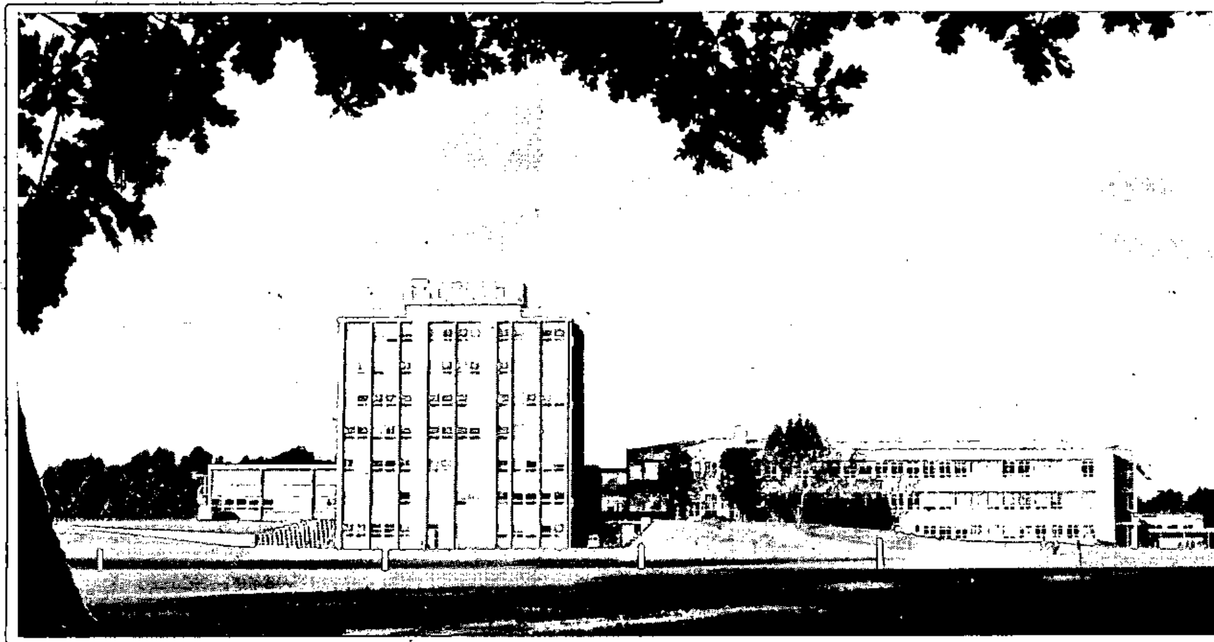
CHEMISTRY IN NEW ZEALAND

JOURNAL OF
THE NEW ZEALAND
INSTITUTE
OF CHEMISTRY



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Editorial

In this issue we continue the series of comments on instrumentation and techniques. We also begin a new section on Current Chemistry, being short accounts of particular research or work in progress in this country. Brief contributions to both sections are invited.

Chemistry for schoolchildren is being organised by branches on such a scale that a separate section reporting these activities in the Journal is merited. The secretaries of the junior groups could be encouraged to send in their own reports.

□

Cover Photograph

Research Buildings of the Ruakura Agricultural Research Centre. They comprise—

1. *The Laboratory Block of the old Ruakura Animal Research Station completed in 1957 (on the right).*
2. *The Tower Block occupied by Research Officers of the Ruakura Soil Research Station and the Ruakura Animal Research Station (completed 1966).*
3. *The Administration Block and Library, recently completed behind the Tower Block.*

Photograph: R. W. Cooper.

CHEMISTRY AND EDUCATION

R. D. Brown

Professor of Chemistry, Monash University

THE PLANNING of a chemistry course as part of secondary or tertiary education presents a continuing challenge. There are two goals. The first is to contribute to the general education of all citizens by providing some basic understanding of chemistry and its significance in the world at large. The second is to offer to selected students specialised instruction leading to university degrees with chemistry or a kindred discipline as the major subject. These goals are difficult to achieve in a changing world in which there is a rapid growth of chemical knowledge and an expanding stream of technological advances.

There are two fixed points in an overall chemistry course. One of these is the end of the professional course, at which stage the Ph.D. graduate needs to be of the same standing as his counterparts in other English-speaking countries, particularly England and the U.S.A. The standard of achievement is steadily edging upwards. We are therefore faced with intensive course-work, either in the early stages of the Ph.D. or at least in the B.Sc. Honours year, in addition to the traditional research project. If the standard required early in the Ph.D. is increasing, then increased attainments must be required in each preceding year of the university course and therefore the content of courses must be frequently scrutinised to ensure that they remain appropriate.

