NZIC

chemistry in new zealand

Vol 52 No 3 June 1988

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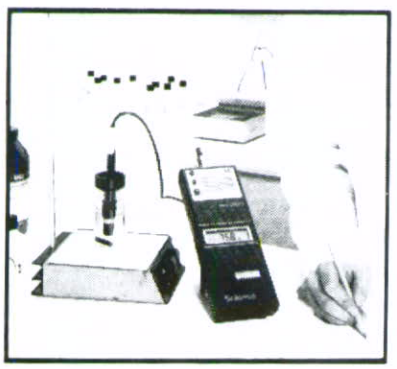

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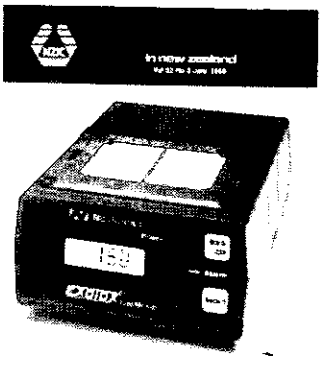
chemistry in new zealand

Vol 52 no 3 June 1988

Front Cover Story



Cover Story
A growing awareness throughout the world of the dangers inherent with confined space entry has led to the extensive use of Neotronics Exotox Gas Monitors. Management and workers are being protected across a wide range of industries which include water supply, sewage treatment, offshore oil production, petrochemical works, underground construction, mining and power generation.

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Advertising Features

July:

This is the month for publication of the 1988 Chemistry in New Zealand Yearbook, which will include detailed listings of suppliers of laboratory instruments, laboratory equipment, chemicals, process control equipment and processing equipment. A Consultants Directory will also be included. If you haven't sent in your completed questionnaire for inclusion in this publication, do so immediately — it may not be too late!

August:

The Conference edition, with NZIC Annual Report, Balance Sheet and notice of the AGM. Feature articles will cover the work of last year's Shell Prize winner, and the new surface analysis facility at Auckland University. The Product Feature will be HPLC, along with notes on the Conference Trade Display.

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EDITORIAL

Outline of the Institute

The New Zealand Institute of Chemistry is the primary professional and learned society for chemists, biochemists, chemical engineers and chemistry technicians in New Zealand. Membership is open to all with appropriate tertiary qualifications in chemistry, biochemistry, or chemical engineering. There is also a student grade of membership, while those persons with a general interest in chemistry, but without the necessary qualifications, may be local members.

Institute activities are many and varied. At the local level, regular Branch meetings, lectures, and social functions provide opportunities for members to meet informally with their colleagues, as well as to keep abreast of developments within the profession. Branches are also active in promoting chemistry in schools with various competitions and participation in science fairs. The Annual Conference of the Institute is held at a different venue each year. The programme includes invited plenary lectures, specialist lecture sessions and work-shops for the presentation of current research findings, trade displays, and social activities. In the public arena the Institute has a number of committees to present members' views on chemical hazards, the environment, chemical education, and public affairs generally. The Institute also has representatives on bodies such as SANZ, AAVA, and the Royal Society of New Zealand.

To assist its members in their profession, the Institute surveys salaries periodically and publishes a Code of Ethics, and Guidelines to Professional Employment. The professional achievements of individual members are recognised each year by the awarding of a number of Institute prizes.

The NZIC has links with the Royal Society of Chemistry, the American Chemical Society, the Royal Australian Chemical Institute, the Federation of Asian Chemical Societies, and the International Union of Pure and Applied Chemistry. Members may therefore have the opportunity of participating in their activities and meeting chemists who visit this country under the auspices of the Institute. In particular, a visiting speaker scheme is currently operated with the RACI.

Application for membership of the Institute is made on a form available from the Registrar (PO Box 29-183, Christchurch). Current (1988) subscriptions for the main membership grades, including the cost of this Journal are: (rebated rates for prompt payment shown in brackets):

Fellows, Members $110 ($100)
Associate $65 ($55) ($45, first 5 years)
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All the above are exclusive of GST.

Bruce W L Graham,
Editor

CHEMISTRY IN NEW ZEALAND EDITOR

The current editor of Chemistry in New Zealand wishes to retire from the position at the end of the year and a replacement is therefore sought.

The position involves planning the content of each issue, soliciting of articles, liason with Branch Correspondents and other regular contributors, selection, editing, and other preparation of material for publication, checking of galleys and page proofs, and so on. The editor acts as liason between the publisher and the NZIC, and attends meetings of Council as appropriate. The editor is also convenor of the Editorial Committee, who are available to give advice and other assistance as required.

The work involved is a minimum of 20-30 hours per issue, with 6 issues per year. The position carries a modest honorarium.

It is preferable that the editor be a member of the NZIC and have a strong interest in chemistry generally, and in Institute affairs. As the magazine is currently published in Auckland an Auckland-based editor would be preferred, although with the ready availability of facsimile facilities operation from another part of the country should also be feasible.

Anyone interested in finding out more about the position should contact the present editor, Dr Bruce Graham, Dept of Health, 2 Edenvale Road, Auckland, ph 601-747(bus) or 836 9472 (home).

THE USE OF THERMAL ANALYSIS IN POLYMER CHARACTERISATION

Dr N.B. Milestone, Chemistry Divn, DSIR, Lower Hutt

Dr Milestone is Section Leader of Inorganic Materials at DSIR Chemistry Division. He has produced the first Thermal Analysis Users' Group Newsletter and compiled a listing of thermal analysis equipment available in the country. Anyone interested in receiving further information should contact him.

Today's world relies on increasing amounts of polymers such as thermoplastics, thermosets, elastomers and composites. High-tech plastics such as polyimides which are derived from materials such as durene, obtained from the Motunui Synfuel plant, are becoming more readily available. The use of these materials depends on an accurate, reliable characterization of how their physical and chemical properties are affected by time, temperature and atmosphere. These properties can be readily and most effectively studied by methods which fall into the realm of thermal analysis.

Thermal analysis is a general term used to cover any technique where a physical property is measured as the temperature is controllably scanned over a wide range. Some of the various techniques available are given in Table 1.

Table 1: Thermal Analysis Techniques

Technique	Abbreviation	Instrument
Differential Thermal Analysis	DTA	
Thermogravimetric Analysis (Thermogravimetry)	TG	Thermobalance
Differential Scanning Calorimetry	DSC	Calorimeter
Thermomechanical Analysis	TMA	Dilatometer
Dynamic Mechanical Thermal Analysis	DMTA	
Dielectric Thermal Analysis DETA	DETA	

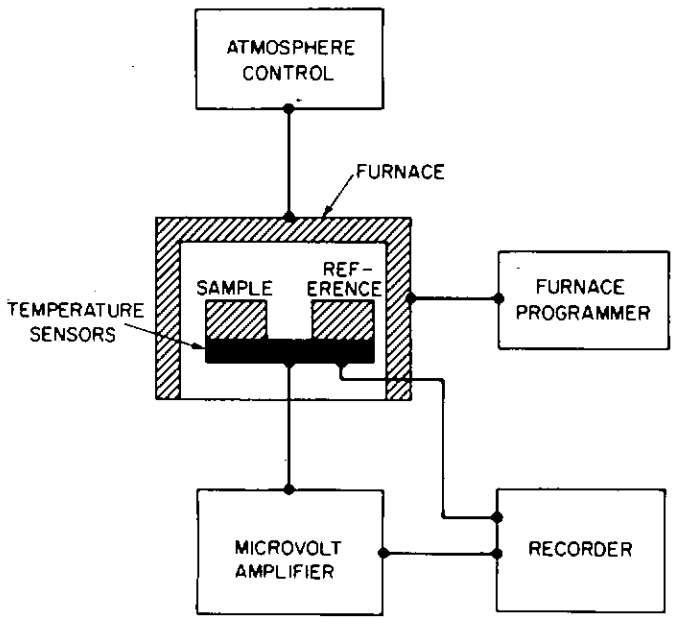

Figure 1: Block diagram of DTA apparatus

Of these, DTA and TG are probably the most widely used techniques and there are several instruments available in New Zealand. DTA is one of the oldest thermal techniques and compares the temperature of a sample with that of a reference material as the two are heated simultaneously. A block diagram is shown in Fig.1. The technique records chemical changes as a series of peaks, exothermic if the sample gets hotter than the reference or endothermic if the sample gets cooler. The use of DTA in polymers is now being superceded by DSC which allows a quantitative measure of the heat of reaction by electrically balancing the temperature of the sample and reference and recording the difference as a heat flow. TG utilizes a thermobalance which measures changes in weight as the temperature rises. The block diagram for a thermobalance is shown in Fig. 2. The results obtained are quantitative, as opposed to those from DTA. The sample is suspended in the furnace and an electronic balance records changes in weight. Because polymers are flammable, one of the important aspects of thermal analysis is that many techniques can be carried out under controlled atmospheres.

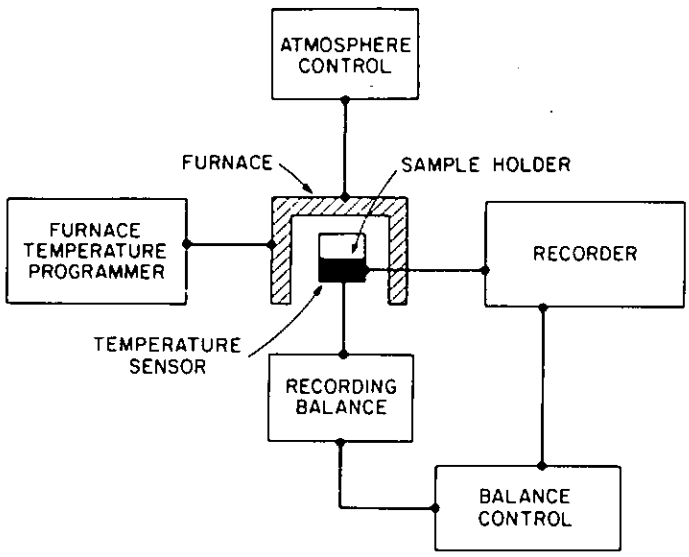

Figure 2: Block diagram of thermobalance

To see how the various techniques are used and to show the type of information that can be obtained, a few examples from polymer chemistry have been chosen.

Glass Transition Temperature

One of the most important properties of polymers is the glass transition temperature, T_g. This can be considered the softening temperature of a polymer and it is the point at which there is sufficient thermal energy within the polymer for the chains to act independently. Below T_g, polymers are stiff, hard and rather brittle with the chains locked in position. Physical properties such as impact resistance, toughness and damping, all increase above T_g but at the expense of stiffness and hardness. Elastomers are compounds which have a T_g well below ambient temperatures. They can dissipate the energy of stretching between the chains as they slide past each other. Rubber is an elastomer at ambient

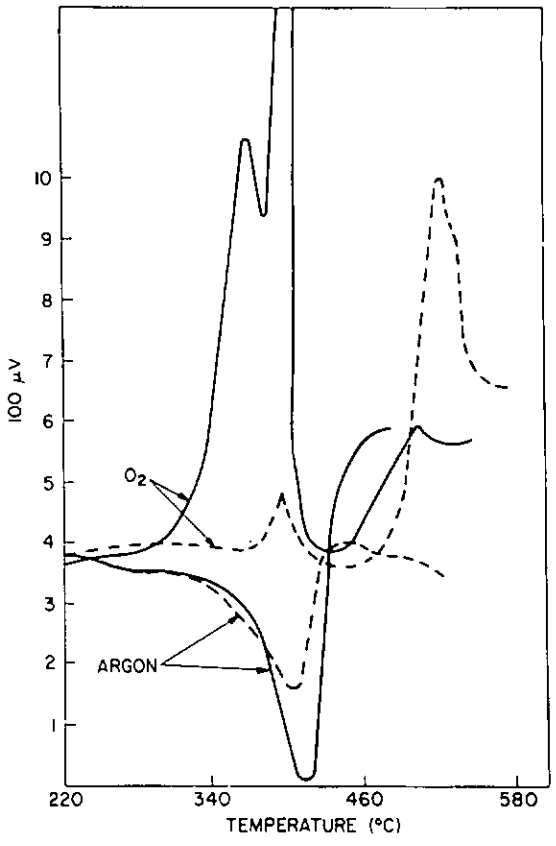

Figure 5: Thermogravimetric curves for various polymers heated in nitrogen (PVC: polyvinyl chloride, PMMA: polymethylmethacrylate, PTFE: polytetrafluorethylene, PI: polyimide).

at ambient temperatures but when cooled in liquid N_2 it becomes brittle and shatters when struck. The T_g determines the useful lower temperature of an elastomer.

T_g is readily detected by DTA since the heat capacity of a sample changes rather abruptly at that point. The sample is suddenly able to absorb more energy as the molecules move more freely, causing a drop in sample temperature which produces an endotherm in the trace. The T_g of any polymer is dependent on a number of factors which include how it was polymerized, its molecular weight and distribution, degree of crosslinking, the stereochemical arrangements about the main chain and finally, the thermal history of the sample. Each of these factors has been the subject of exhaustive study which is beyond the scope of this paper. Although polymers are often considered amorphous, many exhibit aspects of crystallization or ordering of the polymer chains. This can be manifest as an actual temperature of crystallization followed by melting or it can be shown by changes in T_g after thermal treatment.

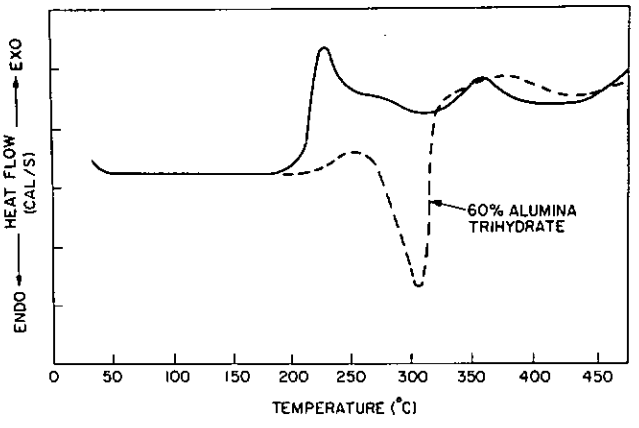

Figure 3: DTA curves of polystyrene and polybromostyrene in argon and oxygen _____PS; _____PBS.

T_g determination is most important in composites. A compatible polymer should show only one T_g for the overall system. If two T_gs are shown it may indicate poor mixing or poor compatability, leaving each phase able to exhibit its own properties so that the enhanced properties sought are not obtained. On the other hand, impact modifiers or plasticizers in brittle plastics should be free to absorb impact and therefore that composite should exhibit two T_gs.

Flammability

One of the main problems with polymers is their flammability. Several techniques exist to combat this, but one common way is to use the lower flammability of brominated compounds, a property used in fire extinguishers. Polystyrene (PS) is a highly flammable polymer. When the reaction is followed by DTA it is found that it is not polystyrene itself, but its thermal degradation product, styrene, which burns so readily. An initial, naked flame raises the temperature of the polymer which results in degradation. The styrene formed burns, further increasing the temperature of the polymer so that more styrene is formed. That continues the process and the reaction runs away. Incorporation of halogenated additives into polystyrene has not been found suitable, as the two types of compounds are not compatible. However, bromine can be incorporated in the side chain on the aromatic ring of styrene, and polybromostyrene (PBS) formed. This material has good fire resistance and yet is compatible with polystyrene. PBS is really less stable than PS as shown by the DTA curves run in argon (Fig.3), but the degradation product does not burn until much higher temperatures are reached, shown by the traces run in air. The sharp exotherms for samples run in air show that the burning is a runaway exothermic reaction.

Another form of flame retardation can be effected by filling the polymer with a material which undergoes a strong endothermic reaction about or below the temperature where the polymer undergoes oxidative degradation. This has the effect of lowering the temperature of the filled polymer when heat is applied. A typical example is the use of aluminium hydroxide which has a strong endothermic reaction about 300 C when it loses water (Fig. 4.). In a polyester filled with 60% aluminium hydroxide this endothermic dehydration reaction will occur, lowering the polymer temperature and producing a non-combustible gas, in this case water vapour, which dilutes and cools the combustible gases (Fig.4).

