CHEMISTRY IN NEW ZEALAND

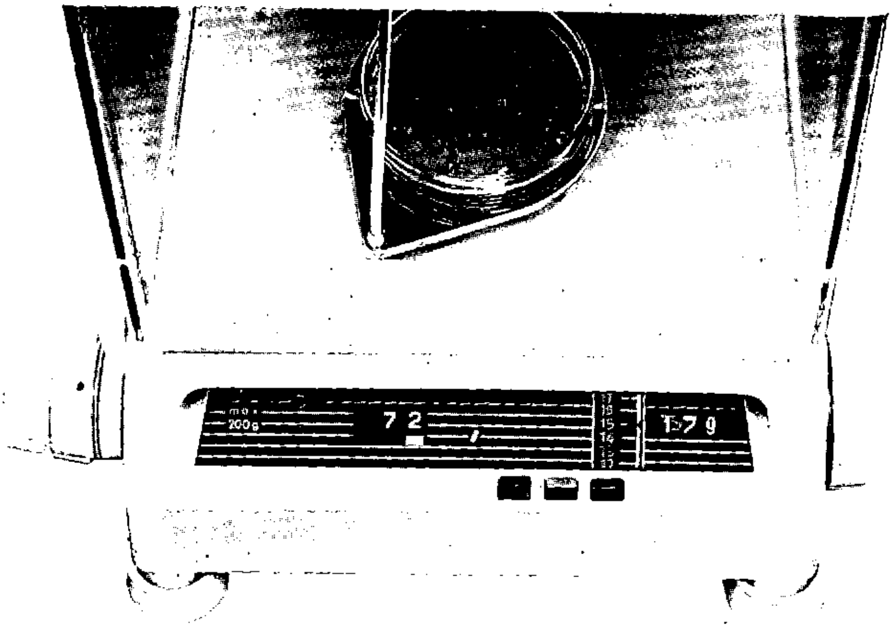
JOURNAL OF
THE NEW ZEALAND
INSTITUTE
OF CHEMISTRY

Vol. 36, No. 1, February, 1972

sartorius

LEADS AGAIN IN BALANCE TECHNOLOGY

- ★ AUTO-ARREST Automatic Beam Arrestment and Release preserves knife edges, quickens weighings, is push button controlled
- ★ Preweighing at the push of a button.
- ★ Full Range Mechanical Taring up to capacity of balance. Tare values indicated on separate set of weight indicators (optional).
- ★ All Digital Readout.



For full details — Free Trial — contact . . .

GEO. W. WILTON & CO. LTD.

P.O. Box 367, WELLINGTON
Phone 697-099

P.O. Box 9071, Newmarket,
AUCKLAND. Phone 360-467

CHEMISTRY IN NEW ZEALAND

Journal of
The New Zealand
Institute of Chemistry

Vol. 36, No. 1, February, 1972

Published bi-monthly by the New Zealand Institute of Chemistry Inc. (P.O. Box 250, Wellington)

Contents

Editor: Miss J. Mattingley, M.Sc., A.N.Z.I.C.
P.O. Box 250, Wellington.

Advertising Manager:
D. Howard, M.Sc., A.N.Z.I.C.
P.O. Box 250, Wellington.

The Institute and Council are not responsible for individual opinions of any kind expressed in any article, editorial, review or report in this publication.

Printed by David F. Jones Ltd., Wellington.

Distribution. The Registrar:
D. J. Hogan, B.Sc., A.N.Z.I.C.
P.O. Box 1926, Christchurch.

Honorary General Secretary:
Prof. W. E. Harvey, M.Sc., Ph.D., F.N.Z.I.C.
P.O. Box 250, Wellington.

Employment Officer:
E. S. Borthwick, M.Sc., A.R.I.C., A.N.Z.I.C.
P.O. Box 2091, Wellington.

The Journal of the N.Z. Institute of Chemistry has an audit circulation Certificate of New Zealand Advertisers. Latest audited circulation (March 1969) 1150.

CLINICAL CHEMISTRY CONTROL PRODUCTS

the
essentials for

QUALITY CONTROL
PROCEDURE MONITORING
RELIABILITY CHECKING

confidence

DDS 5L

ENERAL DESCRIPTION AND USE.

All Bio – R & D control products are of human gin carefully processed and freeze-dried (lyophilized) maximum stability during shipment and storage. econstitution must be with distilled or de-ionized water cept for the Automated Control Serum where a special constituting fluid accompanies the serum. After constitution, the stability of the various constituents of e controls is the same as if in a laboratory specimen.

Assays have been performed by at least three ference clinical laboratories. Methods of assay and assay sults are supplied in the form of a direction insert in ch package. After reconstitution, the control products e to be tested in the same manner as unknown ecimens. If results obtained are the same as the rection insert values (within normal limits of variation), st procedures are considered "in control", and thus, ecimen values may be reported with confidence. gnificantly different values from those reported in the rection insert indicate "out of control" conditions exist, d immediate efforts to discover the source of difference e necessary to produce reportable results.

ORMAL CONTROL SERUM, HUMAN, DRIED. Catalogue No. 620) 6 x 5 mls

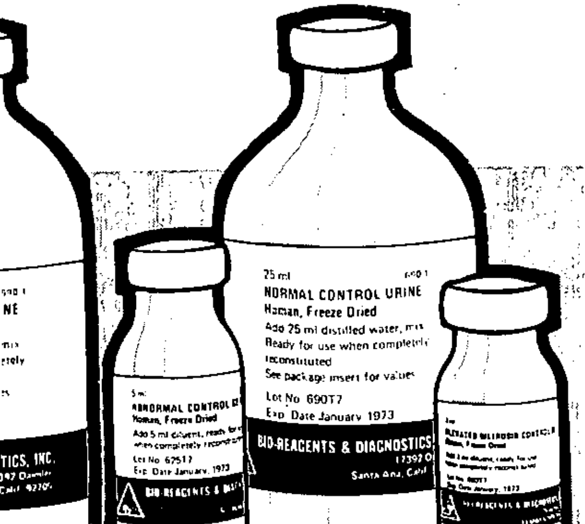
Serum derived from healthy humans containing all onstituents usually found in serum at "normal" oncentrations.

BNORMAL CONTROL SERUM, HUMAN, RIED.(Catalogue No. 625) 6 x 5 mls

Human serum similar to NORMAL CONTROL ERUM except constituents are present in concentrations sually considered "abnormal" or clinically significant.

UTOMATED CONTROL SERUM, HUMAN, RIED.(Catalogue No. 630) 10 x 50 mls

Human serum processed in same manner as all other io – R & D control products. Assays have been erformed using automated equipment and methods of ne Technicon Instruments Corporation (Chauncey, New 'ork). To be used for the control of automated rocedures as opposed to manual methods.



NORMAL ENZYME CONTROL SERUM, HUMAN, DRIED. (Catalogue No. 640) 6 x 3 mls

Human serum carefully processed and freeze-dried so as to preserve the most delicate enzymes normally found in serum. Assayed by the reference laboratories using a variety of methods and reported in various popular enzyme units.

ELEVATED ENZYME CONTROL SERUM, HUMAN, DRIED. (Catalogue No. 645) 6 x 3 mls

Human serum similar to NORMAL ENZYME CONTROL SERUM except enzymes present in concentrations usually considered abnormal or elevated. In conjunction with NORMAL ENZYME CONTROL SERUM, may be used to establish standard or reference curves for enzyme assays.

ELEVATED CHOLESTEROL CONTROL SERUM, HUMAN, DRIED. (Catalogue No. 650) 6 x 5 mls.

Serum derived from humans whose serum possesses high concentrations of cholesterol. Particularly applicable to the control of all cholesterol assay methods since the cholesterol occurs in its natural state (i.e., physiologically bound to protein).

ELEVATED BILIRUBIN CONTROL SERUM, HUMAN, DRIED. (Catalogue No. 660) 6 x 3 mls.

Human serum processed in same manner as all other Bio – R & D control products. Supplemented with bilirubin meeting nationally – established criteria of purity. Therefore, may be used as a secondary reference as well as a control serum.

NORMAL CONTROL URINE, HUMAN, DRIED. (Catalogue No. 690) 4 x 25 mls.

Urine derived from healthy humans and containing constituents usually found in urine specimens in "normal" concentrations including hormones associated with pregnancy. Processed in the same manner as all other Bio – R & D control products. Designed specifically for the control of assay procedures using urine as the specimen.

ABNORMAL CONTROL URINE, HUMAN, DRIED. (Catalogue No. 695) 4 x 25 mls.

Human urine similar to NORMAL CONTROL URINE except constituents are present in concentrations usually considered abnormal. In addition, assays are supplied for some constituents which would not normally occur in measurable amounts in urine.

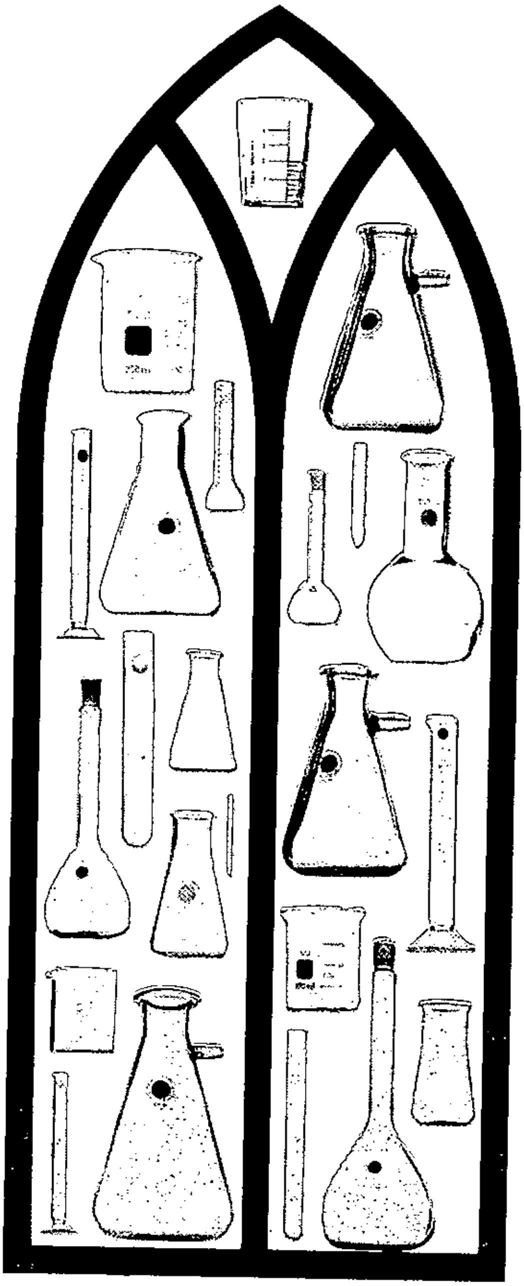
DDS 5R

Bio-Reagents & Diagnostics, Inc.

