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The introduction of CRI's draws ever closer and so the uncertainty surrounding this subject seems to increase the level of anxiety felt by most who will be affected by this dramatic change to the practice of science in New Zealand.

As I talk to people the response varies from one of "let's work on and worry about it when it happens" to some who can do no work at all for worrying about the forthcoming changes. Even the private sector is showing concerns about their ability to compete with a large commercially driven CRI which uses tax payer funded labs, equipment etc to "compete?" in the market place.

Still others can not see how all this will succeed due to a perceived loss of expertise or managerial understanding. The problem of a dwindling base of skill scientists to perform research is also noted with concern.

An April letter from the Hon. Simon Upton to me contained comment from him on how he sees the future under CRI structures. I quote some of his statements.

"Government is indeed aware of the need to keep scientific competence, and for this reason it has decided to indemnify the CRI's for severance costs for any scientists that any CRI may wish to appoint, but who are not fully funded as at 30 June 1992. This will enable the CRI's to make judgment on the employment of these scientists in a measured manner."

"Career structures are very important and I know that all CRI Boards take this issue very seriously. Each CRI is formulating human resource policies and many are advertising for human resource managers reporting directly to the CEO."

Re Libraries, Databases, Computer facilities etc:- "CRI's are being encouraged to keep the communication networks that have been established and to build on these."

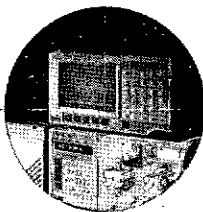
"I have noted your concerns regarding the balance between short term commercial projects and the science of a longer term nature."

It seems to me that the Minister's intention is to cause the least disruption to the practice of good science and that he will act to redress a deficiency or problem if representation is appropriate and constructive. Never the less it is also obvious that, as in industry, scientists will have to get used to the idea of being able to justify their position to a board and to show that their contribution is a worthy one in relation to the overall aim of the organisation.

Chemists more than ever need to be high profile political people, confident of their ability to be adaptable and actively promoting their skills and resources.

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**Chemistry in New Zealand:** Published on behalf of the New Zealand Institute of Chemistry (Inc)  
PO Box 12-347, Wellington Ph: (04) 473-9444.  
Fax (04) 473-2324  
President: D.S. Winter, Hon. Gen. Secretary/ Executive.  
Officer: Alan A. Turner, Hon. Treasurer: D.P. Karl.  
Published six times a year in February, April, June, August, October and December.  
**Editorial:** Technical and scientific article should be submitted to the editor no later than 1st of the month of publication, but much earlier for long articles. The editor will always welcome commercial and industrial news on product design, development and testing processing techniques, company and personal news etc.  
**Editor:** R.B. Hall, 64 Mellons Bay Rd, Howick.  
Phone (09) 534-9109  
**Publisher:** Promotional Options, PO Box 101-189  
N.S.M.C. Auckland 10.  
**Advertising:** Carl Roze, Ph: (09) 521-5151  
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*Special feature for next issue:*  
**A.G.M. Spectroscopy**  
**F.T.I.R.**

# SUPERCRITICAL FLUID EXTRACTION EXPLAINED

BY MARK ALBERTSON

This new technique is becoming more popular very quickly because it offers a variety of advantages

Supercritical Fluid Extraction (SFE) is a relatively new technique in the field of analytical chemistry. It has evolved in the last decade as an alternative method of preparing samples prior to analysis. SFE offers the analyst many advantages that are not available in more conventional sample preparation techniques such as distillation, extraction with organic solvents or low resolution chromatography.

## What is a Supercritical Fluid?

A supercritical fluid is a liquid which is heated beyond the temperature at which it can be turned into a liquid by compression. If a vapour is compressed at some pressure it will start to condense and form a liquid phase. For a set range of temperatures and pressures the liquid phase and the vapour phase will coexist with a surface in between them. The higher the temperature of the vapour the more pressure needs to be applied to turn the vapour into a liquid. Above a certain temperature this behaviour changes and no matter how much pressure is applied there is no region where a vapour phase and a liquid phase coexist instead the vapour just becomes more and more compressed. At this point the vapour is called a gas and the temperature at which this behaviour change takes place is termed the critical temperature. If a liquid is heated past its critical temperature and not allowed to expand it is termed a supercritical fluid.

Supercritical fluids have some very useful properties. The first of these is their high solubilizing power. This creates the possibility of using one extraction fluid to extract a host of analytes of varying polarities and molecular sizes. In addition the solute/fluid binary diffusion coefficients are larger in supercritical fluid systems than in liquid extraction systems which makes the extraction process faster.

## COMPARISON OF EXTRACTION TECHNIQUES EXTRACTION OF CONTAMINATED SOIL (CONCENTRATION IN PPM, ± %RSD)

SOIL #3	PULSED SONICATION	SFE	
		5% ACETONE	5% MEOH
DDT	<0.7	3.2 ± 6.7%	3.6 ± 20%
DDE	1.2	0.88 ± 0.0%	0.89 ± 16%
BHC ALPHA	2.0	0.75 ± 7.5%	0.77 ± 21%
BHC BETA	0.5	0.19 ± 27%	0.51 ± 67%
BHC GAMMA	4.2	0.89 ± 36%	0.91 ± 7.8%
BHC DELTA	<0.02	0.95 ± 8.2%	1.4 ± 0.0%

SFE CONDITIONS: 75°C, 400 atm, 450 mL/min gas flow out restrictor, restrictors at 150°C, hexane trapping solvent, 1 gram soil sample, extracted for 45 minutes, two samples extracted simultaneously.

## Supercritical Carbon Dioxide

Most supercritical fluid extraction systems use carbon dioxide. The low critical temperature of CO<sub>2</sub> makes it ideal for the extraction of thermally labile compounds under conditions slightly above room temperature. Carbon dioxide provides an environment free from molecular oxygen which prevents the oxidation of sensitive analytes. As an extraction medium carbon dioxide is non toxic thus its use in the laboratory can eliminate costs associated with solvent disposal and the concerns about long term exposure of staff to toxic solvents and vapours. This is becoming increasingly important as regulations regarding emission of volatile organics in general and chlorinated hydrocarbons in particular limit the solvents that can be readily employed.

Often to improve the extraction of various analytes a solvent such as methanol or acetone can be mixed with the carbon dioxide prior to

extraction. Typical levels of solvent are 5% which, for a 45 minute extraction using 1 mL/min at the pump, amounts to 2.0- 2.5 mL of solvent collected after the carbon dioxide has depressurised.

## Off-line or On-line

On-line SFE utilises the technique of trapping extracted material on a chromatographic injection loop. The injection loop is usually a thermal or sorbent trap prior to injection onto the chromatographic system.

Off-line SFE is inherently simpler than on-line. The analyst need only be concerned with the extraction and collection steps. The subsequent chromatographic steps can be ignored until later. Analytical scale SFE

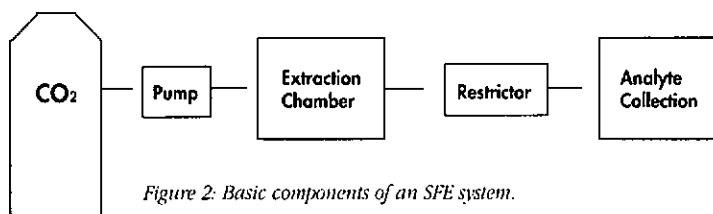


Figure 2: Basic components of an SFE system.

is performed using syringe pumps which are similar to those in supercritical fluid chromatography or more recently with constant flow reciprocating pumps which give higher dynamic flows.

The two modes commonly used in off-line SFE to achieve extraction are static and dynamic. In both cases the sample is put into a cell - which is a sample container. For static extraction the cell is pressurised with the supercritical fluid and the extraction allowed to proceed without any flow through the cell until the extraction is finished. In dynamic extraction the supercritical fluid is pumped through the cell containing the sample and the extracted analytes are removed continuously. Both static and dynamic SFE have been used for quantitative analysis but dynamic yields more rapid recoveries due to the continuous flow of pure extraction solvent into the sample cell.

The method used to collect the analytes is to a large extent dependent on the extraction fluid flow and the technique used to drop the pressure to atmospheric. One technique is to pass the supercritical fluid solution through a resin bed which collect the analytes. Alternatively the supercritical fluid can be passed through a frit restrictor which acts as a throttle to slow down the fluid flow and maintain the pressure in the system. The supercritical fluid then vaporises leaving the analytes behind in a sample vial. An improvement on this system is to pass the gas after the frit restrictor into a small sample of solvent such as hexane.

One advantage of collecting the sample in solvent is the avoidance of aerosol formation. If, for example a sample is extracted using a dynamic flow of CO<sub>2</sub> 1.0 mL/min this will result in a gas flow rate after the restrictor of ca 500 mL/min. At this type of flow rate aerosols are easily formed and analyte can be lost. If the gas flow is directed into a solvent such as hexane then the analytes are trapped in the solvent. Evaporation is not a problem because the temperature of the hexane is lowered by the cooling effect of the depressurised fluid.

With the sample in a hexane solution it is now ready for analysis using a variety of techniques chromatographic or spectroscopic without further extraction.

In conclusion with the availability of commercial systems offering multiple simultaneous extraction capabilities SFE has becoming a fast and economical alternative to traditional extraction techniques. The last major bottle neck in many laboratory analyses is now a thing of the past, the preparation step can now match the analytical techniques in turn around time.

# A SCIENCE AND TECHNOLOGY POLICY FOR NEW ZEALAND

PREPARED BY A FOSTS WORKING GROUP, 10 FEBRUARY 1992

*The following is the policy developed by the Federation of Scientific and Technological Societies (FOSTS) as a science and technology policy for New Zealand. FOSTS is the umbrella body of the science and technological societies affiliated to the Royal Society of New Zealand. It therefore seeks to represent the views of the scientific and technological community, the science practitioners of New Zealand.*

*FOSTS does not consider this policy statement to be "set in concrete" for all time, but rather sees this document as a statement which will evolve over time as circumstances change.*

## INTRODUCTION

Science creates order out of the seemingly random experiences of the world. Technology brings together these ideas and understandings as new applications. Thus, the "outputs" of science and technology are the ideas, discoveries, understandings, inventions, improvements and developments from thinkers, innovators and experimenters. The benefits to our society, in all spheres, are priceless.

Nations such as Switzerland, Sweden, Japan and Germany have developed a culture that recognizes the importance of science and technology in the daily lives of their citizens. These societies have had policies over the last forty years of investing heavily in research and development. They create conditions for medium and long term science, research and development, and respect science and technology as a vital part of their national well-being.

There have been some social costs in these countries. It is important that we in New Zealand do not simply copy the methods of these countries, but improve upon them. In particular, careful consideration of environmental aspects of research and of conservation can be undertaken with appropriate levels of funding and support.

A function of the State is to foster the well-being of its citizens in a sustainable environment. It is a fact that an important part of this well-being comes from the results of scientific work. Our country must develop and maintain its own science and technology. Only in this way can New Zealand improve its socioeconomic and cultural well being.

Unless there is an understanding and appreciation of science and technology by the general population, we cannot expect science and technology to get the support needed, publicly or privately. This in itself is a major reason for the State to foster and encourage science and technology education in the nation.

Government has a responsibility to uptake the "outputs" from science and technology, as defined above, to ensure that New Zealand's competitive advantage and the potential economic, social and environmental benefits will develop.

## 1. GOALS OF FOSTS

### \* SCIENCE AND OUR CULTURE

*The development of a New Zealand culture that recognizes the importance of science and technology in our lives.*

Just as art and sport are vital activities in a well balanced society, so too is science and technology. It is therefore essential to encourage, publicize and communicate science and technology at all levels in our society. Currently New Zealand culture places science and technology subservient to commerce, law and economics. Until there is a broad understanding of the potential value of science and technology, in the top tiers of management of private and public sector enterprises in New Zealand, much of the potential of science and technology will be unrealized. Scientists and technologists must therefore be part of national and corporate policy development and decision making.

Our society needs to recognize the role of science and technology in future socioeconomic welfare and advancement, as well as serving to benefit social and environmental concerns. A balance amongst social,

environmental and economic goals should be sought.

Science and technology education has a crucial dual role to play. It provides a general understanding for the future adult population about the very real benefits of science and technology in their daily lives. It also provides the base on which to build specific training for those who will become scientists and technologists.

### \* COMMITMENT TO SCIENCE

*Increased New Zealand commitment to research and development across all sectors.*

The encouragement of science and technology to benefit New Zealand requires increased commitment from both the public and private sectors. Comparisons with other OECD countries show New Zealand research and development expenditure to be particularly low, especially by business enterprises and universities. Fostering and improving our competitive advantage through research and technology transfer will require increased expenditure in all sectors. A better understanding of science and technology by New Zealand management and New Zealand politicians is therefore required in order that the benefits of research and development can be appreciated and used to obtain competitive advantage over overseas competitors.

This goal can be achieved through

1. Increasing the awareness amongst political leaders;
2. Increasing the awareness amongst business leaders;
3. Fostering science education.