Thermal Stability

When studying thermal degradation of polymers, the products are usually gaseous and stability is ideally studied by

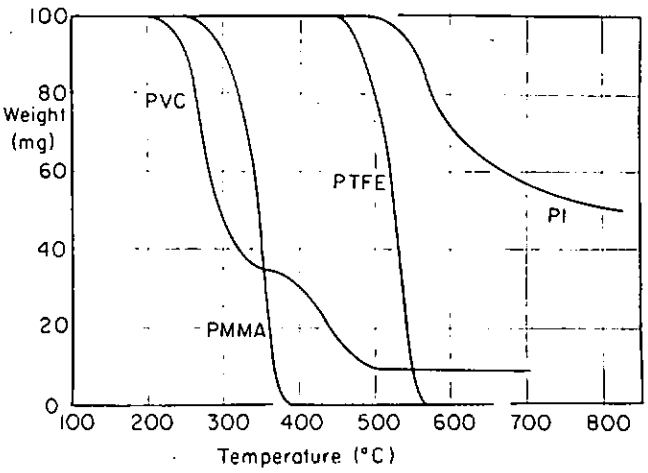

Figure 4: DSC curve of polyester, both filled and unfilled with hydrated alumina.

thermogravimetry. A typical example of the results that can be readily obtained from TGA is shown by following the degradation of a number of different plastics in an inert atmosphere (Fig.5). The stability of the polyimine polymers is clearly evident with decomposition only occurring above 500°C. While PTFE does not degrade till above 400°C, its use is limited to about 250°C since above that temperature it becomes so soft that it will start to flow under its own weight. Polymers such as polyethylene (PE) polyvinylchloride (PVC) or polymethylmethacrylate (PMMA) are not thermally stable. Analysis of the gases shows PVC initially produces HCl_3 while PMMA and PTFE produce volatile monomers.

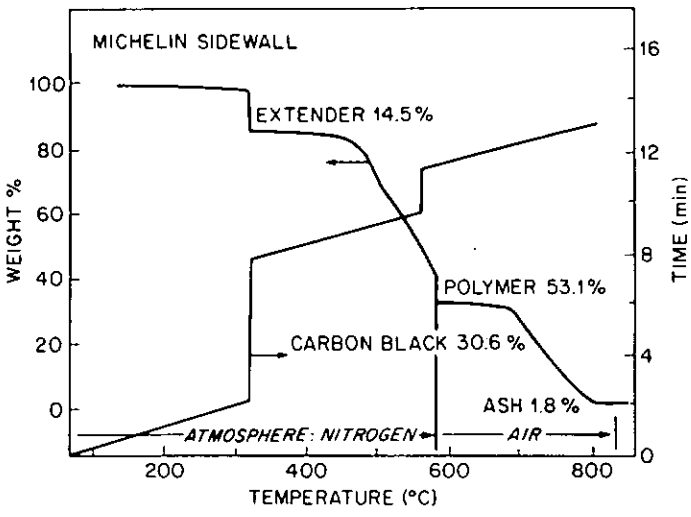

Figure 6: Stepwise TG curve of tyre rubber showing various components. Initial heating is in nitrogen with carbon black determined by heating in air.

If a rubber sample is heated in a combination of inert and oxidizing atmospheres, the amount of each component present in a complex polymer system can be determined by TGA as seen in Fig.6. Automatic microprocessor control allows the temperature to be held constant as weight is lost, to clearly define the steps.

The weight changes give a direct measure of the sample's oxidative and thermal stability. Isothermal heating may allow kinetics to be determined so that thermal lifetimes may be predicted over a few hours rather than the old oven-ageing techniques.

As the temperature of a polymer is raised a wide range of volatiles may be given off. Moisture, both adsorbed and absorbed can be quantified, as can any unreacted monomer. At Chemistry Division, the thermal analysis equipment can be coupled to a mass spectrometer so that the volatiles lost can be analysed and identified. The various mass peaks of the volatile materials can be quantified so amounts can be determined. This has proved a very useful technique when dealing with unknowns. Typical samples that have been investigated include resins, oils, thermoset plastics and food packaging films.

DSC Studies

As already mentioned, DSC has largely replaced DTA. One of the reasons for this is that quantitative information can be readily obtained from the data, unlike DTA which can really only be described as semiquantitative at best. DSC gives much the same type of information as DTA but the measurement is a little more complicated and is usually limited to an upper temperature limit around 700°C or so —really no problem when dealing with polymers. Sub ambient facilities can be easily attached to some instruments allowing elastomers to be studied. Heat capacity measurements can be gained from DSC, something not possible with DTA. In a semicrystalline polymer a readily defined heat of fusion can be measured and the amount of crystallinity measured and used for quality control. DSC is being used extensively in food technology, particularly for studying fats and oils.

Thermomechanical Analysis

Thermomechanical Analysis (TMA) allows thermal expansion coefficients of polymers to be determined and uses a dilatometer as the measuring instrument. In its simplest form a sample of a known length is heated and length changes monitored. However, many other properties can be deduced from the dilatometer curve. T_g can be detected by TMA because the polymer chains start to move past each other at this point, requiring a much larger free volume than below T_g, when the motion of atoms is only short range and within the chain. A polymer has a higher coefficient of expansion above T_g due to the extra motion of the chains. Other information that can be obtained includes softening temperatures, thermal shrinkage and swelling.

More recently there have been significant advancements in the dynamic forms of mechanical analysis (DMA). New equipment has been designed with very high sensitivity and it is particularly suited for obtaining information about the service properties of a polymer. In dynamic mechanical thermal analysis (DMTA) a small sinusoidal mechanical stress is applied to the sample and the resulting strain measured while it is heated. In dielectric thermal analysis (DETA) a sinusoidal electric field is applied and the electric displacement followed. Some rather complex mathematics is needed to fully understand the changes but properties such as glass transition temperature, compatibility of blends, elastic moduli, film thickness, degree of curing and other physical properties can be readily measured. The sensitivities of these techniques are about one thousand times greater than DSC for studying glass transitions and the techniques enable detection of secondary transitions which affect properties such as impact strength and ductility. The transitions often take place below ambient so cooling facilities are needed.

Both techniques detect motion of the polymer molecules. In DMTA a rectangular sample is deformed longitudinally in the tensile head. A static stress is applied and the sample length read out by the controlling computer. The frequency of deformation can be scanned as well as the temperature.

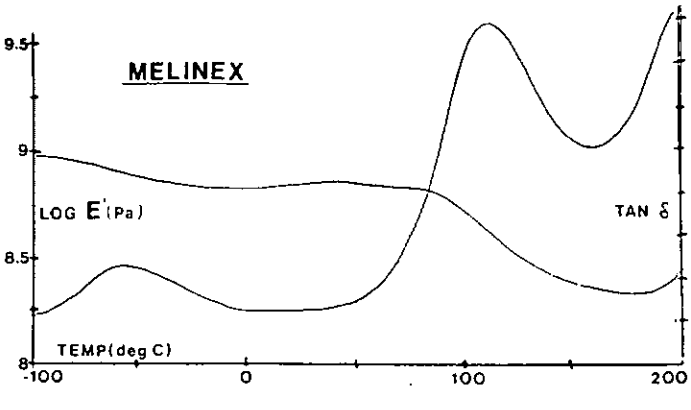

Figure 7: Dynamic thermomechanical data for polyethyleneterephthalate (PET). The ∝ process occurs near 100°C while the β process near -50°C. Melting starts near 200°C.

When the frequency is kept constant and the temperature scanned, polymers normally show two peaks in the output, a large peak, , which is related to the molecular motion of the main polymer chain, which increases dramatically at Tg, and a second peak, , at some temperature below Tg. This peak has been found to correlate with the impact strength of the material and relates to reorganization of specific substituents. The spectrum of polyethyleneterephthalate (PET) shown in Fig.7 is typical.

If the various components of a polymer blend are incompatible then each polymer will exhibit its own relaxation processes. When the two components are compatible then a single peak is seen for the process. This peak moves systematically with composition, lying intermediate between the two pure polymers.

The effects of resin/reinforcement ratios can be readily studied by DMTA. In preparation of graphite/epoxy panels variations were found in the amount of interlamina viods. Using DMTA, workers at Rockwell were able to show that this was due to some batches of resin setting more quickly, leaving insufficient time for volatiles to leave the curing resin and they remained as voids once the polymer hardened. By adjusting curing cycles, the viscosity of the resin could be maintained at a low level sufficiently long for the volatiles to escape.

DETA senses transitions involving dipole or ionic motions and complements DMTA. The method can also be used to study the thickness of polymer coatings on metal. The thinner the film the higher the capacitance and the better the quality of data, down to the point where the sample can no longer withstand the alternating voltage applied and electrical resistance breaks down.

Conclusion

The examples cited above give some indication of the way thermal analysis can be used for polymer characterization. Thermal analysis is being used for the study of materials such as coal, food, packaging materials and adhesives in New Zealand. One of the main advantages of thermal analysis is that small samples can be used and results obtained quickly.

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DIFFERENTIAL THERMAL ANALYSIS (DTA) STUDY OF THE LOW TEMPERATURE OXIDATION OF COAL

T.W.Matheson, Coal Research Association of N.Z. (Inc.), Lower Hutt. &
D.E.Rogers, Chemistry Division, DSIR, Lower Hutt

New Zealand has extensive deposits of lignite which are an important energy resource. However, these coals have a high moisture content which makes transport expensive and difficult and results in a low heat output on combustion. One solution is to dry the coal but it then becomes susceptible to spontaneous combustion, with the attendant economic losses and potential danger to personnel and equipment.

The behaviour of a coal on exposure to oxygen at or about ambient temperature, plays an important part in subsequent spontaneous combustion. Differential thermal analysis (DTA) is particularly suited to the investigation of the thermal nature of this interaction.

DTA was carried out using the Stone DTA Model 202 at Chemistry Division. Typically, coal (0.0085g., < '76um) was weighed into an aluminium pan, placed in the sample holder and heated to 110°C under nitrogen to remove moisture. The sample was then brought to the desired experimental temperature. The data logger was switched on once the temperature had stabilised, the gas stream then changed to oxygen and readings continued for about one hour. In the DTA configuration used, the aluminium pan containing the sample sat directly on the ring-shaped thermocouple; an identical empty crucible sat on the reference thermocouple. The conditions chosen, (weight of sample, particle size, gas flow) were such that the oxidation reactions were chemical rather than diffusion controlled. The only occasions when diffusion limitations were apparent were when ignition occurred.

An example of the isothermal DTA traces obtained is shown in the Figure. The major feature is an immediate, sharp exothermic reaction between oxygen and the coal, which can be detected and measured even at room temperature. The reaction is more exothermic with increasing temperature until ignition occurs at about 200°C. The exotherm does not result from the heat of adsorption of oxygen on the coal which has a much smaller heat of reaction. No exotherm is observed for pre-oxidised coal. Preliminary experiments established the flow rates of oxygen and nitrogen at which the gas stream could be switched without causing spurious peaks.

Results from the DTA experiments, when taken in conjunction with those from complementary techniques (FTIR, gas analysis, ESR) offer some insight into the chemical

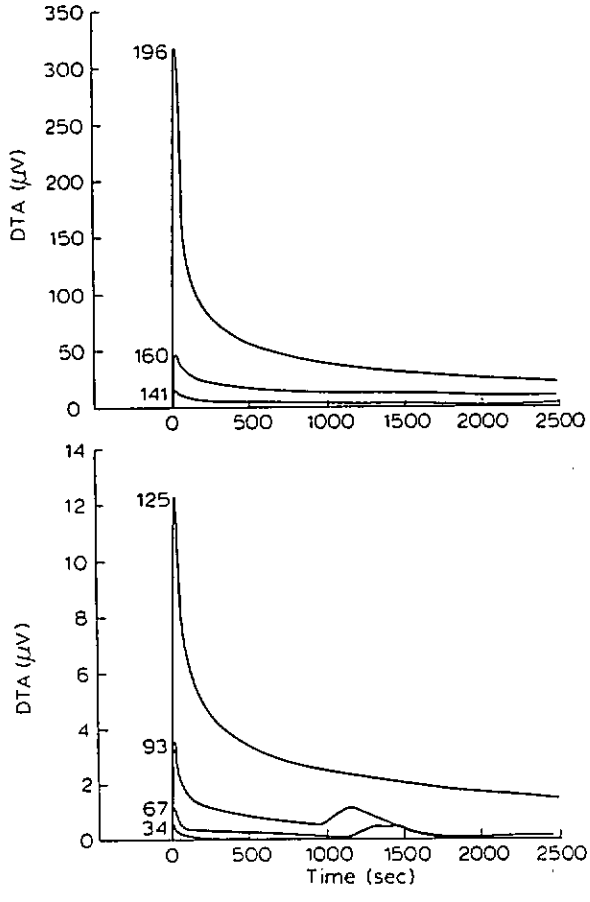


Figure Oxidation of Newvale lignite at different temperatures (°C)

mechanisms of low temperature oxidation of coal. The size of the exotherm at a particular temperature is a measure of the coal's reactivity to oxygen and so provides a guide to the potential of a coal to spontaneously combust, an important factor in the large scale use of these coals.

Acknowledgement: This work was supported by NZERDC

THERMAL ANALYSIS OF MILKFAT AND BUTTER

Dr Alastair K H MacGibbon, New Zealand Dairy Research Institute, Palmerston North

Thermal analysis of fats and fat products has two major practical uses. Firstly the melting characteristics of fats have a direct influence on the appearance and texture of fat products, thus many of the characteristics of the final food product may be predicted from analysis of the fat components. In addition, heating and cooling are the most common processing conditions used in food production and detailed knowledge of the thermal properties of the products aids decisions as to the heating and cooling capacity required in the production.

The principle of differential scanning calorimetry (DSC) is relatively simple, being the measurement of the energy changes in a sample on heating (or cooling). The sample and reference materials are placed in sealed pans and subjected to the same linear temperature program (which can vary from 0.3°C/min to 300°C/min in our instrument). If the sample undergoes a thermally-induced event, the control system senses the resulting temperature differential between the sample and the reference and supplies more or less heat (energy) to the sample to bring it to the same temperature as the reference and maintain the temperature program. The heat flow rate that is measured is proportional to the instantaneous specific heat of the sample (the energy required to raise the temperature of the sample 1°C). In addition, when phase changes or transitions which involve an energy change occur during the temperature scan the contribution to the heat flow rate is also measured. For instance in the melting of ice to water, energy is absorbed by the sample (latent heat of fusion) requiring the instrument to supply more energy to the sample to maintain the temperature program. This is observed as a peak in the thermogram, the area of which is the value of the latent heat.

The equipment used at the N.Z. Dairy Research Institute is a computer controlled Perkin-Elmer DSC-2C differential scanning calorimeter with a refrigerated block which allows a temperature range of -60°C to 700°C. The sample used is typically 10mg and is contained in a sealed aluminium pan.

Natural fats such as milkfat and vegetable oils are a complex mixture of triglycerides. To make matters more complex, triglycerides can exist in several different crystalline forms called polymorphs which can interconvert, usually to a thermodynamically more stable form. The melting behaviour is also dependent on the tendency for triglycerides of a similar structure to form solid solutions. Though these two phenomena usually occur together, polymorphism is more important in sharp melting fats such as cocoa butter, while solid solutions are more apparent in complex fats with a broad melting range such as milkfat. The major consequence of the complex nature of the solidification is that the properties of fats are critically dependent on the thermal history of the fat. This is important in food manufacture because the processing conditions can determine the texture of the final product. The resulting DSC thermogram therefore depends on both the chemical composition and the thermal history of the fat.

