehicles. The rape seed crop grows well below the 45° parallel and yields 3 or more tonnes per hectare. This gives 450 litres of crude oil per hectare, which, after refining to remove gums etc., becomes 380 litres of refined oil per hectare.

The plant was owned originally by Fletchers, but has been bought from them and refurbished over the last two years. It operates using waste heat from Southland Co-operative Phosphate Company's sulphuric acid plant.

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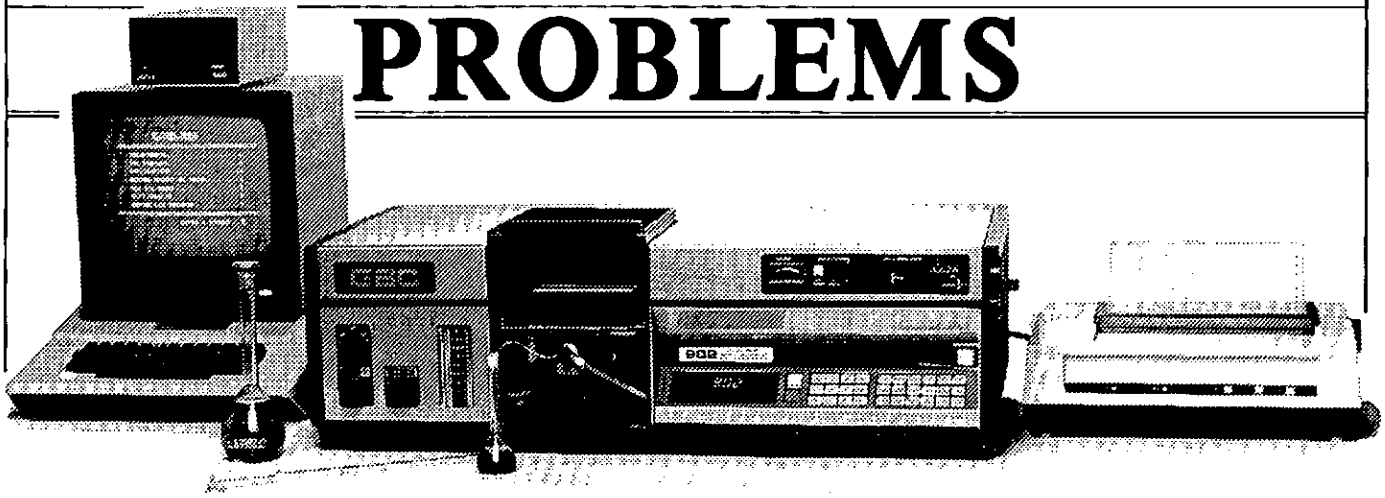

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DSIR AND RESEARCH INSTITUTIONS

DSIR MT ALBERT RESEARCH CENTRE

Dr Frank Whitfield from the Division of Food Research, CSIRO at North Ryde (NSW), where he specialises in food flavours (and off flavours), visited the research centre recently.

Dr Robin Mitchell attended the IVth International Congress of Plant Pathology, held at the University of Melbourne 17-24th August.

DSIR CHEMISTRY DIVISION GRACEFIELD

J. S. Buckleton, a chemistry graduate from Auckland Univeristy has been appointed to the Forensic Section.

Dr G. J. Down has left Chemistry Division.

Dr L. Y. Foo has returned to the Natural Products Section at Chemistry Division after spending fourteen months working in Louisiana with the USDA Forest Service.

Dr L. J. Porter, head of the Organic Section, recently spent eight weeks in the USA, Great Britain and the Federal Republic of Germany visiting laboratories working on the Chemistry of Tannins, and also looking at mass spectrometry facilities.

Dr G. J. Sutherland from the Drugs and Alcohol Section will be spending 3 weeks in Singapore and Australia to attend two Forensic Conferences. He will also visit laboratories involved in the analysis of illicit drugs.

Dr R. H. Newman recently visited laboratories in the UK and Europe to discuss NMR facilities.

INSTITUTE OF NUCLEAR SCIENCES

Dr Harry Sutton has been away for 2 months visiting Holland, W. Germany, United Kingdom and Canada. He attended conferences on topics as diverse as superoxide radicals in chemistry and biology, repair of radiation damage in cells and the 7th International Congress of Radiation Research. Visits were also made to laboratories involved in food irradiation and to several laboratories where he inspected the latest pulse radiolysis equipment.

Dr Peter Roberts has visited Australia for ten days, where he attended the 9th AINSE Radiation Biology conference. Visits were also made to laboratories in and around Sydney interested in different aspects of radiation biology and/or cancer research.

N.Z. FERTILISER MANUFACTURERS' RESEARCH ASSOCIATION

After many years of valuable service *P. J. Gallaher* and *L. Evans* have retired. *Dr. K. R. Laing* has succeeded the former as section leader of the Fertiliser Chemistry Section. *Dr C. E. L. Headford* and *A. G. Charleston* (formerly a Technical Officer with the Association) have been appointed as chemists. *Dr Headford*, a graduate of Auckland University, joined the organisation after two years postdoctoral research at Colorado State University. *Mrs S. Roughan*, who has joined the section as a senior technician, previously worked in the laboratories of the Soil Science Dept., Massey University.

Dr S. R. McConnel has resigned from the Physical Chemistry Section to take up a position with New Zealand Steel Ltd and *Dr D. A. Rogers* has been appointed as his successor.

FOREST RESEARCH INSTITUTE

Dr R. A. Franich attended the 4th International Congress of Plant Pathology in Melbourne to present a poster on "Dothistroma blight lesion induction with dothistromin: a first step in use for screening P. radiata for Dothistroma resistance."

Numerous members presented work at the Waikato conference on topics ranging from pulp chemistry to beetle pong.

The tour party from conference was well received and had a brief but concentrated tour around assorted facilities relevant to chemistry.

Dr K. L. Mackie is the recipient of a David Henry Fellowship and will use it in the forthcoming year to go to Canada for 7 months to work at Forintek Canada Corp. on steam explosion technology as a wood pre-treatment technique prior to hydrolysis.

The death occurred on 29 August of *Dr Ian Callender* in a car accident. The event was made even more tragic because he was on his way to visit his wife in hospital just 22 hours after she had given birth to their first child. Ian will be missed both as a person at FRI and Rotorua as well as for the contribution he was making to research on anaerobic digestion of wood ethanol stillage waste material for energy production.

The consequences of the rebuilding programme are still manifest. Most recent moves were the relocation of the gcms facility to its permanent location adjacent to a "customised" gc and hplc laboratory complex. FRI has also just taken delivery of a Shimadzu VF 320 X-ray fluorescence spectrometer for use by the Soil and Wood Preservation sections.

BUILDING RESEARCH ASSOCIATION

Dr Peter Foster has been co-opted for a further three years to the Board of the International Council for Building Research Studies and Documentation (CIB). He recently attended the Stockholm Congress of CIB, and held discussions with several Scandinavian organisations focussed on the maximum levels of industry support for research, and the transfer of technical information.