At the other end of the course is the fixed point in time at which the training in chemistry begins. In the state of Victoria this is in the fifth form of secondary schooling. The two years of study in fifth and sixth forms are preceded by four years of study of general science. To meet the increasing standards demanded at the graduate end we must either pack more into all years between the fixed points, or increase the length of the course, or prune dead or dying wood. I prefer the latter and I believe that there is usually good scope for the secateurs.

When it comes to deciding the syllabus for school level chemistry a fundamental issue has to be faced. It relates to the two goals indicated above. Can a single course be suitable for the general educational purpose of giving all students some familiarity with a discipline that has had a major impact on modern civilisation and at the same time also be a suitable first stage in the specialised instruction of embryo professional chemists? I believe that the answer is "yes". But I consider that the courses with which I am most familiar are not ideal for meeting the two requirements.

My concern is, that the syllabus appears to be designed primarily for specialist training and not enough attention is given to the broader implications of chemistry. Examples of such matters are: the role played by chemical developments in the evolution of the modern industrial society; the economic and social significance of the production of new metals; plastics and other structural materials and of synthetic fibres; the impact of chemistry on agriculture, etc. Such matters are not part of school chemistry courses in Victoria, but they should be. It may be that we need the advice of economists and social scientists to present such matters suitably. Summer schools in which science teachers discuss such topics with economists and social scientists might prove fruitful.

Now I am not suggesting that these aspects should dominate the chemistry course; far from it. But they should be introduced. They might be considered by syllabus committees when they are reviewing the time devoted to

Text of an address to NZIC Conference, 1966

historical aspects of chemistry. It is important that students gain some appreciation of the way in which scientific ideas evolve, but it is all too easy to overplay the historical side of the subject. For some chemical topics the historical aspect could, with advantage, be interwoven with the social and economic implications.

A related matter is the discussion of industrial processes that is usually included in school courses — the production of ammonia, steel, etc. Too often the emphasis is on the details of the chemical plant, the least important aspect! I remember as a schoolboy being examined on the details of the plant for the contact process for sulphuric acid manufacture. Some time later I visited such an industrial plant in Melbourne and was surprised to find that, for good reasons, it did not correspond at all closely to the plant that was presented in such great detail in the chemistry test (of English origin) that I had studied at school. Now I cannot see the point of requiring students to memorise details of industrial plants — brief descriptions might be included for interest only, not to be memorised. However, I see good reason to expect a student who is writing an essay on the industrial production of ammonia to include in it some indications of the economic significance of the process.

A school chemistry course of the kind that I have been describing would have a strong claim to be a central part of the education of all students. It would stand in strong contrast to such narrow and uneducational subjects as Latin and it would be of rather greater importance than such well-entrenched subjects as geography and history. Indeed I believe that it is time to review the apportionment of secondary school time to the different subjects. The relative significance of geography, history and science in the modern world is very different from the relative significance of these subjects in the nineteenth century, but one feels that there are strong nineteenth century overtones in the allocation of times to subjects in the secondary school curricula.

My remarks so far have related to the general educational aspects of a chemistry course, which I consider just as important for the specialist chemist as for the general student. If we turn now to the conventional chemical content of school courses, the main point to be made is that the factual details of the syllabus are relatively negotiable. It is a matter of indifference whether, say, the chemistry of arsenic is included or omitted. A reasonable body of factual material must be included to enable the basic principles to be developed and discussed, but beyond that there is reasonable room for manoeuvre. This means that there would not be great difficulty in manipulating the syllabus to provide some space for discussion of chemical economics and social implications of chemistry. Some factual and historical material might be removed.

The important part of the syllabus is the emphasis on scientific method and the need for careful and critical thinking. The student must be introduced to modern chemical principles and be given a good appreciation of the way in which chemical concepts are formed, developed, reshaped and perhaps ultimately discarded. He must steadily acquire the ability to use chemical principles correctly to solve chemical problems. An insight into the design of experiments and the critical interpretation of experimental results are also vital. This last requirement is, of course, met admirably in the recent P.S.S.C. physics course, and we may have to take a leaf out of the physicists' book here.