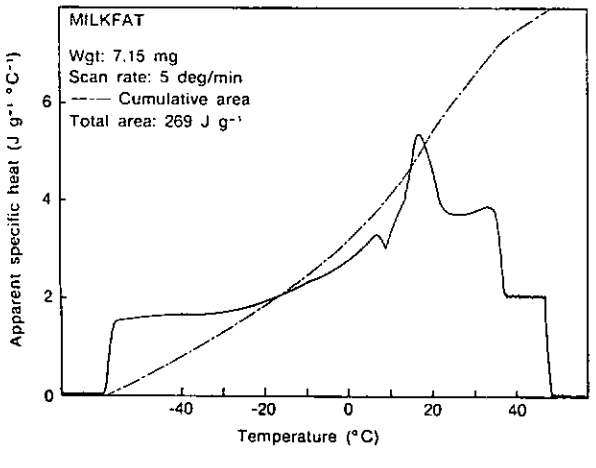
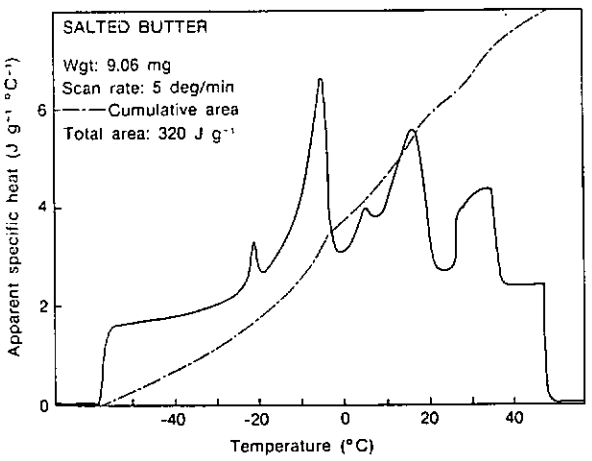


Figure 1 shows a thermogram for the heating of milkfat, the fat component of butter. The sample was prepared by completely melting to remove any thermal history and then cooling to -58.2°C (215 K) at a set rate (10°C/min). The rate of heat flow was measured as the temperature was raised to 46.8°C (320 K) at 5°C/min. The initial plateau is the specific heat of the fat at low temperatures, but as the temperature is increased some of the fat begins to melt, increasing the heat flow rate. The feature of milkfat is the very wide temperature range over which the triglycerides melt, about -40°C to +35°C. The melting profile can be divided into three fractions (at approximately 10°C and 20°C) with increasing proportions of saturated and long chain fatty acids in the triglycerides. The dashed line is the cumulative area under the curve. The plateau at high temperature, after all the melting has taken place, represents the specific heat of the liquid fat. The actual shape of the thermogram changes through the dairy season, with more high melting and intermediate fractions during the summer leading to harder fat and consequently harder butter.

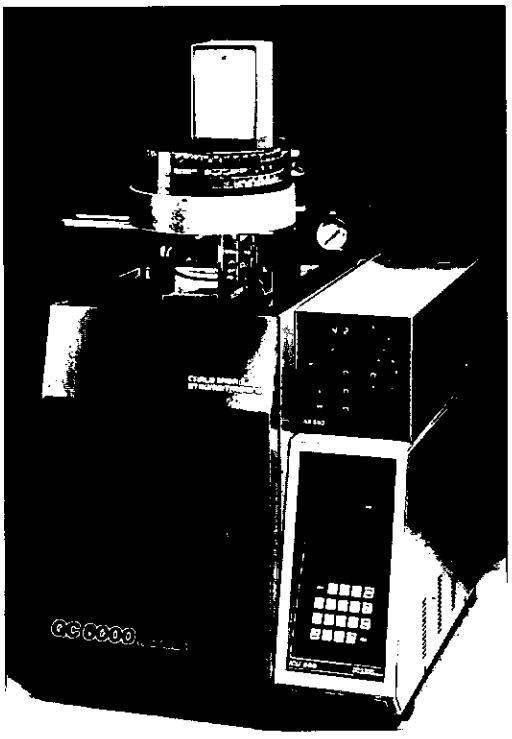


The thermogram for butter has a similar contribution from the three milkfat fractions and the additional contribution from the aqueous phase. With unsalted butter this introduces a single sharp peak at about 0°C due to the melting of frozen water. However salted butter is a mixture of components including fat (81.3%), water (15.7%) and salt (1.4%). While the contribution of the fats are similar, the presence of salt and other components in the aqueous phase leads to a freezing point depression of the water during cooling. On heating the salted butter an interesting thermogram is produced (Fig. 2). In addition to the contribution of the fat there is an initial sharp peak due to the melting of some of the aqueous phase at the eutectic temperature of salt and water, followed by the broad melting peak. Thus salted and unsalted butters have quite different thermal characteristics.

In general DSC is used to obtain thermal information on the seasonal changes in milkfat, in the analysis of individual samples, crystallization studies, and to determine the characteristics of blends of milkfat with other fats and consumer products. While DSC analysis is usually carried out in conjunction with other tests and may not always be the most convenient method, the major advantage of DSC is that a "fingerprint" of the thermal properties is obtained.

CARLO ERBA

LEADERS IN GAS CHROMATOGRAPHY



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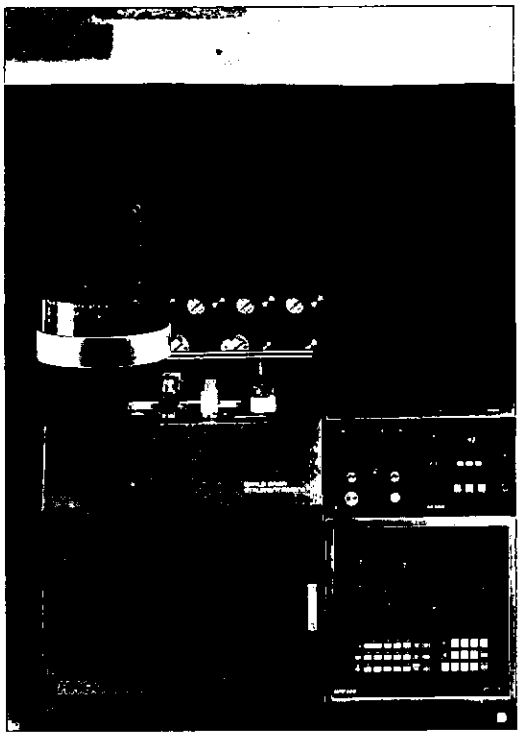

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JOBS FOR CHEMISTS — 2

C.R. Southward, New Zealand Dairy Research Institute
& I.D. Watson, Massey University, Palmerston North

Two years ago, an article was published in this Journal[1] describing job vacancies in chemistry which appeared in the Saturday editions of five New Zealand newspapers during the 12-month period from March 1984 to February 1985. At the request of the Council of NZIC, a further, similar survey was undertaken during the period March 1987 to February 1988. The Saturday editions of the New Zealand Herald, Evening Post, Christchurch Press, Otago Daily Times, Waikato Times, Gisborne Herald, Evening Standard and Nelson Evening Mail were carefully scanned during this period for advertisements related to chemistry or positions likely to be of interest to chemists. In addition, copies of the bimonthly Education Gazette were scrutinized for teaching positions which involved chemistry. It became evident early in the survey that the New Zealand Herald did not give very high priority to Situations Vacant in its Saturday editions. On a number of occasions, they were either completely or partly transferred to the following Monday's edition. Consequently, after the first 4 to 6 weeks of the survey, the Saturday editions of the New Zealand Herald were replaced by those published on Mondays.

The total number of jobs was nearly 1200, and these appeared in about 1140 advertisements. While this is significantly greater than the number of jobs appearing in the 1984-85 survey, it does include school teachers (approximately 200) which were omitted from the previous survey. In the analysis made in this survey, all jobs have been included, whether temporary or part time in nature, whatever qualifications were required. Some 29 overseas vacancies have also been included; these were requesting mostly school teachers or university lecturers and included 6 VSA positions. The job vacancies included positions where holders of chemistry qualifications might be in competition with other qualifications such as BE, BTech, NZCE, etc.

It must be noted that this survey is not exhaustive, since only the 'Saturday' editions of the papers named above were scrutinized. The majority of the advertisements (66%) were regional, often only appearing in one paper (especially in the North Island) and seldom being repeated. Occasionally the same job would be readvertised several months later. (The most persistent advertisement appeared to be for VSA teachers in Zimbabwe where the Education Gazette included 5 advertisements in a four-month period!). It should also be noted that, occasionally, a multiple vacancy including the words 'several' or 'a number' would appear. In such circumstances, it was decided that these should be considered as '3' vacancies.

General

(i) Location

Considering that many local papers were not surveyed, there are a number of interesting observations which emerge from an analysis of the data. Over 40% of all the jobs were in Auckland (516) and about 20% (254) were in Wellington. Christchurch was next (94) followed by Palmerston North (55) (probably due to inclusion of the Evening Standard in the survey), Dunedin (35), Hamilton (30), Bay of Plenty (19), Nelson (16) and Rotorua (13). Interestingly, the number of vacancies in both Palmerston North and Nelson is the same as that found in the first survey, but the proportion of the total number of jobs in this survey has decreased considerably. For those who prefer a job in the country, there appears to be a number available in the Waikato (mostly dairy-related), the central North Island and in Taranaki (dairying and petroleum based). However, there are scattered jobs in most other parts of the country, especially for school teachers.

(ii) Types of Employers

The single biggest employer, as found in the previous survey, is the industrial sector (595 vacancies, 50%). About half of these advertisements were placed by Personnel companies, and it was not always easy to see what type of industry was involved. In comparison with the previous survey, it appears that Personnel companies are being used by Industry employers much more frequently. Government Departments (including the Department of Education) were the next single biggest group with 294 vacancies, followed by Academia (including Universities, Polytechnics and Medical Research Institutes) with 151 vacancies, Local Bodies, including hospitals (67), Commerce (Sales and Marketing) (47) and Research Associations(31).

(iii) Qualifications

Of the 1187 jobs advertised, 440 (37%) required a university degree in Chemistry (or, in competition, other degrees), 262 either a BSc or NZCS in Chemistry, 127 an NZCS in Chemistry, 149 University Entrance or 6th Form Certificate in Chemistry while 209 did not specify any particular qualifications.

In the survey, it was assumed that all school teachers needed a university degree in Chemistry.

(iv) Kinds of Jobs

The jobs were divided into 14 categories, similar to the previous survey. The most common was the Laboratory Technician (also referred to as Laboratory Assistant, etc) (529), followed by School Teacher (197), Scientist (109), Manager/Supervisor (93), Quality Control person (66), Sales/Marketing (47), Analytical Chemist (42) and Product Development Chemist (36). Only 12 University Lecturers' positions (plus 7 Polytechnic Tutors) were advertised with a further single advertisement for a Science Editor and five vacancies for Patent Officers. Nineteen advertisements (by Personnel companies) were so vague that it was not possible to determine the category in which to place the advertisement.

(v) Which Papers to Read

The New Zealand Herald contained 45% (535) of all the jobs advertised. Of these, 426 appeared solely in that paper. Similar figures for the others with the sole figures in parentheses are: Evening Post 232 (166); Christchurch Press 239 (107); Otago Daily Times 137 (22), Evening Standard 82 (27), Waikato Times 33 (25) (March-August only), Nelson Evening Mail 17 (5) and Gisborne Herald 4 (4). The Education Gazette contained vacancies for 177 teachers, a further 20 teachers being recruited through the various newspapers. Even Chemistry in New Zealand contributed during the year with 5 vacancies! As mentioned earlier, the North Island papers which were scanned (with the exception of the Evening Standard) had a very high ratio of sole to total advertisements (72-80%). The Gisborne Herald, Education Gazette ments (72-80%). The Gisborne Herald, Education Gazette and Chemistry in New Zealand all contained sole advertisements within the scope of this survey. By contrast, the majority of the advertisements in the three South Island papers scanned (67-84%) appeared in at least one other paper, often

Table 1 Jobs by Employment Sector

Occupational Group	No of jobs	Total
A. Manufacturing (and mining)		
Metals and mining	29	
Chemicals, plastics and rubbers	35	
Adhesives, resins, building products	41	
Petroleum products	18	288
Laboratory equipment, etc.	22	
Cosmetics, soaps and cleaners	17	
Surface coatings, inks, paints, packaging	97	
Miscellaneous[a]	29	
B. Agriculture, Food and Primary Processing		
Food and beverages	76	
Dairy products/processing	64	
Meat, fish products/processing	22	
Horticultural, seeds, soils	22	219
Pulp and paper, forestry	16	
Biological production/processing	10	
Wool/textiles/dyeing	9	
C. Education		
School teaching, school labs	204	
University/polytechnic research/ lecturing	99	303
D. Health and Safety		
Medical, hospital, pharmaceuticals	139	204
Water treatment, health, animal health	65	
E. Miscellaneous		
Consulting	11	
Patent Examiners	5	173
Unspecified	157	

Note[a]: Jobs included in this category include concrete, batteries, refrigeration, power generation, nuclear sciences and non-specific Government research.

a North Island one. As noted previously, it is worthwhile to search beyond the local newspaper, provided you don't mind travelling! Only 21 of the advertisements appeared in four newspapers and only six in five of the newspapers surveyed.

(vi) Which Month to Peruse

The most advertisements appeared in November (136), followed by October (125) while the lowest two months were March and December (each with 68). April (71) and May (75) were notably below the mean of 99 while June and January (115 each) were somewhat above it. This pattern is definitely different from that reported in the first survey, perhaps because of the relatively high numbers of vacancies for school teachers appearing in October (48) and November (39).

(vii) How Much?

As in the first survey, not many advertisements mentioned specific salary figures. The universities were very consistent in including the salary range for the job and, occasionally, salaries were provided by one of the other employing groups. The only other time when salaries were given (often "negotiable") were with the anonymous vacancies used by Personnel companies. Overall, salaries ranged from about $10,000 (technician/school leaver) to about $85,000 (Professor) in 1987 dollars. Fringe benefits were sometimes mentioned with managerial and sales positions.

Jobs by Employment Sector

Table 1 groups the employment opportunities according to four sectors: Manufacturing; Food, Agriculture and Primary Processing; Education; and Health and Safety. A fifth, Miscellaneous, consisting of mainly the unspecified jobs, is also included.

It can be seen that the greatest number of jobs (303) is in education though, to be fair, this also includes research in universities as well as teaching. Manufacturing and mining (288) is also a major group. Jobs in medical research, hospital laboratories and pharmaceuticals (139) provide a substantial contribution to the Health and Safety group (204), while positions in the food and beverage industry (76) provide about a third of the total vacancies in the Agriculture, Food and Primary Processing group (219). A substantial number of unspecified jobs (157) is included in the Miscellaneous group (173).

Jobs in Industry

A complete breakdown of the job categories advertised in Industry, together with the qualifications, is given in Table 2. Since the last survey, it is clear that Industry is regarding more and more the NZCS and BSc as equivalent. Only in research and production is a degree the preferred option. There is also a tendency to seek less qualified people than before — about half of the jobs involved NZCS or less. Perhaps this reflects a wish of employers, particularly for technician jobs, to seek to train people on the job, the inclusion of part-time positions, and, for managers and other responsible positions, to seek specific personal qualities rather than scholastic qualifications *per se*.

The number of jobs advertised for positions in Research Associations, Government Departments, Local Bodies and Academia are shown in Table 3. Research Associations include only those funded jointly by Industry and Government. Consequently, jobs in the Forest Research Institute and DSIR are included under Government Departments. The Malaghan Institute of Medical Research (Wellington) has been included in Academia.

Just as the Technician jobs in Industry required NZCS or NZCS trainees so, too, did the non-industrial vacancies for Technicians, whereas the research positions preferred degrees, usually with Honours or PhD. It should be noted that among those research positions offered in universities are a significant number of post-doctoral fellowships. The jobs advertised for positions in the universities were noted to be scattered through several departments such as Cell Biology, Zoology, Soil Science, Pharmacy, Animal Science and Biotechnology as well as in the more expected Chemistry and Biochemistry Departments.