Sole New Zealand Agents

DIAGNOSTIC DIVISION

DOMINION DENTAL SUPPLIES LTD.
Auckland, Wellington, Christchurch



Unstained glass

A new formula surface active agent providing unrivalled
performance in laboratory cleaning and radioactive decontamination
COMPLETELY RINSABLE FROM ANY SURFACE
PHOSPHATE-FREE AND BIODEGRADABLE
Fast-acting-stable solutions ensure true economy and safety
yet provide results which cannot be achieved by the use of
ddichromate/suphuric acid mixtures.

decon90®

Request Free Samples now from Sole New Zealand Agents . . .

GEO. W. WILTON & CO. LIMITED

P.O. BOX 367, WELLINGTON
PHONE 697-099

P.O. BOX 9071, NEWMARKET, AUCKLAND
PHONE 360-467

INFRARED SPECTROSCOPY IN THE SERVICE OF THE POST OFFICE

B. Cleverley, M.Sc., Ph.D., and Anne Goldman, M.Sc.
Chemistry Division, D.S.I.R.

Most people display an interest in postage stamps, chemists not least, if the interest shown in New Zealand stamps by our colleagues overseas be any indication. The New Zealand Post Office has lately been faced with complaints about the bitter flavour of adhesives used on some recent commemorative stamps and this brief account of work done at Chemistry Division tells of the application of infrared spectroscopy to the isolation and identification of the bitter material.

Recent issues of New Zealand stamps have been printed by two different printers in Great Britain, one in Switzerland and another in Japan. A number of different adhesives are being used, but polyvinyl alcohol has almost replaced other remoistenable adhesives. The Post Office found that the complaints appeared to be associated only with the polyvinyl alcohol adhesives used on stamps from Japan.

Experimental

Most recent stamp issues were examined.

The adhesives were moistened, scraped from the backs of the stamps and allowed to dry. A taste panel tested both the intact stamps and their corresponding adhesives and found that the stamps and the adhesives of some issues produced an unpleasant taste at the back of the tongue where bitter flavours are detected. The flavour took some time to develop, but persisted for a few minutes after each test.

Table of Postage Stamp Adhesives Investigated for Bitterness

Type	Flavour	Origin
Gum arabic		
Koromiko, 6c	bland	Great Britain (A)
Carbohydrate		
Cardigan Bay, 10c	bland	Switzerland
Earth Satellite, 8c	bland	Switzerland
Polyvinyl alcohol, Type I		
Matua-Tikumu, 4c	bland	Great Britain (A)
Chatham Island Lily, 1c	bland	Japan
Chatham Island Mollyhawk, 2c	bland	Japan
Polyvinyl alcohol, Type II		
Women's Institute, 4c	bitter	Japan
Palmerston North, 3c	bitter	Japan
Rotary International, 10c	bitter	Japan
Unicef, 7c	bitter	Japan
One Ton Cup, 5c	bland	Great Britain (B)

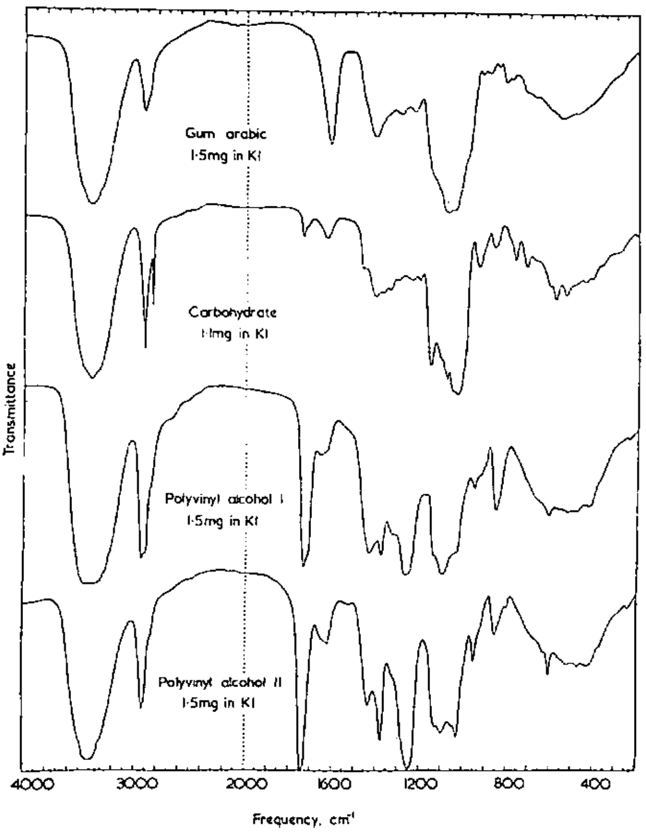


Fig. 1. Infrared spectra of postage stamp adhesives.

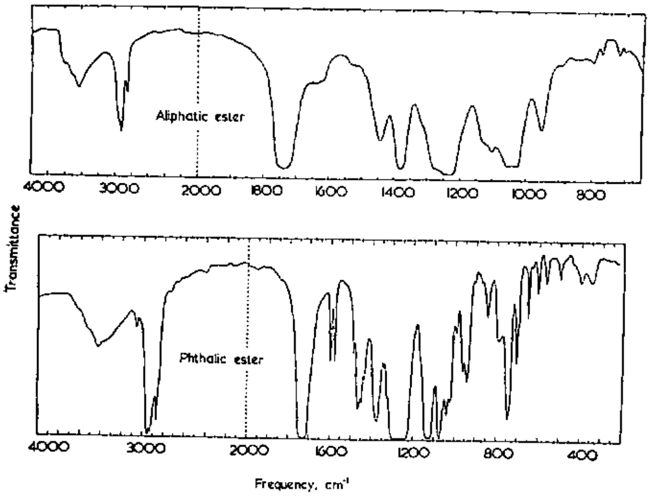


Fig. 2. Infrared spectra of additives from polyvinyl alcohol stamp adhesives.

All but two of the infrared absorption spectra were recorded between 200 and 4000 cm^{-1} on a Beckman IR-12 spectrophotometer. The adhesive samples were dispersed in pressed pellets of potassium iodide prepared by grinding each adhesive with 50 mg of moistened potassium iodide, drying and then grinding again with a further 180 mg of iodide before evacuating and pressing. A plain potassium iodide pellet was used in the reference beam. Liquids extracted from the adhesives were prepared as films between halide plates. A Perkin-Elmer model 21 spectrophotometer was used for recording the spectra of small quantities of two extracts.

Results and Development

Typical spectra of each of the four types of adhesives that were found are shown in Figure 1, and the findings of the taste panel are summarized in the table.

The spectra shows that there are two distinct types of polyvinyl alcohol being used. Polyvinyl alcohol is prepared by the controlled hydrolysis of polyvinyl acetate. Comparison with standard spectra[1] indicates that type I is 86-89 percent hydrolysed polyvinyl acetate and type II is 70-73 percent hydrolysed polyvinyl acetate. Polyvinyl acetate is responsible for the carbonyl absorption band at 1740 cm^{-1}, and also absorbs strongly at 1375, 1250, 1025, 950 and 605 cm^{-1}, at which frequencies the type II adhesive with its higher acetate content absorbs more strongly than the type I adhesive.

In these two polyvinyl alcohol stamp adhesives a compromise has been achieved between the adhesion properties of pure polyvinyl acetate and the solubility of pure polyvinyl alcohol. Stamp adhesives should be remoistenable, resistant to curling and block resistant (resistant to dry adhesion between stacked sheets). Bitterness could derive from chemical additives used to improve these properties, as commercial vinyl alcohol-acetate polymers are themselves tasteless. The bitterness in type II adhesives from Japan was removed when the stamps or their adhesives were soaked in ether, and some weak absorption detail was also absent in the 1000-1100 cm^{-1} region of the spectrum of the extracted adhesive. After the bland type II adhesive from Great Britain had been soaked in ether there was also a slight change in the same general region of its spectrum. Figure 1 shows the spectrum of an extracted polyvinyl alcohol type II adhesive.

The spectra of both the extracted and the unextracted type I adhesives are the same.

The additives were extracted with ether and identified by their infrared spectra. The spectra in figure 2 show that a phthalate-type plasticiser was extracted from the bitter type II adhesive and that an aliphatic ester was isolated from the bland type II adhesive.

Only a very small quantity of an aliphatic ester was isolated from a type I adhesive. The spectra of aliphatic esters are not generally specific enough to enable any one particular ester to be identified.

The spectra of phthalic esters combine the absorption bands which are characteristic of an ester with those characteristic of an ortho disubstituted benzene ring. The nature of the alcohol residues also influences phthalic ester spectra especially in the regions where C-H vibrations absorb radiation, but it is not always possible to obtain an exact identification of any particular phthalate from its infrared spectrum. The spectrum of the phthalate extracted from stamp adhesive does not match any available reference spectra.[2]

The bitter taste of stamp adhesives is therefore associated with a phthalate plasticiser. Laboratory grade dimethyl, diethyl and di-n-butyl phthalates, although harmless, were all found to have a bitter taste. The unpleasant taste of dimethyl phthalate will have been noticed by anyone using it as an insect repellant. It was also found that the intense bitterness of the polyvinyl acetate from a well-known brand of emulsion adhesive was removed when its phthalate plasticiser was extracted, while the polyvinyl acetate from another well-known brand, that contained large quantities of an aliphatic ester was tasteless.

It would appear that plasticisers are used when compounding polyvinyl alcohol-acetate adhesives, especially adhesive polymers containing high proportions of acetate. Phthalate plasticisers are commonly used, but other additives are available and have been used for stamp adhesives where taste and flavour are of importance.

Summary

As a result of this work at Chemistry Division, Post Office officials now know that there are two types of polyvinyl alcohol adhesives being used on stamps printed in Great Britain and Japan, and that a bitter tasting additive is present in only one type from Japan. The Post Office is now able to specify that only bland tasting and harmless additives be used in polyvinyl alcohol adhesives on New Zealand stamps. In addition, manufacturers should be aware of the problems that may arise when adapting familiar materials to new uses.

REFERENCES

1. Sadtler Reference Spectra, Philadelphia, Pa., U.S.A.
2. R. B. Du Vall, "Infrared Spectra of Plasticizers and Other Additives", the Dow Chemical Co., Midland, Mich., U.S.A.