## 2. THE ROLE OF GOVERNMENT

Government, in its leadership role, should help influence the attitudes of New Zealanders by advancing science and technology as vital for the continued socioeconomic well-being of New Zealand.

### 2.1 A Stable, Evolving Environment

*Policy: that scientific and technological research policy be more focussed on medium to long-term research.*

To promote an effective level of research and development, it is necessary to provide a stable environment. A funding environment must be developed that enables research to be planned and carried out over appropriate time scales, without an artificial requirement of achieving short-term objectives. Science and technology expertise takes many years to develop, the best value coming from long term commitment. Short term hiring of scientists on contracts inevitably leads to superficial science. We accept the need to develop short, as well as medium and long term research priorities but emphasize that there must be a more open system of consultation including full consultation with leading researchers.

### 2.2 Funding Regime

*Policy: that the funding of science and technology in New Zealand provide core support for long-term research.*

New Zealand scientists support some competition for funding research through a single centralized agency. However, much science funding is required on a long term basis. Funding must also be available for new initiatives. Much of the progress in science comes from small incremental improvements to existing ideas, as distinct from spectacular breakthroughs, therefore, on-going funding for New Zealand-based technology transfer is crucial, whether the original scientific breakthrough originated in New Zealand or elsewhere.

To deal with all these needs we consider that, as well as competitive funding through the Foundation for Research, Science and Technology, there must also be substantial long term core funding (by whatever

name) for all government science institutions and universities. We agree that science accountability should be based on monitoring outputs rather than by controlling inputs.

### 2.3 Communication of Science and Technology

*Policy: that communication of science and technology be accorded a high priority.*

Effective communication is one of the prerequisites for good science and technology, both among scientists themselves and between scientists and the wider community. Scientific and technological developments are of little use locked away. Communication between S&T and industrial sectors is vital and therefore science publishing and communication (both national and international) must be maintained. New discoveries must be communicated clearly to industry so that the wider community can benefit. There is a significant communication component in technology transfer.

The public promotion of science is also important to achieve a high degree of scientific literacy and an understanding of the important contribution of science and technology.

### 2.4 Science Advice

*Policy: that the Royal Society of New Zealand be maintained as an independent source of advice to parliament and government on scientific and technological matters.*

The Royal Society of New Zealand is the science body that is able to provide independent advice on science and technology matters from the science community.

Direct lines of communication must exist between the Prime Minister's Department, Minister of Research Science and Technology and The Royal Society of New Zealand to provide independent science input into decision making.

### 2.5 Standard of Science Policy Advice

*Policy: that policy advisers be subject to the same high standards of knowledge and effectiveness as science providers.*

Researchers accept they must meet the best international standards for research in terms of amount and quality of the work done. FOSTS is particularly concerned to see that policy advisers and officials in all government ministries and agencies involved in science and technology policy and funding, meet the same high standards of knowledge and effectiveness. Scientists have an obligation to seek out, use and extend the world's best known methods in their science. Likewise, the Ministry of Research, Science and Technology (MoRST) has an obligation to seek out and use the world's best known methods of establishing achievable science policy and the Foundation for Research, Science and Technology (FRST) has an obligation to use the world's best known methods in the management of its science funding activities.

## 3. CROWN RESEARCH INSTITUTES (CRI'S)

FOSTS supports many of the directions recommended by the Ministerial Science Task Group on the formation of CRI's. Within these new Institutes, researchers are the primary resource and all policy must take this into account.

### 3.1 CRI Boards

*Policy: that at least half of the members of boards of CRI's have scientific and/or technological expertise.*

Crown Research Institutes are funded to provide public good, strategic research for the well-being of New Zealand. Therefore, it is essential for the CRI boards to include directors with scientific and technical expertise and experience as well as business/financial expertise. There is a requirement for the boards to be balanced so that the scientific directions and policy development of the CRI's are in the best interests of the nation.

We consider at least half the members of CRI boards should have considerable scientific and/or technological experience. We note that in the highly successful Japanese and Western European economies, the emphasis is on S&T and not financial expertise.

### 3.2 Career Paths

*Policy: that national guidelines be established for the development of career structures for scientists and technologists in CRI's.*

High quality science requires excellent scientists and technical specialists. This excellence takes many years to develop, initially within tertiary institutions and then over many years of employment. Overseas experience is often essential. CRI's will succeed only if they can offer career opportunities comparable with universities and overseas institutions.

For this reason, we believe that scientists and technical specialists need to see clear career paths along which they can develop. There should be national guidelines on career paths which encourage all CRI's to recognize this progression. Career structures should be flexible to allow for the employment of scientists who need time away from the paid workforce. Scientists should not have to move into administration to achieve seniority.

### 3.3 Administration

*Policy: that the administrative structures of CRI's be minimal and geared to science support.*

Now that science policy development is mainly the role of MoRST, and funding is mainly the role of FRST, there is no need for large administrative structures in the CRI's. Instead, the administration should be small and efficient, and the organization itself should operate on a flat organizational structure. The focus for the administration should be on science support. To ensure the best use of resources, resource allocation should be very close to the people actually doing the work. Science is best done through collaboration and co-operation. Vertical administrative structures only frustrate scientific excellence. FOSTS will continue to monitor administrative overheads of CRI's.

### 3.4 CRI's and Universities

*Policy: that close links be fostered between CRI's and universities.*

Close relationships between CRI's and universities provide the necessary impetus to promote research in both sectors, and provide career paths for young scientists. Both types of institution benefit from

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closer links; the universities with somewhat more emphasis on fundamental science, and the CRI's with their strategic directions. Centres of excellence should be encouraged to concentrate strategic research in science disciplines. Joint appointments will refresh CRI scientists and university teachers. Finally, CRI/university links will provide developing career paths to attract young scientists, especially if CRI's are able to offer fellowships and jointly supervised PhD programmes.

## 4. THE TERTIARY SECTOR

New Zealand universities carry out research in their own right and, along with polytechnics, play a vital role in the training of future science and technology workers. These underpin the human resource for science and technology. Compared with other OECD countries, New Zealand universities are seriously underfunded and are thus forced into a role more of centres of higher learning than of research. Funding for tertiary institutions must aim at attaining the OECD average over the next decade. Polytechnics provide a critical service in the training of technologists and need to be linked with both the community and science providers.

### 4.1 Funding Levels

*Policy: that science and technology funding in universities be increased in real terms to a level comparable with other OECD countries.*

The level of funding for research into science and technology must be increased in real terms, over a period of years, to support the necessary level of research. Some of this increased funding should come from the private sector.

### 4.2 Science Graduate Student Development

*Policy: that movement of graduate students amongst education and research institutions be encouraged and facilitated.*

The movement of science students amongst institutions should be encouraged so that graduate students can experience different environments and gain experience with different supervisors. Funding of graduate students should be increased through specific funding to departments and by grants from FRST for research projects. Minimum standards of supervision should be set by mutual discussion between universities.

### 4.3 Science Undergraduate Student Development

*Policy: that a "study right" be available for a minimum of four years.*

Recent changes to the support of tertiary level students make science and technology courses less attainable unless there is support by the student's family. Degrees in the applied sciences often take longer than degrees in arts or commerce. Under the current student funding regime, candidates for four year undergraduate degrees are disadvantaged financially, creating a disincentive to take these essential courses.

FOSTS advocates a "study right" for a minimum of four years. Additional help can come from scholarships that demand entry standards, satisfactory progress during the course of study and repayment by service in later years, protected by a simple bond system.

## 5. PRIVATE SECTOR SCIENCE AND TECHNOLOGY

Science and technology research and development in New Zealand is vital for the well-being of New Zealand and its competitive advantage. Relying on the purchase of offshore science will ensure New Zealand always lags and never leads. Worse, lack of participation in and therefore appreciation of the benefits of S&T by the private sector all too often results in no advancement at all.

FOSTS encourages the private sector to see the advantages of engaging in scientific research. There is a special place for the private sector in the development of scientific discoveries and the advancement of technological innovations. When a private company is involved at the development stage of new ideas, it inevitably has a lead on its competitors in the commercial exploitation of those ideas. Compared with 19 OECD countries, New Zealand ranks at the bottom in private sector input into research and development. A top priority is to dramatically increase research and development in the private sector.

This could be done through tax incentives, levies and/or direct funding, and co-operative programmes with government or tertiary institution laboratories. Private sector funding must be increased to a level which enables New Zealand to be internationally competitive through technological development.

### 5.1 Industry Support

#### 5.1.1 Levies

*Policy: that production levies be adopted to supplement research and development funding.*

Industry/commodity levies could be used to supplement and increase support for the development of technology which is of particular significance to that industry. These could take the form of an agreed percentage of turnover or production to be spent on genuine research and development either by the industry or through outside contracts.

#### 5.1.2 Joint Ventures

*Policy: that joint venture bidding for research funds by the public and private sectors be encouraged.*

FOSTS supports the joint venture bidding process to encourage New Zealand based industry involvement in R&D. There is a need for the wider education of industry leaders to appraise them of the benefits flowing from research and development.

### 5.2 Inter-organization Co-operation

*Policy: that communication and technology transfer between researchers in government, universities and the private sector be encouraged and facilitated.*

Better communication and technology transfer between research workers in government, universities and the private sector is needed to make the best use of our science. The excessive introduction of competition for funding will provide a disincentive to co-operation and hence could work against New Zealand's development as a whole.

### 5.3 Science Participation in Private Sector Management

*Policy: that increased science and technology participation in all levels of management is necessary for expanded economic development.*

The most economically successful countries, such as Germany, Japan and Sweden have personnel with either science or technology skills at all levels of management. This allows technical expertise and thinking as input into industrial and commercial decisions. This should become the norm in New Zealand.

### 5.4 Science Careers in the Private Sector

*Policy: to encourage the expansion of research and development in the private sector.*

Presently, there are few researchers outside the government science agencies and universities. Research and development careers in the private sector need immediate stimulation both by increasing the present low levels of private sector research and development, and recognizing career paths for science and technology employees.

## 6. SCIENTISTS

The value of scientists as part of New Zealand's resource and as intellectual capital in this country must be recognized and fostered. Science and technology personnel are the primary resource, knowledge base, and skilled workforce for research and development activities. Recognition for science researchers should depend solely on achievement. However, efforts should be made to reduce the gender and ethnicity imbalances present in the science community.

### 6.1 Career Structures

*Policy: that adequate career structures be maintained to retain and reward excellence by scientists, technologists and support staff.*

Excellence in science and technology requires well trained human resources. New Zealand must maintain career structures for excellent scientists, technologists and support staff. Science researchers operate in an international marketplace. Due recognition, incentives and

rewarding career opportunities should be provided for scientists with proven competence. An essential element is that remuneration be at a level that recognizes the true importance of science and technology to the success of the organization.

Scientific institutions must have policies which ensure long-term development of careers in research. Excellence in science management can be achieved by using the world's best known methods of "people-oriented" management. Career paths must ensure that the best scientists are able to stay in research rather than being diverted to administration for career advancement.

### **6.2 Flexibility**

*Policy: that flexible work policies be adopted to provide career continuation.*

Scientific institutions should have flexible policies to allow part time and other special work arrangements and to allow for career continuation where a change in status prevents full time employment for some period. A considerable investment is involved in training new people to acquire expertise, so the current resource base should be maintained.

## **7. SCIENCE EDUCATION**

Education in science and about science from pre-school onwards, is an essential background for a society that needs scientific and technological skills. Coupled with this is the need for mathematical skills. Numeracy skills are as fundamental as literacy skills.

### **7.1 National Curriculum**

*Policy: that knowledge and understanding of science and technology must be provided for all, not just for those who plan to specialize in science.*

The National Curriculum should have a very strong emphasis on the attainment of knowledge about science and technology, and its major role in society today. This needs to be addressed at all levels.

### **7.2 Recruitment and Training of Teachers**

*Policy: there should be sufficient funding for the recruitment, retention and professional development of science and technology teachers and lecturers at all levels of New Zealand's education system.*

There is a particular need to stimulate interest in science and technology, currently at unacceptably low levels amongst teachers in the vital pre-school and primary stages of education.

Secondary school science teachers need to have graduated in appropriate fields. Professional development opportunities for existing teachers must be encouraged as part of good modern management of a skilled human resource.

### **7.3 Recruitment of Science Researchers**

*Policy: that career and salary structures for scientists and technologists be comparable with those in other developed countries.*

Science and technology is international and hence New Zealand must be able to compete with other developed countries for the best science researchers.

### **7.4 School Syllabus**

*Policy: that the skills of science and technology community be used in revision and upgrading of the school science syllabus.*

The school science syllabus should be continually upgraded because science and technology change so rapidly. Facilities should be made available to schools to enable them to undertake stimulating programmes. Provision for input from scientists could greatly enrich school programmes at small cost. Practical skills are needed as well as academic skills.