Conclusions

Since the previous survey was carried out, three years have passed, and there have been some major upheavals in Government departments as well as in a number of non-Government industries. The results of this survey suggest that the jobs are still there, probably more than there were three years ago. Even after the sharemarket crash in October, the jobs were still being advertised in significant numbers. The competition for jobs, particularly for chemistry graduates in Industry, has possibly increased and the current economic climate may encourage employers to seek less qualified people where they can. On the other hand, the scope for jobs in the non-industrial sector seems to have increased. This, however, must be tempered with the knowledge that the effect of 'user pays' on the the DSIR, MAF and the Research Organizations has still to be seen.

As suggested two years ago, be prepared to look widely, to travel and to accept the challenges placed before you.

Acknowledgements

The assistance of Dr Robert MacLagan, University of Canterbury (scanning the Christchurch Press and the Education Gazette), Dr Don Cook, Tairawhiti Community College, Gisborne (scanning the Gisborne Herald), Mr Christopher Shaw, Cawthron Institute (scanning the Nelson Evening Mail) and Dr Chris Kirk, University of Waikato (scanning the Waikato times) is gratefully acknowledged. The encouragement of the Council of NZIC and the NZIC Manawatu Branch Committee is much appreciated.

Reference

1. I.D. Watson and C.R. Southward. Chem. in N.Z. **50**, 75-76 (1986).

Table 2 Jobs in Industry

Type	Number	University Degree	Degree or NZCS	NZCS	UE or 6th Form Certificate	Not Specified
Technician	337	8	79	63	93	94
Quality Control Person	56	5	29	2	9	11
Manager	84	24	28	10		22
Researcher	8	6	2			
Sales/Marketing[a]	47	5	13	5		24
Analyst	26	8	12	2		4
Development	35	13	13	4		5
Production	32	16	9	1	3	3
Consultant	2	2				
Design Engineer	2	2				
Not Specified	15	7	6	1	1	
TOTAL	**644**	**96**	**191**	**88**	**106**	**163**

Note:[a]: Sales/Marketing could also be considered as Commerce but is included here for the sake of simplicity.

Table 3 Jobs in Non-Industrial Employment

Type	Number	University Degree	Degree or NZCS	NZCS	UE or 6th Form Certificate	Not Specified
Research Associations						
Technician	15	1	3	1	8	2
Manager/Supervisor	3	3				
Researcher	11	10	1			
Analyst	2	2				
TOTAL	**31**	**16**	**4**	**1**	**8**	**2**
Academic[a]						
Technician	79	17	21	14	5	22
Manager/Supervisor	1	1				
Researcher	50	47	2		1	
Analyst	2	2				
Lecturer/Tutor	19	19				
TOTAL	**151**	**86**	**23**	**14**	**6**	**22**
Government Departments						
Technician	53		22	8	15	8
Quality Control Person	2	1	1			
Manager/Supervisor	2	2				
Researcher	27	23	1		1	2
Analyst	7	3	4			
Editor	1	1				
Patent Officer	5	5				
TOTAL	**97**	**35**	**28**	**8**	**16**	**10**
Local Bodies						
Technician	43	3	6	15	12	7
Quality Control Person	5	2	2			1
Manager	2					2
Researcher	13	8	4		1	
Analyst	4	3		1		
TOTAL	**67**	**16**	**12**	**16**	**13**	**10**

Note[a]: Includes tutors in Polytechnics, and medical research outside hospitals as well as post-graduate and post-doctoral fellowships for research in the universities.

First Genetically Engineered Vaccine in New Zealand

The worlds first genetically engineered Hepatitis-B vaccine produced in yeast instead of using human blood plasma is now available in New Zealand. The breakthrough process has halved the cost of vaccination compared with blood-based products, putting vaccination within reach of the large number of New Zealanders "at risk" but not covered by the Health Department's free immunisation programme for pre-schoolers.

The manufacturers, vaccine giants, Smith Kline and French, are confident that the new manufacturing process will be the forerunner of vaccine production in the future. Genetically engineered, Engerix-B, developed by Smith, Kline Biologicals in Belgium, involves a new method of extracting the antigen from the Hepatitis-B virus. The antigen is the part of the virus which prompts the body to produce protective antibodies after vaccination, but is not responsible for causing the disease. The antigens are reproduced in mass quantities using yeast cells.

Although production of a genetically-engineered vaccine, such as Engerix-B, requires a high level of expertise and a number of complex procedures, its manufacture is considerably less complicated — and inherently safer — than those required for the manufacture of plasma-derived Hepatitis B vaccines.

These plasma-derived Hepatitis B vaccines are made by extracting the surface antigen from the infected blood of chronic Hepatitis B carriers. These vaccines became available in the early 1980s and although they are effective, they have a number of drawbacks including high cost and short supply.

To ensure purity, plasma-derived vaccines require approximately 65 weeks processing and control time, compared to only about 10 weeks for the r-DNA vaccine. The supply of plasma-derived Hepatitis B vaccine also depends on the availability of suitable Hepatitis B-carrier blood, which may be difficult to obtain. By contrast, the supply of genetically-engineered Hepatitis B vaccine depends mainly on the industrial facilities that can be built and allocated to its production. Supply can be scaled up to meet demand.

BRANCH NEWS

Waikato

A joint meeting was held with the Institute of Professional Professional Engineers of New Zealand (Waikato Branch) on April 19th. The meeting was held at a local restaurant and had the theme "Engineering R & D". Following a very pleasant meal, a panel of speakers from various employment sectors relating to science, technology and engineering addressed the sixty-plus audience. Engineering (including chemical) activities at FRI, MAF (Ruakura) and from general Waikato commercial and business sectors were described, along with technology and engineering research, and teaching programmes at the University and Polytechnic.

Rex Gallagher, chairman of the local branch of NZIC, also addressed the gathering on an important local initiative: the proposal to establish a Science and Technology Park.

The evening offered a welcome opportunity for Institute members to mix with colleagues on a broader basis and consider issues of mutual interest.

Dr Robert Franich reports that the inaugural meeting of the Bay of Plenty sub-branch was held in March as planned and was a great success. About 35 people attended to hear **Professor Neidlein's** address, including some from Tauranga and Wairakei and some who had never attended a branch meeting before.

Manawatu

The first Branch meeting for this year took the form of a "working" dinner on 8 March. After feeding on sausages, lamb chops and salad, the participants were addressed by **Dr Susan Rodriguez** of the DSIR's Biotechnology Division on "Acidity in Wine." Dr Rodriguez described how the level of malic acid in wine may be reduced by a mutant strain of Schizosaccharomyces yeast, without affecting the level of sugar or the introduction of undesirable flavours. After tasting commercial wines that had been subjected to various deacidification processes, the meeting decided to postpone a second lecture that had been scheduled that evening.

"Separation and Characterisation of Glucosinolates in *Brassica*. Vegetables by Gas Chromatography-Mass Spectrometry" was the subject of a lecture given by **Dr John Shaw**, Biotechnology Division, DSIR, to a Branch meeting on 27 April. At least one hundred glucosinolates have been characterised from the plant family *Cruciferae*, which includes many important crops consumed by humans and domestic animals. Many of these compounds have both desirable and undesirable physiological properties. Dr Shaw described methods for the analysis of these compounds, that he developed during his recent stay at the US Food and Drug Administration Laboratories in Washington D.C. The glucosinolates, after being isolated from the plant material and derivatised, were separated by high resolution gas chromatography and the components identified and quantitated by negative ion chemical ionisation mass spectrometry.

Canterbury

The branch programme so far this year has been characterised by large attendances at meetings. A record 100 plus people attended the March meeting on the Antarctic, which also incorporated a barbecue. Over 50 members visited G.L. Bowron's Tanneries in February.

Otago

The Branch programme for 1988 began on 23 March with an address by **Professor Richard Neidlein** of the University of Heidelberg on "Developments and Results in Pharmaceutical Chemistry and the Pharmaceutical Industry". This was followed on 20 April by a visit from **Professor Rubin Battino** of Wright State University, Ohio, who gave a lively series of demonstrations on "Interesting and FUN Ways to Teach Chemistry".

As part of Focus on Science and Technology Week the Branch has organised a poster competition for school pupils on the theme "Chemistry in Our World".

OBITUARY

Mr Rick Heighley died on 19 April in Melbourne, aged 43. He was in Melbourne for surgery for cancer, but did not survive the operation. He leaves behind his wife, Marie, and three children.

Rick was General Manager of Beta Chemicals, East Tamaki, and an enthusiastic Institute member. He was an Auckland branch committee member in 1985/86 and a lecturer for the NZIC polymer group courses. His specialty topic was neoprene adhesives. He will be sadly missed by those who knew him.

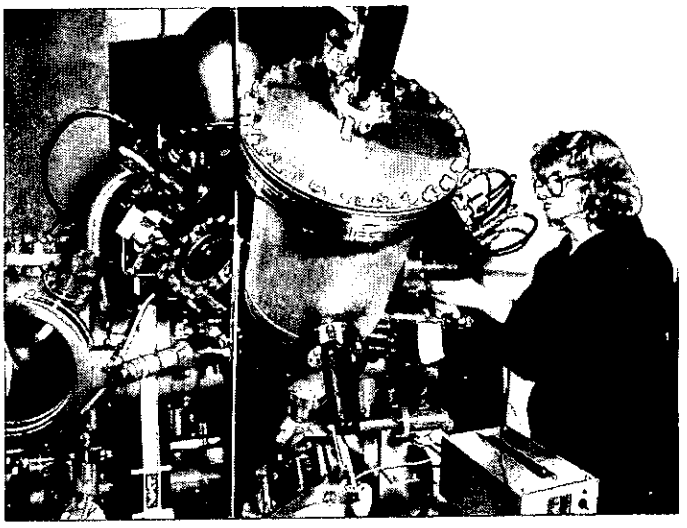
UNIVERSITY AND TECHNICAL INSTITUTE NEWS

Research Centre For Surface And Materials Science

A powerful new instrument for analysing surfaces is being installed at the University of Auckland. The instrument, a Kratos XSAM 800 XPS/Auger spectrometer is the first of its type in New Zealand. It will be set up in the School of Engineering with a suite of related instruments in a laboratory to be known as the Research Centre for Surface and Materials Science.

The facility represents an investment in excess of $800,000 and funding was obtained from university sources, as well as grants from the University Grants Committee, New Zealand Steel Ltd, the Building Research Association of New Zealand, the Industrial Processing Division of DSIR, and New Zealand Aluminium Smelters Ltd. The project leaders are **Professor Barry J Welch**, Chemical and Materials Engineering Department, and **Dr Jim Metson**, Chemistry Department. The installation will be complete and the instrument will be fully commissioned by June, and it is planned to offer a full service to University research workers and the sponsoring bodies, as well as undertaking projects in surface analysis for outside clients in local industry through the Applied Research Office of Auckland University.

The instrument consists essentially of an ultra-high vacuum chamber in which a sample is placed by transfer through a secondary vacuum chamber. The ultra-high vacuum allows electrons emerging from the surface of the sample to be captured and their energies measured with high precision. The electrons are ejected from the surface by using an X-ray beam of controlled energy. This technique is known as XPS, X-ray photoelectron spectroscopy, and is capable of detecting surface atoms and determining their chemical nature with high sensitivity. An alternative approach, the scanning Auger micro-probe, makes use of a scanning electron beam to initiate electron emission from the sample. By this means a map of the surface will be obtained, showing the distribution of the chemical elements with a resolution of one tenth of a micrometer. An ion gun mounted in the analysis chamber can be used to strip atoms from the surface, exposing the sub-surface layers which can then be analysed, so building up a depth profile of the chemical composition of the sample.



The techniques can be used to examine the surface of almost any solid sample, ranging from minerals, plastics, paints, bones and teeth, to metals, alloys and semiconductors. The XPS/Auger system is ideally suited to investigating paints and other surface coatings, metallurgical problems, adhesion between solids, corrosion and passivation of metals, surface segregation in alloys, composition of minerals and ceramics, atmospheric aerosols, and industrial catalysts. In the past, the high capital cost and the absence of a semiconductor industry in New Zealand have delayed the acquisition of instrumentation of this type. Now that the first modern surface analysis instrument will be available at Auckland University it is envisaged that the techniques will become better known in research and technology, and there will be a strong demand for access to the instrument. The University will arrange seminars and training sessions in these techniques later this year.

Auckland

Professor Con Cambie will be attending the International Symposium on the Chemistry of Natural Products in Kyoto, Japan, in May. While there, he will present a poster on sponge natural products. After the symposium, he will spend a few days at the Chinese University of Hong Kong at Shatin, where he will consult with some members of the biochemistry department with whom he is collaborating.

Professor N Tanaka of the University of Tokyo is visiting the University of Auckland Department of Chemistry until September. His field of research is fern chemistry and while here, he is studying extracts from the Fijian species *Agathus Vitiensis*.

Dr A J Pratt from the Dyson Perrins Laboratory of the University of Oxford will be visiting the department from 27 June to 12 September.

The book "Economic Native Plants of New Zealand" by the late Stan Brooker, Professor C Cambie and R C Cooper is now available through the Botany Division, DSIR, Christchurch.

Waikato

The week April 27-May 3 saw a range of exciting "Focus on Science" activities on campus and in the community, not the least of which was the escorting of 1100 Waikato secondary and intermediate school pupils on guided tours of the University of Waikato campus; all in one day! With the help of senior DPhil and MSc students however, the visits were a great success.

Visiting pupils showed a high level of interest in the special displays put on; in particular, the bovine sperm display, the simulation of weather and erosion in the flume room, and the remote operated underwater camera demonstrations were popular.

Dr Louie Gommans, a student for eight years at the University of Waikato, visited during April after returning from a 12 month Post-Doctoral Fellowship at Oxford University. Louie worked with Dr Steven Davies on asymetric syntheses using iron carbonyls, and spoke highly of the competitive working atomosphere at Oxford.

Women In Science

The School of Science at Waikato University has a policy of active recruitment of all representative groups into scientific study and was very pleased to work with the Vocational Guidance Centre of the Department of Labour on a 'Women in Science' day.

Approximately 80 sixth and seventh form girls were invited on campus to tour the School of Science and take part in a panel discussion. The tour was designed as 40-minute sessions chosen in two of the six sciences (biological sciences, chemistry, computer science, earth sciences, mathematics and physics) and tried to provide "hands-on" experience in the laboratories with contact with women lecturers and graduate students.

The panel consited of four women employed in various fields of the sciences both at the University and in the public sector. It discussed a series of questions on the motivation of women in science, the qualifications they require and equal career opportunities for women.

Massey

Dr Gavin Hedwig was awarded the 1988 Claude McCarthy Fellowship. He is going to the University of Bergen, Norway, to undertake measurements of the speed of sound in aqueous solutions of small peptides. This is part of an on-going investigation into water-peptide interactions that has been carried out at Massey University for some time. While in Europe, Dr Hedwig will attend the 10th IUPAC Conference on Chemical Thermodynamics, held in Prague, Czechoslovakia, early in September.

Dr Joyce Waters and **Brian Anderson** have been seconded, for 50% of their time, to the Computer Science Department.

On 6 April, a meeting for high school teachers was organised to coincide with the visit of **Professor R Battino** of the Chemistry Department, Wright State University, Ohio. Professor Battino spoke on the topic "The teaching of chemistry is fun." Over 50 people attended his lecture which was illustrated with demonstrations, videos and skits.

Cont on page 67

GOVT DEPTS & RESEARCH INSTITUTES

New Director for DSIR Industrial Processing Division

Mr Eric Beanland has been appointed Director of the Industrial Processing Division of the DSIR. IPD is one of the leaders in demonstrating success with the government's "user-pays" policy now applied throughout DSIR, and Mr Beanland has been Assistant Director of the Division since its inception in 1978. In his new position, Mr Beanland expects the close liaison between IPD's staff and industry to expand business opportunities for the Division; already 40% of the Division's funding comes from commercial clients.

Mr Beanland joined Chemistry Division of DSIR in 1966, bringing with him 20 years' commercial experience in research management of chemical process industry in the United Kingdom. He has been instrumental in promoting and developing new processing industries using New Zealand resources, and in particular was directly involved in setting up DSIR's National Pilot Plant Centre and the promotion of process engineering research which led to the formation of IPD.