RIC MONOGRAPHS FOR TEACHERS

The Registrar again has copies of the Monographs for Teachers, Numbers 1-4, 6-19 in stock. The following is a full list of titles and prices.

1. Principles of Electrolysis. C. W. Davies	$0.38
2. Principles of Oxidation and Reduction. A. G. Sharpe	$0.38
3. Principles of the Extraction of Metals. D. J. G. Ives	$0.64
4. Principles of Metallic Corrosion. J. P. Chilton	$0.64
5. Principles of Chemical Equilibrium. P. G. Ashmore	Out of Print
6. Principles of Titrimetric Analysis. E. E. Aynsley and A. B. Littlewood	$0.48
7. Principles of Catalysis. G. C. Bond	$0.64
8. Principles of Atomic Orbitals. N. N. Greenwood	$0.64
9. Principles of Reaction Kinetics. P. G. Ashmore	$0.80
10. Industrial Chemistry—Inorganic. D. M. Samuel	$0.80
10(a) Industrial Chemistry Inorganic—2nd Enlarged Edition	$2.60
11. Industrial Chemistry—Organic. D. M. Samuel	$0.64
12. Elements of Chemical Thermodynamics. E. A. Guggenheim	$0.75
13. Principles of Osmotic Phenomena. J. F. Thain	$0.86
14. Principles of the Colloidal State. G. D. Parfitt	$0.64
15. Physico-Chemical Quantities and Units—2nd Edition. M. L. McGlashan	$1.50
16. Chemical Processing in Industry—M. D. Wynne	$0.85
17. An Introduction to Biochemistry—E. G. Brown	$1.50
18. Principles of Crystal Chemistry. E. Cartmell	$1.30
19. The Molecular Basis of Entropy and Chemical Equilibrium	$1.10

Reviews of Nos. 18 and 19 are published elsewhere in this issue. No. 17 will be reviewed in the next issue of the Journal.

THE LEATHER INDUSTRY IN NEW ZEALAND

by B. R. Mann, M.Sc., Ph.D.
G. L. Bowron and Co. Ltd., Christchurch.

The Leather Industry in New Zealand, although it has been established for over a hundred years, is in its infancy. There has been very little progress in developing it towards its full potential and we are at present still in the rather sorry state where over 80 percent of New Zealand's production of hides and skins are exported in a raw or nearly raw condition. This I believe is a sad reflection on the industry as a whole.

I have held the opinion since joining the industry about 10 years ago that New Zealand's manufacturing future lies in the further processing of primary products and the by-products from those primary products. Hides and skins are no small part of that near primary produce and the possibilities of approximately tripling their export value is ever present. The present value of exported raw hides and skins is in excess of $40,000,000 and this year the value of pickled pelts alone, the skin by-product of N.Z.'s meat industry, will exceed $30,000,000. There is the potential therefore for the industry to make a very significant contribution to New Zealand's export earnings. I would see New Zealand as a major supplier of substantially processed leather ready for finishing in the high population areas of the world.

This Company (G. L. Bowron & Co. Ltd.) is at present taking some somewhat faltering steps along the road to achieving something of this end and we can see no reason why this should not continue. Development of export business in highly competitive fields is not easy and set-backs are always likely, but we as a Company believe the potential is there and can be developed, and we are determined to make our contribution towards its development.

Tanneries are renowned for their pollution of rivers throughout the world and to say that they are held somewhat in bad odour would be understating the facts. With the anti-pollution pressure which is ever increasing in Europe, North America and Japan, it is becoming increasingly difficult for tanneries, from a legal point of view and from the point of view of cost, to maintain their wet processing. This is that part of processing which is the major water user and that part which produces most pollution. It is logical therefore that tanneries in high population areas will be keen to buy their starting material in a partly processed condition, ready to finish to the requirements of local fashion. New Zealand, because of its low population, its abundant water resources and the proximity of all its major towns to the open sea, is ideally placed to handle this less desirable part of leather processing. In fact the freezing companies have been doing this in part for the last one hundred years, but they have not been going far enough.

The General Chemistry of the Leather Industry

Structure of Skin Protein

The chemical entity the leather chemist deals with is collagen, a fibrous protein which is the basic component of all skin substances. Its exact structure, like most complex natural proteins, is unknown although the purer leather chemists are coming closer to it as time goes on.

The amino acid components of collagen have been determined, the principal of which are:

Glycine, 26.8% of total nitrogen; Alanine 8.0%; Proline, 9.9%; Hydroxy Proline, 8.0%; Arginine, 15.3%.

There have been numbers of theories put forward as to the order in which the amino acids are arranged in the polypeptide chain, but as is the case with most of the complex and less well ordered proteins there has been no conclusive evidence of a particular order. Skin collagen is usually associated with keratin in the form of hair or wool. The major difference between the two is the presence in keratin of crosslinking cystine molecules.

Processing

The first process the leather chemist is concerned with is the unhairing and liming operation. Unhairing is carried out by treatment of the skin with a mixture of lime and sulphide. The cystine linkages are hydrolysed in the presence of alkali and, provided a reducing agent is present, new crosslinks do not form and the structure of the keratin breaks down. Thus the hair or wool can be readily removed.

Next the collagen is subjected to the liming process. In this the skins are allowed to stand or are agitated in a mixture of water, lime and sodium sulphide. This completes the unhairing process and subjects the collagen itself to alkaline action, the main effects of which are to

(1) Hydrolyse the amide groups—the number of free carboxyl groups is increased and nitrogen is lost in the form of ammonia.
(2) Modify the guanidine groups (the arginine residue).
(3) Bring about some hydrolysis of the keto-imide groups in the backbone of the collagen chains.

Physically, because of osmotic pressure effects alkali has the tendency to swell the fibres of the skin structure. This has the effect of separating the fibres and fibrils within the skin structure and makes them more readily accessible to the tanning materials later on. Liming also has the effect of hydrolysing the unwanted globular proteins present in the skin structure, and removing these.

The effluent from the liming operation is our biggest pollution problem. We are fortunate on the one hand to be able to discharge our effluent into the city sewerage system and not pollute the rivers. We are unfortunate on the other hand that, because of the action of hydrogen sulphide on concrete sewers, we must carefully control the level of impurities contained in our effluent. Sulphides in industrial sewage are unacceptable to the drainage authorities for one major reason—that sulphides cause corrosion of the fabric of the sewer. The smell due to the liberation of hydrogen sulphide is of minor importance, although the toxicity of the gas is such that low concentrations can be quite harmful.

Where acid conditions prevail in the sewer hydrogen sulphide is liberated into the atmosphere and dissolves in the condensed moisture in the sewer above the water line. This is then oxidized to sulphuric acid by different forms of bacteria. There are a number of bacteria involved and for proliferation they require water, oxygen, carbon dioxide, ammonia, as well as minor salt concentrations and a source of oxidizable sulphur. The pH must be below 7.5 for even the most alkali tolerant species to exist.

These acid conditions are readily obtained particularly in fresh concrete due to equilibrium.

$$\underset{\text{(in concrete)}}{CO_3''} \rightleftharpoons \underset{\substack{\text{(dissolved}\\\text{in surface}\\\text{moisture)}}}{HCO_3'} \rightleftharpoons \underset{\text{(in Air)}}{CO_2}$$

The pH will under these conditions soon get down below 7.5 and eventually, by the activities of the bacteria, concentrations of up to 5 percent of sulphuric acid can be built up. The sulphuric acid corrodes the sewer walls. This attack occurs by the formation of sulphates of the various components of the concrete, i.e. calcium, aluminium and iron.

Besides being readily soluble, these salts expand as they are formed and cause crumbling of the aggregates in the concrete.

There are three possible ways of countering the action of sulphides on the sewers:

1. Removal of the sulphide and keeping the pH high.
2. Minimise the oxidation of hydrogen sulphide to sulphuric acid.
3. Use of resistant sewer material.

The local drainage authority has chosen to require us to reduce the sulphide content to less than 5 mg per litre, and to keep our pH above 8.0.

We can achieve this with considerable difficulty. It is possible by aerating a solution of sulphide in the presence of manganous sulphate to reduce the sulphide concentration to about 100 mg per litre, given ideal conditions. Unlike most tanneries, our total effluent is acidic and we have no alternative but to basify it—the whole 300,000 gallons per day. This we do by controlled additions of lime.

The next major process the leather chemist is concerned with is the further modification of collagen with tanning materials. There are two main tanning procedures used in modern tanning.

(a) The chrome tanning process
(b) The vegetable or synthetic tanning process

In the case of chrome tannage the limed skin is acidified and treated with partly complexed (masked as it is known in the trade) trivalent chromium salts. The chromium is taken up into the fibrous structure where ionic bonds are initially formed, in the main between the carboxyl groups and the chromium nucleus. These linkages are, during the tanning and subsequent processes, particularly neutralising and drying, converted into irreversible covalent linkages by incorporating the appropriate active groups from the protein chains into the chromium complex.

Vegetable and synthetic tanning can be considered to be somewhat similar. This is a generalisation since the variety of syntans is very great, and the chemistry and structure of the natural vegetable tanning materials is even now not well know. It seems most likely that the mechanism involves multipoint hydrogen bonding of the phenolic groups within the tanning to the peptide linkage of the collagen. This, however, probably accounts for only a relatively small amount of the total deposition of tanning material in the finished leather. The non-specific deposition of tans and non-tans between the collagen fibres and fibrils contributes much to the commercial properties of leather, even though it does not play a role in the chemical stabilisation or bonding of the protein.

The tanning processes are those where the collagen is modified from its labile form, subject to putrefaction to a stabilised form where it can be dried out and remains soft and supple, and does not rot when it gets wet. These tanning processes can therefore be claimed as the essentials of leather making.

$—NH_3^+$	Pelt Collagen	CO_2^-
pH decrease	isoelectric region pH ∼ 5.0	pH increase
←	shifted by tannage	→
Vegetable tannage and synthetic tannage		Alkaline Normal one bath chrome tannage (with trivalent chromium salts)

However, there are a number of other processes through which leather must go before it can be claimed to be a salable product.

The reactivity of tanned leather depends on the surface charge and from this point on processing is concerned with modification of this charge so that the desired results can be obtained. Pure collagen has its isoelectric point at approximately pH 7.0. This is reduced by the liming operation so that the isoelectric point is in the region of pH 5.0 and is further modified by the tannage. The processes subsequent to tannage are concerned with modifying the surface charge and physically locating the material on or within the dense fibrous structure.