### **7.5 Equity**

*Policy: FOSTIS supports equality of opportunity regardless of gender, ethnic background or disability.*

Despite "open entry" there is a very low rate of Maori and Polynesian entry into science and technology, and a low entry rate of women into physical science and engineering. We support more programmes to help find and remove barriers to the entry of these groups into science and technology.

### **7.6 Science for All**

*Policy: that appreciation of science and technology is a fundamental component of the life skills of any member of society.*

It is important to teach science appreciation courses for those not entering into full-time science and technology courses. This should include a general knowledge of science and technology and an understanding of the impacts of science and technology on daily life. It is important that students realize that whilst some aspects of science, as of other human activity, have proved to be negative, the overwhelming effects are very positive, both in terms of national prosperity and quality of life.

## **8. INTERNATIONAL SCIENCE**

Science and technology is international and developments in New Zealand science and technology must recognize this. There are two aspects:

- linkages with overseas scientists.
- participation in international science programmes.

It must be remembered that New Zealand is remote and the science community in any one discipline is small. Linkages with overseas scientists provide opportunities for communication at the scientist level and provide for the stimulus of new ideas and developments. Many programmes, such as the International Geosphere-Biosphere Programme (IGBP), are interdisciplinary and international in their approach, and New Zealand has a responsibility as a member of these international organizations, to play its role in the global community.

### **8.1 International Exchange of Researchers**

*Policy: that international exchange of researchers be facilitated for the development and vigour of science and technology in New Zealand.*

There must be sufficient government funding to provide an adequate level of international exchanges of scientists between countries. The government should encourage the development of bi- and multi-lateral science agreements and exchanges, working through practicing scientists where possible.

### **8.2 Funding for Multidisciplinary International Programmes**

*Policy: that New Zealand should be fully involved in international multidisciplinary research programmes.*

The government, through the Royal Society and otherwise, needs to provide sufficient funding to support the involvement of New Zealand in international multidisciplinary programmes such as the IGBP and the World Climate Programme (WCP). These programmes are addressing scientific issues and problems that are global in nature. Because of New Zealand's unique environment, the country has a very important role to play in this kind of programme. The return usually far exceeds the investment because of the synergies that occur in multidisciplinary projects with combined resources.

## **9. DATA AND INFORMATION**

Data are the raw materials of science and technology, often having value for many other purposes besides those for which they were originally collected.

Information - analysed and interpreted data - is one of the principal products to come from data; its value to society is maximized when it is made available to as many users as possible.

Data and information are increasingly treated as commodities which may be bought and sold. Electronic means of storing and transmitting data and information make it easier to control access than in the past. Recent restructuring of the public sector is making many types of information less accessible, more expensive to obtain, or completely unavailable.

### **9.1 Access to Crown Information**

*Policy: that all data and information acquired with Crown funding should be freely available, at a price no greater than necessary to cover retrieval and transmission costs.*

The Official Information Act 1982 assumes that information should be made available unless there is a very good reason otherwise (normally

involving national security or commercial sensitivity). FOSTS endorses this philosophy.

The policy proposed by the Ministerial Science Task Group for information collected by CRI's also is endorsed. It should apply to databases, libraries, collections, and other assemblages of intellectual property paid for or owned by the Crown (excluding personal information).

#### 9.2 Access to Information in the Private Sector

*Policy: that private and state-owned enterprises make information available, for the purposes of public good, research and development.*

Treating data and information purely as commodities which are bought and sold on the free market prevents their full value to society being realized.

#### 9.3 National Information Policies

*Policy: that New Zealand makes the fullest possible use of its information resources and information technology.*

The National Library of New Zealand and the Institute of Policy Studies are taking the initiative in developing information policies, and FOSTS supports this initiative. The issues involved, such as those relating to privacy, copyright, or transfer, are very complex. A comprehensive approach to policy development therefore is required, in which the widest possible range of interest groups are involved.

#### 9.4 Information Skills Development

*Policy: that development of information skills should be a priority of the education system at all levels.*

To function in tomorrow's society, people will need to use information technology. This is especially so for those who will seek employment in science and technology, and in the "information industry" (including libraries, banks, etc).

#### CONCLUSION

New Zealand has an opportunity to improve both its socio-economic well-being and quality of life through environmentally sensitive scientific and technological development. To achieve this, New Zealand must evolve a culture which recognizes the importance of science and technology, obtain a commitment to research and development across all sectors and provide an appropriate funding and working environment for its science and technology workforce. New Zealand cannot simply rely on overseas developments.

*Continued from page 35*

The minister is reported in the "Dominion 13 April 1992" as saying: "For the first time, Science is the subject of systematic review and priority setting (with a five year focus)... CRI's will see costly overheads imposed by public service reporting requirements slimmed down and more money released for science itself."

Chemists, as other scientists have done, must move into management areas to be part of this priority setting and also to ensure that "accounting" and "science" understand each other as on their own each will fail to produce the results our country needs.

The challenge of the Nineties is here. Will Chemists stay at the top of the Scientific tree or by apathy or introspection fall to the ground. Really it is up to us.

The Institute will help chemists but you get out of a system what you are prepared to put into it. Our past performance has not been good. This may be the last opportunity to retain our Individuality.

I look forward to meeting you as my Presidential tour begins and to discuss these concepts with you.

Stan Winter,  
President, NZIC



## THE ROYAL AUSTRALIAN CHEMICAL INSTITUTE

### 12th Australian Symposium on Analytical Chemistry incorporating 3rd Environmental Chemistry

PERTH, WESTERN AUSTRALIA, 26TH SEPTEMBER - 1ST OCTOBER 1993

The theme for the conference is "Tomorrow's Solutions Today"

This scientific programme will comprise of three concurrent streams - two will focus on Analytical chemistry and the third on Environmental chemistry. The programme will incorporate plenary sessions, invited speakers, and oral and poster presentations. The call for papers will be in July 1992 - proceedings will be published prior to the conference. The official language of the conference will be English.

The venue for the conference is the Burswood Convention Centre, A range of accommodation will be offered within easy distance of the convention centre.

For further information, please forward your name, organisation, address, telephone and facsimile numbers to the address below:

Symposium Secretariat  
12AC/3EC  
UWA Extension  
Conference Management  
The University of Western Australia  
Nedlands, Western Australia 6009  
Australia.

## FROM THE EDITOR

Whatever our ideas might be about chemistry and what a career as a chemist might involve it is inescapable that sooner rather than later the subject of money arises. People use chemistry to make or help them make money for themselves and for the organisations they are employed by. Most of us who are members of NZIC earn or used to earn a living by practising some aspect of chemistry. Judging by the various interest classifications listed in the Year Book membership information there is great diversity in how chemists actually use their skills. Many clearly do not actually do any hands on chemistry at all, that is left to others. What is not so obvious is that there are far more people in New Zealand making money by using chemistry than the 1500 or so listed members. Some of these unlisted non members are well qualified in chemistry, others may be well qualified in some other discipline and others may have had no formal chemistry training at all, but they all use chemistry to make money. Worse still, modern society uses chemistry to help make money to such an extent and on such a large scale that it is not recognised or acknowledged by the population at large. In the extreme nobody in today's western world escapes being a major user of chemistry.

With the above as background the editor of this magazine offers the membership a few simple ideas, all directly or indirectly involving money.

1. The editor must have a good supply of articles, news items, general interest items, success stories, industry news, news from the universities, news about people, so that what is between the covers will interest a very wide readership.
2. The membership base and hence the number of copies of "Chemistry in New Zealand" distributed is quite small. It must be made as large as possible by encouraging membership or subscriptions from the wider chemistry user population.
3. The only way the magazine can be viable financially is by way of advertising revenue. Advertisers all offer to provide some form of product or service which is essential to the good practice of some aspect of chemistry. It is their way of making money out of chemistry by selling us something we need.
4. Advertisers will place advertisements if their perception is that "Chemistry in New Zealand" will reach people who will influence or make purchasing decisions and of the number of people reached is adequate for their advertising expenditure. For many purchases the person making decisions may not be a member of NZIC and may never see a copy of the magazine. People make money out of chemistry by selling and using all of the ordinary paraphernalia used in any and all laboratories. It's not just the prestige items that need promotion.
5. It is over to members in general to generate increased support for NZIC. Council, the secretariat, the editor can only bring issues or topics to your attention. Any real action must involve individual member effort in providing articles, encouraging new membership, ensuring wide circulation of their copies of "Chemistry in New Zealand," finding potential subscribers to the magazine, identifying potential advertisers and by encouraging their own organisations to place advertisements.

## SACKED SCIENTISTS

Anthony Hubbard's Listener feature "The final melt-down?" (March 16) presented a bleak picture of New Zealand's research and development scene; I had trouble recognising it. The Cawthron Institute in Nelson provides a different example of the effect of recent changes.

The article described the creation of the new Crown Research Institutes. In some respects, Cawthron provides some insights into the way these may function. It has a board with a strong representation from the private sector. It earns 65 percent of its income from commercial activities; the remainder in "public good" research contracts with the Foundation for Research Science and Technology. It does have a heavy emphasis on commercial efficiency and meeting client needs. We try to give maximum value for money. There is nothing new in all this for Cawthron: it has been operating in this way for some years.

Contrary to Anthony Hubbard's fears, long-term, basic research has

not suffered. Cawthron's research into marine microbiology and ecology is far from short-term, with a time horizon of five to 25 years before some of the benefits may be realised. There are spin-offs, though, where the expertise and information gained provide benefits today for industries such as marine farming.

Under the old regime, bodies such as Cawthron were severely handicapped; with little or no input into policy development, with funding allocated by organisations who were direct competitors, and with little opportunity to capture any part of the funds that were made available from time to time for new research areas.

The new system is quite different. All research programmes are judged by an independent group with no vested interest in the outcome. Long-term research is not penalised under the new system - quite the opposite! The key factor is the quality of the research proposed.

From Cawthron's viewpoint, the new system for funds allocation is a great improvement. At last we can compete on an equal basis. Well, almost equal: the 10 percent diverted for the CRI's "non-specific output funding" has reduced the size of the cake for other bidders, but as long as it stays at that level we can live with it.

There are the inevitable teething problems with the system and we are quick to draw these to the attention of the foundation and the ministry. And they listen. Bid preparation takes longer than we would like, and of course we feel that our particular area of research does not receive a sufficiently high priority.

The new world Anthony Hubbard described is certainly tough. Success, and even the continued employment of scientists, will depend on their performance and on the ability of science managers to identify appropriate market niches, to package their work adequately and to ensure that objectives are met. Sound familiar? It is the world that business and some professionals have been living in for years. High quality, long-term research can flourish within such an environment. For the sake of our nation's future, let's hope that it does.

Graeme Robertson  
Chief Executive Officer  
Cawthron Institute

(Source: *Listener* & *TV Times* May 11, 1992)

## IS ECONOMICS A SCIENCE?

### *An Unbiased Account from a Physical-Chemists' Point of View*

Recently I have noticed that economists have begun to draw on some of the jargon and concepts of physical chemistry and are using the ideas of thermodynamics to support their assertions about the possibility of continued economic growth. I guess this gives a thermodynamicist some reciprocal right to expound on the methods of economics.

An aspect of economics which interests me is the relationship between theory and real behaviour. In both fields it appears that one can devise theories about the behaviour of a system and then use them to make predictions about the future behaviour of the system, which can then be compared with the actual behaviour. At this point physical science and economics seem to diverge. When actual and predicted behaviour differ the physical scientist generally concludes that either the observations or the theory are in error. If the observations are trustworthy then the theory has to be wrong. In economics there seems to be a third possibility which is illustrated by the current 'free-market' approach. In this case disagreement between prediction and actuality is often ascribed to 'market failure'. I imagine that the equivalent in physical science would be to say that a disagreement between theory and experiment is due to 'reality failure', perhaps even more mystifying to the physical scientist is the fact that the economist will then sometimes go one step further and propose a measure to 'correct' this 'failure'. This is equivalent to the physical scientist attempting to do something to bring reality more into line with the existing theory.

One must conclude that the relationship between theory and reality is indeed different in these two fields. Physical science aims at elucidating characteristics assumed to be inherent in the system and expressed in its behaviour, while economics seems to be about the construction of models and attempts to impose these models on the system. To my mind the ability that the economist has to 'interfere' with the object of his theory adds a dimension of subjectivity that is not

present in physical science and suggest that there can be no inherent rightness in any particular economic theory.

Arthur Williamson  
First Vice President  
New Zealand Institute of Chemistry

(Source: *Chem NZ*, Number 46, February 1992)

## LETTERS TO THE EDITOR

### SEA LEVEL CHANGE

Dear Sir,

It is good that "Chemistry in New Zealand" should question the arrogance of the computer modellers of atmospheric change who predict imminent doom and gloom in the face of the evidence, but it is only fair to point out that both Roger D Keen (1991) and Keith A Hunter (1992) differ significantly from the "official" version of the factors influencing sea level change as given in Chapter 9 of "Climate Change" (1990). In Table 9.8 of that document is given the "Best Estimate" of several calculated contributions to sea level rise over the last 100 years, as 4cm from thermal expansion, 4cm from glaciers/small ice caps, 2.5cm from the Greenland ice sheet and zero from the Antarctic ice sheet. Hunter's belief that "the principal control on sea level remains the quantity of ice that is held in polar reserves" is not supported by other workers. The estimate of thermal expansion comes from a paper by Wigley and Raper (1987) who used upwelling-diffusion and pure diffusion models of the ocean and took data for the expansion coefficient of seawater as a function of temperature and salinity from tables published by Leyendekkers (1976) who presumably must have taken into account the density maximum phenomenon pointed out by Keen. That does not necessarily mean that either ocean model gives the right answers.