As Assistant Director of the new division when it was formed, he was largely responsible for administration and planning and many facets of the industrial liaison activity that formed the basis of IPD's present successful involvement with New Zealand industry. The Division's work includes chemical engineering and the application of engineering and materials science in such areas as biotechnology, chemical, mineral and materials processing, metallurgy, and corrosion measurement and control.

"IPD has led the way in the application of the Government's 'user-pays' principles within DSIR", said Mr Beanland. "A measure of our success has been the high level of funding we have obtained from our commercial clients. Much of the required work has been of a short-term nature; we are, in effect, living partly on our capital of knowledge obtained by long-term strategic research Continuation of active programmes of long-term research is essential for continued industrial development and for informed planning of the use of New Zealand's resources".

"New Zealand has relatively few big industries willing to fund research at a level where long-term stable development is assured. We see a strong case for the combined cooperation of industry, Government and venture capitalists in promoting the necessary increase of funding if New Zealand is to be competitive in world markets in the chemical and biochemical processing industries.

"New Zealand has some world-class research engineers and scientists responsible for developments which are making a name for New Zealand in a number of industries where the rewards for New Zealand far outweigh any monetary return to DSIR. These people are a valuable resource and deserve adequate support and every encouragement if New Zealand industry is to remain competitive in new and existing markets".

Tom Marshall

The out-going Director of IPD is **Tom Marshall** who retires from the position after almost 40 years service with DSIR.

Mr Marshall has seen many changes in DSIR through his career, having started with Dominion Laboratory working in what would now be considered totally unacceptable facilities, through the move to Gracefield in the 1960's, the formation of Industrial Processing Division in 1978 and his appointment as the director, to its establishment in its present fine buildings in the past few years. Staff numbers under his control have grown from a mere handful in the Metallurgy and Chemical Engineering sections of Dominion Laboratory in the 60's, to a unit of more than one hundred encompassing a wide range of disciplines and providing a well-balanced and highly professional research and development service.

Service to the nation in the promotion of industrial development, has been the foremost objective during his time with DSIR. The major industrial developments in which he has played a part would be a credit to anyone. Unfortunately that contribution and that of DSIR as a whole was too frequently not given due recognition.

From his work at Onekaka attempting to smelt titaniferous ironsands grew one of New Zealand's major industries, New Zealand Steel Limited. Without the contribution of technical expertise from Mr Marshall, coupled with the commercial and managerial expertise of Sir Woolf Fisher, and the enthusiasm of them both, there would be no New Zealand steel industry. The original plant was an excellent example of technology and scale appropriate for resource development in New Zealand.

Mr Marshall's investigations into the performance of metals and the avoidance of corrosion problems in geothermal development resulted in numerous publications and in international recognition. Credit is due to him for the continued high availability of the Wairakei power station, another New Zealand pioneering achievement.

His more recent work has yet to result in full-scale industries, but some of these could still come to fruition. Utilisation of South Island ilmenite sands is imminent. Anode carbon production from Buller coals may yet come to pass, and development of the coalfield at Ohinewai is only a matter of time. The role of Industrial Processing Division led by Tom Marshall in these projects should not be forgotten.

The personal qualities Mr Marshall brought to all these endeavours and exercised in his various management roles within DSIR must not be overlooked. Mr Marshall was noted for his powers of concentration, tenacity, willingness to put in long hours, and perserverance, without which IPD would not be the nationally recognised institution it is today.

At a farewell function in his honour, Dr A J Ellis, director-general of DSIR, congratulated Mr Marshall on his outstanding career in science and engineering and wished him a long and enjoyable retirement.

AIDD, DSIR

Les Boulton of the Engineering Materials Group, recently completed a study tour of five research institutions in Canada and the UK, on a RSNZ Prince and Princess of Wales Science Award. He visited the Vancouver (B.C.) Laboratories of PAPRICAN, the Ontario Research Foundation in Toronto, and the Metallurgical Engineering Dept. of the University of British Columbia, in Canada. In the UK, the Thin Layer Activation Unit (TLA) at the Harwell Laboratories of AEAUK was visited, in relation to DSIR's interest in this technique, and some time was spent at UMIST Corrosion and Protection Centre and CAPCIS, the largest industrial corrosion centre in Europe. Funding of these institutions was one aspect of their operations which was investigated during the visits.

NZ Soil Bureau, DSIR

The Bureau is currently undergoing a re-organisation of its managerial structure and financial planning/control systems. As part of this reorganisation, under new Director, **Derek Milne**, a "Divisional Management Group" has been set up consisting of the Director, Deputy Director (**Norman Wells**), two Science Managers (**Rod Furkert**, Central; and **Alastair Wilson**, Districts), and two Marketing Managers (**Dave Leslie**, International; and **Harry Percival**, New Zealand). The Science Managers have the primary role of initiating and administering a new project-based system of scientific programming, staffing, and financial control. It is expected that the new structures will improve the Bureau's operational and marketing effectiveness in the current commercially-oriented environment, while maintaining a commitment to long-term research efforts in other areas.

In the new project system **Cyril Childs** is the Project Leader "Mineral Formation and Soil Developments" and **Kevin Tate** Project Leader "Soil Fertility, Biological Processes and Plant Growth".

The Member Bodies Committee of The Royal Society of New Zealand recently elected **Harry Percival** as a Member Bodies' Councillor to the Council of the Society for a 3-year term (1988-91).

Continued next page

GOVT DEPTS Continued

NZ Soil Bureau, DSIR

Jock Churchman returned at the end of January from a 6-month study period at the School of Agriculture, University of Western Australia, Perth, where he worked with the Soil Science and Plant Nutrition Group. Jock took advantage of the ancient deeply weathered granites near Perth to test ideas developed in New Zealand about the relationship between halloysite and kaolinite, particularly the slow conversion of halloysite to kaolinite. While there he took the opportunity to study the fine micro-porosity of halloysite — and kaolinite-rich soils from both Australia and New Zealand, using the laboratory's gas sorption apparatus. Using the same apparatus, Jock was also able to study the surface areas of a range of New Zealand subsoils.

Benny Theng departed for the People's Republic of China on 10 May for a month, to give a series of lectures at the Institute of Soil Science, Academia Sinica, in Nanjing. The trip relates to an invitation initially issued in 1985. While in China, Benny will also look at land instability problems in Guizhou Province and give additional lectures at Nanjing Agricultural University and at the Institute of Soils and Fertilisers in Beijing.

NECAL, Dept of Health, Auckland

Dr Alistair Bingham is spending 3 months in Germany on a DAAD Fellowship. Most of the time will be spent furthering the group's interest in dioxin research, in the laboratory of Professor K Ballschmiter, Universitat Ulm. Dr Bingham will also be attending the international conference Dioxin 88, which is being held in Umea, Sweden, in early September. Results from the study of dioxin emissions from motor vehicles will be presented.

We were delighted to learn recently of the success of one of our technicians in the 1987 AAVA Chemistry V examinations. **Harshila Narsey** was first equal in the Auckland region with **Debra Nairn** of Chemistry Division DSIR, and these two shared the Auckland Branch NZIC prize.

Dr Tony Betts has been appointed a Scientist in the Environmental Chemistry Section of NECAL. He recently returned to New Zealand after nearly 2 years post-doctoral research at the Corrosion and Protection Centre of the University of Manchester Institute of Science and Technology. During this period the localised corrosion of stainless steel was investigated using electrochemical methods.

Chemistry Divn, DSIR, Auckland

Barry Axon of Chemistry Division has just returned from a year's study leave in the United Kingdom. He spent the time at the Ministry of Defence Royal Armament Research and Development Establishment at Fort Halstead near Aldermaston, where there is a small group which specialises in forensic investigations of explosives cases. While there, he researched the trace analysis of explosives and observed their operating procedures to become familiar with how they work. This visit grew out of the Rainbow Warrior case. The DSIR was able to get some traces of explosives, but found it did not have the expertise to analyse them and to interpret the results. Barry took the samples to R.A.R.D.E. and had them analysed, and realised that the DSIR needed more expertise in this area. He feels that the year's study leave has enabled him to bring back to New Zealand a wealth of new techniques and a much better understanding of the explosives field.

Dr Peter Nelson, Government Analyst at Auckland, was recently honoured for the best paper published in the British Forensic Science Journal. The award was presented at a function in Auckland by **Sir David Beattie**. Dr Nelson shares the prize with three co-authors, **Mrs Anne Kristemaker, Dr Trevor Crosby** and **Dr Charles Watt.**

John Buckledon of Chemistry Division, DSIR, is travelling to the United Kingdom in May and returning at the end of the year. He will be spending the time at the Home Office Central Research Establishment at Aldermaston. While there, he will be researching the interpretation of physical evidence using artificial intelligence programmes.

UNIVERSITY NEWS Cont. from page 65

Canterbury

Dr Peter Harland is on leave until March next year. He is working with Professor Philip Brooks at Rice Quantum Institute, Houston, Texas, using crossed molecular beam techniques to study collisions between alkali metal atoms and symmetric top molecules.

The department is hosting three Erskine visitors during the teaching year. **Dr Mark Florence** from CSIRO Division of Fuel Technology at Lucas Heights, returned to Australia at the end of April after a two month visit. **Professor Kyle Bayes**, Department of Chemistry, UCLA, arrives in early July for three months, and **Professor Ian Scott**, Texas A & M, will be here for six weeks from mid-July.

Christchurch Polytechnic

A two day seminar on polymer science was held in April by ChCh Polytechnic in conjunction with the Plastics Institute of NZ (South Island Affiliate). Twenty people from the industry attended, including foremen, diemakers, middle managers and company managers. The seminars consisted of lectures and laboratory practical work and the lecturers were **Dr Selwyn Maister** of ChCh Polytechnic and **Mr John Prentice** of Auckland. Further seminars to cater for the large number of industry people requiring training, are planned.

Otago

Dr Chris Pope and **Dr Lyall Hanton** returned from leave at the start of this year. **Dr Dave Fenby** presented a paper on "Science in Mid-Victorian Australasia" at a Royal Society - Royal Institution conference on Anglo-Australian Science, 1788-1988, in London in January. **Dr Jim McQuillan** and **Jonathan Love** presented work at the 7th Australian Electrochemistry Conference in Sydney in February.

Dr Jonathan Kim has taken up a post-doctoral fellowship with Dr Keith Hunter. Dr Kim recently completed his PhD in marine chemistry with Dr William Fitzgerald at the University of Connecticut.

Professor Bryan Jones of the University of Toronto visited on 8 March and spoke on "Enzymes in Organic Synthesis". Another Canadian visitor was **Professor John Bertie** of the University of Alberta who gave a 14 April talk on "Structures and vibrational spectroscopy of 'simple' solids: The many phases of ice and the three hydrates of ammonia".

During Focus on Science and Technology Week the Chemistry Department held an Open Day on 29 April during which **Dr Ross Grimmett** staged several presentations of "It's a Gas", a popular series of demonstrations. **Professor David Buckingham** also presented an Open Lecture on 3 May entitled "Chemistry is FUN".

The Biochemistry Department has enjoyed a good number of visitors from abroad over the last three months: **Professors Robert Tijan** and **Jasper Rine** from the University of Berkley and **Drs. Volker** and **Petra Novotney** from the Max Planck Institute for Molecular Genetics in Berlin. Also visiting have been **Professor Akira Kobata, Professor Peter Campbell** and **Dr David Thames.**

Several Biochemistry students have completed PhD studies and have gone on to post-docs. **Paul** and **Teresa Jones** to the University of Michigan, **Jacqui Knight** and **Craig Marshall** to Cambridge, the latter to work with Professor Robin Carrell with assistance from a Wellcome Research Fellowship.

A personal chair has recently been awarded to **Associate Professor Pat Sullivan**, distinguished for his work on candida albicans.

Professor Jim Mann of the Department of Human Nutrition, Faculty of Consumer and Applied Sciences (formerly the Faculty of Home Science) took up his appointment early this year. **Professor Marion Robinson** of that Department recently received the prestigious McCollum Award from the American Society of Clinical Nutrition.

WORK WANTED

We have had enquiries from two Hungarian refugees, currently resident in Austria and seeking permanent employment in New Zealand. One is a chromatographer with 13 years experience in the pharmaceutical and environmental fields. The other is a technician with 10 years experience in a variety of industries including printing plate manufacture and a galvanising plant.

Anyone interested in doing their bit for international relations can obtain further information from the editor.

Membership Changes; 11 May 1988

Fellow:

BEST, Philip Graham, BSc. Dept of Statistics, Wellington. (Marketing Manager).

BURNS, Donald Jeffrey Waugh, BSc(Hons)(Cantuar) PhD (Auck). Dept. of Hort. & Processing, DSIR, Auckland. (Asst. Director).

FRENCH, George, HNC. NZ Aluminium Smelters Ltd, Invercargill. (Superintendant, Laboratory Services).

GRIGOR, Murray Robert, BSc Hons)(Cantuar) PhD (Otago). Biochemistry Dept, University of Otago. (Assoc Professor).

McCONNON, Peter Alan, MSc (NZ). Aorangi Laboratories Ltd, Dunedin. (Managing Director).

MELTON, Laurence David, MSc(Auck) PhD(Simon Fraser). Dept of Food Science, University of Otago. (Snr Lecturer).

ROBINSON, Brian Harford, BSc(Hons) PhD(Cantuar). Chemistry Dept, University of Otago. (Professor and Chairman).

SIMPSON, James, BSc(Hons) PhD(Sthhmptn). Chemistry Dept, University of Otago. (Assoc. Professor).

TATE, Warren Perry, MSc PhD(Well). Dept of Biochemistry, University of Otago. (Assoc. Professor)

WHITE, Robert Edwin, BAgr. Sc. DPhil(Qld). Dept of Soil Science, Massey University. (Head of Dept and Director of Fertiliser Res.)

WHITNEY, Robert Stephen, BSc (Hons)(UWIST) PhD (Essex). Coal Res. Org. NZ Lower Hutt. (Director).

Member:

BOUMEESTER, Michael John, NZCS. W Grayson & Associates Ltd, Auckland. (Laboratory Manager).

DAVIDSON, Michael Thomas, NZCS. Wilsons (NZ) Portland Cement Co Ltd, Portland, Northland. (Works Chemist)

GREEN, John Charles, MA(Oxon) PhD (Leeds) MRSC C.Chem. Kristin School, Albany, Auckland. (Chemistry Teacher).

McDONALD, Kieran Melrose, BSc(Hons)(Well). Shell Oil NZ Ltd, Wellington. (Chief Chemist).

MARTIN, Wilhelmina, BSc. Horticultural Research Centre, MAF, Levin. (Chemist).

METCALFE, Loyola Joann, BSc(Hons)(Dalhousie) MSc (Halifax). Shirley Boys' High School, Christchurch. (Teacher).

Re-admission as Member:

COWELL, Bernard James, NZCS MSc(Auck). Northern Pulp Ltd, Kaitaia. (Chief Chemist).

Member from Graduate:

BARTON, Richard Harlow, MA MSc(Auck). Chemistry Dept, University of Auckland. (Research Technician).

CHAMBERS, Mark Vernon, BSc(Hons)(Cantuar). Empire Rubber Mills Ltd, Christchurch. (Chemist)

CRAWFORD, Karl Francis Michael, BSc DipSci(Otago). Unilever (NZ) Ltd, Petone. (Laboratory Supervisor).

DOLAN, Laurence Patrick, MSc(Cantuar). North Canterbury Hospital Board, Christchurch. (Quality Control Officer).

HALLIWELL, Robert John, MSc(Waik). Dulux Ltd, Auckland. (Technical Officer).

HAY, Michael Patrick, BSc Hons)(Cantuar). Chemistry Dept, University of Canterbury. (PhD Student).

HERBERT, John Michael, MSc PhD(Auck). School of Chemical Sciences, University of East Anglia, Norwick U.K. (Snr. Res. Asst.)

HORNE, Margaret Lynette, BSc(Hons)(Massey). NZ Pharmaceuticals Ltd, Palmerston North. (Research Chemist).