In all that I have said there is the implication of the revision of the chemistry syllabus. This is important as a continuing process. A syllabus that has not been revised for five years is bound to be less than completely satisfactory. A brief description of recent revisions of the school chemistry syllabus in Victoria may be of interest here. Serious attempts to revise the syllabus started about a decade ago when the existing syllabus was recognised to be seriously out of date. The teaching of Dalton's atomic theory, equivalent weights, acid-base theory and the theory of electrolytic dissociation was antiquated, and the descriptive chemistry of the elements read very much like a dictionary or cookery book. The course was obviously appearing rather dull to students and was falling more and more out of step with the current chemical concepts to which students were being exposed as soon as their university course started. A steady process of modernisation was initiated. It has now culminated in the production of a text book and laboratory manual which are being used for the first time this year. The new syllabus requires greater attainments in several directions. The treatment of valency and structural chemistry has been increased, chemical equilibria are treated more quantitatively, thermochemistry is couched in thermodynamic terms, the content of organic chemistry has been increased and descriptive inorganic chemistry revised. Throughout, the emphasis has been placed on three-dimensional geometrical aspects. The laboratory course has been revised to include more physical chemistry, while aqueous solution chemistry has been diminished in significance. I regret, however, that the economic and social aspects of chemistry have been ignored.

Another significant aspect of chemical education concerns the important related disciplines. I refer especially to mathematics and physics. Constant appeal to the principles of mechanics and electrostatics is made when interpreting chemical phenomena on the atomic-molecular scale and electrical circuitry concepts frequently crop up in electrochemistry and elsewhere. University level chemistry also increasingly requires a fluency in describing chemical phenomena by means of mathematical equations and symbols. Familiarity with mathematical attitudes is, if anything, more important than the acquisition of specific mathematical skills — differentiation, integration, etc. — although both are necessary for modern chemists. Thus, part of the scrutiny of the teaching of chemistry in schools must be to ensure that students are able to get parallel instruction in physics and mathematics. Of these I consider mathematics the most vital. It is essential that the mathematical ability of students be steadily developed without interruptions. It is feasible, in unfortunate cases, to make up for previous deficiencies in instruction in chemistry or physics by some additional reading and tutorials, but filling in deficiencies in mathematics is far harder, especially the renewing of mathematical studies after a period away from the subject.

If I may turn now to tertiary level chemistry, there are a number of controversial educational points to be considered. It is popular to suggest that tertiary level science courses should be made more "cultural" by including some proportion of non-science subjects in them. Setting aside the semantic question of whether the word "cultural" is being correctly used, I do not believe that it is satisfactory to compel students to study subjects that do not appeal to them and which they do not consider useful in their chosen career. This is a problem which is illustrated by a remark made to me by the research manager of a large Australian company. He said that he found that new engineering graduates tend to find their feet more quickly in his firm than do chemistry graduates. He attributes this to the flavour of engineering courses, which he thinks prepare the graduate better for the interplay of his subject with industry and the community and that he is better prepared to work among his fellow men. The suggestions that I have made about including some considerations of economic and social factors in school chemistry courses might help to overcome this defect in chemistry graduates. I see less scope for incorporating such aspects in tertiary level chemistry courses for people who hope to become academic chemists. Those pursuing pure science will not take very kindly to the inclusion of applied topics in their university course, because by this stage they are realising just how much pure science they must ingest if they are to become expert chemists.

New areas of science are becoming particularly important and are demanding a place in the tertiary level training of chemists. The mushroom growth of instrumentation, especially of electronic devices in chemistry, makes it imperative that modern graduates have sufficient basic knowledge of electronics to understand the workings of chemical equipment. We have then, an increasingly important task of overcoming the "black box" mentality.

Another new development, going beyond the ranks of chemistry graduates and extending into virtually all university faculties, is the need for an appreciation of computer techniques. The programmed sequential computer is starting to have an enormous impact on many aspects of modern society, in industry and commerce, hospital management, libraries, linguistics, the law, and other areas besides scientific and technological computation. At Monash University at present, all final year students in economics, engineering, physics and chemistry attend a computer course in computer principles, programming, data processing and computation. Whether chemistry graduates proceed to industrial jobs or research positions they are likely to be involved in or to supervise work requiring data processing or heavy computation. Science teachers need similar experience because schoolchildren already are eager to hear about computers and I predict that it will not be long before computer techniques are taught at school level.

The problem of preparing a graduate to take his place in chemical industry is sometimes tackled by including lectures on industrial chemistry as part of, say, the third year chemistry course. This usually seems to be a failure. It is particularly difficult to find good lecturers who are able to make the subject interesting, so it is treated as a chore by the students. Perhaps the answer is to separate students into those studying pure science and those studying applied science. The latter could then include in their studies courses on industrial chemistry, economics and marketing, some chemical engineering topics and so on.