Dr Wayne Sharman presented a paper entitled "Building Materials Usage in the Dairy, Fertiliser and Pulp and Paper Industries" to the Australian Institute of Metals-New Zealand Metals and Materials Symposium held at the Institute of Nuclear Sciences, Lower Hutt, in August.

DEPARTMENT OF HEALTH, WELLINGTON

The Toxicology Section has been busy recently with *Michael Bates* (Principal Toxicologist) having attended a UNEP sponsored course on Preventive Toxicology, held mainly in Moscow.

John Reeve participated in the NZ Weed and Pest Control Society's Conference in Hastings.

Jim Waters is shortly to go to the University of Surrey in Guildford, UK, to study for an MSc in Toxicology.

Roger Holden, Principal Air Pollution Control Officer has attended the 11th Australian Conference on Chemical Engineering, Brisbane, in September, where he delivered a paper on "A demonstration of the safe destruction of PCB waste oil in a coal-fired cement kiln."

CAWTHRON INSTITUTE

Barry Mattingley attended a 3-week UNESCO Training Workshop on the use of marine organisms in marine pollution monitoring in Queenscliff Australia at the end of August.

WOOL RESEARCH ORGANIZATION

Delivery has been taken of a Bruker Fourier Transform Infrared Spectrophotometer for analysis of yarn extracts.

CONFERENCES

Gas Chromatography Workshops

The Chromatography Group is running two workshops in November at Waikato Technical Institute. A repeat of the popular Basic Gas Chromatography workshop. Nov. 8—11 inclusive, registration $75 with accommodation extra. Capillary Gas Chromatography workshop Nov. 15—17. This course will be open *only* to those with prior knowledge of gc (including in particular personal use of instruments). Emphasis will be on "hands on" use of different instruments and capillary column and injection configurations. Registration $150, accommodation extra. Contact Dr P. Judd, Waikato Technical Institute, Private Bag, Hamilton.

DEVELOPMENTS IN FOOD ANALYSIS

Department of Food Technology, Massey University, 14th and 15th November 1983. The main purpose is to introduce food chemists to new and efficient methods of food analysis. It is hoped that the symposium will provide the opportunity for contacts to be made and a bridge to be built between academic and research chemists and those working in industry.

Contact: Symposium on Food Chemistry,
Food Technology Department,
Massey University,
Palmerston North.

FERTILISER CONFERENCE

FMRA 19th Technical Conference, Auckland, 30 Nov. 1 Dec. 1983. Contact: The Conference Secretary, P.O. Box 23-637, Hunters Corner.

OVERSEAS

Asian Chemical Conference — Priorites in Chemistry in Development of Asia, Kuala Lumpur, 29—31 March 1984. Contact/ Hon. Secretary, Malaysian Institute of Chemistry, c/o Rubber Research Institute, P.O. Box 150 Kuala Lumpur, Malaysia.

23rd International Conference on Co-ordination Chemistry, July 29 — August 3, 1984, Boulder Colorado.
Contact:
Secretary, XXIII, CIRES,
Campus Box 449,
University of Colorado,
Boulder,
CO 80309,
USA.

International Conference on Organic Solvent Toxicity, 15—17 October 1984, Stockholm.
Contact: Dr Peter Lundberg, ICOST, National Board of Occupational Safety and Health,
6-17184 SOLNA,
SWEDEN.

UNIVERSITY NEWS

MASSEY

Dr Scott Whineray of the Department of Chemistry, Biochemistry and Biophysics visited China in September to attend the Physics Education Conference. This conference was sponsored jointly by the Asia Society for Physics Education and UNESCO.

Dr Eric Ainscough (see p86 in the August issue) was recently promoted to Reader in the Department of Chemistry, Biochemistry and Biophysics.

Dr Ted N. Baker of the same Department and current Branch Chairman, was awarded the 1983 ICI Prize for his work on the three-dimensional structures of proteins. Recently he received a grant from the Medical Research Council to support his determination of the three-dimensional structure of human lactoferrin (the iron-binding protein in milk) by X-ray crystallography. Also, Dr Baker and *Dr Sylvia V. Rumball* were awarded a grant, from the NZ Dairy Research Institute to carry out an investigation of the structure and function of bovine lactoferrin.

Dr Len F. Blackwell (Dept. of Chem., Biochem. and Biophysics) has recently received a grant from the NZ Natural Family Planning Research Group to permit him to continue his work to develop an oestrogen test kit. Next year Dr Blackwell will be continuing this line of investigation with *Dr Jim Brown* in the Department of Obstetrics and Gynaecology at the University of Melbourne.

Dr Roger W. Purchas (Department of Animal Science) has received a research contract (for a 3 year period) from the University of Missouri at Columbia for research into the relationship between nutrition and meat flavour of beef and lamb. Similar research will be carried out by *Prof. Milton E. Bailey* (Department of Food Science and Nutrition at the University of Missouri) using animals raised under typical American conditions. Some chemical analyses for this contract will be undertaken by *Dr Cecil B. Johnson* of Applied Biochemistry Division of the D.S.I.R. in Palmerston North. Early in August, Prof. Bailey paid a brief visit to New Zealand. While in Palmerston North he addressed an Animal Science Departmental seminar on aspects of his research work. He described attempts to correlate the concentrations of "marker compounds" (e.g. hexanal, nononal and 2-pentyl furan) in lipid-containing meat products with flavour qualities of the food. Particular reference was made to differences in the flavour of meat from grass and grain-fed beef animals which can be readily detected by Americans. Generally, since Americans prefer meat from the grain-fed animals, this fact could be of economic importance to New Zealand's primary industry.

VICTORIA

The 1983 Royal Society's Hamilton Memorial Prize awarded for outstanding research by a young scientist has this year been presented to *Dr Dennis Nelson*, formerly of the Victoria University Chemistry Department for his dental work studying the nature of solids from which teeth are made.

On 29 June *Prof. Fred Basolo* visited the Chemistry Department and presented a seminar on "Synthetic Oxygen Carriers of Biological Interest."

CANTERBURY

During April *Prof. H.C. Brown* Nobel Laureate Purdue University visited the Chemistry Department and gave a lecture entitled "From little acorns to tall oak trees — boranes through organoboranes." Also in April, *Dr J.E. Butler* (US Naval Research Laboratory, Washington) gave a seminar on laser photolysis and induced fluorescence techniques.

Dr E. Fischer (Weizmann Institute) has returned to Israel after having spent a period of leave in the Department.

Dr John Blunt has returned after spending leave at University of New South Wales.

In the Department of Chemical and Process Engineering, *Dr Brian Earl* has returned from a study leave spent mainly with Davy McKee Pacific Ltd in Melbourne, working on computer-aided design packages for chemical engineering functions. Prior to his return he represented the Chemical Engineering group at the PACHEC Conference in Seoul.