As an example of how easy it is to drop scientific clangers when discussing climate change may I mention two passages from a recent book "Greenhouse New Zealand" by M J Salinger (page 81). "The

oceans are like a bath of water. If a bath is filled with an amount of cold water, and the water is heated, this same amount of water occupies more space and expands in the bath". Roger D Keen has shown that this is not necessarily true. Then, "The melting of sea-ice and icebergs in the Arctic and Antarctic will also contribute to the rise in sea level." So Salinger has not heard of the Principle of Archimedes!

The authors of Chapter 9 of "Climate Change" think it is "highly likely" that global mean sea level has been rising, but, apparently, this is by no means certain. Measurement sites are heavily biased in favour of Northern Hemisphere urbanised ports, and there are few long series of measurements. Urban sites subside because of loss of ground water and from the weight of buildings. Some places rise or fall from plate movements. Although corrections to the data are supposed to have been made, it is possible that the estimated mean sea level rise of 1.0-2.0mm/yr over the last 100 years might be illusory.

V R Gray, MA, PhD, FNZIC

#### References

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Wigley, M L & Raper, S C B. 1987 *Nature* 330, 127-131  
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Salinger, M J 1991, *Greenhouse New Zealand; Our Climate: past, present and future*, Square One Press, Dunedin

### GREENPEACE NEW ZEALAND

7 April 1992

Dear Sir

"Frustrating but predictable" is my reaction to the letter from Rob Whitney, Director of the Coal Research Assn (Feb 1992), attempting to undermine "precipitate action" by the New Zealand government over global warming.

It is totally non-representative of the broad and robust consensus of international science (IPCC) to quote Fred Singer, a well known greenhouse "debunker". In January this year the IPCC science working group confirmed the 1990 major findings. The fact that greater research has found a dampening effect on warming due to acid rain aerosols and ozone depletion is not a cause for complacency but rather a cause for increased concern.

Even the coal industry would surely not suggest that we should juggle a global warming with ozone depletion and acid rain? As these forms of environmental destruction are dealt with we are more likely to face an acceleration of warming in the future.

The issue that is focused on with increasing tenacity by the fossil fuel lobby is whether or not global warming is or isn't going to happen and whether we should or shouldn't do anything about it. I would argue, however, that this line of argument is missing the point and sets up a whole new population dynamic of straw men.

The real issue is one of how the national and international communities deal with risk. No one would deny that there are uncertainties - of course there is the chance that nothing happens and that unprecedented levels of greenhouse gases in the atmosphere are offset by negative feedbacks etc etc. but what about centre of the spectrum - the scenarios presented by the broad voice of the IPCC (which incidentally have been backed up by Sir John Houghton Chair of Working Group I in response to Singer). What about the upper edge of the range or more alarming - the "worst case" analysis where natural feedbacks coalesce to result in irreversible and unstoppable warming.

What about the impressively consistent underestimation by the scientific community of the pace and extent of ozone depletion?

The debate is about where you are willing to put your environmental, and hence economic, security. As a participant and speaker at the Coal Conference last year I argued that the responsible (and economically safe) reaction from the coal industry is to move right out of a coal orientated supply-driven approach to energy and into the provision of clean and efficient energy services.

Any other response is quite simply too expensive to risk.

Kirsty Hamilton

Greenpeace Atmosphere and Energy Campaign

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# CONFERENCES

## TRACE ELEMENTS: ROLE, RISKS AND REMEDIES

### *The trace element group of New Zealand*

10-12th August 1992, at Massey University in conjunction with the Nutrition Society of NZ.

This is a multidisciplinary group that meets once every four years.

#### AREAS OF INTEREST INCLUDE:

Environment, Geology, Soil Science, Agronomy, Plant Physiology, Animal Health, Human Health, Epidemiology, Pathology, Water Chemistry, etc.

#### PRESENTATIONS: INVITED INTERNATIONAL

(including Dr Julian Mercer, Melbourne; Dr Mark Florence, Sydney) and LOCAL SPEAKERS (Dr Keith Hunter, Dr Mike Timperley, Professor Andrew Sykes, Mr Roger Ellison, Professor Robert Brooks among others)

#### YOU ARE CORDIALLY INVITED TO ATTEND AND CONTRIBUTE

*For further information contact:*

*Max Turner, Trace Element Group Conference*

*C/- Dept of Soil Science*

*Massey University, Palmerston North*

*Phone: (06) 356 9099 Fax: (06) 350 5632*

## TOWARDS REDUCING THE INCIDENCE OF COLORECTAL CANCER: THE ROLE OF INHERITANCE AND DIET

### **6th ICEM SATELLITE MEETING**

*Auckland, New Zealand, February 16-19, 1993*

**Convener:** Dr I Ferguson  
Cancer Research Laboratory  
University of Auckland Medical School  
Private Bag  
Auckland  
New Zealand.  
Telephone No. (09) 379-5780 ext 6372  
Fax No. (09) 373-5215

We would welcome your attendance at this meeting. An integrated program has been developed, and we anticipate fruitful discussions and debate. Plenary speakers have been invited from several different countries, and there will be sessions for contributed papers and posters. Providing there are sufficient numbers, there will be a program for accompanying persons, and opportunities for preconference tours. Main topics to be covered in the scientific sessions are:

- Day 1. Inherited susceptibility to colorectal cancer.
- Day 2. Mutagens, carcinogens and other risk factors in the diet.
- Day 3. Antimutagens and anticarcinogens in the diet, and other ways of modifying the risk.
- Day 4. New experimental approaches. Workshop session.

## THE ROYAL AUSTRALIAN CHEMICAL INSTITUTE NINTH NATIONAL CONVENTION

*December 6-11, 1992*

*Monash University Clayton, Victoria, Australia.*

### **CALL FOR PAPERS**

The following Divisions invite participants to offer papers and posters for inclusion in their programmes. Submissions must be provided as an

abstract printed in black on A4 paper (295 x 210mm). The script should be centred and 150mm in width ie. 30mm margins. The total height, including title, should be no more than 240mm. The title should be in upper case script and 30mm from the top of the page. After the title, leave one line space, then give the authors in lower case script, with first names, underling the presenter. Leave one more line then give the department and institution in lower case script. Leave one further linespace, begin the abstract. Please send two copies. Most Divisions will offer restricted opportunity for oral presentations and it may be necessary for papers to be presented as posters. Divisions will give adequate notice of this.

Unless otherwise stated, papers should be received by the Division Secretary no later than July 31, 1992.

The Analytical, Colloids and Surfaces and Electrochemistry Division programmes will be filled by invited speakers. More information will appear on the official registration form in Chemistry in Australia in July and other pre convention publicity appearing each month. General enquiries should be sent to Dr E K Nunn, Secretary 9NC, Department of Chemistry, Monash University, Clayton, Victoria 3168. Ph (03) 5654566, Fax (03) 5654597 or Contact Alan Turner, NZIC, PO Box 12347 Wellington.

## INVITATION TO PERTH

The organising committee invites you to participate in 12AC/3EC from 26 September - 1 October 1993

The biennial symposium, which will focus on analytical and environmental chemistry, has the theme "Tomorrow's Solutions Today".

Outstanding international and Australian chemists will contribute to a stimulating scientific programme.

The sessions will be held at the Burswood Convention Centre.

This is an ideal time for a conference in Perth: the average temperature is 21 degrees Celsius. It is also the optimum time of the wildflower season, one of the major attractions of the State.

We look forward to welcoming you to Perth in 1993.

*For further information:*

*Symposium Secretariat*

*12AC/3EC*

*UWA Extension*


*Conference Management*

*The University of Western Australia*

*Nedlands, WA 6009*

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# PUBLIC AFFAIRS

## DISCUSSION PAPER - 'HUMAN CAPITAL'

In response to FOSTS invitation (26 March 1992) to contribute ideas, the New Zealand Institute of Chemistry cannot accept the currently prevailing concept of Human 'Capital' / 'Resources' by which today's administrators view scientists - and other practitioners.

Such perceptions are a primary cause of hostile, unproductive work environments now being created, which are incapable of producing the quality of science which New Zealand now desperately needs for its social, economic and environmental protection and development.

Science - and its many benefits - is generated and progressed by PEOPLE - individuals and groups - each with their own unique interests, knowledge, skills, inventiveness, dedication and personal ambitions. The 'resources' are merely their tools.

It is these people who are the key driving force of science. Dehumanising them into units of 'resources' will inevitably stifle that essential driving force, causing New Zealand's much-needed science to stagnate and decay.

To enable New Zealand to meet its objectives in science and technology, we recommend:

1. Politicians and their administrators recognise scientists as people - similar to themselves, but who have chosen careers in practice rather than in administration.

An immediate positive step would be for the newly-established Crown Institutes to shed fashionable jargon and restore Personnel Officers to replace Human Resource Managers.

2. Creation of more positive perceptions and understanding of the role of science and technology within our society.

Politicians, business and community leaders must provide positive leadership, to attract sufficient numbers of young people into science careers.

3. Re-establishment of a sound, viable education system, staffed with trained, experienced, motivated teachers, together with their necessary resources, capable of training sufficient numbers of scientists, to required standards.

4. Creation of robust career structures, with performance-based progression paths and commensurate rewards, to attract, develop and retain the required numbers, calibres and skills of scientists necessary to fulfil New Zealand's science and technology needs, over projectable time-scales. (At least seven years are necessary to reach desired levels of experience.)

5. Establishment of due professional status and recognition of scientists in our society, comparable with that of other professions such as in law, finance, economics, marketing, etc.

6. Creation of a much better scientifically informed society, through general and specific education programmes, media coverage, promotional activities, capable of balancing longer-term benefits to society as a whole, with short-term monetary gains to individuals and sectors.

7. Retaining a high international profile in science and technology, to enable New Zealand to both contribute to and derive benefits from the widest base of available knowledge and skills.

Active liaisons must be maintained at all levels - government through individual to command the necessary recognition and credibility.

8. If our scientists are to be viewed as 'human capital', let them be at least treated as all other forms of capital wealth, ie to be:

- carefully preserved and not allowed to erode
- invested with care and foresight
- measured in both current and future values

*Continued on page 46*



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POLICY & PUBLIC AFFAIRS COMMITTEE

NEW ZEALAND INSTITUTE OF CHEMISTRY (INC)

April 1992

## SUBMISSION - CROWN RESEARCH INSTITUTES BILL

### General Recommendation

We suggest that the credibility (both national and international) and effectiveness of the Crown Research Institutes would be significantly enhanced if this bill also empowers the Royal Society of New Zealand (as the country's senior scientific body) to:

- overview each Institute's scientific integrity
- promote the health and development of each contributing discipline
- advise Institute boards and shareholding Ministers on scientific aspects of CRI operations
- receive the resources necessary to carry out these important functions

The Bill should provide also the basic mechanisms by which such overview should best be achieved.

### Specific Comments/Recommendations

#### Section 2 Interpretation

Being the core function of these Institutes, the term "Research" requires more meaningful definition, for example:-

The pursuit of scientific knowledge and techniques; the practical applications of those findings to the needs of society.

The term 'related services' requires similar clarification, to allow Institutes to provide also appropriate diagnostic and advisory services to clients.

#### Section 5 Principles of Operation

This section should also provide (under ss1 items)

(f) that a Crown Research Institute must remain fully independent in its constitution, and activities.

(g) that a Crown Research Institute must follow prescribed procedures and controls to ensure the integrity and reliability of all its outputs. ss4 para(e) (or additional) to require Crown Research Institutes to provide robust career structures and positive progression paths.

Section 6; also Sections 15 and 2

(1) "The Shareholding Minister" and "The responsible Minister" to be defined (ie: responsible for Science and Technology)

(2) Suggest a panel of three Ministers appropriate (ie: Minister of Finance to have casting power).

The third Minister could be (or rotate) responsible for eg: Agriculture, Trade and Industry.

#### Section 7 Directors and their Role

This section should also provide for co-option of sitting or advisory directors in appropriate specialist fields.

#### Section 8

##### Requirement to 'consult with' State Services Commissioner

#### Section 9

The powers of the Commissioner under these circumstances must surely be defined here!

#### Section 15 Powers of shareholding Ministers

Such open powers can have significant financial implications for a commercial enterprise and should therefore be more clearly defined.

#### Section 23 Interpretation relating to transfer of assets and liabilities

The principal asset of a Research Institute - one upon which its progress (and survival) totally depends - is the unique knowledge, skills and expertise of its people (now termed 'human resources').