McLELLAN, Gavin David, MSc PhD(Auck). Chemistry Dept, University of Glasgow, Scotland. (Research Asst.)

O'CONNELL, Michael James, BSc(Hons) PhD(Cantuar). Chemistry Dept, University of Bristol, England. (Post-Doc. Res. Asst)

van EYK, Stephen John, BSc(Hons). Chemistry Dept, University of Canterbury. (PhD Student).

WHEATCROFT, Annette Joy, NZCS BSc. Diocesan School for Girls, Auckland. (Teacher).

WONG, She Tin, MSc(Auck). Chemistry Dept, University of Auckland. (PhD Student).

YOUNG, Leslie, MSc(Auck). Spectrum Laboratories Ltd, Wairaka, Auckland. (Project Analyst).

Member from Technician:

GREEN, Roger Francis Bryan, NZCS. The Tasman Tanning Co. Ltd, Wanganui. (Special Projects Manager).

Associate, Graduate or Technician:

BONSELL, Mary Heather, BSc. Pomona RD, R.D.1, Upper Moutere (Apple packer)

CRUMP, Michael Edward, NZCS. Chemistry Divn, DSIR, Taupo. (from Technican). (Technician)

KENNY, Frances Mary, Dip. Anal. Sci. (Ireland). Smithfield Freezing Works, Timaru. (from Technician). (Chemist).

LEVICK, Susan Meira, BSc (Hons)(Cantuar). Industrial Process Divn, DSIR, Lower Hutt. (Scientist).

LOULANTING, Arthur Fatu, NZCS. Dulux Divn. of ICI Auckland. (Production Supt.)

HARRISON, Neil Robert, NZCS. Southland Co-op Phosphate Co. Ltd, Invercargill. (Snr. Technician).

TOWN, Raewyn May, BSc (Hons)(Cantuar). Chemistry Dept. University of Canterbury. (PhD Student).

Deaths:

M T Hunter; D J Tennent (Canterbury) C J Highley (Auck)

Resignations:

J M Readman (o/s); R O Weenick (Waikato); J B Stott (Cant); D J Hawke (Otago).

Chemical Education Trust

Report For Year Ending April 30, 1988

The Chemical Education Trust was formally established on 10th July 1987 with the sealing of a Deed between the New Zealand Institute of Chemistry Inc. and the Trustees. The sealing of this Deed was the culmination of lengthy discussions concerning the best way for the Institute to achieve its objective of funding "such educational charitable purposes as the Trustees may from time to time elect and in particular broadening, promoting, stimulating and increasing the interest and participation of both students and teachers in the physical sciences in general and chemistry in particular."

The Institute has, of course, for many years fostered the broad objectives which are laid down in the Deed but this has been on a somewhat sporadic basis and has been dependent on the particular interests of branch committees and the funds available to them. The various activities are much too numerous to detail but have included competitions, demonstrations, lectures and practical exercises, while the National Chemistry Week in August last year is a fine example of what can be achieved. Also the publication of "Chem N.Z.", and Chemical Processes in New Zealand" are indications of ways in which the teaching profession can be assisted.

Because of the fact that all these activities were uncoordinated and without any specific budgetary provision, it was decided in 1985 to create a special grade of company membership with the fees from such members being directed primarily toward the educational field. More mature consideration, however, brought the realisation that the establishment of a Trust Fund would permit a clearer understanding of how the funds should be applied. Also it was realised that donations to an approved charitable trust would be deductible for taxation purposes.

The fund was started by a contribution of $20,000 from the reserves of the Institute and subsequently appeals were made to individual Institute members and to companies which might be expected to have an interest in chemistry. The response of members has been very gratifying and is the more so since some have undertaken to make payments on a regular basis for some years ahead. Contributions from companies have been disappointing but a further approach is now in hand. A recent opportunity was taken to explain the activities of C.E.T. to members of the Chemical Industries Council and an appeal is currently being made to them.

Overall the fund now stands at approximately $40,000 and a payment of $400 to each of the six branches is being made during the current year. This may be taken as a token payment with the primary purpose of drawing attention to the C.E.T. and giving an indication of future possibilities. The Trustees have no specific plans for support of individual objectives and look forward to receiving suggestions from branches, It is realised that these may relate to activities within the branches or may be countrywide.

The Trustees of the C.E.T. must, in terms of the NZIC by-laws, be former Presidents of the Institute and the duties and responsibilities of the Trustees are clearly defined in the Trust Deed. At its meeting of 28 April 1987 the Standing Committee of Council ratified the appointment of Professor G.N. Malcolm, Professor G.B. Petersen and Mr A.W. Mackney as inaugural Trustees.

A W Mackney
CHAIRMAN OF TRUSTEES
G N Malcolm TRUSTEE

BOOK REVIEWS

HAZARDS IN THE CHEMICAL LABORATORY. 4TH EDITION. Edited by L. Bretherick. Royal Society of Chemistry. London 1986. xiv ⅞ 604 pp. ISBN 0-85186-489-9. $A67.50.

This publication must be by now the standard "safety" reference in many laboratories. The most useful section is Chapter 8, or the "Yellow Pages", which takes up two thirds of the entire volume with detailed information on some 490 "hazardous chemicals". The materials included are either flammable, explosive, corrosive and/or toxic substances or groups of substances commonly used in chemical laboratories. For each entry a brief description is given of the hazardous properties and effects on the human body of the material, along with first aid and fire-fighting procedures, and suggestions for dealing with spillages. Those materials which are known or suspected to be carcinogenic in man are noted. Reactivity hazards are also briefly covered, along with references to the relevant entries in the *Handbook of Reactive Chemical Hazards* (L. Bretherick, 3rd edition, Butterworths 1985).

Other sections of the book are taken up with topics such as the (UK) Health and Safety at Work Act 1974, Safety Planning and Management, Fire Protection, Reactive Chemical Hazards, Chemical Hazards and Toxicology, Health Care and First Aid, Precautions Against Radiations, and "An Americal View". This latter chapter is an attempt to discuss briefly, the significant differences between UK and USA safety legislation, and will probably be of only passing interest to most readers in New Zealand. Likewise the earlier chapter on the detail of the UK legislation. These are only minor considerations however; the majority of the book contains much that is as relevant to the local scene as it is overseas.

For anyone looking for a basic text on chemical safety, or to start up a collection on the subject, this would make an excellent first purchase. Those readers who already have the third edition may wish to update it, or perhaps it is so well thumbed that it needs replacement anyway! Note though that the only major changes five years on, are those relating to UK and EEC legislation.

B W Graham

CONCISE CHEMICAL & TECHNICAL DICTIONARY. 4TH EDITION. Edited by H.Bennett. Edward Arnold, London 1986. xxxviii + 1271 pp. ISBN 0-7131-3584-0. 85.

To quote from the Preface to the first edition: "This is a dictionary for both professionals and laymen: chemists and engineers in all industries, technical workers of all trades, manufacturers, importers, brokers, salesmen, teachers, librarians, students of all professions, and every intelligent person who wants to understand what he is reading when he comes across a technical expression in a book, newspaper or advertisement of a chemical product." A bold claim! - but with nearly 100,000 entries this extensive compilation probably goes a significant way towards achieving it.

The entries in the dictionary can probably be classified into three categories — chemical compounds, technical terms, and trade names. For the former the information given includes chemical name, synonyms, semi-structural formula, molecular weight, some basic physical properties, and uses. Technical terms are covered by a brief but generally adequate (?) definition (eg. Air Pollution: Air containing gaseous and/or particulate matter in excess of normal dry air). By far the greatest amount of coverage appears to be given to trade names, and here the standard of treatment is quite variable. Thus we are told that Air-Fresh is a deodorizer, and Zzzott (the last entry) is a bleach. By comparison Airflex 720 is a vinylethylene terpolymer, Dowtherm A is a mixture of diphenyl and diphenyl oxide, and Zoamix is, or contains, 3,5 dinitro-o-toluamide.

If one has a frequent need to find out the composition or identity of commercial products this dictionary will probably be of some value - provided one has the necessary technical background to be able to fill in the "gaps". If it wasn't for the price the chemical entries would qualify this as a poorman's Rubber Handbook. The definitions of technical terms are not dealt with as well as in some more authoritative publications but are more or less adequate.

There are not many books available with extensive treatment of chemical trade names, as this one has. It can probably be given a firm recommendation on that basis alone.

B W Graham

Deterioration in Buildings

A one-day symposium organised by the Australasian Corrosion Association, University of Auckland, **5 July 1988.**

The Australasian Corrosion Association is conducting a symposium on the Deterioration in Buildings to inform and increase the awareness of the non specialist of the corrective measures available. We believe we are covering all aspects of buildings, the speakers are specialists in their fields and have been selected for their independence and impartiality.

We have been fortunate to obtain the services of Professor Brian Cherry of Monash University, Australia, as a main speaker, and the financial assistance of Construction Techniques Ltd is appreciated.

The course aims to inform the non specialist on all aspects of the topic and to widen the knowledge of specialists in allied fields to their own. The speakers will structure their presentations accordingly.

For further information contact the ACA, PO Box 5961, Auckland

CONFERENCES

NZIC/NZBS CONFERENCE

Registration forms for this year's Conference were posted to Institute and Society members in April. All participants to the Conference should have returned their completed forms by now to Mr Mark Pritchard, the Conference Secretary. Further registrations, together with the late fee however, will be accepted. Please note that most of the programme takes place at the Teachers' College, Palmerston North.

Contributions to the symposium marking the forthcoming retirement of **Professor Dick Batt** from the Chair of Biochemistry at Massey University will be given by;

Dr Tony Roberton, Department of Biochemistry, University of Auckland

Dr Christine Winterbourne, Clinical Biochemistry Department, Christchurch Clinical School of Medicine

Dr John Robertson, Biotechnology Division, DSIR, Palmerston North

Dr Terry Thomas, NZ Dairy Research Institute, Palmerston North

Dr Grattan Roughan, Division of Horticulture and Processing, DSIR, Auckland

Dr Kathy Crow, Department of Chemistry and Biochemistry, Massey University, Palmerston North.

AGMs of the NZIC and NZBS specialist groups will take place from 5.30 - 6.00pm on Thursday 25 August. The AGM of the Institute of Chemistry will follow these meetings, until 6.45pm.

A full programme of evening social events has been planned. A Trades Mixer at the College will take place on Tuesday 23 August between 6 and 10pm. The Conference will be opened by the Mayor of Palmerston North, **Mr Paul Rieger**, at 6.00pm on Wednesday 24 August. This ceremony and the following Presidential Address and Massey University Vice-Chancellor's Buffet will take place at the University. Following the Institute's AGM on Thursday, the Conference Dinner will be held at the Racecourse Eulogy Room. Transport will be provided to all events not held at the Teachers' College.

Conference Extravaganza For Macrocyclic and Bio-inorganic Chemists

A veritable cornucopia of conferences is to be held in Australia from 25 June to 13 July 1989, for macrocyclic and bio-inorganic chemists and those in related research areas. The full list of meetings is given below. Further details are available from the editor.

* XXVII International Conference on Coordination Chemistry: July 2-7, 1989, Gold Coast, Queensland; convenor ICCC Secretariat.
* XIV International Symposium on Macrocyclic Chemistry: June 25-28, 1989 in Townsville; convenor Prof. L.F.Lindoy.
* Symposium on Marine Bio-inorganic Chemistry: June 29-July 2, 1989 at the Heron Island Research Station; convenor Prof. C.J.Hawkins.
* 9th International Conference on Proteins of Iron Storage and Transport: July 9-13, 1989 in Brisbane; convenor Prof. L.W. Powell.
* Symposium on Metal Compounds in the Detection and Treatment of Cancer: July 10-12, 1989 at Marysville, Victoria; convenor Dr I.A.G.Roos.
* Symposium on Applied Organo-metallic chemistry: an entry to the New Technology: July 10-12, 1989 in New South Wales' Hunter Valley; convenor Dr A.F.Masters.
* Biennial Conference of the Chemical Education Division of the Royal Australian Chemical Institute: June 26-28, 1989 in Brisbane; convenor Dr P. Pomery.

Speciality and Petroleum-based Chemicals in Asia-Pacific — Technology and Industrial Development -

A multinational conference of academic chemists, industrial chemists, chemical industrial executives, planners, financiers and regulators will be held in Hong Kong and Guangzhou, China from **12 to 17 December 1988.** The conference has as its theme — "Speciality and Petroleum-based Chemicals in Asia-Pacific - Technology and Industrial Development" as it will focus on the scientific and industrial development of speciality and petroleum-based chemicals in Asia-Pacific, particularly in developing countries.

The conference is organized by Hong Kong Chemical Society, co-organized by Royal Society of Chemistry, Chinese Chemical Society, Chinese Association for Science and Technology and their branches in Guangdong Province. It is supported by Zhongshan University, The British Council and many chemical companies. The conference has invited leading chemists — including some Nobel Prize winners, prominent chemical industrialists, and senior government officials with scientific and industrial responsibilities to make keynote speeches or present papers. It will be the first of possibly a series of multinational events to be jointly organized by Hong Kong Chemical Society in co-operation with Royal Society of Chemistry.

The conference will cover petroleum-based chemicals and speciality chemicals including but not limited to plastics, synthetic rubbers, synthetic fibres, coatings, adhesives, surfactants, agricultural chemicals, pharmaceuticals, dyestuffs, fragrances, pesticides, household chemicals, and chemical reagents with regard to:

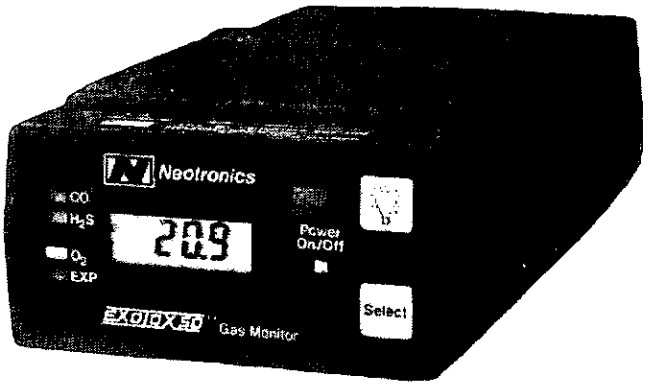
(1) New products, new processes and new techniques
(2) Future development of the science and the industry
(3) Chemistry and the chemical industry in nation-building
(4) Environmental protection
(5) Industrial, occupational and product safety
(6) Planning and management
(7) Financing
(8) Human resources and technology development
(9) Quality assurance and analytical procedures

The conference will be held in the brand-new Hong Kong Convention and Exhibition Centre (HKCEC) from 12 to 14 December and in the China Hotel in Guangzhou on 16 and 17 December. A large-scale international chemicals exhibition known as Chemicals Expo 88 will be held at HKCEC at the same time as the Conference. The exhibition is organized by SHK International Services Ltd. Major international chemical and equipment manufacturers, including those from China, will take part in the 3-day event. A smaller scale Mini-Expo will be held in Guangzhou, China.

The conference organiser now calls for papers from chemists in academic and research institutes and those serving the commercial, industrial and government sectors. Papers addressing subjects relevant to the theme and scope of this conference, particularly those of originality, will be welcome. English will be the conference language.

Further information on this conference is available through Dr John Packer of the Chemistry Department, University of Auckland.

GAS ANALYSERS FROM APC



Exotox Gas Monitors

The Neotronics Exotox range of gas monitors provide complete protection to workers against the various harmful effects of toxic gases, asphyxiants and flammable gases in a package the size of a hand held radio.

Gas monitoring protects employees in a wide range of industries. Exotox gas monitors are now being used in applications as diverse as sewage treatment and maintenance, tunnels, petrochemical, mining, shipping and power generation. In particular, Exotox greatly simplifies the entries made into confined spaces by workers such as telephone or water engineers.

Most countries now have legislation which demands that the employer protects the worker against gas hazards using gas analysis equipment. Exotox provides the answer, a comprehensive, reliable monitor which protects the worker yet with a size and weight that keeps it unobtrusive. With over 30,000 instruments protecting workers around the world Neotronics means "Peace of Mind."