The mentioning of applied science raises another issue. My impression is that we need a broader range of training than can be offered by universities alone. In other words we need alternative tertiary institutions. There may be room for several kinds of alternative institutions, including junior colleges that cater for the less well prepared student and do not attempt to take him beyond the pass B.Sc. Degree (or even pass him on to a university for his final year of the pass B.Sc.). However, rather than discuss this issue, which may be more urgent where I come from than in New Zealand, I should like to turn to another kind of institution, one that we call a senior technical college, in Victoria.

The senior technical colleges have been offering courses leading to a Diploma of Applied Chemistry. Unfortunately, these courses, which could be particularly suitable for students who know that they prefer applied science to pure science, have not proved at all popular. Perhaps this is primarily a "status symbol" problem. If so, the step that has just been taken in Victoria should overcome this. We have recently created the Victoria Institute of Colleges. This is a degree-giving body that will confer degrees on students from affiliated technical colleges. To gain affiliation, a college will have to achieve a rather higher quality of instruction than has been the practice so far, and this will require revision of syllabus and improvement of the working conditions of staff so that rather better quality staff may be recruited in the future. Moves in these directions are already being made by more than one technical college and we shall soon be seeing the products of these developments.

A related development is the proposal that the technical colleges should introduce courses in the humanities and social sciences. In all of these proposals it is important that the institutions do not merely develop into pale copies of existing universities. This is recognised widely and I believe that the courses will evolve with a different slant, namely with greater emphasis on the industrial and economic aspects of chemistry. I would like to see the bulk of the students whose inclinations be on the applied side of chemistry go through technical colleges and graduate with say B.Appl.Sc. Those who wished to study for a higher degree could then move to a university, while at the undergraduate level the universities could concentrate rather more on students attracted to pure science.

I would also think that it would be desirable to recruit chemistry teachers from both sources. Both kinds of course will inevitably have their strengths and weaknesses, and a blend of both approaches in schoolteaching might be beneficial.

There are many other aspects of chemistry and education that I have not touched on. My selection of material was rather arbitrary and other matters are just as important as those that I have covered. I hope however that I have said enough to provoke a lively discussion. After all, the important part of this conference is the discussion.

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OBITUARY

Roy Gardner,

D.SC., F.R.I.C., F.N.Z.I.C., M.I.CHEM.E.

ROY GARDNER was born in Masterton in 1898 and educated at the Central School and the District High School (forerunner of Wairarapa College). He qualified as a pharmacist and worked in that capacity in several parts of the country. His career in chemistry began at Auckland University College, from which he graduated B.Sc. in 1921. He went to Otago University in the following year, gaining the M.Sc. degree with first class honours, his thesis being on the essential oil of manuka (*Leptospermum scoparium*). He continued work on the essential oils of native plants during his years (1922-33) as a teacher at King Edward Technical College, and during one full-time year (1928) as John Edmond Research Fellow at Otago University. For this he was awarded the degree of D.Sc. by the University of New Zealand in 1930, having previously obtained the Fellowship of the Institute of Chemistry (now F.R.I.C.) by examination in 1927.

It was during this period that the Otago Chemical Society was formed (1929) with Professor J. K. H. Inglis as president and Dr. Gardner as secretary. In the following year (November 1930) the first meeting of the Otago Branch of N.Z.I.C. was held, with Dr. Gardner, then president of the Otago Chemical Society, in the chair. He then became Otago's delegate to the Council of the new Institute, and an original Fellow.

In 1933 he took a bold step in the middle of the economic depression, setting up practice as a Consultant and Analytical Chemist in Dunedin. His broad training eminently suited him for this work and for over thirty years he played an important part in Dunedin's industrial life. In the first of the two addresses he gave as President of the Institute (1940 and 1941), he discussed the relation of chemists to the manufacturing industries of New Zealand, assuming that an era of industrial expansion was beginning. This was a theme on which he had just published his book "The Basis of Prosperity in New Zealand", a common sense and orthodox approach to a question with which the country is still coming to grips twenty-seven years later. In his second presidential address he further developed his theme, discussing in the light of his own experience industries which could be developed. Salt from the sea was not among them "until some cheap method is found".