How - and in what terms - is this asset to be valued and taken into account, especially in terms of s16, s17 and s33?

#### Section 34 Transfer of Employees

ss1 How will this section affect employees who will be carrying out different duties upon transfer to Institutes?

As changes in duties appear likely in many instances, appropriate re-definition is required.

#### Section 35 Protection of conditions of employment upon transfer

This (or an additional) section should clarify whether - and if so, under what conditions - an employee may undertake concurrent engagements eg: private consultant, extra-mural activities etc.

#### Section 38 Emergency Powers of Prime Minister

This section should state the basis of compensation due to a Crown Institute so affected, as such Institutes now become independent commercial enterprises.

## PRIZES AND AWARDS

### THE AUSTRALIA PRIZE

The Australia Prize is an international award given by the Government of the Commonwealth of Australia for an outstanding specific achievement in a selected area of science and technology promoting human welfare.

In this context, science encompasses natural and technological sciences, engineering and mathematics.

The prize is \$A250,000, together with an inscribed medal.

The Australia Prize Committee consists of the Presidents of the Australian Academy of Science and the Australian Academy of Technological Sciences and Engineering, alternating in the Chair, and other distinguished Australians. The Committee, assisted by specialist advisers, recommends on the award of the Australia Prize.



The Australia Prize acknowledges outstanding achievement by scientists and technologists, and celebrates success. To date, the awards have featured innovations based on applying science and technology to human challenges.

#### THE 1993 AUSTRALIA PRIZE

The 1993 Australia Prize will be awarded in the field of:

##### *sensory perception.*

Nominations are now being sought internationally from learned bodies, universities, research institutions and professional associations. Nominations close on 31 July 1992.

For further information, contact the Australia Prize Secretariat at the address below:

Australia Prize  
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AUSTRALIA Telex AA 62654

Application forms available from Alan Turner NZIC Secretariat.

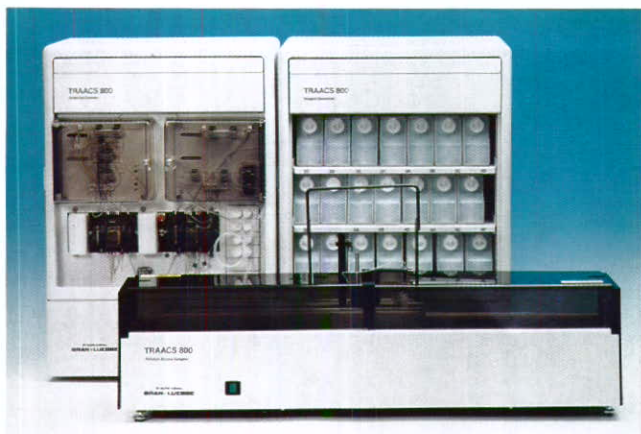
# TRAACS 800 Wet Chemical Analyzer

Bran + Luebbe's thirty plus years of experience in automated wet chemical analysis with their AutoAnalyzer systems has been embodied in a new generation continuous flow analyzer, the TRAACS 800. TRAACS incorporates all the benefits of continuous flow analysis – reproducibility, flexibility, sensitivity and reliability – in an innovative design to give a fully automated analyzer that offers high throughput, lower reagent consumption and less operator interaction.

The high performance of TRAACS has been proven in many laboratories in Australia and hundreds throughout the world and demonstrates why Bran + Luebbe continues to be at the leading edge of laboratory automation.

## Design Features

- Streamlined compact vertical design which occupies as little as 1.0 metre of linear bench space.
- Bubble-through-the-flowcell and small bore tubing allowing typical throughputs of 120 samples/hour.
- 120 place random access sampler including standards and QC sample rack and dual probe capability.
- Multispeed pumps for allowing fast system wash-out for quick changeover of chemistries and intermittent operation to conserve reagent usage during standby.



- A choice of Multitest Cartridges allowing up to 12 different tests to be performed on the one manifold configuration.
- A dual beam dual channel fibre optic colorimeter with a choice of self-aligning flowcells from 10mm up to 50mm in path length to maximise sensitivity.
- Automatic dilution of off-scale samples and automatic re-run of samples following off-scale peaks that may have been affected by tailing.
- Automatic baseline and gain adjustment.
- Comprehensive data analysis software including continuous real-time printout of results and peak traces with flagged anomalies, multitasking and re-analysis of stored data.

## Methods

There are over 800 separate Bran + Luebbe methods available on the AutoAnalyzer and most of these are now available for the TRAACS. The most common methods are listed overleaf. Many environmental methods have US EPA or NPDES approval. All methods are guaranteed to meet specified minimal performance criteria.

## Options

- Reagent Sequencer for automated start-up and shutdown, and automated changeover on Multitest chemistries.
- On-line Micro-distillation Bath
- Alternative Detector Interface for coupling TRAACS to a wide array of different detectors such as flame photometer, UV spectrophotometer and fluorometer.

If you are ready to upgrade and you don't want to experiment with new technology or, if your existing equipment hasn't lived up to your expectations, Bran + Luebbe's TRAACS offers state-of-the-art technology but with a proven performance!

**Bran + Luebbe**  
**Setting the Standard in Wet Chemical Analysis**

**Yes, I am interested in finding more about Bran + Luebbe TRAACS 800 Wet Chemical Analyzer.**

I would like:

- to attend a seminar on TRAACS 800       to have a rep contact me  
 to have some additional information

Name \_\_\_\_\_ Position \_\_\_\_\_

Organisation \_\_\_\_\_

Address \_\_\_\_\_

Postcode \_\_\_\_\_

Telephone \_\_\_\_\_ Facsimile \_\_\_\_\_

**Please complete this form and return it to Alfa-Laval (NZ) Ltd**

*If you have any further enquiries, please contact Helene Soanes on (07) 849 6020*

## TRAACS Methods: Summary

### Water

Acidity  
Alkalinity  
Aluminium  
Ammonia  
Boron  
Chloride  
Cyanide (with UV digestion and on-line distillation)  
Dissolved Organic Carbon  
Fluoride (with on-line distillation)  
Hardness  
Iron  
Magnesium  
Manganese  
Nitrate  
Nitrite  
Phenol (with on-line distillation)  
Phosphate  
Silicate  
Sulphate  
Sulphite

### Detergent

Phosphate  
Silicate

### Soil

Ammonia  
Calcium  
Magnesium  
Phosphate  
Potassium  
Sodium

### Chlor-alkali cell liquor

Chlorate  
Chloride  
Hypochlorite  
Hydroxide

### Tobacco

Ammonia  
Nicotine  
Nitrate  
Phosphate  
Sugars; reduced and total  
Urea

### Fertilizer

Calcium  
Nitrogen (total N)  
Phosphate

### Blood

Alcohol  
Glucose  
Urea

### Wine

Glucose  
Fructose  
Lactate  
Malic acid  
SO<sub>2</sub>, free and total  
Reduced Sugars  
Volatile acidity

### Food, Animal Feed

Amylase  
Ascorbic acid  
Calcium  
Diastatic power in malt  
Glucose  
Iron  
Lactate  
Phosphate  
Protein (Kjeldahl Nitrogen)

AFFIX  
POSTAGE  
STAMP  
HERE

**Alfa-Laval (NZ) Ltd**  
**P.O. Box 10-241**  
**Hamilton New Zealand**

# **SAFETY IN LABORATORIES**

**3 day ANSTO training program  
Auckland, 14 - 16 October, 1992**

## **COURSE AIM**

To provide a state of the art review of safety standards related to laboratories. At the end of this 3 day course participants will be aware of most occupational hazards found in the laboratory and know how to deal with them.

This course is based on Australian Standards and incorporates appropriate New Zealand Acts, regulations codes and guides.

## **WHO SHOULD ATTEND**

Laboratory managers, supervisors and interested individuals who desire (and need!) a good working knowledge of laboratory safety should attend. It is equally applicable to OH&S practitioners and risk managers who wish to broaden their knowledge in this area.

## **SYNOPSIS**

The course is based on the principles and practices of laboratory safety described in the relevant standards. The program is based on morning lectures followed by afternoon syndicate workshops and practicals. The subjects covered are:

- \* General safety principles
- \* Chemical safety
- \* Microbiology
- \* Ionising radiation
- \* Non-ionising radiation
- \* Mechanical aspects
- \* Electrical aspects
- \* Fume cupboards
- \* Chemical and toxic waste disposal
- \* Laboratory construction
- \* Fire safety
- \* Safety audits & inspections
- \* Grading of laboratories
- \* Performance testing of fume hoods
- \* Noise and light survey

## **WHERE, WHEN & HOW MUCH**

This course will be conducted at Auckland University on 14 - 16 October 1992. The cost is \$850 per person (all cheques and monies payable to Ansto Training) and includes a copy of AS2243 (parts 1 to 10), AS2982 and supplementary course notes. Local accommodation can be arranged.

Applications close 30 September, 1992.

**Ansto  
training**

**For further information and applications contact A Sutherton,  
Ansto Training, Private Mail Bag 1, Lucas Heights, NSW, Australia 2234  
Tel: 0011 61 2 717-9435. Fax: 0011 61 2 717-9449**

# BRANCH NEWS

## MANAWATU BRANCH NEWS

### Meetings:

On April 22 the branch held a very successful students meeting which began with a chemical "trivial pursuits" quiz (that was not as trivial as it appeared at first sight), which was also the basis for a social hour before dinner. After a pleasant meal, 59 members and new members were entertained by local personality Robert Neale, the Massey Orator. Mr Neale spoke on "The Chemistry of Language" and his thesis was that we cannot know anything about chemistry because we cannot know anything about anything, such is the weakness of our language. A provocative and stimulating viewpoint. As a result of the meeting, the Branch enrolled 29 new members, mostly Honours and PhD students in the Chemistry/Biochemistry Department at Massey.

A meeting for teachers in the region was held on April 24 in conjunction with Massey University Chemistry/Biochemistry Department and the Science Centre. This was held at the new "temporary" premises of the Science Centre, and incorporated the launch of Lockwood Smith's new curriculum for science in schools. The meeting was attended by about 70 people, who were first addressed by the Minister, then shown around the Science Centre. Following dinner, the meeting was addressed by Charles Fogliani from Charles Sturt University at Bathurst. Charles is an innovative crusader who is bringing chemistry to dizzy heights of popularity in Australia. Under the auspices of the RACI he runs a chemistry quiz for school students which last year attracted 68,000 entries. Other promotional activities included: titration competitions, posters and stickers advertising chemistry. Charles was visiting New Zealand to promote his chemistry quiz and share his ideas with teachers and Branch members. The talk created a lot of discussion and gave up plenty of ideas for chemistry week here.

On 10-12 August the trace element group will be holding a meeting entitled "Trace Elements: Role, Risks and Remedies" at Massey University in conjunction with the Nutrition Society of NZ. Details are available from Max Turner, Department of Soil Science, Massey University.

### People:

Congratulations to Branch Chairman John Shaw on his appointment as one of the Managers for the horticultural CRI.

Alistair MacGibbon (past Chairman and present Council delegate) is at present in Toronto at a conference on Fats and Oils.

### Other:

June will see the official opening of the Science Centre (Inc) in Palmerston North. This represents a special success for long-term Branch member Sylvia Rumball, who has put in a vast amount of effort and commitment over the past 5 years or so towards this end. Congratulations Sylvia!!

# 0-9+521-5151

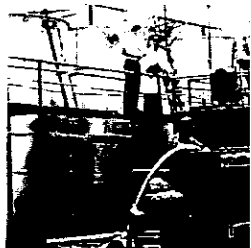
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IN NEW ZEALAND

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COMMERCIAL EDITORIAL: Roger Whiting, Ph: 0-9-377-3570

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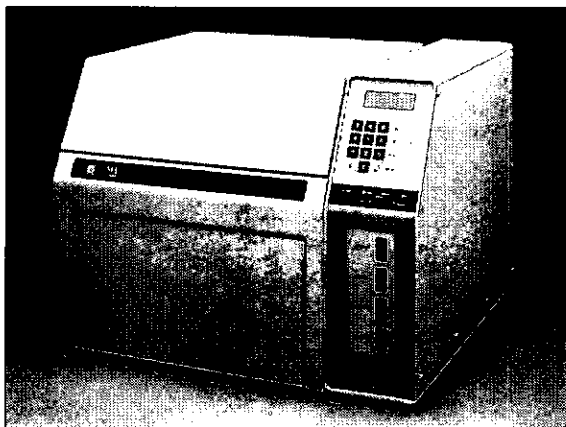
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# PRODUCT NEWS

## THE NEW DIONEX GLYCOSTATION FOR PRACTICAL CARBOHYDRATE ANALYSIS

The Dionex GlycoStation is the first analytical instrument that brings practical, automated carbohydrate analysis of glycoproteins to life scientists. The GlycoStation combines the specialized knowledge of carbohydrate analysis, state-of-the-art instrumentation and a comprehensive list of calibration standards. It is the ideal instrument for fundamental research, process monitoring, product quality control or routine analysis in the analytical core facility.