Neutralizing reduces the strongly cationic surface charge and allows for greater penetration of dyestuffs which are many and varied in type but can be considered generally as the sodium salts of sulphonic acids. e.g. Orange G.G. These salts are taken up mainly onto the chromium nucleus by ionic linkages, and modified in later operations.

The dyeing operation allows us to enter into the field of fashion and to meet the modern needs for colour. Dyeing is a separate and complex technology in itself and is a very interesting part of our work.

The leather next goes through the fat liquoring process in which reactive oils, produced by the sulphating or sulphiting of natural or synthetic unsaturated oils, are applied to the fibrous structure. Here again the degree of penetration must be carefully controlled by the reactivity of the leather, the oil, the particule size of the oil in water emulsion, and on the mechanical conditions under which the fat liquor is applied. The purpose of fat liquoring is to lubricate the fibres so that they will slide easily over one another and so that when the leather is dried out it remains soft and supple.

Drying, the next operation, takes away the water. This may seem very simple. However we have, up to this point, produced such a complicated chemical mess that chemically the drying operation is extremely important. During drying the concentrations of the solutions applied are increased, and under these conditions and in the conditions of elevated temperatures, the various reactions proceed to equilibrium or completion.

There are a number of finishing operations which follow. These are carefully controlled and designed to enhance the natural beauty of the leather, and to enhance its wearing properties.

This company has specialized in the production of calf upper leathers for women's fashion shoes, and in more recent years in woolskins. The processing of woolskins is similar to the processing of other leathers. The liming operation is replaced by scouring the wool to make it clean. This is done by washing the skins with detergents and mild alkali and rinsing them well.

The tannage of a skin which has not been limed is a much more difficult business than tanning a limed skin. As a consequence we have especially developed a tannage using synthetic tanning materials which enables us to process the woolskins rapidly to a safe condition in which they can be stored. This tannage, which can take a skin from its raw state fresh from the animal's back to a condition ready to be dried out in less than 24 hours, is a full tannage, although we seldom use it as such since we want to give better qualities to the skin.

Because the skins' properties have been modified by the pretannage the chrome tanning process is again a rapid process giving the desired properties in a very short time.

The tanning and dyeing operations for woolskins must be carried out in very different equipment because the skins are so much more bulky, and the dyeing and finishing operations are concerned with the wool rather than the leather. Again however, dyeing gives colour to the product, and finishing enhances its natural beauty.

The processing of woolskins has opened up for us a brand new technology. It has required us to develop methods of tanning which are satisfactory without the assistance of liming operations. At the time we began using them they were unique. It has forced us to develop dyeing processes which can be used to give satisfactory results as far as levelness and fastness is concerned under the limitations set by the mixture of substrates with which we deal.

Textile dyers would be horrified if they were asked to produce dark colours with satisfactory fastness properties at temperatures no greater than 70°C. Leather dyers would be horrified at the merciless treatment we give our skins in order to achieve these results. This is in relation to the use of levelling agents and dispersing agents.

However, by combining a knowledge of the technologies of leather and wool, with the skill and artistry of people who have spent their lifetime working in the leather trade, we have been able to evolve products, especially our long wool scatter rugs, which are unique in many aspects and which are keenly sought after in many parts of the world.

It has enabled us as a company to add to New Zealand's export earnings while we attain our own company objective of increasing our exports by almost 50 per cent each year. It has demonstrated that given the will, the technology, and the capital, the growth of the industry discussed at the beginning can be achieved.

OBITUARIES

Kenneth Massey Griffin 1898-1972

With the death of K. M. Griffin on January 12th 1972 after some months' illness, the Institute loses a member who took a keen interest in its activities ever since its formation in 1931. He was an original member of the Auckland Chemical Society formed in 1925, and became Secretary and Vice-President next year. This society took the initiative in starting the Institute of which it became the Auckland Branch when it was established. He became a Fellow in 1943, and an Honorary Fellow in 1963. He served on the Auckland Branch Committee, being Chairman in 1944-5, and President of the Institute in 1955. He attended the Conference at Palmerston North in 1970, but failing health kept him from Hamilton last year. He was also a Fellow of the Royal Institute of Chemistry.

Mr. Griffin was born at Nelson and educated at Nelson College and Victoria University College, where besides taking First Class Honours in chemistry, he also studied law, which proved very useful in his later forensic work. After eight years in the Dominion Laboratory Wellington, he was appointed the first full-time Government Analyst at Auckland in 1924, and held this position until he retired in 1958. Here he was involved in many notable criminal trials, many of which are described in detail in Sir Vincent Meredith's book, "A Long Brief". Soon after he came to Auckland his testimony that a blaze could be converted to bay with copper sulphate exposed a racing swindle. In the Piha arson case, the police suspected that a body had been dug up and burned in a bach fire in order to make a fraudulent insurance claim. The only evidence they had was a piece of clay about the size of a pea, which had been recovered from a shovel used by the suspects. Samples of soil were collected from over 100 newly filled-in graves. By various analytical tests Griffin narrowed it down to one, and informed the police that if they opened that grave they would find it empty, which proved to be right. Sir Vincent described this as "the most striking example of accurate deduction in his experience".

Apart from this more spectacular work, Mr. Griffin took a keen interest in food and drug analysis and administration. He made a trip overseas in 1937 to study these matters, forensic methods, and the treatment and analysis of water and sewage. One outcome was the publication of a D.S.I.R. Bulletin "Water Pollution Prevention", a prophetic work unheeded at the time.

Mr. Griffin was a University Blue in Athletics, and was mile and half mile champion for N.Z. Universities in 1923. He played tennis until quite late in life. He was also interested in tramping and was a foundation Vice-President of the Federated Mountain Clubs of New Zealand. He continued to keep fit by cycling to work, even when this became something of a hazard in modern city traffic.

Ken Griffin was brought up in a rather narrow, religious atmosphere, and while his views became more liberal, he maintained strong Church interests all his life. He combined this with his University connections by being the Methodist Church representative on the Foundation controlling the Maclaurin Chapel at Auckland University. He was also Clerk to the Court of Convocation.

Because of his strong espousal of what he believed to be right, his somewhat outspoken views and his uncompromising attitude to what he felt to be wrong, Mr. Griffin gained a reputation of being rather contentious, but basically he was warm-hearted and will be mourned by many friends. He had no time for pretentiousness, but a passion for truth in all fields.

In 1923 he married Miss Marie Priestley of Wellington who with two sons and a daughter survives him. Mrs. Griffin's social work, particularly in marriage guidance, has been recognised by the award of M.B.E. In this work she was well supported by her husband, especially after his retirement.

The writer is indebted to Mr. G. W. Stace for assistance in preparing this notice.

S.G.B.

MRS. EUNICE M. CLARE

We regret to record the death almost a year ago of Mrs. Clare formerly Miss Eunice M. Wall, M.Sc., Dip.Ed., who was a member of the Institute from the foundation year until 1943, a contributor to the first issue of the Institute's journal and an active worker for the Wellington Branch. As a member of the Chemistry Section of the Department of Agriculture she published a number of research papers on trace elements, arsenic poisoning in thermal areas, and on estimation and metabolism of the perloline alkaloids, discovery of which arose from her observations of abnormal absorption spectra during estimations of chlorophyll in ryegrass. Her husband, Norm Clare, is Waikato Branch Chairman this year.

RETIREMENT OF PROFESSOR H. N. PARTON

Hugh Parton retires from his position as Mellor Professor of Chemistry and Pro-Vice Chancellor in February 1972. The Otago Branch of the Institute is honouring him at a special function on 22 February, and the Otago University Press is publishing a volume of essays by Parton to mark his retirement.

Members of the Institute will be given an opportunity to purchase the volume "Science is Human" before publication.

SALARY SURVEY 1971

Correction: Please note the following correction to the Salary Survey.

	Employment	*Group*	
Variable omitted	*Industry*	*Govt.*	*University*
None	51	72	74
Age	40	28	52
Quality of Primary Degree	48	68	72
Ph.D. or not	47	61	73
Major Function	28	67	63

INSTITUTE BRANCH OFFICERS 1971-72

Auckland

Chairman: Associate Professor G. A. Wright. Secretary: G. McSweeney. Treasurer: Dr. I. Devereux. Committee: A. C. Kennett, R. H. Hopgood, G. A. Corban, Dr. M. S. White. Editor: J. G. Fletcher. Delegate to Council: J. C. Hawthorn.

Dr. Graham A. Wright was educated at New Plymouth Boys' High School and Auckland University College, graduating M.Sc. in 1957. He spent a year teaching at Auckland Grammar School in 1958, followed by 2 years research in physical chemistry at Balliol College, Oxford for his D. Phil. (1960). Dr. Wright held an Oersted fellowship at the University of Copenhagen in 1961, when he worked in the field of coordination chemistry. In 1962 he joined the University of Auckland as a lecturer in chemistry, and is now Associate-Professor.

Dr. Wright's research fields are oxyanion reaction mechanisms, physical chemistry of bismuth compounds, and interfacial electrochemistry. This last-mentioned field includes work on electrode reaction mechanisms, anodic dissolution kinetics of metals, passivation and corrosion, solid state electrochemistry, ion exchange processes and electrochemical equilibria. Dr. Wright is married with 3 children, and is President of the University Rugby Club and an active member of the Danish Society.

Wellington

Chairman: F. Hurst. Secretary: W. Freitag. Treasurer: Dr. N. R. Tate. Committee: J. C. Clarke, Professor R. Ferrier, B. L. Cockburn, C. L. Stonyer, Editor: Dr. A. F. M. Barton. Delegate: Dr. P. K. Foster. Hon. Auditor: Dr. R. J. Furkert.

Frank Hurst was born in Nelson, and educated at Nelson College. After winning a University Junior scholarship he studied chemistry at Canterbury gaining a B.Sc. in 1940 and M.Sc. in 1946. Four years had been spent in RNZAF as a meteorological officer. He joined Dominion Laboratory in 1947 in the Christchurch branch, transferring to Wellington in 1950. His work was mainly on pesticides, but now police work is his main occupation. He is head of the Forensic Section of Chemistry Division, and is also Chief Gas Examiner.

Waikato

Chairman: N. T. Clare. Secretary-Treasurer: Dr. J. H. Watkinson. Committee: Dr. C. L. Davey, R. J. Lancaster, Dr. K. M. Mackay, Dr. D. E. G. Sheat. Delegate to Council: R. J. Lancaster.