Prof. Bill Reswick from the Technion-Israel University of Technology is spending three months with the Department. A specialist in process analysis and design and economics, he will be contributing to courses for final year chemical engineering students, and extension studies courses for professional engineers.

The Department has recently commissioned its new VAX/11/730 computer system replacing the 11 year old PDP-11/15. The system will be used for on-line control and data acquisition, as well as for a range of undergraduate and research computing purposes.

In September *Dr Alan Metcalfe*, Senior Lecturer in Physical Chemistry in the Department, died suddenly aged 45. An obituary is printed in this issue.

Prof. K.L. Rhinehart, School of Chemical Sciences, University of Illinois, was in the Department as a visiting Erskine Fellow in July/August. Known for his work in the fields of mass spectometry and biologically active marine natural products, he gave a series of seminars in the Department on these topics.

In August *Prof. Clair C. Patterson*, California Institute of Technology made a brief visit to the Department. A world authority on levels of heavy metals in the environment, he gave an address entitled "Industrial and Natural Lead Fluxes in the Oceans and Biosphere."

Another visitor in August was *Prof. R.J.H. Clark* University College London, who was 1983 Tilden Lecturer of the Royal Society of Chemistry.

He gave seminars on the chemistry and spectroscopy of mixed valance complexes and on applications of resonance raman spectroscopy.

Visiting the Department in September/October is *Prof. Neill Bartlett*, University of California, Berkeley, a visiting Erskine Fellow. Well known for his work in discovering the first xenon compounds, he is giving a series of seminars and lectures on topics in inorganic chemistry while at Canterbury.

OTAGO

From the Chemistry Department, *Dr R.M. Carr* attended the conference of the N.Z.I.C.'s Geochemical Group at Rotorua in May where he presented a paper on coal as a source of liquid fuel. While in the North Island, he also visited the LPG plant at Kapuni and NZ Forest Product's mill at Kinleith.

Dr Keith Hunter attended a NWASCO working group in Wellington in March where he spoke on chemical aspects of heavy metals in the aquatic environment. He has also been advising the Taranaki Catchment Commission on the design of monitoring programmes for trace metals in connection with petrochemical industries in Taranaki. A TCC funded study of the marine geochemistry of zinc is being carried out by *Simon Tyler* for an M.Sc. degree. *Dr Hunter* and *Frank Ho*, a Ph.D. student, cruised in the Tasman Sea in August on the DSIR vessel, Tangaroa. They were accompanied by *Dr John Spedding*, Auckland University and American colleagues from the SEAREX PROGRAMME. The cruise was supported by the US-NZ Co-operative Science Programme. Studies were made of the chemical and physical properties of seawater in the Three Kings Islands upwelling zone, together with studies of marine rain and aerosols.

Dr Walter Dudley, marine geologist at the University of Hawaii, visited the Department in June. Dr Dudley, an authority on paleoceanography, spoke on tsunamis.

Applied Chemistry students visited industries in Southland in April. Chemist *Mr Stan Winter*, conducted them around the Southland Co-operative Phosphate Company's works at Awarua, Manager, *Mr Arthur Wilson* explained processes at the Southland Dairy Co-op at Edendale, and the group also visited the NZ Aluminium Smelter's plant at Tiwai Point.

The Advanced 2 unit in Applied Chemistry is now offered by the University as a full unit at Advanced 2 level, so that the Chemistry Department can now offer degrees with majors in Chemistry or Applied Chemistry. Also, the Council of the NZIC now recognises the new degree in Applied Chemistry as sufficient qualification for graduate or corporate membership of the Institute.

Visitors to the Chemistry Department have included *Dr Patrick Buat-Menard* from the Centre des faibles Radiactivites in France. Dr Buat-Menard directs research into trace element and radionuclide fluxes to the oceans from the atmosphere, and is in New Zealand to gather samples of marine aerosols at the SEAREX tower, Cape Reinga, and volcanic gases at White Island. While in Dunedin, he lectured on atmospheric sources of trace elements in the ocean. Other visitors included *Dr W.P. Griffith* from Imperial College, London, who lectured on nitrido and oxo complexes of the platinum metals, and *Dr Warren Roper* from the University of Auckland who spoke on metal-carbon multiple bonds.

The U.G.C. has made funds available to the Chemistry Department for equipment which will include a climbing-film evaporator for the Applied Chemistry Section, a rapid-scan spectrograph, and jointly with the Nutrition Department, for atomic absorption equipment.

From the Toxicology Section, *Drs Don Ferry* and *Wayne Temple* attended a conference at the University of Sydney on hazardous chemicals in the Australian environment. They then proceeded to Japan where they visited the Yokohama Pollution Control Centre, *Dr Kato*, an expert on pollution monitoring, at Yokohama University, and Kyoto where they inspected the QP1000 G.D.-mass spectrometer at the Shimadzu Sanjo Factory.

In the Pharmacy Department, *Dr George Laws* has returned from sabbatical leave at the University of Bath where he was studying aspects of anaesthesia with *Dr Alan Casey*. *Prof. A.H. Beckett* from the Pharmacy Department at Chelsea College, London, and *Dr Hicklin* from Crawley Hospital in England, visited recently and gave a joint seminar on arthritis. *Prof. Beckett* later lectured on drug abuse in sports.

New HPLC equipment has been installed in the Pharmacy Department and funds have been allocated to purchase rate-of-solution and bioavailability equipment which will be used for drug testing. Plans to re-house the Department in the Medical School's Adams Building are proceeding smoothly.

In the Biochemistry Department, *Dr Michael Crumpton*, Deputy Director of Research at the Imperial Cancer Research Fund Laboratories, London, visited recently and talked on cell surface glycoproteins in relation to cell differentiation and malignancy. A growing interest in glycoproteins in the Department meant there was much fruitful discussion during Dr Crumpton's visit.

Dr Laurie Melton of the Nutrition Department has returned from sabbatical leave with *Prof. Peter Albersheim* at the University of Colorado. He studied the heptasaccharide portion of a complex polymer from plant cell walls.

Dr Kevin Farnden is presenting a paper at a conference in Amsterdam, then will visit laboratories in Germany, Holland and the UK to further his interests in nitrogen fixation and plant vectors for cloning. Representing the Medical Research Council, *Assoc. Prof. M.G. Smith* will attend a conference on the Exchange of Biomedical Science at Bethesda, USA, then visit several laboratories on America's East Coast. *Dr Warren Tate* will visit the Max-Planck Institute for Molecular Genetics in West Berlin and the Baylor College of Medicine in the USA to further his studies on the cloning of protein factors important in biosynthesis.

Prof. R.H. Peters. Professor of Polymer and Fibre Science at U.M.I.S.T. in England, has arrived in the Textiles Department as a Williams Evans Visiting Fellow. During a 3-month stay, he will lecture in Textiles Science courses and give a series of seminars and open lectures.