### Some unique GlycoStation features are:

- Full automation of the HPAE-PAD technology that has revolutionized carbohydrate analysis.
- Complete system control using the unique GlycoStation software.
- Self-tutoring instruction of the operator in HPAE-PAD methods with the interactive users guide and system software.
- Calibration standards for all methods.

Life scientist will find the Glyco-Station a great asset in understanding the relationship between the structure and function of glycoprotein glycans in their efforts to 'engineer' more potent glycoprotein based therapeutics.

To find out more about how the new GlycoStation can meet your analytical needs, contact the SCITECH office nearest you.

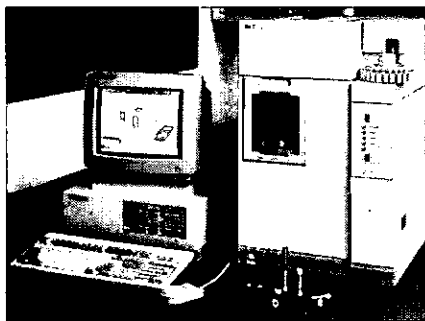
## HEWLETT PACKARD HP7680A

The HP7680A SFE was designed specifically for sample preparation. The complete stand-alone operation of this automatic SFE Unit permits you to:

- Prepare samples for a variety of analytical instruments: GC, LC, UV/VIS, NMR, and others.
- Repeat analyses without repeating extractions.
- Prepare samples without tying up other analytical instruments.
- Analyze a wide range of samples, including thermally labile compounds.
- Increase the number of analyses because of reduced sample preparation time.
- Minimize chemical consumption and hazardous waste disposal costs.

### What "Precise Control of Sample Preparation" Really Means.

The HP7680A is a major advance in sample preparation technology. With the HP7680A, you'll be able to fully automate,



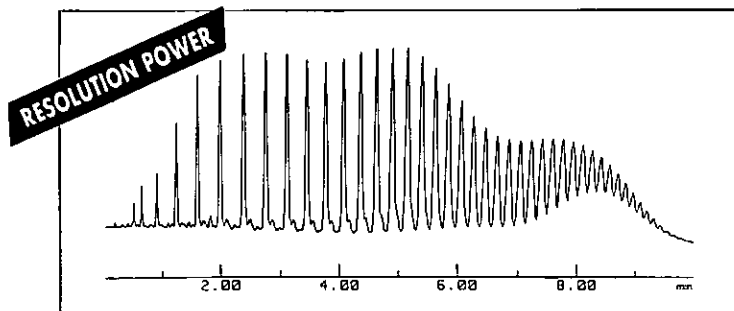
accurately control, and repeat extraction processes like never before.

### For further information contact:

**Medtec Products**  
PO Box 34-241  
Birkenhead, Auckland  
Phone: (09) 480-6763

## SUPERCRITICAL FLUID CHROMATOGRAPHY SYSTEM

Gilson has introduced Series SF3, a new system for packed-column SFC. Breaking away from previous technology requiring fixed flow restrictors or manual adjustment for pressure control of supercritical fluid, Series SF3 controls pressure gradients automatically, and without changing the mass flow rate of mobile phase in the column. The amount of organic solvent mixed with carbon dioxide and the total flow rate are also programmable. The result is a potential for optimal resolution by independent adjustment of each of the three chromatographic variables (retention, selectivity and efficiency). Analytical-scale quantitative separations are performed up to 200°C. Speed and resolution are enhanced compared to LC.



Chromatogram of a mixture of Triton X-114, X-165 and X-305. Courtesy of Ciba-Geigy Ltd, Basel.

Column: C18, 100 x 2 mm, 3 µm. Oven: 140°C. Detector: UV at 210 nm. Mobile phase: CO<sub>2</sub> with 10% methanol, 2 ml/min, 125 to 350 bar in 10 min.

Faced with the need to analyse complex mixtures in increasing numbers of samples, the pharmaceutical and chemical industries require fast and automated chromatography.

Packed column SFC is the fastest chromatographic technique available today. Gilson is the first manufacturer to fully automate pressure programming for retention control in SFC.

Series SF3 solves the problem of automating the pressure gradient without changing the flowrate. Series SF3 is chromatography at the optimum flowrate (about 5 times higher than in HPLC), with no need for manual adjustment.

### Resolution

Simultaneous pressure gradient and modifier gradient. Separate adjustments for retention and selectivity at maximum efficiency.

### Sensitivity

Pulsefree baselines at high sensitivity, with low-wavelength UV detector and small amounts of modifier solvent.

### Compatibility

May also be used as a standard or high-temperature HPLC system.

**Plus** extra benefits inherent to packed column SFC as compared to HPLC: less organic solvent, lower running cost, wide application range including polymers, easier coupling with MS and FTIR spectrometers and with light-scattering detector.

## SERIES SF3

### Supercritical fluid chromatograph — Specifications

#### Type

Automatic gradient analytical SFC system, high-pressure mixing of carbon dioxide with organic modifier, independent programming of mobile phase pressure, composition and total flowrate.

#### Liquid-contact materials

316L stainless steel, titanium, sapphire, ruby, ceramic, PTFE, PCrTFE and PVDF.

#### Column temperature and pressure

Temperature: from ambient plus 15°C up to 200°C with 0.1°C stability.  
Pressure: up to 60 MPa at the inlet and 40 MPa at the outlet with better than 1% stability.  
Carbon dioxide density: from 0.11 to 0.96 g/mL.

#### Operating Modes

Constant or programmed pressure, constant or programmed composition, constant or programmed total mass flowrate (8 combinations).

#### Operating program

Time: from 10<sup>-2</sup> to 10<sup>4</sup> min, from 0.01 to 1 min increment according to range.

Number of points: up to 25 total, including pressure, composition, total liquid flowrate and electrical contact events.

Pressure: from 9 MPa (typically) up to 40 MPa at column outlet, 0.1 MPa increment.

Total liquid flowrate: from 0.5 to 5 mL/min (with pressure program), 0.01 mL/min increment.

Composition: from 0.2 to 20% (typically) at 5 mL/min, from 2 to 20% (typically) at 0.5 mL/min, 0.1% increment.

Electrical contact events: 3 outputs to activate autosampler, integrator and detector autozero, and 1 input to wait for injection.

Number of program loops: up to 999.

Number of programs stored: up to 10 plus 4 safety programs.

#### Safety features

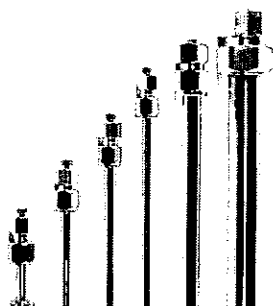
Four programs defined by the user and activated in case of pressure at column inlet exceeding selected high and low limits, power failure, and input of an emergency signal (temperature threshold, leak detection, etc.). Automatic system shut-off at end of operation.

#### For further information contact:

**John Morris Scientific Ltd**  
Scientific Instruments  
Auckland (09) 444-5836  
Lower Hutt (04) 528-7600  
Christchurch (03) 652-825  
Toll Free 0800-651700

## PHENOGE L GPC COLUMNS NOW AVAILABLE IN NEW "EXPRESS" FORMAT

The popular line of Phenogel GPC columns for non-aqueous polymer analysis is now offered in a new 15 cm short length format. Phenogel Express columns are ideal for the rapid analysis and characterization of production or process samples, or in those situations where resolution can be sacrificed for speed. The short



length minimizes solvent consumption while enhancing sample throughput. Phenogel Express columns are available in various pore sizes and can be easily coupled in series to extend the effective separation range of the system. Proprietary packing techniques are combined with rigorous QC testing to produce high-quality, reproducible columns every time.

#### For further information, please contact:

**Mr Tom Cleveland**  
Phenomenex Inc.  
2320 W. 205th St  
Torrance  
CA 90501 USA  
Tel: 310-212-0555 Fax: 310-328-7768

## PREPMASTER

FAST. SAFE. COST-EFFECTIVE.

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SFE with Cryogenic Collection

- 10 times faster than Soxhlet.
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## ACCUTRAP

Automated Cryogenic Collection for Off-Line SFE.

- Excellent reproducibility with microprocessor control of all components.
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- Resists plugging with multiple-heated zones.
- Operation at high CO<sub>2</sub> flow rates allows for fast extractions.
- Easy changing of extraction flow rates to suit application.
- No extra steps after collection - vial easily transfers to analytical instrument.
- Compatible with PrepMaster and other SFE systems.

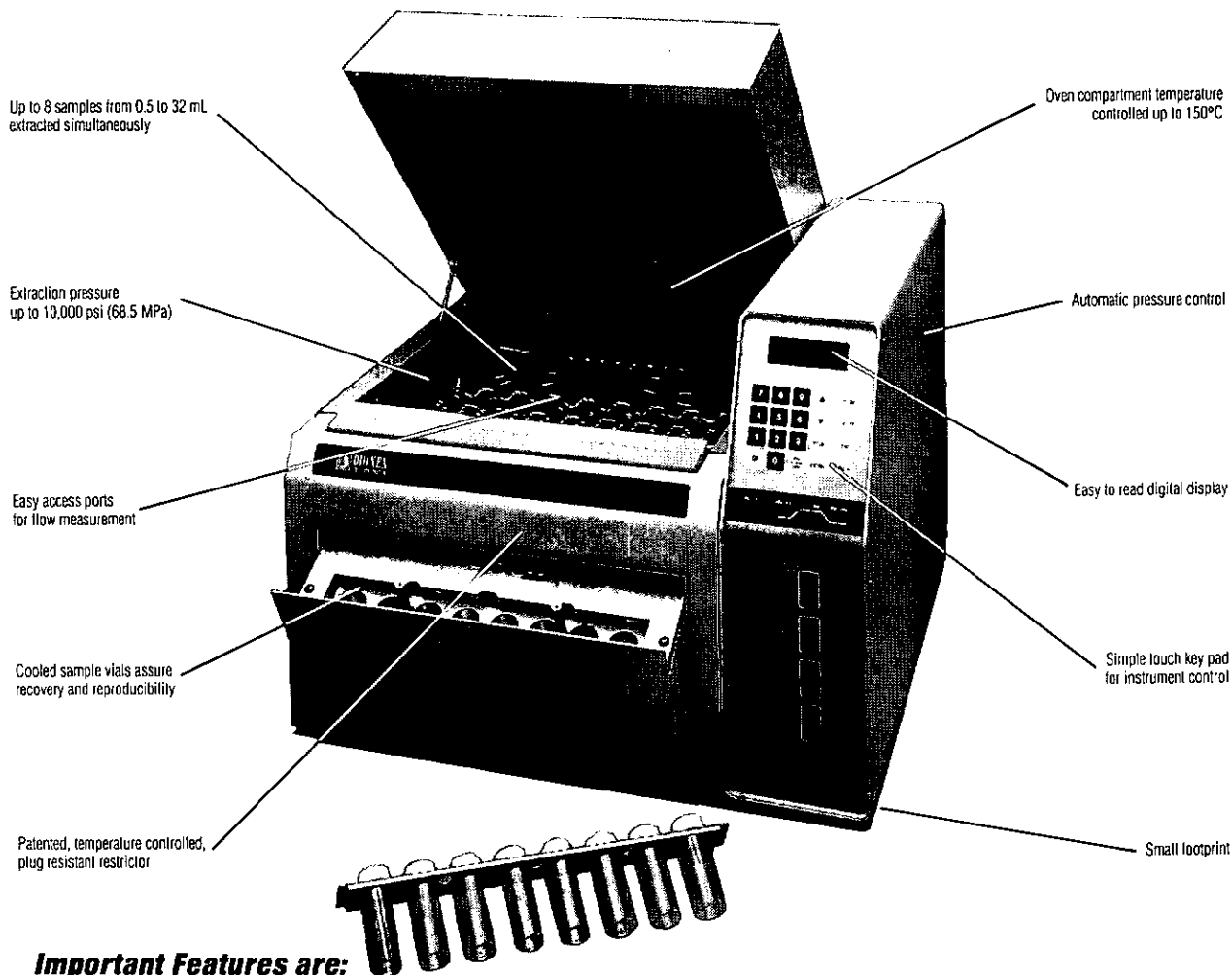
#### For further information contact:

**Perkin Elmer Pty Ltd**  
PO Box 22-159  
Auckland  
Phone: (09) 276-2230



# SFE-703 SUPERCRITICAL FLUID EXTRACTION SYSTEM

A BETTER SOLUTION FOR SAMPLE PREPARATION



## Important Features are:

- **SUPERCRITICAL FLUID EXTRACTION**  
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Samples will be automatically extracted and collected in minutes.
- **REPRODUCIBLE RECOVERY**  
Advanced restrictor technology, pressure control, cooled collection tray assure reproducible recovery.
- **HIGH PRESSURE EQUALS HIGHER RECOVERIES**  
Full pressure range up to 10,000 psi (68.5 MPa) provides added flexibility in selecting the optimum pressure for extraction.
- **COST-EFFECTIVE**  
The SFE-703 does not require a secondary solvent extraction step from a solid trap; therefore virtually all solvent usage and disposal costs are eliminated.
- **EASY TO USE**  
All control of the SFE-703 is from the hermetically sealed touch key pad. External computer is unnecessary.