Mr. N. T. Clare graduated M.Sc. (Hons.) from Victoria University College in 1934. After 2 years on the staff of the V.U.C. Chemistry Department he joined the Chemistry Section of the Department of Agriculture in Wellington, then transferred to Wallaceville in 1938 when a major programme of research on facial eczema was initiated. In 1940 after studying porphyrin and bile pigment chemicals with Dr. Lamberg in Sydney he completed identification of phylloerythrin as the photosensitising agent in facial eczema and some related diseases in sheep. He transferred to Ruakura as Chief Biochemist, then in 1965 accepted an invitation to join a United Nations Development Plan team in Turkey. He spent 2 years establishing a chemical unit for sheep disease research and initiating studies on mineral deficiencies and nutrition at Pendiln, near Istanbul. Since his return he has been in charge of the Chemistry and Chemical Servicing Sections of Ruakura Animal Research Centre. His publications include papers on analytical methods, photodynamic agents in facial eczema and similar diseases, reviews, and a Commonwealth Agricultural Bureau monograph on photosensitisation in domestic animals.

His participation in Institute affairs includes the Journal Committee (1938), Secretary Examinations Committee (1945-47), Conference Chairman (1951), Chairman Waikato Branch (1954), service on the Council several years and Editor (1960-64). He was elected to Fellowship in 1947.

Manawatu

Chairman: Dr. I. D. Watson. Secretary: Dr. M. Hardman. Treasurer: C. Towler. Committee: Miss M. Humphries, Professor G. N. Malcolm, G. Ryburn, S. White. Editor: Dr. R. Gallagher.

Dr. I. D. Watson is a Senior Lecturer in Chemistry at Massey University. He entered Otago University from Gore High School and graduated M.Sc. with first class honours in Chemistry in 1960. In the following year he was appointed to the staff of the Otago

Chemistry Department as an Assistant Lecturer and commenced Ph. D. studies under the supervision of Dr. A. G. Williamson. His doctoral work on the behaviour of non-electrolyte solutions was taken a stage further in 1968 when he proceeded on a U.G.C. Post-doctoral Scholarship and a Ramsay Memorial Fellowship to the Department of Chemical Engineering at Imperial College, London, to study the theory of liquid mixtures with Professor J. S. Rowlinson, F.R.S. Dr. Watson returned to Otago University in 1969 and became a Senior Lecturer in 1970. At the end of that year he moved to Massey University where he is contributing to both chemical and biochemical study programmes.

Since 1969 Dr. Watson has been National Secretary of the World University Service in New Zealand, and in 1971 was instrumental in transferring the National Executive Committee from Otago University to Massey University.

Canterbury

Chairman: Dr. A. G. Williamson. Secretary: Dr. J. W. Blunt. Treasurer: Dr. C. G. Freeman. Committee: J. G. McGimpsey, P. R. Richards, Dr. W. S. Simpson, Dr. I. L. Weatherall, Editor: D. J. Hogan. Delegate: Dr. A. G. Williamson.

Dr. A. G. Williamson graduated M.Sc. with first-class honours in chemistry from Canterbury University College in 1954. From there he went to Reading University to study thermodynamics of hydrocarbon solutions, graduating Ph.D. in 1958. During 1957 he was an assistant lecturer in chemistry at Reading. Following a period as a post-doctoral fellow at the University of California at Los Angeles, he joined the staff of the University of Otago Chemistry Department in 1959. In 1965/6 he spent a year at Exeter University and in 1967 he joined the staff of the Department of Chemical Engineering at the University of Canterbury where he is presently Reader in Chemical Engineering. His research interests are in the thermodynamics and statistical mechanics of solutions and in the thermodynamics of membrane processes.

Otago

Chairman: Professor G. B. Peterson. Secretary: M. R. Anderson. Treasurer: Dr. G. W. Emerson. Committee: Dr. G. Flaws, J. W. McChesney, G. Scott, A. N. Scrymgeour. Editor: Professor D. J. Brasch. Delegate: Professor G. B. Peterson.

Professor G. B. Petersen was educated at the Palmerston North Boys' High School. He graduated B.Sc. in chemistry and biochemistry in 1955 and M.Sc. with Second Class Honours in Chemistry in 1956 from the University of Otago. From 1956-1959 he was a student in the biochemistry department of Oxford University, from which he graduated D.Phil. in 1959. He was admitted to the degree of M.A. (Oxon.) by decree in 1962.

In 1959, Dr. Petersen joined the staff of the D.S.I.R. Plant Chemistry Division at Palmerston North. He returned to Oxford in 1962 and was for two years Departmental Demonstrator in the department of biochemistry. In 1964, he returned to the Plant Chemistry Division via the United States, where he spent a short time as Research Fellow in Medicine at Harvard University followed by a period of three months of observational travel on a travel grant awarded by the Carnegie Corporation of New York. Dr. Petersen's research interests are in the broad field of nucleic acid structure and function, and particularly in the arrangement of nucleotide sequences in deoxyribonucleic acid. Professor Petersen is now head of the Department of Biochemistry at Otago University, a positio he has held since 1968.

FOREST RESEARCH INSTITUTE OPEN DAYS 1972

The Forest Research Institute will be open to visitors from 10 a.m. to 4 p.m. on the following dates in 1972:

WEDNESDAY, 15 MARCH 1972 — Open only to invited guests from the Forest Service, other Government departments, industry, the Universities, etc. Invitations will be sent out early in 1972.

THURSDAY, 16 MARCH 1972 — Open to High School parties only. Pupils should be in groups of 8-10. We would prefer senior pupils, preferably with a science background, as some scientific knowledge is desirable if pupils are to understand our work. *There is no limit to the number of parties each High School can send.*

SATURDAY, 18 MARCH 1972 — Public day. The Institute will be open to anyone who wishes to see our work.

There will be approximately 40 displays and demonstrations of forest research. Some laboratories will be open to enable visitors to see research staff at work. The Redwood Grove will be open to visitors.

Cafeteria and car parking facilities will be available in the grounds.

If you want any further information, please do not hesitate to telephone or write to Mr. J. H. Wright, Information Officer, Forest Research Institute, Private Bag, Rotorua, Telephone Rotorua 82-179 ext. 813 or 814.

BRANCH NOTES

AUCKLAND

Annual Report of Branch

Seven committee meetings and 11 branch meetings were held during the year. Additionally two very successful events were held—a two-day Symposium on Atomic Absorption Spectroscopy and a Luncheon Meeting. The incoming committee was urged by the retiring President Mr. J. C. Hawthorn to follow up these experiments with more alternative types of meeting. He suggested a special series of topics of interest to technicians and another for industrial members. The committee remains concerned at the low attendances at evening meetings, the large number of members not participating in any activity, and the even larger number of graduate chemists not being members of the Institute. Branch members will see a variety of activities being offered in 1972 and are urged to take advantage of them.

Attendance at meetings during 1971 followed the usual trend of involving less than 10 percent of our Branch Membership. By employment breakdown this appears to be:

	1971	1970	1966
Industry	110	114	115
University	49	55	26
Secondary Schools	19	19	10
Government	21	19	13
Hospitals	12	12	6
Technical Institutes	6	5	4
Local Bodies	2	2	2
Not known	25	7	—
Overseas	7	—	—
Other	23	17	4
	275	280	180

The Branch Committee has presented to Council a proposal for the slight rewording of the Rule 9.2.4 regarding membership by Examination. It is also taking a leading role in Laboratory Safety with a proposal to Council to publish items on this important topic.

1972 Programme

The 1972 evening programme will be distributed to members in February. An enlightened group of speakers have made themselves available and the Committee is hopeful of an excellent member response. Because of the success of the 1971 Luncheon meeting five 1972 Luncheon meetings are planned. All will be at Danish House, the first two being on 16 February and 17 May.

Personal

Dr. Charmian J. O'Connor has been promoted to Associate Professor.

Mr. P. C .A. Bailey and Dr. C. A. Wright have been awarded a prize for the best research paper presented to the Australasian Corrosion Association for 1971.

Assoc. Professor Ernie J. Searle (sometime Chemistry Master at the Auckland Grammar School and later lecturer at the Auckland Teachers' College) presently on the staff of the Geology Department, Auckland University, has been awarded a personal chair. He will retire in 1972.

Professor H. Odell has resumed his seat on the Technicians Certification Authority as the Vice-chancellor's representative.

Mr. B. C. Barrack recently toured South East Asia with his Company in preparation for commissioning a new factory complex in Ellerslie.

Mr. J. C. Fletcher attended a course in Wellington to prepare for the Auckland Technical Institute's role in aiding the Community to adopt the New Zealand Standard 650 IP for the changeover to the metric system.

Mr. J. H. Goodey (Sonata Laboratories Ltd.) and Mrs. Goodey have returned after a period of eighteen months overseas, during which time they visited industrial and chemical laboratories in Europe and U.S.A.

Rev. T. P. Cheeseman (a Ph.D. graduate in crystallography from Auckland) has returned from England, where he gained his B.D.(Lond.) and was ordained into the Church of England. He is now Curate at the Parish of Manurewa.

Correction

Auckland Branch Notes in December 1971 issue, Mr. D. B. Rands (not his father Mr. M. B. Rands) has been appointed production chemist with Philips Industries (N.Z.) Ltd., Wellington.

Manawatu

The branch has established an additional prize. This new prize is for the best student in third-year Biochemistry at Massey University.

Applied Biochemistry Division D.S.I.R.

Dr. T. Bauchop recently joined the microbiology section. He was previously at the Rowett Research Institute in Aberdeen.

Dr. D. J. Walker is at present visiting the Division for a period of 6 months while on leave from the CSIRO Division of Nutritional Biochemistry, Adelaide. He is studying nitrogen flow through the rumen, and bacterial growth yields, with Drs. Ulyatt and Clarke.

Professor K. K. Carroll recently visited the Division for 3 months, while en route to the Dept. of Clinical Science, A.N.U., Canberra. He is on leave from the Biochemistry Dept., University of Western Ontario. Prof. Carroll addressed the November meeting of the branch on "Cholesterol Metabolism, Diet and Atherosclerosis."

New Zealand Dairy Research Institute

Dr. R. M. Dolby retired on December 21 from his position as Supervisor of Applied Research.

Dr. W. B. Sanderson has been appointed to the position of Supervisor of Applied Research. He previously held the position of Product Development Co-ordinator. He has recently completed a visit to Japan, Europe and the United States of America to obtain first-hand information on the merits of and recent developments in spray drying equipment.

Dr. D. J. Woodhams has been appointed as Head of the Milk Powder Section. This position was previously held by Dr. W. B. Canderson.