GENERAL NEWS

CHEM. N.Z. MOVES NORTH

CHEM. N.Z., the newsletter of the N.Z.I.C. Chemistry Education Group, is now based in Palmerston North, with a new editorial committee headed by *Andrew Brodie* (Massey University). The other members of the editorial team are *Alan Furness* (Palmerston North Boys' High School), *Russell Mathews* (Freyberg High School) and *Ken Whittle* (Manawatu Polytechnic). *John Rudge* (Palmerston North Teachers' College) assisted with one issue, but has had to resign from the committee as he is to become director of the Nelson Museum.

CHEM. N.Z. was established in 1978 with an editorial committee in Christchurch. The first editor was *Jack Fergusson* (University of Canterbury). He and his committee have done a magnificant job producing CHEM. N.Z. over the past five years. It is well received by teachers, with a mailing list of over 480. The newsletter is strongly recommended to trainee chemistry teachers by teachers' college lecturers. The fact that the Australian Chemical Education Group Newsletter, CHEMEDA, was largely inspired by CHEM. N.Z. must be taken as a compliment.

CHEM. N.Z. contains a wide variety of material. Especially popular are, the answers to the previous years' University Bursary Chemistry Examination! Articles covering aspects of chemistry teaching, details of experiments for class room use, and industrial processes in New Zealand are also useful.

CHEM. N.Z. is funded by the N.Z.I.C. Council and is free to members of the Chemistry Education Group. Any chemistry teacher, whether or not they are members of the N.Z.I.C., can join the Group. This is one way in which the N.Z.I.C. supports chemistry teachers.

NZ DAIRY BOARD REPLIES

In reply to a letter from Dr Wright, Mr B. Knowles General Manager of the Dairy Board has shown a much more reasonable attitude to the NZIC's views than some Fair Go guests. On the aspect of not exposing people to caricature or ridicule he writes "... I shall ask our people to have a careful look at any future developments of advertising."

FORMATION OF SANA

An Association to be known as Scientists Against Nuclear Arms (New Zealand) is currently being formed, and scientists, including engineers are being invited to join. There is a provision for student membership. There are already branches of SANA in the UK and Australia and it is intended that the New Zealand Association become affiliated with them.

The Association will attempt to remain apolitical in the sense that it will not allign itself with any particular party policy. It does however intend to make its voice heard in the political arena. This has already occurred to some extent when the Minister of Defence was taken to task for his statement that NZ could not be expected to be a target in a nuclear war.

Membership application forms may be obtained by writing to Dr. P.R. Wills, Acting Co-ordinator of SANA, Department of Physics, University of Auckland, Private Bag, Auckland.

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WATER TREATMENT

WATER POLLUTION AT THE HAMILTON CONFERENCE

The importance of water chemistry and treatment from the industrial and environmental viewpoints was emphasised by a special section on the last day of the 1983 Conference in Hamilton. The collection of nine papers was given a tremendous start by the plenary lecture from Dr Doug Weiss of CSIRO, the inaugural RACI/NZIC exchange Fellow. In a very clearly presented address, Dr Weiss outlined the chemistry behind the SIROFLOC process for the removal of colour and turbidity from municipal water supplies. The process utilises magnetite instead of the conventional alum flocs as an adsorption medium. At the appropriate pH the magnetite is positively charged, adsorbing colour and clay colloids. Passage through a magnetic field flocculates the particles which settle rapidly removing the need for a further filtration step. Further, the magnetite can be regenerated with alkalie and the sludge disposal problems are reduced.

The other eight papers were presented in two sessions either side of lunch on the Friday and were quite well attended despite some of them being omitted from the printed conference programme. The papers looked at several aspects of water in which chemists are involved, in particular, analysis, treatment and processes in natural waters.

GOOD PROSPECTS FOR LOCAL CHEMICAL EQUIPMENT COMPANY

After providing a unique exchange service for water de-ionisers in New Zealand over the last few years, Processed Chemicals Industries Ltd. (PROCHEM), is now exporting equipment to Australia. An Australian company, Aquion Pty. Ltd. with headquarters in Melbourne is now offering the Prochem service in N.S.W. and Victoria.

Prochem manufactures and services water de-ionisers for industry, laboratories and home dialysis machines. All equipment is manufactured in New Zealand, including the conductivity meters, the exchange cylinders and all plumbing fittings.

The Prochem system of regeneration uses counter current processing leading to an unusually high level of regeneration. This in turn means higher purity water from twin bed systems, comparable to normal mixed bed systems.

"Customers here and in Australia are often surprised at the purity of the water produced," claims Dr. Ian Devereux, Prochem's Sales & Export Manager, "particularly when they have had experience with in-house systems." With the recession easing in Australia and CER underway, Prochem believes exports will rise substantially over the next twelve months.

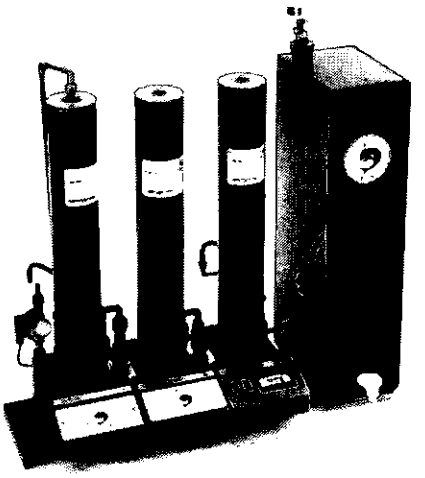
"We see Australia as our first stepping stone to world-wide sales," says Dr. Devereux. "In some countries we may seek a market for a particular product, such as our dialysis de-ionisers, rather than all our products. This type of specialised middle technology is ideally suited to New Zealand manufacturing. I believe it is much more likely to succeed than some of the high technology projects being discussed lately," concluded Dr. Devereux.

For further information, circle 13 on the Reader Reply Card.

HIGH PURITY WATER FOR LABORATORIES

The Elgastat Spectrum modular purification system has recently been launched in New Zealand by Wilton Instruments, exclusive agents for British water treatment specialists, The Elga Group, in order to meet the growing demands made by laboratories searching for an efficient method of producing low cost, high purity water.

Combining the technologies of reverse osmosis, ion exchange and membrane filtration, Elgastat Spectrum provides a versatile and comprehensive purification system. A selection of the 8 media cartridges can be employed to provide the user with a tailor-made system to meet individual requirements and purity specifications.



The Elgastat Spectrum RO reverse osmosis unit employs the most advanced design in membrane technology and is unique in that it requires no pre-treatment and can operate directly off a mains water supply.

Supplied with a 36-litre capacity sealed storage tank fitted with an automatic level control device and bacterial air filter, this unit will, when used in conjunction with Spectrum activated carbon and nuclear grade de-ionisation cartridges produce Reagent Grade water at low cost.