Science & Technology (NZ) Ltd

CONTACT MARK ALBERTSON, PRODUCT MANAGER, AT AUCKLAND OFFICE

Dunedin (Head Office)  
Phone (03) 477-7860  
Fax (03) 477-7870

Christchurch  
Phone (03) 383-1146  
Fax (03) 383-1149  
Mobile (025) 329-202

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Phone (04) 566-6096  
Fax (04) 566-6097  
Mobile (025) 440-781

Auckland  
Phone (09) 270-3332  
Fax (09) 270-3333  
Mobile (025) 329-301

## NEW AA SYSTEMS

### SOLAAR 919

#### *for the budget conscious laboratory.*

Where cost is the key issue, yet analytical performance remains essential, the new SOLAAR 919 AA system from Unicam fills the requirement exactly. The modular concept of SOLAAR 919 facilitates any combination of quad lamp turret, advanced gas control and automatic background correct. Two dedicated furnace options are available. The spectrometer may be used as a stand-alone unit or upgraded with the addition of a PC based Data and Control Station. In combination with its powerful, yet friendly, software package, the system offers a workhorse facility with a high degree of automation and unrivalled analytical performance.

A huge range of accessories ensures that SOLAAR 919 copes with the most demanding analysis requirements.

### SOLAAR 939

#### *with Windows 3 software suite*

The new Unicam SOLAAR 939 series of AA spectrometers provide an innovative approach to laboratory needs in elemental analysis.

All hardware options are provided as standard, including an automated lamp turret and new QuadLine background correction facility. The degree of automation and facilities is determined by the software packages employed. As laboratory needs change, the software may be completely upgraded, converting the 939 through to a full automatic 16 element system including full QC protocols and re-analysis options.

The software suite for SOLAAR 939 is entirely Windows 3 based, giving concurrent multi-tasking access to a vast range of complimentary applications.

Available in single or Stockdale double beam options, outstanding AA performance is guaranteed by a computer optimised spray chamber and burner system suitable for all sample and flame types. A wide range of vapour, furnace and sample handling accessories complete this total solution for elemental analysis.

### SOLAAR 959

#### *for highest productivity in elemental analysis*

The new SOLAAR 959 AA system from Unicam offers a complete multi-element package for laboratories demanding the very best in productivity and performance.

With Stockdale double beam optics, QuadLine background correction, an autosampler with capacity in excess of 250 solutions, automated dilution facilities and the complete Unicam Windows 3 based software suite, this flagship system provides the perfect solution for the busy laboratory.

Performance is assured in flame, furnace or vapour modes by highly reliable, innovative atomisation systems. Each is complemented by sample preparation and presentation devices employing intelligent dilution and optimisation methods for ensured analysis conditions. These include flow injection sampling techniques.

UNICAM Analytical Systems

### GF 90 GRAPHITE FURNACE

#### *lowest trace metal detection*

This new Unicam GF90 Graphite Furnace concept optimises atomisation efficiency whilst minimising matrix interference effects.

Dynamic optical temperature control provides maximum reproducible heating rates, independent of cuvette age. A new range of cuvette types now include the ELC (Extended Lifetime Cuvette) ensuring dependable operation from lengthy automated analyses.

The additional AP90 Autoprobe provides a unique method of vapour phase interference control by utilising the temporal, thermal characteristics of cuvette and internal gas. The FS90 sample preparation and presentation system totally automates analysis procedures, including automatic and intelligent sample dilution and furnace ash-atomise temperature optimisation.

The QuadLine background correct technique, employing 200/240Hz modulation frequencies, ensures accurate results with the most demanding samples.

## FLOW INJECTION ELEMENTAL ANALYSIS

#### *flexible and productive trace analysis*

AA analyses which prove difficult by conventional means may now be performed by the latest addition to the Unicam AA catalogue - the F190 Flow Injection System.

Designed to complement the new Unicam SOLAAR AA range, the F190 offers customised on-line sample preparation for the laboratory that wants to avoid tedious manual sample pre-treatment.

Based on the principle of injecting a discrete volume of sample into a flowing carrier stream, the technique offers the potential of improved high solids handling, low volume hydride analysis, on-line sample dilution and calibration, reagent addition, pre-concentration, matrix isolation and speciation.

The F190 is compatible with the new SOLAAR AA range from Unicam; the level of automation dependent on specific system configurations.

#### **For further information contact:**

#### **UNICAM Analytical Systems**

9/19 Hannigan Dr

PO Box 14-334, Pannure, Auckland.

Pb: 09 527-1745 Fac: 09 527-1743

## LC-10A THE "KAIZEN" HPLC

*Shimadzu launches distinctly new, advanced HPLC system in New Zealand and Australia.*

Shimadzu Corporation recently launched its competitively-priced modular HPLC system, the LC-10A at trade shows in the USA and Europe. This system is now available in New Zealand.

The new 260mm wide system consists of 22 integrated modules which use fibre optic interfaces to minimise electronic noise and ensure reliable data communication. The micro-volume dual plunger HPLC pumps offer "doubled pump seal life" and the SPD-10A UV detector boasts "three times the sensitivity of the best detectors currently available".

In the US recently Shimadzu Scientific's marketing manager Dean Sequera was quoted as saying, "The word Kaizen, Japanese for the philosophy of continual improvement, best describes what we consider a major engineering achievement ... every one of these 22 components - the broadest line available from a single source - benefited from this concept in its design, manufacture and meticulous quality control".

The LC-10A has seen a very positive market reaction in Japan with around 2000 LC-10A pumps having been sold in the first eight months. Customers have shown particular interest in the high sensitivity of the SPD-10A detector, pump reliability and serviceability, the cooling capability of the column oven, and the design of the auto-injector.

Bruce Fraser, manager of Douglas Scientific, Shimadzu's agents in New Zealand remarks: "We're convinced that the LC-10A series will definitely be a big success ... when the LC-6A was introduced in the mid 80's, Shimadzu HPLC sales took off and then continued as word got around of its exceptional reliability and high performance. The LC-10A will be a must buy tool for discerning chromatographers who see the need for systems capable of exploiting emerging developments in LC applications and column technology".

The official launch of this system will take place in July with seminars and demonstrations in the following centres:

Auckland  
Hamilton  
Palmerston North  
Wellington  
Christchurch  
Dunedin

#### **For further information and an invitation contact:**

#### **Douglas Scientific**

PO Box 45-027, Auckland 8

Fax: (09) 793-477

Pb: (09) 793-993

Outside Auckland, Freephone 0800 735-725.

# CHEMISTRY IN NEW ZEALAND

The official journal of the New Zealand Institute of Chemistry

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Editorial policy is to publish articles relevant to readership profile with particular emphasis on NZ based chemical research, political and regulatory developments in science and science based industries. Room is also devoted to articles on commercial developments in the science and chemical industries. E.G New products, agencies, plants.

### EDITORIAL FEATURES

*August* - AGM. In spectroscopy - FTIR

*October* - Company Profiles - Thermal analysis

*December* - Data acquisition systems and auto samplers

**February '93 - Spectroscopy UVVIS & AA**

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# COMPANY NEWS

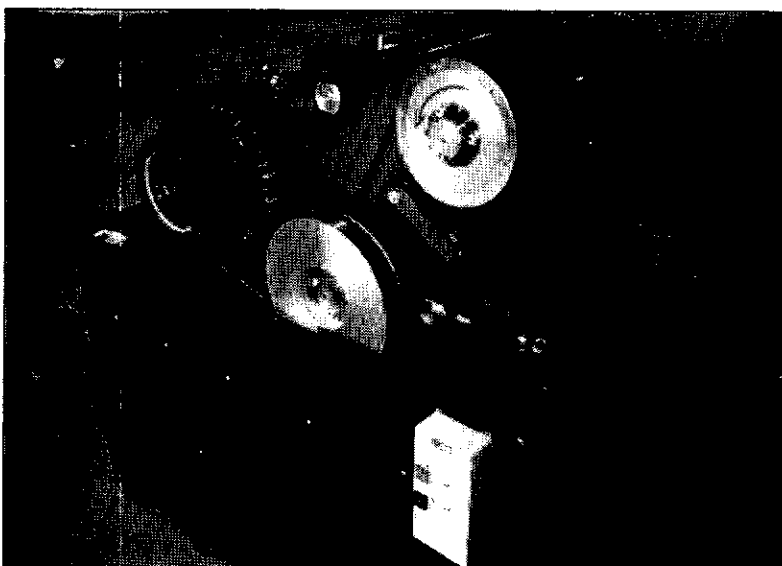
## GOOD NEWS FOR ROCKLABS

In May, Rocklabs Ltd of Auckland received the largest order ever in its 22 year history. The new Mines and Minerals Research Centre (MMRC) in Sudbury, Canada ordered eleven of Rocklabs sample preparation machines to a total value of over \$300,000.

The order was won against international competition from Germany, USA, Australia and Canada itself.

The MMRC will include the Ontario Geological Survey which has celebrated its 100th Anniversary and is moving out of Toronto. The Centre includes a new building next to Laurentian University with purpose built sample preparation facilities, one of the few laboratories in the world where sample preparation has been carefully planned, with its own budget, not just getting what was left over when everything else was paid for.

Included in the MMRC order were three of Rocklabs' new Boyd Crushers, named after its inventor, Mr Philip Boyd of Waihi. The Boyd Crusher is the world's first laboratory crusher to crush drill core or lump rock from 50 mm to less than 2 mm in one pass. Mr Philip Boyd has managed the Waihi sample preparation facility for W Grayson & Associates for several years. He spent two years developing design ideas and then built a prototype which was used for one year before Rocklabs began to manufacture them. Most will be exported but two of the first batch were sold in Waihi, one to the new Golden Cross gold mine and



one to the SGS assay laboratory. Another has been sold to a coal laboratory in Chicago.

The Boyd Crusher has two moving jaws with their movement controlled so that when one is open the other is closed. It operates almost like two crushers in one and patents have been applied for in Australia, Canada, Germany and USA as well as New Zealand.

The Boyd Crusher is one of the unique machines used by Rocklabs in the world's first automated flow-through sample preparation System. Rocklabs' manager and founder, Dr Ian Devereux has been developing machines since 1980 that can be connected together by conveyors and feeders etc. to create the sample but effective automated System.

The first one was installed at Mt Isa Mines in Queensland in 1991 and several more orders are expected soon.

"With our Integrated Systems, we are trying to bring the mining and related industries such as steel, cement etc. and earth science laboratories into the 20th Century before it ends. Working conditions in many sample preparation areas are poor and the quality of the work suspect. Over the last few decades, laboratories have spent large sums of money on new analytical techniques, now it is the turn of sample preparation. Better results are coming from better sample preparation and we are looking forward to steadily increasing sales during the 1990's" said Dr Ian Devereux.

Rocklabs exports about 95% of its production and has over 1000 customers in 50 countries. It is a world leader in the area of sample preparation. Like many smaller New Zealand companies it will be difficult for Rocklabs to finance the expected export growth through more borrowing, so is seeking an equity partner. With more capital, Rocklabs can speed up its System development and marketing and reap the benefit of its past twelve years of R & D.

The 1992/93 year seems certain to be a new record of sales for Rocklabs, one of the many smaller export oriented companies that are turning New Zealand's economy around.

## ROCKLABS AUTOMATED SAMPLE PRE SYSTEMS

Rocklabs Systems are designed to suit each customer's needs, i.e. they are custom built, they are not a single design to meet all possible circumstances. A "universal" approach to designing a System means that many customers would be paying too much for a complex System that they do not need.

### **Modular Concept**

Recent attempts to produce an automated System by other Companies have incorporated robots and complex machines and the cost has been in excess of \$US11,000,000 for one laboratory System. Rocklabs believes that this concept does not provide a reliable System at reasonable cost. Rocklabs Systems are based on a modular concept, building up a System from individual machines which have proven performance and which were designed to be married together in a simple flow-through sequence, without the need for any robots or complex devices. This could be described as "integrated" rather than "automated".

### **Minimum Cost**

Rocklabs Systems can be as simple as just two machines coupled together, to a sophisticated array of many machines: two types of crushers, splitters (riffle and rotary), flow through pulverisers, cleaning procedures, plus drying if required. The cost will be from \$US50,000 to \$US150,000, depending on the requirements of the System.

### **New Approach Needed**

The advent of Rocklabs Systems requires a new approach to Sample Preparation. The customer does not purchase a "machine" which will only do a defined job, Rocklabs builds a System to do what the customer wants. This change of approach puts new responsibility on the customer, to re-examine what sampling and sample preparation procedure should be carried out, to achieve the required accuracy and precision in sampling. Sample sizes can be increased as there is no limit now on sample size.