Mr. A. G. Hale, a Dairy Industry Graduate Trainee, has completed his training and joined the N.Z. Dairy Board in Wellington.

Mr. O. E. Mills has recently left the Institute on a special fellowship to travel to PIRA in the United Kingdom where he will investigate the properties of papers used in commercial paper coating operations.

Massey University

Dr. D. R. Husbands was recently appointed as lecturer in the Department of Chemistry and Biochemistry. He previously worked at Unilever Research Laboratory. Colworth House, Bedford, England, on the use of fats in the nutrition of farm animals especially poultry. He also worked on lipid metabolism in birds.

Mr. V. Sills, a recent appointment to the Food Technology Department, has been awarded a fellowship of the Royal Institute of Chemistry.

Dr. R. T. Gallagher graduated Ph.D. recently, his thesis being entitled "The Structure of Dothistromin".

Drs. M. H. Timperley and L. F. Molloy also graduated Ph.D. in Chemistry recently. Dr. Timperley is now carrying out geochemical research at the Canadian Geological Survey, Ottawa, and Dr. Molloy has joined the Soil Bureau, D.S.I.R., Taita.

Dr. Abdul Khaleque, a recent graduate of the Dept. of Food Technology is currently being employed in the Casein Section of the

N.Z. Dairy Research Institute and will shortly be returning to his home town of Dacca.

Mr. E. E. Dutton of the Biotechnology Department has resigned his position to become a consultant in process engineering and heating ventilating to a group of Palmerston North architects.

Professor R. L. Earle and Dr. M. D. Earle of the Biotechnology and Food Technology Departments have been at the University of Waterloo, Ontario, Canada. They are now in Scotland and are expected to return in March.

The Australian and the New Zealand Institutes of Food Technology are to hold a combined meeting in May at Surfers Paradise, Queensland. It is anticipated that forty to fifty delegates from New Zealand will attend. This is the first combined conference to be held and it is hoped that a combined conference can be hel devery few years.

Otago

Retirement of Professor H. N. Parton

Professor Parton, who relinquished his position as Head of the Department of Chemistry last July in order to serve as full-time Pro-Vicechancellor, officially retires in February. The Otago Branch of the Institute is holding a special function on 22nd February to honour Professor Parton and to enable local members to bid him farewell. The Branch Committee extended an invitation to ex-students and friends to attend.

Science is Human

To mark Professor Parton's retirement the Otago University Press is publishing a volume of essays "Science is Human" in February. These essays have been chosen from talks given by Professor Parton over a number of years, some of them to Institute Meetings, and should be of interest to all members. Members will be given an opportunity to purchase the volume before publication.

Chemistry Department, O.U.

Dr. A. F. Smith left in December for a years study leave at Imperial College. Dr. Smith will work with Dr. M. Spiro on the kinetics of electrode processes. (Dr. Spiro was Mellor Visiting Professor at the University of Otago in 1970.)

Pharmacy News

Dr. Kenneth Taylor has recently returned from the Department of Pharmacology, John Hopkins University School of Medicine, Baltimore, Md., U.S.A., where during the tenure of a Postdoctoral Fellowship he worked with Professor Solomon H. Snyder on the pharmacology of histamine.

Mr. R. H. McKeown has returned from study leave spent at the Department of Pharmacy, University of Sydney, where he worked on barbiturates. Mr. McKeown also visited universities, drug standards laboratories and drug companies in the U.S.A. and Britain during his leave period.

Institute Prize

Congratulations are extended to Miss D. M. A. Johnson of Devonport, Auckland, who is the winner of the Institute of Chemistry Prize for Intermediate Chemistry at Otago University for 1971.

Visitors

Visitors to Dunedin have included Professor M. L. Huggins of hydrogen bond and polymer fame. Professor Huggins gave no formal lecture but discussions of his latest theoretical papers on polymer solutions were held with local "non-electrolyte" chemists.

Professor G. Wilse Robinson, Erskine Fellow of the University of Canterbury, and Professor of Chemistry at the California Institute of Technology, visited Dunedin in November and lectured on "Human Vision—How it Works".

1972 INTERNATIONAL CLEAN AIR CONFERENCE

The Clean Air Society, in conjunction with the University of Melbourne, is sponsoring the fourth International Clean Air Conference at the University of Melbourne, 15-18 May 1972.

This Conference is the fourth Clean Air Conference to be held in Australia, and the first to be held in Melbourne. Earlier Conferences—1962, 1965, 1969—were held in Sydney and established these as one of the most important in the field of air pollution and its control to be held outside the United States of America.

This conference promises to be bigger than any of its predecessors; over 50 technical papers have been accepted, and these cover a wide range of subjects of vital interest to workers in this area. These are:

Global, Regional and Local Meteorology
Atmospheric and Aerodynamic Sciences
Biological Effects of Air Pollution
Economic Factors in Air Pollution
Emission Control for Industrial Processes
Control Equipment Technology
Automotive Emissions and Control
Measurement Techniques
Environmental Surveys.

Keynote speakers will address plenary sessions of the conference, as well as giving specialist papers. These include:

Dr. J. T. Middleton, Commissioner, Air Pollution Control Office, E.P.A., U.S.A.

Dr. C. J. Stairmand (I.C.I., U.K.).

Mr. D. H. Lucas (Head of the Physics Section, Central Research Laboratories, C.E.G.B., U.K.).

Dr. J. A. Brink (Monsanto Enviro-Chem Systems Inc., St. Louis, U.S.A.).

Mr. C. G. Cortelyou (Air and Water Conservation Co-ordinator, Mobil Oil Corp., U.S.A.).

Mr. A. E. O'Keefe (Chief, Air Quality Measurement Methods Branch, E.P.A., U.S.A.).

Professor M. Treshow (Dept. of Biology, University of Utah, U.S.A.).

A large technical exhibition, Clean Air '72, showing air pollution monitoring and control equipment, as well as apparatus, books and scientific tools in related areas has been organized in conjunction with the Conference.

Qantas and T.A.A. have been made official carriers to the Conference, and Dalgety Travel are arranging a special tour to the Conference.

Information about the Conference can be obtained either from:

Mr. A. W. Skam, Secretary/Treasurer of the New Zealand Branch, Clean Air Society of Australia and New Zealand, P.O. Box 2225, Auckland, New Zealand,

or

The Organising Secretary, Dr. W. Strauss, 1972 Clean Air Conference, National Science Centre, 191 Royal Parade, Parkville, Victoria, Australia, 3052.

APPENDICES TO IUPAC INFORMATION BULLETIN

Further Appendices to the IUPAC *Information Bulletin* whose titles are listed below are in the course of publication and will be issued in February 1972.

Appendices on Tentative Nomenclature, Symbols, Units and Standards
(Yellow Booklets)

No. 14 Recommendations on Nomenclature for Contamination Phenomena in Precipitation from Aqueous Solutions (Commission on Analytical Nomenclature).

No. 15 Recommendations on Nomenclature for Chromatography (Commission on Analytical Nomenclature).

No. 16 Recommendations for Nomenclature of Thermal Analysis (Commission on Analytical Nomenclature).

No. 17 Recommendations for Nomenclature of Mass Spectrometry (Commission on Analytical Nomenclature).

No. 18 Recommendations on Nomenclature of Scales of Working in Analysis (Commission on Analytical Nomenclature).

No. 19 Rules for the Nomenclature of Carotenoids (IUPAC Commission on Organic Nomenclature and IUPAC-IUB Commission on Biochemical Nomenclature).

No. 20 Quantities and Units in Clinical Chemistry (Clinical Chemistry Section and IFCC).

No. 21 List of Quantities in Clinical Chemistry (Clinical Chemistry Section and IFCC).

Technical Reports ***(Blue Booklets)***

No. 4 Recommended Method for Benzo(a)-pyrene in Foods (Commission on Trace Substances).

No. 5 A Survey of Analytical Procedures for Traces of N-Nitrosamines in Foods (Commission on Trace Substances).

Gratis copies may be obtained by writing to IUPAC Secretariat, Bank Court Chambers, 2-3 Pound Way, Cowley Centre, Oxford OX4 3YF, U.K.

The Appendices are available free of charge to chemists/chemical organizations writing to IUPAC; Secretariat subscribers to the IUPAC *Information Bulletin* are sent all Appendices automatically immediately they are published. The Bulletin provides a news medium for the activities of the 40 or so IUPAC Committees concerned with topics of international importance to pure and applied chemistry. Annual subscription to the *Information Bulletin* is US$2.50 or £1.00 (surface), US$5.00 or £2.00 (by air).

SI UNITS IN CHEMISTRY

A one-day course will be held at the Chemistry Department, University of Auckland, on Wednesday, 10 May 1972 (9 a.m. to 5 p.m.).

The object of the course will be to explain fully the new SI system of units and its application in the various branches of Chemistry. Particular attention will be given to correct abbreviations and format, and to the choice of suitable sub-multiples of the basic SI units when convenience or existing usage makes this desirable.

The course will consist of 4 lectures, 1 seminar and 1 laboratory demonstration. A booklet containing lecture notes and reference material will be issued to each participant.

Participants:

Analytical chemists
Industrial chemists
Research chemists
Chemical engineers
Technicians
Biochemists
Technical administrators and management
Secondary school teachers
Technical Institute tutors.

All members of N.Z. Institute of Chemistry and other chemists and technicians are invited to take part in this course.

Importance. The conversion to SI Units has now commenced and most chemists will be faced with decisions concerning calibration of instruments and equipment, interconversion of units, training of staff, publication of technical reports, teaching and examinations under the new SI syllabi, etc. This course will provide an opportunity to become fully informed on the new system at an early stage.

Further information, brochure and enrolment forms are available from Centre for Continuing Education (formerly University Extension), University of Auckland, Auckland.

BOOK REVIEWS

Physical Methods in Advanced Inorganic Chemistry, edited by H. A. O. Hill and P. Day, Interscience (John Wiley), London, 1968, 629 pp, $14.25.

This book surveys the 10 principal spectroscopic and diffraction techniques used to determine molecular structure in modern inorganic chemistry. The topics covered in chapters by different authors are diffraction methods (Prout), X-ray spectroscopy (Bonnelle), photoelectron spectroscopy (Turner), electronic absorption spectroscopy (Schmidtke), optical rotatory dispersion and circular dichroism (Gillard), vibrational spectroscopy (infra-red and Raman) (Ware), electron paramagnetic resonance (König), Mössbauer spectroscopy (Danon), nuclear quadrupole resonance (Sillescu) and nuclear magnetic resonance (Eaton). Under favourable conditions these techniques may yield not only the exact molecular geometry, but also internal properties of the molecule such as energy levels, transition probabilities, electric and magnetic moments, bond strengths and force constants, amplitudes and frequencies of bond stretching and bending, etc.