The internal recirculation pump ensures that water quality is retained, even when not being drawn to service, by maintaining the water in a state of continuous movement through the activated carbon and de-ionisation resins via the storage tank.

New Zealand agents: Wilton Instruments (a division of Smith Biolab Ltd.)

For further information, circle 14 on the Reader Reply Card.

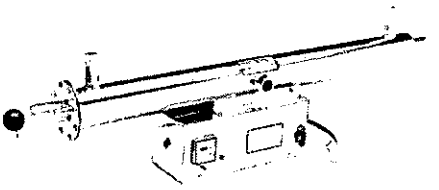
ULTRA VIOLET WATER STERILIZERS PROTECT PRODUCT AND PROFIT

M.T. STICKLAND CONTAMINATION CONTROL LIMITED.

The recent installation of STERIFLO Ultra Violet Sterilizers at the New Zealdnd Apple and Pear Board's Juice Packaging Plant at Wiri in Auckland signalled a major advance in quality control and determination by the Board to stay a market leader in the field of Fruit Juice.

In this industry water is probably the most used and least questioned raw material.

Municipal Water Treatment is primarily designed to destroy coliform organisms. However, experience has shown that many spoilage organisms survive and are present in a high percentage of mains water supplies. This is the water that some Bottlers rely on for their production and cleaning procedures.



Modern plants employ rather sophisticated water treatment systems in order to maintain a quality standard which is required for consistant flavour, clarity and quality. These are water softeners, ion exchange units and carbon filters. Whilst these types of equipment perform valuable functions and are effective in providing physical and chemical quality standards in water they also produce serious drawbacks. Unfortunately many Plant Engineers are not aware of the incubator effect common to this type of equipment.

As a result of trapping micro-organisms in the resin or filter beds, and at the same time trapping organic matter, (which serves as food for these micro-organisms), the treated water could contain bacterial counts as high as ten times greater than the raw feed water. This means that a Municipal Water Supply with a relatively low bacteria count can be converted into treated water with a high bacteria count by the very equipment being used to safeguard its quality.

Bacteria present in the water will cause problems, in the final product, with taste, odour, colour and changes in turbidity, resulting in customer dissatisfaction and product returns to Retailers.

The STERIFLO Ultra Violet Sterilizer manufactured in Auckland by Contamination Control Limited is an easily installed in line water treatment device which destroys micro-organisms without imparting any undesirable taste, odour, colour or pH change to the water. Installation of a STERIFLO downstream of other treatment devices will ensure bacterially safe water for all production requirements.

Units are available with capacities from a few litres to thousands of litres per minute.

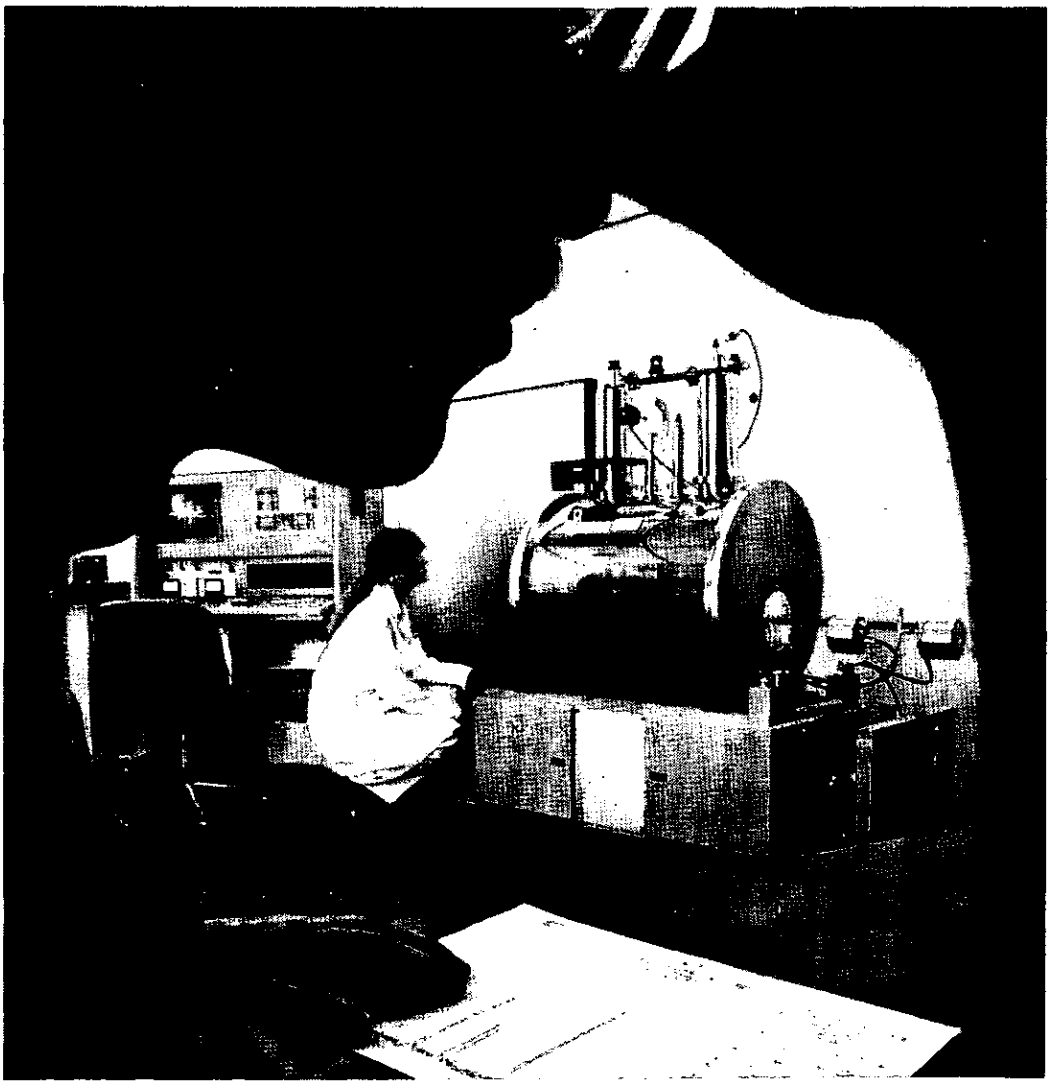
For further information, circle 15 on the Reader reply card.

WATER QUALITY CENTRE
Hamilton
SEMINAR
on
LAND TREATMENT OF WASTES
To be held at the University of Waikato, Hamilton, New Zealand, 7-9 February 1984.

IPENZ Conference
Hastings
February 13—17, 1984

This will include a contribution from the Technical Group on Water.
For further information contact
Mr B. Selles or Mr W. Bull
Hastings City Council,
P.O. Box 1436, Hastings.

Tomorrow's Technology Today



Nicolet S-199: A Solids NMR That Will Fit Comfortably in Any Laboratory.