### **Better Management**

When laboratory samples are prepared by manual methods, every sample must be processed properly, often by unskilled workers. It is almost impossible to ensure that every sample receives the appropriate care. What happens when the Management isn't looking? What does the night shift do? Rocklabs Systems ensure that every sample is prepared in the same way. More reliable results lead to better decisions, better management.

### **For Further Information contact:**

**Rocklabs Ltd**  
**PO Box 18-142**  
**Auckland 6**  
**Phone: (09) 570-4698**

## SCI-TECH COMPANY PROFILE

Science & Technology (NZ) Ltd is a technical marketing company operating in New Zealand and the South Pacific Islands.

The company comprises a team of people who in some cases have been together for fifteen years. Similarly many of their principals have been associated with them for the same time period.

In the relatively small market size of New Zealand, Sci-Tech strives to have specialisation in certain technology areas. Thus a commitment to customer post sales support, re applications and instrumentation service, is made via very frequent attendance at product principals' sites for on-going training and seminars.

The following gives a brief description of their operations:

### Markets

#### Industry:

- Food Technology
- Petrochemical
- Chemical Engineering
- Local Authorities
- Energy Providers
- Private Analytical Labs

#### Research:

- Government Research Institutes
- (Crown Research Institutes)
- Industry Research Institute, i.e. dairy, meat, wool
- Universities and Tertiary Institutes:
- Science Teaching and Research Faculty
- Medical Teaching and Research Faculty
- Polytechnics and Technical

#### Health Care:

- Med-labs (Pathology) i.e. Biochem
- Clinical Laboratory i.e. respiratory, micro etc.

#### Export:

- Sci-Tech Manufacturing Division
- Scientific Glassware and O.E.M. Apparatus

Each market area is under individual management.

### Product Groups

Into the above markets we have the following groups, each under a product manager and supporting team.

### Scientific Sector

Analytical Instrumentation Bruker, Jasco, Thermo Jarrel Ash  
High Technology Wallac, I.E.C.  
Industrial Spectroscopy Nirxsystems  
Separation Sciences Hamilton, Jasco, Rheodyne, J & W, Isco, Varian  
Sample Preparation  
Laboratory Products Elgi, Schott Group, Sci-Tech, Medica, TSL

### Health Sciences Sector

Biotechnology & Molecular Biology Hybaid, Strategene, Queue Systems,  
Jasco, Wallac, Isco, Toyo Jozo  
Med-Lab Products T.I.L., Wallac, Planer, P K Morgan, Bio- Orbit  
Environmental Thermoenvironmental Inc, Strohleim

### New Agencies

Science & Technology (NZ) Ltd have just been appointed the exclusive distributors for:

#### 1. Neslab Instruments Inc USA

Neslab are world leaders in constant temperature baths/circulators, shaking waterbaths, immersion coolers, benchtop personal freezers and recirculating chillers. Contact your local Sci-Tech office for more details and a free copy of the Neslab 1992 Catalogue.

#### 2. Dionex Corporation USA

Dionex are the world renowned ion chromatography manufacturers and with Lee Scientific have added SFE and CE to their prestigious product line.

Mark Albertson has been dedicated to solving customers' application problems with Dionex solutions and products formerly with Hyde Scientific. He joins the Sci-Tech team bringing with him the knowledge and expertise gained over the last six years.

#### 3. Prolabo France

Prolabo manufacture microwave digestion systems which are rapidly

gaining acceptance as an alternative fast and safe digestion method for a wide variety of applications. Contact your local Sci-Tech office for a demonstration of the latest model 301.

#### 4. Buck Scientific USA

This company was formed many years ago by a group of ex Perkin Elmer engineers who saw a market for refurbished instrumentation such as the PE Atomic Absorption Spectrophotometers. This has led to manufacturing their own quality low cost instrumentation such as AA's, IR's, GC's, flame photometers and small dedicated instrumentation. There is also a complete range of accessories and consumables for these techniques.

#### 5. Nicolet Instrument Corporation

Sci-Tech is very proud to have just been appointed the exclusive distributors for this world market leader in FTIR. Their range of instrumentation covers instruments for teaching, research and dedicated analysis providing customers with the widest choice of FTIR instrumentation in the world. They recently have merged with Spectra Tech thereby providing a complete range of IR/FTIR accessories which are now exclusively available from Sci-Tech.

If you currently own a Nicolet instrument, please contact your local Sci-Tech office to register it. This will enable them to ensure that any information or service you may require is available.

Auckland Wellington Christchurch Dunedin  
Ph:09-270-3332 Ph:04-566-6096 Ph:03-383-1146 Ph:03-477-7860


## A NEW ELEMENT HAS BEEN DISCOVERED - ADMINISTRATION

It is the heaviest element yet discovered. It consists of 1 neutron, 8 assistant neutrons, 25 vice-neutrons and 256 assistant vice-neutrons. Despite its weight, it does not appear to combine or react with other elements and appears to be completely non-productive.

from Bulletin April 21, 1992

Advertising Rates  
See page 52

# Advertising Works



IN NEW ZEALAND

## Your Publication

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**COMMERCIAL EDITORIAL:**  
**Roger Whiting, Ph: 0-9-377-3570**

# FUME MANAGEMENT

BY THERMOPLASTIC

*Dedicated to Laboratory Safety*

*Backed by many years of research and development, all our fumecupboards fully meet New Zealand Safety Standard 7203. Xtracare also meets New Zealand Standard 6101 part 3, and is classified as NON-HAZARDOUS.*



## THERMOPLASTIC Labrocure



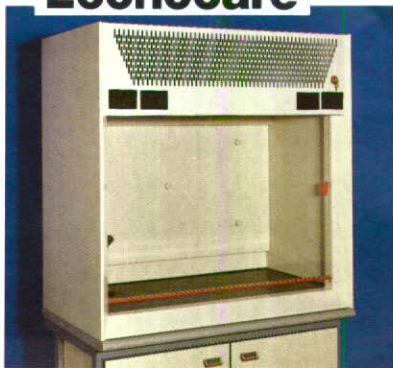
**LABROCARE**—Added Operator Protection  
Available in three sizes:

Model	Height	Width front to back	Length
LAB4	1550mm	760mm	1220mm
LAB5	1550mm	760mm	1525mm
LAB6	1550mm	760mm	1830mm

The Labrocure Fumecupboard has been specifically designed in New Zealand to meet situations which do not call for the advanced performance of the Xtracare. Built to the same internal height of 1550mm it offers the advantage of being able to set up taller laboratory equipment. It has the same slimline columns which both reduce turbulence and give more working space; and the same by-pass system to balance air intake. Fume containment is excellent. A full range of labtraps can be fitted to the ergonomic front beam. Baffles can be easily removed for cleaning and the recessed floor in Fridurit, Resistex, Techdek or Stainless Steel looks after spillage. Made of quality materials throughout, Labrocure comes with sealed overhead lighting and doors with armour toughened glass or acrylic as an option.

*Thermoplastic Engineering Ltd. produce fumecupboards to handle perchlorates, radio isotopes and a wide range of solvents. Additionally they produce a special model for schools. All Thermoplastic fumecupboard models can be made to special sizes as required.*

## THERMOPLASTIC Econocare



### ECONOCARE II

The ALL-Purpose Fumecupboard...designed in New Zealand by Thermoplastic to meet New Zealand Standard 7203 and specifically for the New Zealand laboratory environment, suitable for positioning on standard 900mm high laboratory bench unit.

Model	Height	Width front to back	Length
ECON4	1220mm	760mm	1220mm
ECON5	1220mm	760mm	1525mm
ECON6	1220mm	760mm	1830mm

The new improved ECONOCARE II is constructed of high quality PVC. It features a single opening inlet. The bypass system and the vertical slimline side columns which reduce internal turbulence combine to provide balanced air velocity. All joints are PVC welded for increased chemical resistance. (After 21 years experience it is Thermoplastic policy to avoid stainless steel sheet or powder-coated aluminium in body construction. Stainless steel is however one of the four options for the work surface, the others being Fridurit, Resistex and Techdek.) Armour toughened glass doors or acrylic are options. Fume containment is excellent as is the sealed overhead lighting, while the ergonomic front beam can accommodate a full range of laboratory taps as required. Removable baffles make for ease of cleaning.

## THERMOPLASTIC Xtracare

### Microprocessor control

Designed for greater safety, simplicity and ease of operation, Xtracare meets New Zealand Standard 7203 and 6101 part 3 more comprehensively than any other fumecupboard on the New Zealand market. It is close to the ultimate in safe performance.

Other important features are Heat resistant FRIDURIT™ ceramic floor as standard. Completely resistant to practically all chemicals. (Test data available.) Alternative floors in Resistex, Techdek or Stainless Steel. Recessed floors contain spillage.

Patented baffle system for increased fume containment. Baffles easily removed for cleaning.

New design of roof outlet to provide more even air extraction. Full width exhaust outlet.

Condensate trap to prevent condensation in ducting from returning to fumecupboard.

Ergonomically designed base beam for ease of tap operation. Full range of lab taps can be fitted.

Available in three sizes

Model	Height	Front to Back	Length
XTR4	1550mm	760mm	1225mm
XTR5	1550mm	760mm	1525mm
XTR6	1550mm	760mm	1825mm

### SPECIAL SIZES MADE TO ORDER

**Slimline angled columns to reduce turbulence.**

**Redesigned armour toughened 2-part glass doors...smooth, quiet...opening to 900mm high...automatic lock reset.**

**Gas and water services rear-mounted to give a much greater and clearer working surface.**

**Sealed overtop lighting delivering in excess of 400 lux to the working surface.**

Phone or Fax for immediate information about any Thermoplastic product or service.

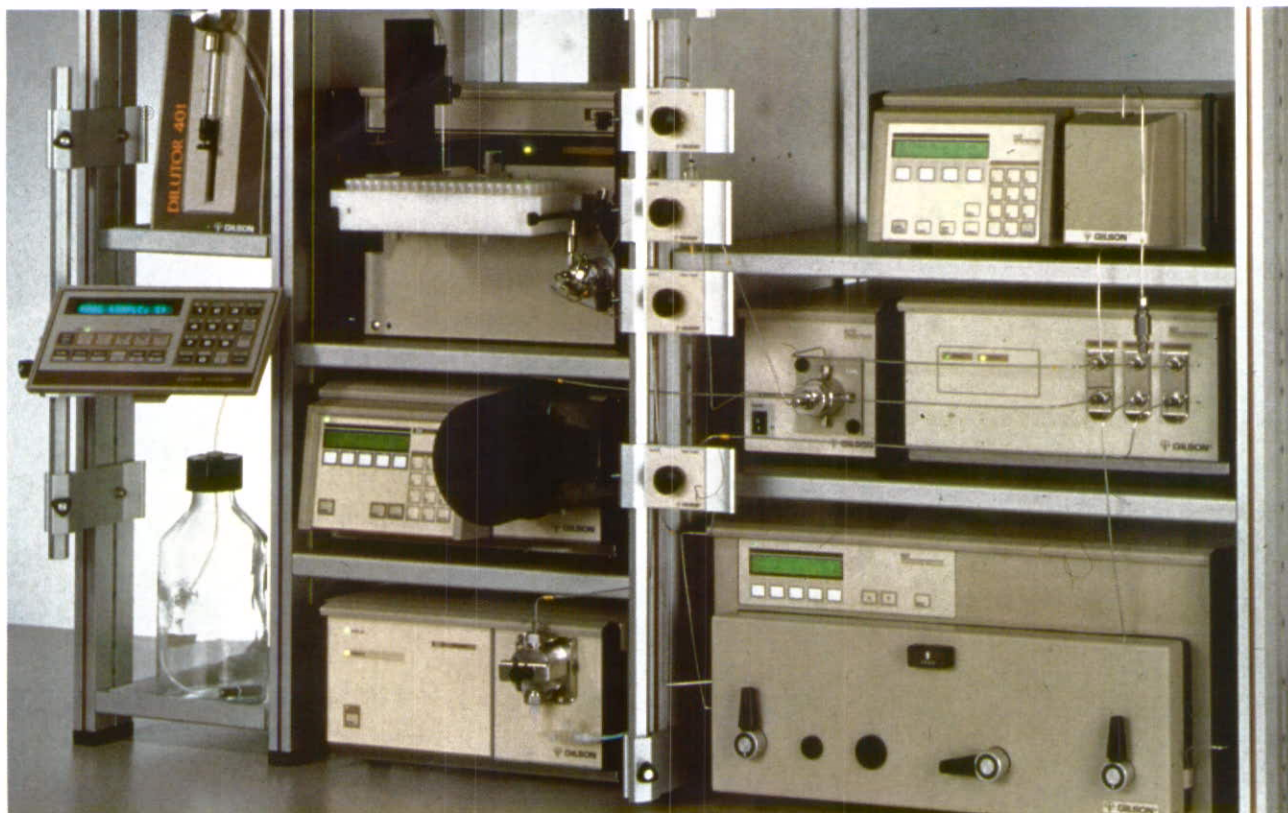


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