The chapters average 50 pages, and consist of a statement of the basic principle and scope of the method, followed by discussion of the theory, experimental method, limitations, and application to typical examples of inorganic compounds. The writing is authoritative and clear for the most part, although the chapter on paramagnetic resonance is rather more heavily theoretical than the remainder of the book. The examples chosen for illustration provide the most interesting reading in each chapter. Thus the discussion of correct and incorrect structures deduced from X-ray diffraction patterns gives a vivid insight into the problems involved. Mass spectrometry seems to be the main omission from the range of techniques covered.

An additional chapter on the thermochemistry of solutions (Christensen and Izatt) has a rather different character, since the object is to determine thermodynamic parameters rather than structural information. Perhaps a more general chapter on thermal analysis (differential thermal analysis, thermogravimetric analysis and differential scanning calorimetry) would have been more in keeping with the remainder of the book.

A final essay by the editors gives a critical appraisal of the various structural methods, using the xenon fluorides and ferrocene as examples. A sound evaluation is given of the information content of each technique, and the problems of assignment and precision of the structural parameters that can be deduced.

This book is suitable for advanced university students and research chemists. Its value as a study and reference text will not be confined to inorganic chemists; there is much of value for all chemists concerned with these structural techniques. The printing and production are well up to the high standard set by the Wiley publishing house.

G. A. Wright.

Some Thermodynamic Aspects of Inorganic Chemistry, by D. A. Johnson, Cambridge University Press, London, 1968, pp. 224, U.K. 45/- (cloth), 18/- (paper).

This paperback is one of a series of Cambridge Chemistry Texts designed as a supplementary textbook for final year honours students (N.Z. M.Sc.). It attempts to rationalize the stability and reactivity of inorganic compounds using the methods of equilibrium thermodynamics. A sound knowledge of formal thermodynamics is required to read this book with ease, and one should also have a good familiarity with modern inorganic chemistry since the author's approach is almost exclusively thermodynamic; questions of synthesis, structure, valence and kinetics are given only brief mention.

The book begins with a good treatment of the ionic model, using the simplified Kapustinskii equations for lattice energies. There is a detailed account of solution equilibria, electrode potentials and solvation processes in water and liquid ammonia, followed by chapters on the transition metals (including lanthanides and actinides) and non-metal compounds treated from a bond energy viewpoint. A prominent omission is Pearson's theory of hard and soft acids and bases. The Ebsworth oxidation state diagram for sulphur is discussed, but the more useful potential/pH diagrams of Pourbaix are not covered.

The book can be recommended as a useful source-book, since it contains much data (not S.I.) and a wealth of examples from the whole range of inorganic chemistry. The writing is authoritative, but the author's preference for general formulae and comprehensive statements makes some chapters heavy going. The only references given are to general books and reviews; more specific references to key papers would be an advantage, especially where the interpretations are controversial.

G. A. Wright.

The Molecular Basis of Entropy and Chemical Equilibrium, P. A. H. Wyatt, R.I.C. Monograph for Teachers No. 19 Royal Institute of Chemistry, London, pp vii — 65.

The large number of treatments of the second law of thermodynamics and entropy for high school students which have been published over the last few years is perhaps a measure of the inherent difficulty of writing a satisfactory explanation of this topic at sixth-form level. Most of these articles have been open to severe criticism, many have been misleading, and a fair proportion have been downright rubbish.

It is very refreshing, therefore, to read Wyatt's monograph which is concise, eminently readable, and essentially correct.

The single feature which makes Wyatt's book outstandingly different from most treatments at this level is that it gets away from all the hocus pocus about entropy and geometrical randomness. Wyatt sets out to explain in a simple way the relation of the entropy of classical thermodynamics to statistical mechanical concepts. In doing this, he starts by discussing the extension of quantum mechanical ideas to large collections of particles and distribution of the system among the available quantum states. This in itself is a great step forward in elementary chemistry. The idea that quantum mechanics is applicable to a wider range of phenomena than chemical bonding is one which authors in this field seem to have been afraid to introduce at this level.

Wyatt then obtains, without using too many fancy words, a partition function, and from there on his task is relatively simple. He admits to taking a short cut which might mystify some readers in his identification on page 31 of $(V_2/V_1)^L$ with the ratio of numbers of quantum states for the volume change of a perfect gas. This particular piece of mystery could have been avoided had the author been prepared to write down an expression for the spacing of the translational energy levels. However, it could equally be argued that this is merely pulling the rabbit out of a different hat. In any case, unless one wishes to try and teach the whole of modern physics at sixth-form level, one has to be prepared to accept an "it can be shown that" argument somewhere along the line.

One could take issue with many of the details of Wyatt's presentation, but to do so in reviewing a book which is so much better than other comparable works in its basic approach would be captious.

The reviewer shares the author's uncertainty about how much of the book's content can be successfully passed on to sixth formers, or indeed to sixth-form teachers. What is certain is that the book should be read and understood by anyone who intends to teach thermodynamics at an elementary level.

If it influences some to try to teach the subject properly, that will be a good thing. If it influences others to stop teaching the subject badly, that too will be a good thing.

C. A. WRIGHT.

Principals of Crystal Chemistry by E. Cartnell. Royal Institute of Chemistry Monograph for Teachers No. 18 (1971) 67 pp.

This series is intended to present concise and authoritative accounts of topics in chemistry for the guidance of teachers at and above G.C.E. A-level, and to summarise newer areas of science which involve chemistry. The content of the present text is largely irrelevant to the New Zealand 7th form syllabus, and exceeds in scope and depth material taught in most of our first year university courses. High school and university teachers would find the historical sections novel and interesting, but most technical sections are too concise, lack explanatory examples and even developed point. Some statements concerning X-ray analyses are incorrect or so vague that the non-specialist reader would be left with a false impression of the present state of investigations in this field.

The two longest chapters, 'Crystal Lattice Energy' and 'A Survey of Crystal Structures', feature some interesting examples from the more recent chemical literature which could be used to great advantage by all teachers. In 'Suggestions for Further Reading' the author has included a surprising number of classical and advanced texts with no printing later than 1968. Any person seeking perspectives of the subject, balanced by the enormous technological advances of the last decade, would be much better advised to read from the many excellent articles and books which have been published for the first time during the last three years.

WARD T. ROBINSON.

Polarography, by D. R. Crow and J. V. Westwood, Methuen and Co. Ltd., London, 1968, 184 pp, UK £1.50.

This little book is one of a series of Methuen monographs on chemical subjects. The authors have succeeded admirably in their aim of covering the essentials of polarography in a lucid fashion, and the book should prove to be a very popular introduction to the subject. Many larger and more specialized books have been written on polarography, but Crow and Westwood have managed to cover all the main aspects in their well-organised treatment of the field. There are 67 clear diagrams, and the bibliographies and indices are very useful.

Starting with the polarographic diffusion current and the basis of the voltammetric curves for a variety of cases, the book deals with experimental technique, polarography of inorganic complexes, electro-reduction of organic compounds, analytical applications and the more recent methods of AC and oscilloscopic polarography. There is no discussion of other electrode materials (graphite, glassy carbon, noble metals) which can often be used in place of the dropping mercury electrode. The treatment of irreversible polarographic reactions, in which the rate determining step is the electron transfer at the electrode surface, is not satisfactory by modern standards. It is a pity that the Koutecky method (1953), which yields heterogeneous rate constants directly from the observed polarogram, was not described, since it is now widely used in the field of electrode kinetics. But apart from these points the book can be recommended for its clarity and numerous practical examples.

G. A. WRIGHT.

CONFERENCE 1972

★

Wellington

August 21-26

★

Theme . . .

Reviews of Broad Topics for all Chemists

LA1186NZ

Pronalys'* analytical reagents are manufactured to stringent specifications and are routinely tested for purity, colour, clarity of solution and other requirements. For these reasons the Pronalys' range can be fully relied upon to produce accurate results under all conditions of laboratory analysis and in the most exacting procedures.

A booklet listing the 'Pronalys' range, with detailed specifications, is available on request

Pronalys *trade mark

Analytical Reagents

Distributors MAY & BAKER (NEW ZEALAND) LTD.
P.O. Box 35060, Naenae. Telephone 677-016.
Stockists: Kempthorne Prosser & Co. Ltd.
Auckland, Palmerston North, Wellington,
Christchurch and Dunedin.
South Island Chemicals Ltd., Christchurch.

Phone Schwarz/Mann Now

Auckland 483-039
Wellington 58-964
Christchurch 30-662

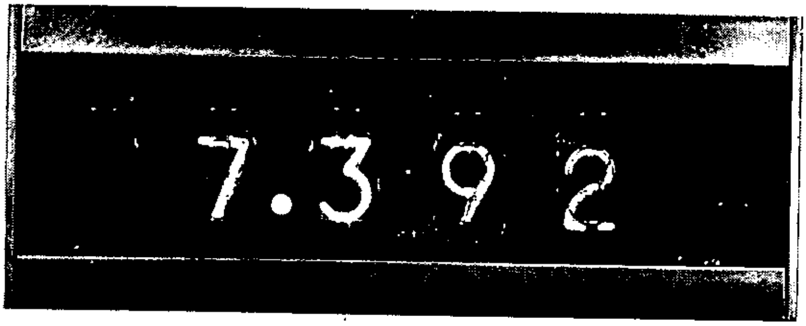
For Schwarz/Mann
Amino Acids & Derivatives
Peptides & Polypeptides
Fatty Acids and Alkaloids
Enzymes & Coenzymes
Enzyme Substrates
Carbohydrates
Hormones & Insulin Derivatives
Antibiotics
Purines, Pyrimidines & Nucleoproteins
Purified Proteins, Blood Fractions & Antisera
Vitamins
Steroids/Intermediates
Radiochemicals

Schwarz/Mann products are fully available throughout New Zealand from Smith-Biolab Ltd. *Smith-Biolab technical representatives are as close as your phone. Call today for any enquiry.*

SMITH-BIOLAB LTD
P O Box 36007 Auckland 9 New Zealand

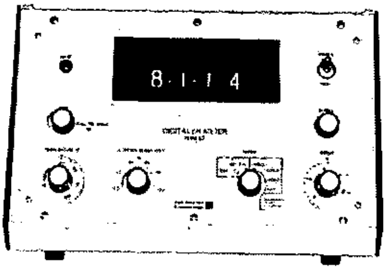
8223 SM

NEW



Extremely accurate pH-measurements and non-fatiguing precision routine measurements

DIGITAL pH-METER FOR MEASUREMENT OF pH AND mV:
0-14 pH. –1400 to +1400 mV, –7000 to +7000 mV.