Whatever your solids NMR application — fossil fuels polymers, natural products, catalysts, biologically active compounds — the Nicolet S-100 will fill your needs. And it will also fit into your laboratory. The horizontal orientation of the superconducting solenoid means that you can refill the liquid helium in a room with ceilings as low as 8 feet. The total weight of the S-100 is only 1100 lbs (495 kg), so floor loading is not a problem. The Nicolet S-100 fits easily into the large NMR laboratory that is adding a solids instrument, as well as into the industrial laboratory that wants to take advantage of the power and capabilities in solids NMR offered by the Nicolet S-100.

The S-100 Is the Solution for Your Solid Samples

S-100 balances sensitivity with reliability to bring dependable routine solids analysis to your fingertips.

The unique horizontal magnet configuration allows rapid sample change.

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WATER TREATMENT

FILTER SELECTION — A REVIEW OF ALTERNATIVES

JOHN HUDSON GAF (AUSTRALASIA) Pty. Ltd.

Filtration theory has developed considerably in recent years, but not to the stage where an engineer can design a filter directly from basics as is possible in the case of a distillation column or a heat exchanger. Thus the design or specification of filtration systems is invariably left to technical personnel involved in manufacture of filter equipment.

FACTORS AFFECTING EQUIPMENT CHOICE

The primary factor in filter design is the cake permeability. This is almost always unique for a given filtration problem, and in situ testing is the only certain way of selecting a filter exactly appropriate for the task.

However, there are many factors governing the choice of a filter, and some of the more important of these are:

1. Fixed and operating costs.
2. Quantities and values of materials to be handled.
3. Fluid properties such as viscosity, density and corrosive nature.
4. Whether the valuable product is to be the solid, the fluid, or both.
5. Concentration, temperature, and pressure of slurry.
6. Particle size and shape, surface characteristics of the particles, and compressibility of the solid material.
7. Extent of washing necessary for the filter cake.

Many of these have a marked influence over the rate at which filtrate is obtained which is of vital interest to the user. More precisely, the major variables affecting filtration rate are:

1. Pressure drop across the filter.
2. Area of filtering surface.
3. Viscosity of the filtrate.
4. Resistance of the cake.
5. Resistance of the filter medium.

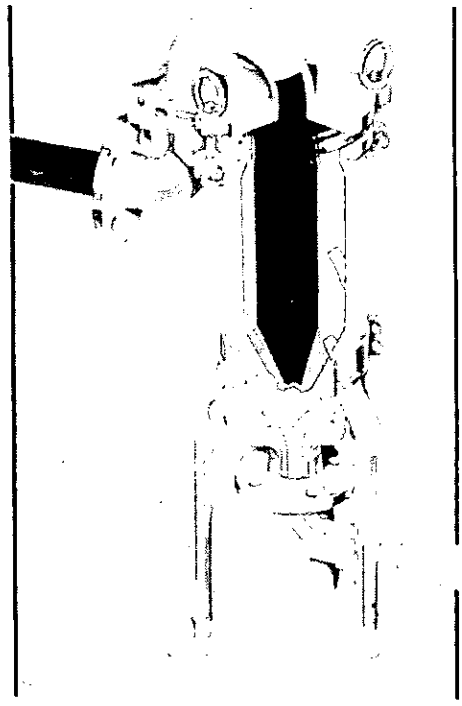
It is not my intention to digress further into the theoretical aspects of filtration at this stage, but rather to argue the advantages of bag filtration compared to some other commercially available options, within the framework of the foregoing criteria.

TYPES OF EQUIPMENT

Filtration equipment is often categorised as either batch or continuous. These terms are self explanatory, but it should be noted that any batch system can be made "continuous" by the use of parallel installations where one unit is on standby while the other is operating.

Batch filters include the following: sand filters, bag or hat filters, plate-and-frame filter press, horizontal plate filter (sparkler), vertical and horizontal leaf filters, disc filters, cartridge filters, with many different variations of each of these types.

Continuous filters are either pressure or vacuum types, generally classed as either rotary drum or rotary disc filters. The basic advantage claimed for these is that the cake thickness at any given location on the submerged filtering surface does not vary with time, any build-up being removed by a knife or blade.



The principal features of the GAF bag filtration system are:

* Simplicity — no moving parts.
* Speed of changeover of filter element — less downtime.
* Wide range of quality micron rated filter bags from one to 850 microns in a wide variety of materials.
* Solids caught and retained in the bag for easy disposal — cannot re-enter the system during changeover.
* Open or closed systems; pressure vessels available to operate up to 300 psi.
* Smooth, continuous wetted surface — no corners to trap and build up solids.
* Interior of vessel contains only clean filtrate after bag removal, thus reducing clean-up time.
* No tools required to operate or handle — no demarcation disputes.
* Vessel construction in a variety of materials.
* Various models available with flow rates from four to 4000 litres per minute.
* Ability to handle a wide range of viscosities — thixotropes are not a problem.

For further information, circle **17** on the Reader reply card.

'SUPERFLOC'

A PHYSICO-CHEMICAL TREATMENT PROCESS FOR ORGANIC WASTEWATERS THAT ENABLES RECOVERY OF SALEABLE BY-PRODUCTS.

'Superfloc' is a compact physico-chemical treatment process that has been developed for use on industrial waste waters containing high organic concentrations. The process, for which MacEwans Machinery Limited are the sole agents, has been developed in New Zealand over the past fifteen years primarily on meat processing wastes, by the DSIR, a consortium of New Zealand freezing works and latterly by the Development Finance Corporation. It utilises chemical flocculants to remove pollutants from the waste stream as a readily settleable sludge. An extensive series of laboratory and pilot scale trials have proved that the process is particularly applicable to food processing industries where the effluents contain a significant quantity of solids which can be sold as a stock feed supplement to offset the cost of the plant.

The 'Superfloc' system developed as a pre-treatment for the removal of proteins and charged ionic groups from meat packing plant effluents. The pre-treatment system was required to remove high levels of grease and suspended solids to prevent resin fouling and it was also considered desirable to reduce the protein concentration to low levels to achieve practical separation by ion exchange. The efficiency of the process was equivalent to secondary treatment and as such 'Superfloc' can stand along as an alternative secondary treatment.

Unit process of 'Superfloc' involve:-

1. Acid addition to denatured protein
2. Coagulant addition
3. Neutralisation
4. Flocculation
5. Clarification
6. Thickening, heating and drying of settled solids.

To date, one full-scale plant treating 7500 m^3/10 hr day of freezing works effluent has been installed in New Zealand.

Figures relating to the full-scale plant are still being monitored, however, the information currently available shows that process performance has been consistent through the stages of pilot plant, prototype plant and full-scale plant. MacEwans 'Superfloc' treatment system is capable of removing practically all grease and suspended solids, while a BOD_5 reduction of 85% is readily achievable. At the Wairoa plant the standard of treatment exceeds that required by the Water Right.