The Exotox 55 continuously monitors up to four gases, digitally displays the results, produces audio visual alarms (if preset limits are exceeded) and downloads the results to a data logger for later analysis all at the same time!

FEATURES

- Four gas
- Full data logging capability
- Large LCD real-time display
- Long life sensors with long term stability
- Audio visual alarms with alarm cancel facility
- TWA and STEL displays
- Long battery life between charges
- Fast battery charger
- Radio frequency interference protection
- Rugged splashproof case
- Low maintenance

New Gas Sensors

The world's leader in toxic gas sensors has just released an innovative package.

CITY TECHNOLOGY's innovative sensor design has been allied with modern electronics to produce a range of industry standard 2-wire 4-20mA transmitters. Designed to function over a wide range of temperatures, their main features include intrinsically safe circuitry, optional RFI protected enclosures, linear output and replaceable pre-calibrated sensors.

Remote sensor precalibration removes the traditional need for two people during instrument recalibration, whilst CENELEC and Factory Mutual I.S. certification (pending) allows their use in the most hazardous areas.

Designed for use in hazardous or general purpose environments these 2-wire stand alone gas transmitters give reliable low cost gas measurements in a wide range of industrial applications where single or multi-channel monitoring over great distances is involved. Transmitters are supplied complete with sensor for: Carbon Monoxide Hydrogen Sulphide Sulphur Dioxide Chlorine Nitrogen Dioxide Nitric Oxide Hydrogen
Principal Advantages:

- Intrinsically safe circuitry
- Replaceable pre-calibrated sensors
- RFI protected
- Rugged, practical design
- Accurate, reliable operation

Already the units have been applied in three project areas in New Zealand -

Car Parks - Carbon Monoxide Water Treatment Plant - Sulphur Dioxide & Chlorine Pulp & Paper - Chlorine

Ethylene Oxide

INTERSCAN CORPORATION, a world leader in toxic gas detection, introduces its new line of monitoring instrumentation for ethylene oxide.

With installations in more than 40 countries, and with years of experience in some of the most demanding and diverse toxic gas detection applications imaginable:
- Hydrazine monitoring for NASA - CO monitoring in steel mills - Cl monitoring in chemical plants - residual insecticide detection AND -Pulmonary function testing

INTERSCAN is now the company to turn to for all your ethylene oxide monitoring requirements.

The instruments operate on the field-proven electrochemical voltammetric principle, and are available in four basic configurations.

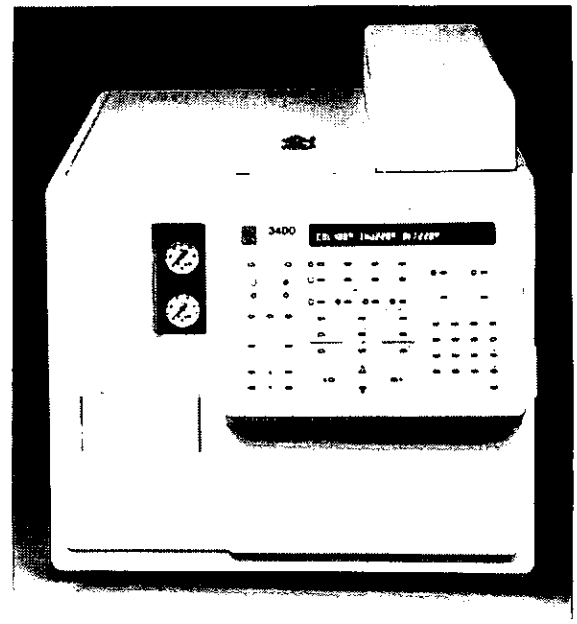
The Compact Portable and Standard Portable Analysers are designed expressly for doing EtO survey work. Operating off integral rechargeable batteries, they can also be employed for occasional longer term studies. Use them with your strip chart recorder, or Interscan's 9000 Series Digital Recorders, to get a detailed picture of EtO exposures.

The LD Series Continuous Monitoring System feature ultra-tough construction, and a long list of standard features and options, including a special two-point modification - perfect for monitoring the sterilizer door and drain.

The Rack-Mount Configured analysers are intended for those applications in which line power operation is desired, but the industrial type packaging of the LD Series is not required. Designed to be installed in a standard 483mm (19') rack, or to be used on the bench, their open frame construction and use of standard electrical and pneumatic components allow them to be easily incorporated into a system, if need be.

The Multipoint Continuous Monitoring Systems are intended for monitoring EtO at several different locations within the same general area, and feature either stream-switching operation, dedicated continuous monitoring channels, or a combination of the two. Designed-in flexibility provides custom features at a standard equipment price.

Covering the field in analytical instruments



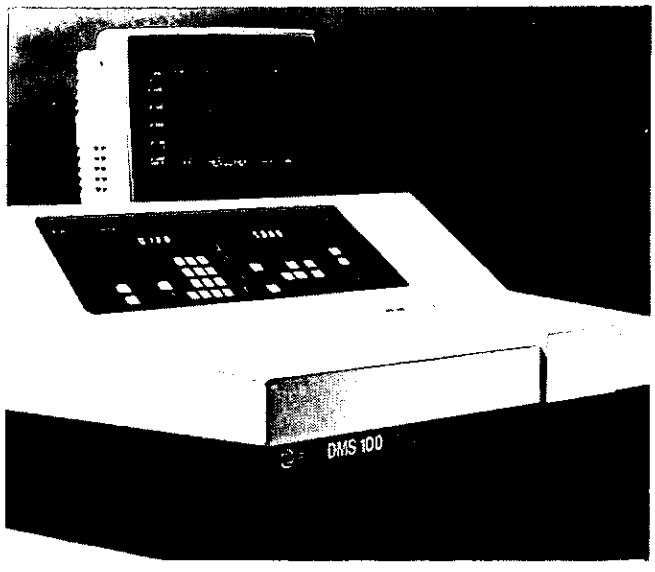
Varian 3000 series Gas Chromatographs ▷

Models 3300, 3400, 3500, 3600

Choose from a range of injectors, detectors and flow controls to suit your applications:

- Standard or automated systems.
- Packed column or capillary options.
- Data handling options.

The 3000 Series has a model and configuration to suit you.



◁ DMS Series UV-Visible Spectrophotometers

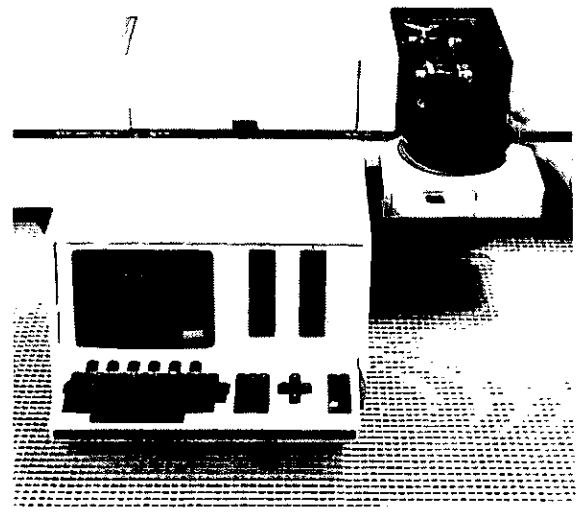
Models 80, 90, 100, 200, 300

A range of double beam instruments for all applications from routine to research. Buy only the features you need and choose from a wide range of accessories and sample-handling systems. Apply the power of advanced data handling, graphics displays and applications packages.

SpectrAA Series Atomic Absorption Spectrophotometers ▷

Models 10/20, 30/40, 300/400

Single and double beam . Choose from a range of flame controls, lamp turrets and background correction, levels of data handling from routine inboard to advanced PC operation, even Zeeman systems. All from the company that pioneered atomic absorption – Varian.



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Wilton Instruments Division

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COMPANY NEWS

InterMed Scientific

InterMed Scientific Ltd announce the addition to their team of **Mr John Clark.**

John is well known to many laboratory staff, and supply companies, having spent 13 years in the laboratory supply industry. Resigning from his position as Scientific Manager of Kempthorne Medical Supplies, John will take up a role in product management and development for InterMed Scientific Ltd.

Management Changes At Wiltons

Graham Clarke, formally General Manager of the Wilton Instruments Division of Salmond Smith Biolab Limited, has retired to pursue family business interests.

Barry Kerslake, previously Marketing Manager, has been appointed as Manager of the Division, responsible for all marketing and sales activity, while **Roger Voller,** New Zealand Service Manager, has separate responsibility for Instrument Service Support.

Associated with these changes, **Brian Breese** has been appointed Technical support Manager responsible for Customer Service operations and technical product enquiries. **Kim Irving** has been appointed Sales Supervisor, responsible for direction of Wilton's team of Sales Representatives.

Two New Agencies For Watson Victor

Watson Victor are pleased to announce that they have been appointed sole agents for **Malthus Instruments,** and **Sensititre,** both of the U.K.

Malthus Instruments technology is used for the rapid and automatic detection of the presence of a wide range of micro-organisms in the food, dairy, water, cosmetic and allied industries. Testing up to 256 samples simultaneously for the presence of aerobic, microaerophilic and anaerobic micro-organisms, the computer based instrument is designed for continuous automated analysis - 24 hours a day. The instrument is a highly cost effective alternative to traditional analysis.

The Sensititre automated system utilizes advanced fluorescence technology for rapid antibiotic susceptibility and bacterial indentification testing. Microtitre plates can be read automatically after as little as five hours incubation, or after overnight incubation.

Perkin-Elmer Acquires Nelson Analytical Through Merger

The Perkin-Elmer Corporation of Norwalk, Connecticut, and Nelson Analytical, Inc. of Cupertino, California, have signed a letter of intent in which Perkin-Elmer will acquire Nelson through a merger of the two companies.

Perkin-Elmer is the world leader in analytical instrumentation and Nelson is a leader in chromatography data handling systems. The merger will bring financial and worldwide distribution resources to Nelson and state-of-the-art expertise in data handling to Perkin-Elmer.

Following completion of merger arrangements, Perkin-Elmer Nelson Systems, Inc., a subsidary of Perkin-Elmer, will focus on market leadership in automation and systems integration for analytical laboratories. The company will be managed by David C Nelson, founder of Nelson Analytical, and will be comprised of Nelson's existing organization and Perkin-Elmers's laboratory automation business. Operations will be conducted in Cupertino, California; Norwald, Connecticut; and Europe.

Besides analytical instruments, Perkin-Elmer manufactures semiconductor processing equipment, surface technology systems, avionic instrumentation, electrooptical systems and computers. Its annual sales are $1.3 billion.

Perkin-Elmer is represented in New Zealand by Sci-Med division of Ebos Group Ltd.

A New Fully Automated Multielement Atomic Absorption Spectrometer From Perkin-Elmer

Perkin-Elmer's new Model 2100 is a fully automated multielement atomic absorption spectrometer. This cost-effective system yields high analytical performance for flame, graphite furnace and mercury/hydride analyses. The spectrometer uses a unique single-path, double-beam concept that provides the high energy throughput and low noise of a single-beam optical system with the stability and ease of use of a double-beam system. The 2100 and all major accessories, including the new HGA® -700 Graphite Furnace and AS-70 Furnace Autosampler are completely controlled by an Epson computer.

The 2100's single-path, double-beam concept employs a Baseline Balancing Burner system, the first of its kind designed for a commercial AA instrument. The burner system moves the flame out of the light path automatically during non-measurement periods, allowing the light path to be used as a reference beam for automatic baseline correction. For graphite furnace or mercury/hydride analysis, Perkin-Elmer's proven Baseline Offset Correction (BOC) technique is used.

For further information please circle no. 1 on reader reply card.

Beckman's New Elutriator Rotor Recovers Nearly 100% Of Cells

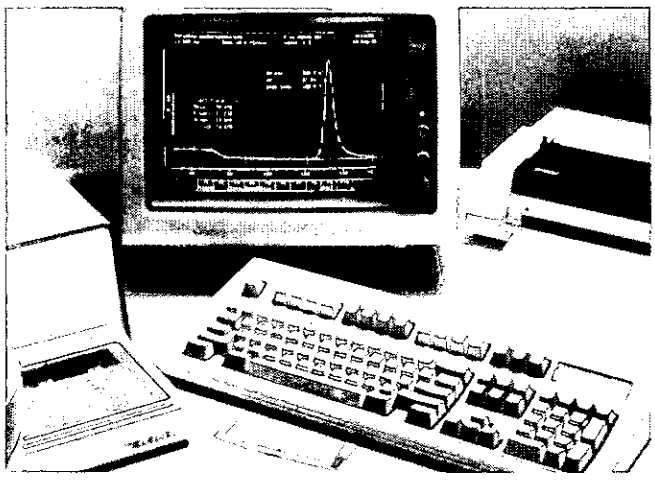
Alphatech Systems introduce the new Beckman JE-5.0 Elutriator Rotor for counterflow centrifugation in the recovery of specific populations of living cells. This unit offers application versatility and distinct advantages over earlier elutriator rotors. The new rotor is designed for the Beckman J6 Series floor model centrifuges.

Applications of Beckman elutriator systems include synchronous cell growth studies, the separation of liver cells, human lymphocytes and monocytes, and other cell and particle studies. Using elutriation, cells retain their viability because they are separated by a gentle, washing action, and can be processed in an isotonic medium. Cell recovery rate is close to 100% for many types of cells including bone marrow, brain, lung, blood, and testis. Elutriator rotors are also used for drug suspensions and yeasts.

The Beckman JE-5.0 Elutriator Rotor is easy to use, clean, and sterilize. All working parts of the rotor are in a single, quick-release assembly. The entire cartridge withstands autoclaving for sterilization. Interchangeable chambers adapt the rotor for both small and large volume applications.

For further information please circle no. 2 on reader reply card.

THERMAL ANALYSIS



METTLER TA72 GraphWare: Compare and process thermoanalytical measured values and curves on a personal computer

The new METTLER TA72 GraphWare software supports the processing of thermoanalytical measured values and curves as determined by the METTLER TA3000 System and prepared and transferred by the TC10A TA processor. The broad application area of the evaluation software covers not only the checking of materials and their development but also the investigation of thermal effects of new compounds. In all these investigations, the TA72 GraphWare offers the possibility to compare and simultaneously process several thermoanalytical curves.

All commands entered using the function keys are executed instantly by GraphWare on the color monitor. TA Processor and computer can be operated independently; the system can thus be employed as a genuine multitasking station in an extremely efficient and economical manner.

In addition to its function as an investigative tool, GraphWare also serves as a database. The data stored on the fixed disc or diskette can therefore be recalled at any time for further processing on the screen. The METTLER TA72 GraphWare assures access to the measurement data by commercial programs.

Selectable evaluation functions

The following are among the functions offered by TA72 GraphWare: Full or partial integration over a freely definable range with different baseline types; onset determination with tangents, which can be optimized by the user on the screen; endset temperature; glass transition temperature for DSC and TMA curves; content analysis; step evaluation; and coefficient of expansion.

For further information please circle no. 3 on reader reply card.

Bahr Geratebau

Bahr Geratebau offer a range of the following Thermal Analysis systems:

- High-temperature viscometers
- Glaze stress testers
- Shrinkage meters
- Automatic measurement recording and evaluation with computers
- Dilatometers
- DTA Differential Thermal-Analysers
- DSC Differential Calorimeters
- TG Thermal Balances
- STA Simultaneous Thermal-Analysers (DTA/TG)

Now available in New Zealand from: John Morris Scientific Ltd, PO Box 6348, Wellesley St, Auckland; Tlx: NZ63193, Fax (09) 444 0974

For further information please circle no. 5 on reader reply card.

Polymer Laboratories

Polymer Laboratories manufacture a range of mechanical and dielectric thermal analysers. With the mechanical analysers the sample is scanned through a temperature program, whilst simultaneously being subject to mechanical vibrations in a variety of frequencies. The lag between stress and strain when plotted against temperature provide clues as to the internal changes within the sample.