PHM52

Not only is the new pH-Meter, type PHM52, equipped with digital read-out which avoids uncertainty in reading the measured results and eliminates operator eye-strain in precision routine measurements; it also features adjustments enabling a true measurement of pH to an accuracy of one thousandth of a pH-unit, viz.: a multiturn buffer-adjustment potentiometer, and calibrated controls for ISO-pH, electrode sensitivity, and temperature adjustment. The long-term stability is ensured by a fully transistorized electronic circuitry including integrated circuits.

SOLE AGENT
WATSON VICTOR LTD.
Head Office: 4 Adelaide Road, Wellington.
Branches: Auckland, Christchurch and Dunedin.

RADIOMETER
COPENHAGEN

Phone Becton-Dickinson Now

Auckland 483-039
Wellington 58-964
Christchurch 30-662

B-D Becton-Dickinson for

Vacutainers – Blood Collection Equipment

Unopettes – Micro Blood Collection Equipment

Microlances – Both regular and heavy duty

Cornwall Continuous Pipetting Outfit

R.T.U. Precleaned Disposable Culture Tubes

Disposable and Reusable Medical Supplies.

Becton-Dickinson products are fully available throughout New Zealand from Smith-Biolab Ltd. *Smith-Biolab technical representatives are as close as your phone. Call today for any enquiry.*

SMITH-BIOLAB LTD
P O Box 36007 Auckland 9 New Zealand

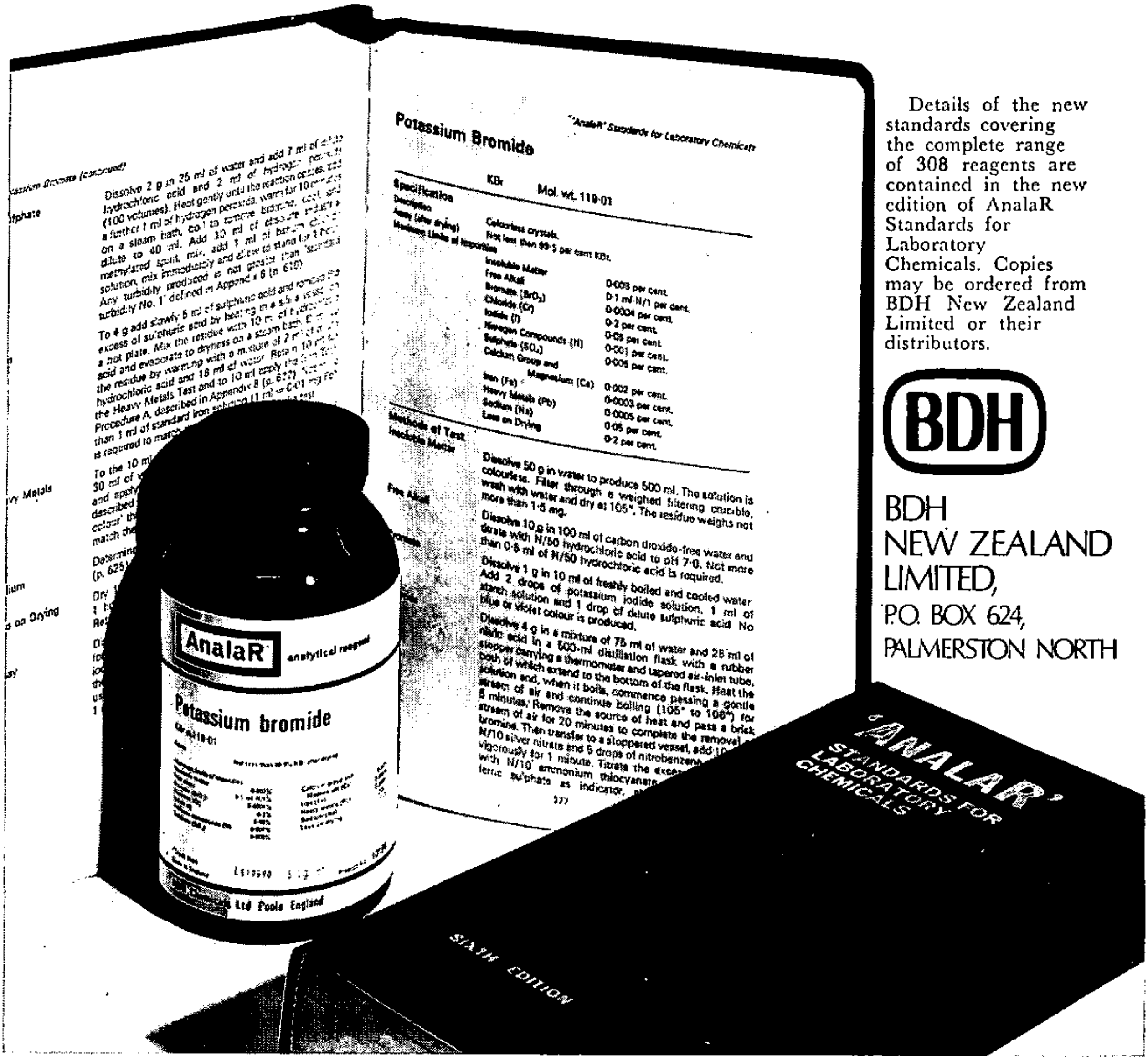
8354/BD

BDH ANALAR–now even better!

To keep pace with the increasingly exacting demands of modern laboratory practice and advances in analytical chemistry, specifications for 'AnalaR' reagents have been made even more stringent and more extensive, as a result of several years' work revising and improving analytical procedures.

Many additional tests have been included in the light of manufacturing experience and advances in analytical chemistry.

ANALAR Analytical Reagents



Details of the new standards covering the complete range of 308 reagents are contained in the new edition of AnalaR Standards for Laboratory Chemicals. Copies may be ordered from BDH New Zealand Limited or their distributors.

BDH

BDH
NEW ZEALAND
LIMITED,
P.O. BOX 624,
PALMERSTON NORTH

**Phone
James A. Jobling
Now**

**Auckland 483-039
Wellington 58-964
Christchurch 30-662**

James A. Jobling for all your Laboratory Glassware.

- E-mil Graduated Laboratory Glassware and Thermometers.
- Pyrex Borosilicate Laboratory Glassware.
- Quickfit & Quartz Interchangeable Laboratory Glassware, Laboratory Water Stills.
- Clearfit Interchangeable, but with clear joints.

We hold comprehensive stocks in Auckland and Christchurch.

James A. Jobling products are fully available throughout New Zealand from Smith-Biolab Ltd. *Smith-Biolab technical representatives are as close as your phone. Call today for any enquiry.*

SB
SMITH-BIOLAB LTD
P O Box 36007 Auckland 9 New Zealand

8354/JJ

If you have a laboratory . . . whether it's small or large . . . research or industrial . . . whatever the size or type, the ND.A. can be of assistance to you.

We stock a comprehensive range of analytical and laboratory reagents, technical and industrial chemicals, scientific apparatus and laboratory equipment.

CONSULT the N.D.A. in regard to your particular requirements, we will be pleased to quote you on an ex-stock or indent basis.

◆

The National Dairy Association of N.Z. Ltd.

Head Office:
Wellington
P.O. Box 28

Stocks at . . .
AUCKLAND
P.O. Box 1001

PALMERSTON NORTH
P.O. Box 210

Phone
Amicon
Now

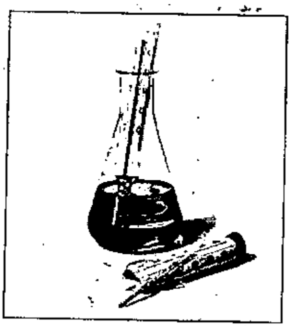
Auckland 483-039
Wellington 58-964
Christchurch 30-662

Amicon : Ultrafiltration for laboratory and clinical uses.
Ultrafiltration may be used for Concentration, Separation
and Purification of Colloids and Macromolecules.

Amicon products are fully available throughout New Zealand from Smith-Biolab Ltd. *Smith-Biolab technical representatives are as close as your phone. Call today for any enquiry.*

SMITH-BIOLAB LTD
PO Box 36007 Auckland 9 New Zealand

8354/Am



Save time with accurate temperature measurements

We have developed an instrument which measures temperatures easily, quickly, and accurately—especially liquids and semisolids.

The Mettler TM15 has a measuring range of −20 to +300 °C and 0.05 °C reproducibility without range switching. It rapidly advances to sensor temperature.

The platinum sensors can be replaced with no effect on the guaranteed accuracies. The strictly linear recorder output with full range zero-point displacement permits accurate recording of temperature measurements. The TM15 can be switched over to maximum or minimum reading.

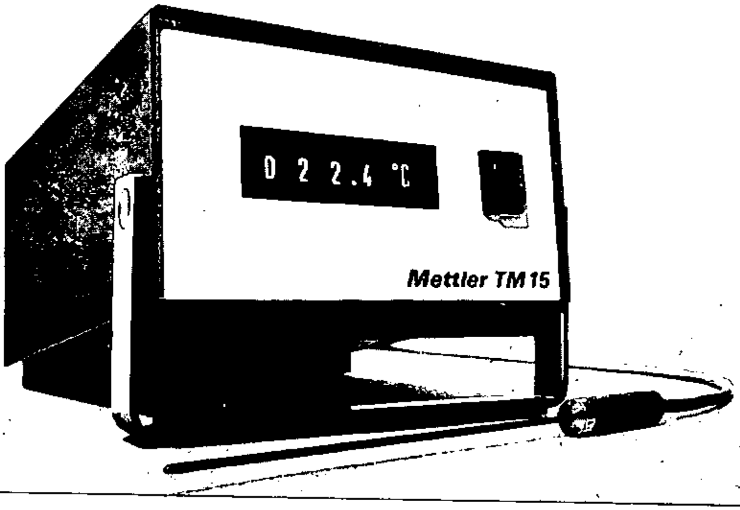
These features suggest a measuring instrument too costly for purposes other than research.

But the TM15 is so reasonably priced that we recommend its use wherever accurate temperature measurements are required.

With the Mettler TM15 you are assured of exact temperature measurements every time.

Mettler

Mettler instruments save time



SOLE AGENT
WATSON VICTOR LTD.
Head Office: 4 Adelaide Road, Wellington.
Branches: Auckland, Christchurch and Dunedin.