Following the clarification process, the organic sludge is heat treated to improve dewaterability. The final moisture content of the sludge following dewatering and drying is less than 7%.

The daily works production of effluent meal in this fashion is 1.2 kg per cubic metre of effluent treated. In general, the effluent meal is lower in protein and has a high grease content when compared to conventional meat meal. Extensive feeding trials have show it to be a good dietary supplement for non-ruminant animals using 10% inclusion. The high grease content obviates the need to supplement feeds with tallow which is presently added to improve metabolic efficiency. The feeding trials using 'Superfloc' effluent meal show comparable growth to meat and bone meal at the same inclusion and there have been no toxicity or palatability problems. The sale of the effluent meal from the installed full-scale plant currently covers all the operating costs of the plant.

The 'Superfloc treatment system offered by MacEwans has proved itself as a viable secondary treatment. The compactness of the plant reduces land area requirements associated with conventional treatment systems. Pollutants are removed from the waste stream as a by-product sludge. Sale of this by-product at current prices covers all operating costs widely marketed it will attract a greater return to provide profit from operating the 'Superfloc' waste treatment facility.

For further information circle **18** on the Reader reply card.

PRODUCT NEWS

TRADES DISPLAY FEATURE OF HAMILTON CONFERENCE

The first impression of the 1983 Conference Trades Exhibition was of the omnipresence of the VDU. It was all there, an impressive range of shiny new technology, the latest in instrumentation, laboratory hardware and chemicals.

Straight inside the door, Sci-Med were showing off the latest Shimadzu equipment, liquid chromatography (including microbore) (19), gas chromatography (20) uv-vis (21) and IR spectrophotometry (22).

Philips gave pride of place to the Pye-Unicam PU9000 AAS system (23) and were also displaying chromatography (24) and spectrophotometry equipment (25).

Considerable interest centred around the Alphatech Associates area where liquid scintillation equipment (26) and also the Issac/Apple interfacing equipment (27) was displayed.

The second most attractive feature at the NDA stand was the Gerhardt digestion and distillation apparatus for Kjeldahl determinations (28).

Christine White and the Gerhardt Kjeldahl apparatus at the NDA stand.

Advanced Electronics were displaying the GBC Model SB901 AAS (29) recently advertised in Chemistry in New Zealand. Also at their stand under the Advanced Micro-Computers banner was the LABTAM Network Computer (30) Rocklabs displayed their new ring grinder (31). A New Zealand company, run by Dr Ian Devereux, which exports 95% of its production, Rocklabs would appreciate any help NZ scientists could give in suggesting possible contacts in agricultural, forestry and horticultural laboratories overseas.

Other exhibitors included Alltech Associates, Auckland Valve and Fitting, BDH Chemicals, KMS, Labsupply Pierce, May and Baker, NZIG, Northrop Instruments and Systems, Perkin Elmer Instruments, Roche Products, Scientific Supplies Ltd, Smith Biolab and Watson Victor.

Numbers in brackets refer to the Reader reply card, for further information on any of the products mention, circle the appropriate number (s) and post the card.

PERKIN-ELMER ESTABLISHES NEW AUCKLAND OFFICE

PERKIN-ELMER INSTRUMENTS have recently occupied a new sales and service facility in Auckland. The office is based in the Auckland city centre and enables improved sales and service response throughout the Auckland metropolitan area. A demonstration laboratory provides facilities for the display of a wide range of new instruments, including recently released computer aided equipment.

PERKIN-ELMER COMPUTERS are also based in this new facility and their current 32 Bit computer is also available for demonstration.

A new general catalogue entitled "INSTRUMENT NEWS" features a wide range of new analytical instrumentation which was released at the A.C.S. Pittsburg meeting earlier this year.

INSTRUMENT NEWS can be obtained free by application to, the new address:
PERKIN-ELMER INSTRUMENTS
29 ANZAC AVENUE
P.O. BOX 6348
WELLESLEY STREET
AUCKLAND.
TELEPHONE 770-928/929
or by circling 32 on the Reader Reply card.

NEW MICROBORE COLUMNS FROM WATERS

A new line of 2mm ID microbore HPLC columns packed with Waters proven uBONDAPAK is being introduced by Waters Associates.

Waters Microbore uBONDAPAK Columns are claimed to provide a fourfold increase in sensitivity and reduce solvent consumption by as much as 80% compared to standard 3.9mm HPLC columns. As an added advantage, Waters microbore columns are compatible with all Waters HPLC systems without requiring any instrument modification.

These new 2mm ID microbore columns are available in 10 uBONDAPAK C^{18} and custom packings. N.Z. agents Alphatech Systems Ltd.

For further information circle 33 on the Reader reply card.

SOLID PHASE EXTRACTION

The 'Baker'-10 SPE System is a sample preparation device that operates on the efficient and rapid technique of Solid Phase Extraction (SPE). This system uses a specially designed Vacuum Manifold that processes disposable SPE columns. Solvents and samples are aspirated through the columns via a Vacuum Manifold. Sample eluates are collected in tubes positioned in a removable rack placed inside the Manifold and are either used directly or evaporated and reconstituted in an appropriate solvent for further analysis. Up to 10 columns can be processed simultaneously.

'BAKER'-10 SPE Disposable Columns are polypropylene prepacked with selective Reversed-Phase. Polar and Ion-Exchange Organosilanes bonded to 40-um 60 A Silica Gel. The highly surface active sorbents, contained by two 20-um polyethylene frits, provide high capacity.

This configuration allows extraction of compounds from sample solution volumes of a few hundred microlitres to several hundred milliliters.

Columns are available with reservoirs of 1-ml, 3-ml, and 6-ml, with extraction capacities up to 60mg.

Application notes have been prepared for the extraction of many substances.

NZ agents: Kempthorne Medical Supplies Limited.

For further information circle 34 on Reader Reply Card.

HP LIQUID CHROMATOGRAPHY INSTRUMENTATION

Hewlett-Packard has introduced the HP 1090 family of integrated LC modules.

HP chemists believe that the need to improve laboratory productivity is leading to the adoption of two new coloumn standards, using micro-bore and high-speed columns.

Compared to standard 10cm columns packed with 5-micrometre particles, the new 6cm x 4.6mm high-speed packed with 3-micrometre particles complete the analysis three times faster and improve detectability. The new 2.1mm i.d. micro-bore columns reduce solvent consumption by 80% and increase column detectability five times. Both new columns maintain equivalent resolution.

With the HP1090, the analyst can use the high-speed and micro-bore columns without sacrificing available resolution. Hewlett-Packard designed all the individual parts of the HP 1090 with minimum volume and with optimum geometry, so as to reduce external contributions to peak volume.

The new solvent delivery system generates gradients at high-flow rates (for high-speed columns) or low-flow rates (for micro-bore columns) with equal precision.