The technique is a thousand times more sensitive than DSC for studying glass transition phenomena. Systems are currently used for investigating the compatibility of polymer blends, curing properties of epoxy and other thermo-setting resins, modulus and damping properties of rubbers used in impact situations, structural information on waxes and fats etc. The DMTA is currently available with a tension head or a shear head and a torsion head is currently under development.

The DMTA is fully software controlled with a choice of temperature ranges -150°C to 300°C, -150°C to 500°C or ambient to 800°C, with heating rates of 0.1°C per min to 20°C per min. The mechanical frequency range is from 0.01 to 200Hz.

The dielectric thermal analyser works by applying a range of frequencies across the same sample presented as a thin layer, whilst the system is temperature scanned. The measurement of dielectric loss is an indication of the internal properties of the sample and is plotted against temperature. This extends the range of frequencies available from 20Hz to 100kHz with a temperature range of -150°C to 300°C. More information is available from the New Zealand representatives AWA Ltd.

For further information please circle no. 4 on reader reply card.

NEW T G from CAHN

CAHN Balances long associated with TGS have released a new IBM compatible range of systems. The TG 121 has a capacity of 1.5g, 0.1 micro g sensitivity, and top temperature of 1100°C.

Further details available from John Morris Scientific Ltd.

For further information please circle no. 6 on reader reply card.

NEW from NETZCH: High temperature DSC.

NETZCH have recently released the Model DSC 404, with a heating rate of 0.1 to 50K/min and temperature range up to 1,500° C, available with or without date acquisition. This unit can be used in conjunction with the Model STA 409 for simultaneous TG/DSC measurements.

NETZCH are represented in New Zealand by John Morris Scientific Ltd.

For further information please circle no. 7 on reader reply card.

Shimadzu Thermal Analysis Systems

Shimadzu's 40 series thermal analysis systems represent their latest ideas in modular design based on a 4 channel controller with a built in microcomputer. In the 40 series, up to 4 channels of identical or different thermal analysis techniques may be run at one time with the data being processed simultaneously or sequentially for display and reprocessing.

The data presentation may be either by analogue recorder, Shimadzu CR6A chromatopac or a personal computer.

The following analysis systems are available.

1. Differential Thermal analysis (DTA). This uses a dumbell shaped detector of very low heat capacity on which are placed a sample and reference substance. When the detector is heated the difference in temperature between sample and reference sides is measured and displayed. Three different models are available covering a range of 150 to 1500°C and atmosphere gases may be readily changed.

2. Differential Scanning Calorimetry (DSC). The heat compensating type uses two small cups in which are placed the sample and reference substances; these are heated or cooled at the same rate and any difference between them is zeroed by applying power to small heaters built into the cups. The applied energy being a direct measure of the reaction heat. These are available in two models from -100°C to ×300°C under controlled atmospheric conditions.

3. Differential Scanning Calorimetry (DSC). The heat flux type is a higher temperature system which relies on measuring the heat flux between the sample and reference during heating and cooling. Two models are available from -125°C to 600°C with controlled atmosphere.

4. Thermogravimetry (TG). Both macro and micro systems are available with weighing systems capable of 1g and 10g respectively and each version is available in two temperature ranges from ambient to 900°C, and ambient to 1500°C.

5. Simultaneous Differential Thermal Analysis — Thermogravimetry (DTA-TG). A special unit is available to run simultaneous DTA-TG on the one sample with the same heating program and same atmosphere. Two temperature ranges are available covering ambient to 1500°C.

6. Thermomechanical analysis (TMA). The deformation of a specimen is measured during temperature variation with three modes of measurement being available:-

Continued next page

PRODUCT NEWS

Small, Simple Mass-selective Detector

Northrop Instruments & Systems Ltd today introduced the Hewlett Packard 5971A mass-selective detector (MSD), which Hewlett Packard believes is the smallest, simplest mass-selective detector available.

Designed for use as a detector with the Hewlett Packard 5890A gas chromatograph, the Hewlett Packard 5971A MSD mounts on the side of the GC and takes only 7 linear inches of counter space.

An entire GC/MS system - Hewlett Packard 5971A MSD, Hewlett Packard 5890A GC and Hewlett Packard 59970C ChemStation - fits on a standard five-foot lab bench with room to spare.

True, Classical Electron-impact Spectra

The Hewlett Packard 5971A MSD produces true, classical EI spectra that can be compared to accepted, established library spectra for positive identification of both target compounds and unknowns. With classical spectra, even if the compound isn't in the library, the spectrum can be interpreted by isotope calculations. Spectra do not vary with concentration.

With fewer parts than previous mass spectrometers, the new MSD is simple to maintain. The source has half as many parts as previous sources and is easy to disassemble and clean.

Troubleshooting and board-level maintenance are simplified since there are only four electronics boards and each is modular in design with related functions grouped together.

Low Failure Rate

For low failure rate and low cost of operation, the system vacuum is maintained by an air-cooled diffusion pump that has no bearings or moving parts.

The Hewlett Packard 5971A is controlled by the Hewlett Packard 59970C ChemStation with New Revision 3.2 software that provides enhanced graphics, math, statistics and macro-automation capabilities.

Optimised for Capillary Chromatography

The GC/MS interface, which is just 9 inches long, is maintained at a constant temperature with no hot or cold spots to degrade chromatography. For maximum inertness and sensitivity, the capillary column enters directly into the source.

Columns up to 0.3mm internal diameter can be used. For packed-column operation, an optional jet separator can be installed in the Hewlett Packard 5890A gas chromatograph.

Total Ion Scanning

The Hewlett Packard 5971A will scan any mass range between 10 and 650 amu at any of eight selectable scan rates. Scan rates and mass ranges are time-programmable, allowing close examination of masses of interest.

Each eluting peak can be scanned repeatedly over a chosen mass range. All resulting spectra are stored and available for immediate display in total ion chromatogram and in individual spectra for each scan.

Selected Ion Monitoring (SIM)

In SIM the MSD can be set to monitor only those ions that are characteristic of a specific compound or compounds of interest. Since selective scanning permits the mass analyzer to dwell longer on specific masses, this mode is more sensitive. It permits analysis at low picogram levels. Up to 250 groups of 20 ions each can be monitored.

For further information please circle no. 8 on reader reply card.

The Complete System For Total Fat Determination

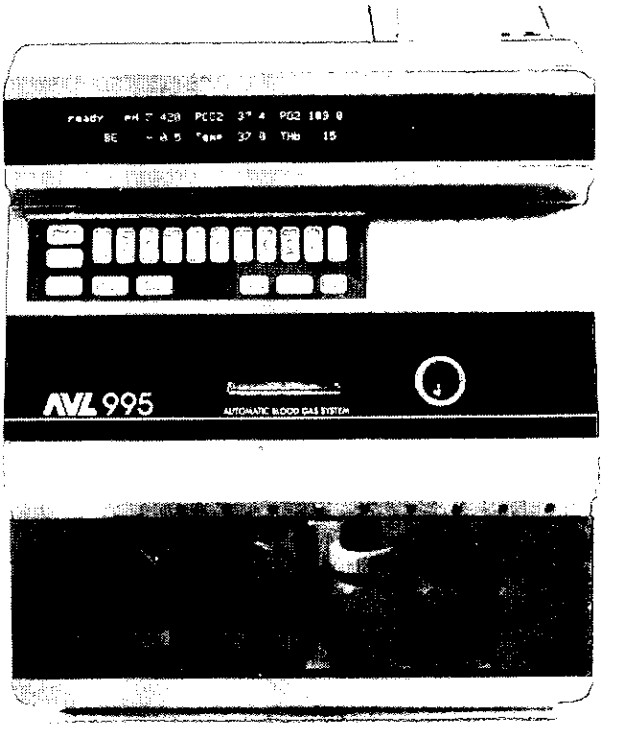
The new Tecator 1047 Hydrolysing Unit together with the Soxtec HT systems allows total fat determination to be performed according to official methods in a rapid, safe and simple way. These systems for acid hydrolysis and solvent extraction are a solution to most needs in fat and oil determination. This includes feed, petfood, meat, prepared foods, baby foods, confectioneries and many other samples.

The 1047 Hydrolysing Unit is designed for safe and simple processing of up to six samples simultaneously. Acid hydrolysis, filtration and washing are performed without any sample handling. In addition, the same reusable glass thimbles are used in both the Hydrolysing Unit and the Soxtec HT systems.

The Soxtec HT Systems cut extraction time. They are up to five times faster than traditional Soxhlet. Systems for small or large workloads are available.

Tecator are represented in New Zealand by the Wilton Instruments Division of Salmond Smith Biolab

For further information please circle no. 9 on reader reply card.



AVL Release New Blood Gas System

Designed to meet the needs of the most demanding, AVL's New 995 fully automated Blood Gas Analyzer provides the following features:

- pH, PCO2, PO2 and 9 calculated values. When electrolytes are required, it may be coupled with an AVL ISE Analyzer of choice (Na^+, K^+,Cl^+,Li^+,TCO_2).
- Sturdily-built, patented electrodes which combine optimised sensitivity and time-proven performance.
- An automatic cleaning cycle through which the entire system, from sample port to waste container, is flushed with a decontaminating cleaning solution - protecting the operator against transmission of life-threatening infectious diseases such as hepatitis, AIDS, and others.
- The Standard AVL Data-Link Management System permits coupling the AVL 995 with an AVL ISE Electrolyte Analyzer and PC, Oximeter, ticket printer, modem and external keyboard, if desired.
- Low cost-per-test because the true AVL micromethod uses substantially less reagent. Furthermore, no cylinders of expensive premixed calibrating gas are required, thanks to the built-in AVL gas mixing system.

The AVL 995 has been logically designed to maximise cost-effectiveness and reliability.

AVL are represented in New Zealand by Wilton Instrument Division of Salmond Smith Biolab.

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

Thermal Analysis Cont.

1) Expansion and contraction. 2) Elongation under load. 3) Penetration - Available temperatures vary according to mode but may be up to 1500°C.

A choice of sample cells in different materials is available to suit each machine as are flow controllers, differentiators, cooling systems etc.

Thermal Analysis - Mass Spectrometry. The newly announced bench top quadrupole mass spectrometer model QP2000 may be interfaced to the thermal analysis systems to provide further information on changes with the sample for further information etc.

For further information please circle no. 10 on reader reply card.

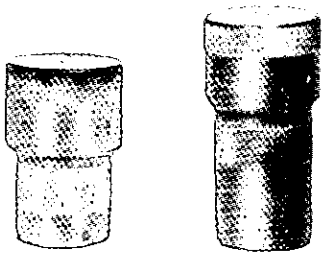
Microwave Digestion Revisited

In the April 1988 issue of Chemistry in New Zealand, Jeremy Batchelar described the use of microwave heating for the dissolution of a range of samples. John Morris Scientific now advise that they have a range of equipment available for the use of this technique through the two agencies described below.

Parr Microwave Acid Digestion Bombs.

The Parr Instrument Company is pleased to introduce an entirely new line of pressure vessels for preparing analytical samples, designed specifically for microwave heating. Using a new, high-strength, microwave-transparent construction material to enclose a chemically inert, Teflon sample cup, these new bombs can be placed directly in a microwave oven for specific, high speed heating to drastically reduce the time required to dissolve or digest analytical samples. With this unique procedure, heating times of less than one minute will often produce complete dissolution of many materials.

In addition to the more aggressive digestion action produced at the higher temperatures and pressures generated in these bombs, there are several other important advantages in this technique. Volatile materials are not lost from these sealed vessels, and the sensitive parts of a microwave oven are not subjected to corrosive acid fumes. Specially constructed and/or vented ovens are not



required. As with metal jacketed acid digestion bombs, the higher temperatures and pressures produced in these bombs will generally eliminate the need for perchloric acid to obtain complete digestions.

The rapid cycle time (approximately 20 to 30 minutes, including cooling) offered in this procedure allows digestions to be carried out in multiple steps, if desired, either for analytical or safety reasons. Acid can be added in several steps, or different acids can be added to dissolve inorganics after an organic matrix has been destroyed.

Equally important in the list of advantages offered by these bombs is the elimination of all metal from the bomb structure. With all body parts made of a high strength polymer resin there are no metal parts subject to corrosion, as with conventional acid digestion bombs, and no possible sources of metallic ion contamination.

MDS-SID Laboratory Microwave Digestion System

The complete microwave digestion system, including purpose-built oven with a wide range of programmable controls, exhaust system control, corrosion protected cavity, vessel capping station, overflow collection vessel, and a 12 tube turntable. Benefits of the system are as follows:

- Reduced Digestion times. Digestions can be done 4 to 100 times faster using microwave heating with sealed vessels.
- Automatic operation. The unit can be programmed to do a digestion and can often be left unattended to complete its work.
- No fumes. Fume generation can be eliminated or at least minimized since the MDS-81D uses closed vessels for digestions. The MDS-81D requires no space under a fume hood.
- Corrosion resistant construction. The unit can be used to heat most common acids and acid mixtures.
- Reliable operation. The MDS-81D magnetron is protected from overheating caused by reflected microwave energy. This ensures long magnetron life and provides consistent, reproducible power output test after test, regardless of sample size.
- Eliminate the need for perchloric acid. Organic materials can be fully decomposed without use of perchloric acid because of the higher temperatures generated in the MDS-81D system.

For further information please circle no. 13 on reader reply card.

Powder Blending And Agglomerating

A/S Niro Atomizer, Soeborg, Denmark, has entered into an agreement with PattersonKelley Co., East Stroudsburg, Pennsylvania, USA, to form a joint venture company, P-K NIRO ATOMIZER A/S.

P-K NIRO ATOMIZER will market Patterson-Kelley's line of blending, granulating and drying equipment through Niro Atomizer (NZ) Ltd in New Zealand.

The location of P-K Niro Atomizer will be Copenhagen, Denmark. The company has established an extensive laboratory and pilot station to assist customers develop new, or improve existing products.

Patterson-Kelley Co., is known internationally for their process plant used in the pharmaceutical, cosmetics, chemical, powder metals, food, ceramics, and plastics industries and for their heat transfer and mass transfer equipment. The company is the leading manufacturer within solids mixing in the United States. Founded in 1880, it became well-known as a major US manufacturer of water heaters for commercial and industrial buildings. In 1950, diversification into process plant came about following the invention of the V-shaped Twin-Shell batch blender, which has since become the industrial standard for precise, uniform mixing. Later innovations included the Zig-Zag continuous mixer, Solids Processor, Tubular Vacuum Dryer, Continuous Tubular Dryer and Cross-Flow Mixer. Patterson-Kelley Co. is a division of Harsco Corporation, known world-wide for its engineering and building products, defense and industrial services. The corporation employs 11,000 people.

A/S Niro Atomizer is recognised world-wide as the leading international manufacturer of spray dryers, fluid bed dryers and evaporators. Niro Atomizer offers a complete range of spray drying systems and remains today in the forefront of the technology regarding energy efficiency, environmental protection and product quality. NIRO ATOMIZER supplies plants to a wide variety of industries. In the food industry, this includes such products as coffee, coffee whitener, dried eggs, milk, soups, baby food, powdered cheese and fruits. The Niro Atomizer spray dryers and fluid bed dryers are also extensively used in the chemical, ceramic, polymer and pharmaceutical industries.

For further information please circle no. 12 on reader reply card.

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to the Sedigraph 5100.
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Both lab and industrial. Portable, to in-line. From Ingold, Crison, Suntex.

VACUUM

Alcatel — For all your vacuum needs, standard, chemical resistant, plasma RVP's, Drag, TMP, Hi Vac.

CENTRIFUGES

Sarstedt offer an excellent range of centrifuges, and the tubes to suit all needs.

CAM SPEC

A new name in quality single beam UV/VIS and accessories.

YOUR OTHER NEEDS

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Compliance to ASTM and more.

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.....

What is your principal classification?

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- ☐ SUPPLIER INSTRUMENTS
- ☐ SUPPLIER LAB. EQUIPMENT
- ☐ RESEARCH
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