INTEGRATED MODULES FOR MAXIMUM OPERATIONAL FLEXIBILITY

Contained within the HP 1090 mainframe are component modules designed to perform as one integrated system. The chemist configures the HP 1090 for a particular type of application. Each module can be easily removed and exchanged with a minimum of cables and connections.

Available today are the following modules: DR5 solvent delivery system; sampling modules (both automatic and manual); diode array detector modules; and the column compartment.

A wide variety of data-handling and communication options are accommodated through analog output, HP-IB or serial interfaces.

NZ distributors, Northrop Instruments and Systems Ltd.

For further information circle 35 on the Reader reply card.

CELL AFFINITY CHROMATOGRAPHY BOOKLET

"Cell Affinity Chromatography — principles and methods" is the title of a new technical handbook available from Pharmacia Fine Chemicals. This handbook contains a clear description of the principles and scope of this important new technique for purifying cells and of the special Macrobead™ derivatives of Sepharose® used. It includes applications examples of cell separations performed using these derivatives, as well as full details of how to prepare absorbents and how to carry out the separation. The handbook is available on request from Watson Victor Ltd and is part of an extensive programme for cell separation, culture and study.

For further information circle 36 on the Reader Reply Card.

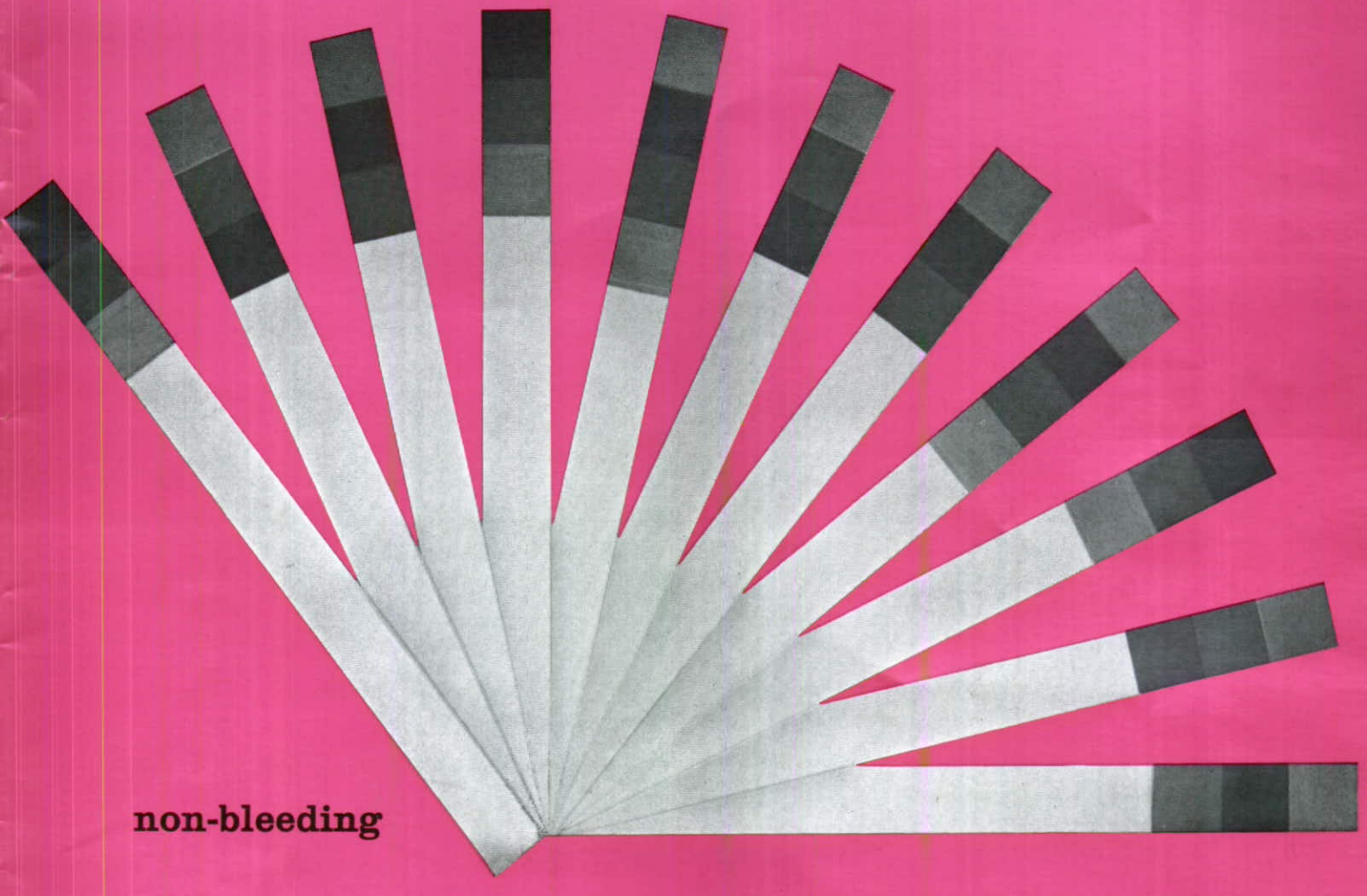
ALLTECH STOCK-LIST AVAILABLE

Alltech's current stock-list, with nearly 500 different items held in Auckland and NZ prices given. The list is available on request.

For a copy to be sent to you, circle 37 on the Reader reply card.

Reagents

MERCK



non-bleeding

Universal indicator strips: pH 0–14
Special indicator strips: pH 0–2.5;
pH 2.5–4.5; pH 4.0–7.0; pH 6.5–10.0; pH 11.0–13.0
Neutralit pH 5–10 Acilit pH 0–6
Alkalit pH 7.5–14

Decisive advantages of these strips are that:

the reaction zones are firmly bonded on to the plastic backing

they do not bleed

they are not adversely affected by longer periods of immersion

they permit measurements to be made in weakly buffered, and even coloured solutions

their colour differences are quite distinct

they possess a high photostability

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For further information circle 2 on Reader Reply Card.

Satin smooth or sparkling

Thanks to AMF Cuno filters.

Nobody makes more filtration products than AMF Cuno. We offer a full line of filters to solve a full range of filter problems.

If your problem, for example, is keeping paint satin smooth, choose Micro-Klean® II filter cartridges. The exclusive construction gives you greater dirt holding capacity. Longer filter life. Lower filtration costs.

Zeta Plus®, another innovation from Cuno's labs, has all the advantages of asbestos filtration. Without the asbestos. Zeta Plus provides reliable, cost effective submicron filtration. Better flow rate. Longer media life.

And it meets the rigid requirements of the Food and Drug Administration. It will even put the sparkle in your burgundy.

Our experience with filtration technology is unparalleled. Our product line unequalled. So, whenever a solution is giving you problems, call your local AMF distributor. Or write us: AMF Cuno Division, 400 Research Parkway, Meriden, CT 06450. (203) 237-5541.

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For further information circle 3 on Reader Reply Card.