Dr. Gardner retained his connections with both teaching and pharmacy all his working life. When a course in Applied Chemistry was introduced at Otago University he gladly agreed to contribute some lectures each year, based on his experience as a public analyst and consultant. He acted as an examiner for the Pharmacy Board for some ten years and in 1935 was President of the Pharmaceutical Section of A.N.Z.A.A.S. When the degree of B.Pharm. was established at Otago University he became Senior Lecturer in Pharmaceutical Chemistry for three years up to his retirement from active work.

In 1963 his contribution to chemistry in New Zealand was recognised by his election as an Honorary Fellow of the Institute. In one of the addresses he gave as president, he claimed, with full justification, that public analysts have contributed as greatly to the status of the profession of chemistry in New Zealand as they have in England. His own contribution was a notable one.

Dr. Gardner was to take an appointment as part-time librarian at the Fertilizer Manufacturers' Research Association but died suddenly on April 8, 1967. The Institute extends its sympathy to his family.

H. N. PARTON.

A SIMPLE AUTOMATIC TITRIMETER FOR THE DETERMINATION OF IODINE USING THE "DEAD-STOP" METHOD

W. G. Whittlestone and A. Twomey

Ruakura Agricultural Research Centre

THE need to estimate the iodine content of a large number of samples of iodophor solutions arose at this laboratory in the course of a study on the stability of iodophors. As only one part-time assistant was available it was essential to automate at least part of the work. No titrimeter was available at the laboratory but, as is quite common in other institutions, a potentiometric recorder (Phillips type PR 2210. A/21), was available. Thought was therefore given to converting this instrument so that it would function as an automatic "dead-stop" titrimeter.

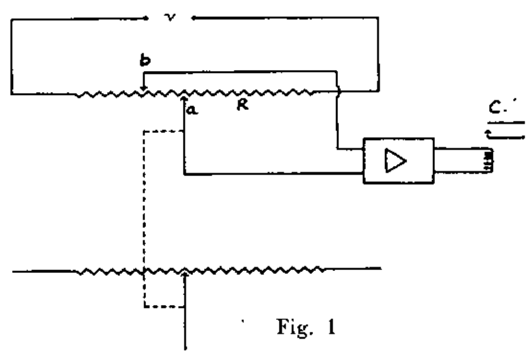

Fig. 1

The PR 2210 is fitted with a controlling device consisting of a mechanical relay controlled by a phase sensitive electronic relay. Figure 1 shows the diagram of the controlling system. A Resistor R is fed from a source of alternating voltage and is fitted with two independent sliders, (a) a slider connected to the electronic relay and coupled mechanically to the slider on the potentiometric bridge and (b) a slider which can be set manually. When (a) and (b) coincide no voltage appears at the terminals of the relay. However, if (a) is above or below (b) a voltage appears at the terminals, the phase of which is determined by the relative position of the 2 sliders. Depending on phase the mechanical relay (c) will be open or closed.

Figure 2 sets out the modification which was made to the measuring part of the potentiometric recorder. SW 1 is a double change-over switch connected into the chart drive motor (CDM) circuit, which in the upper position (shown in the diagram) connects the latter to the terminals of the mechanical relay of the controller system. In the lower position the chart drive motor is operated normally. The switch SW 2 is used in the course of carrying out a titration as a manual motor control. When used as a titrimeter, a second synchronous motor (M) is

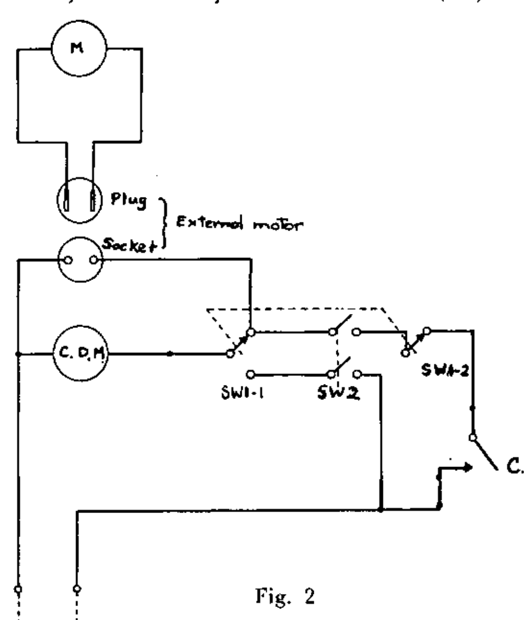

Fig. 2

connected into the circuit as shown. This motor drives through a rack and pinion mechanism a hypodermic syringe which is used as a burette containing standard sodium thiosulphate solution.

The circuit of the detecting system is shown in Figure 3.[1] This consists of a mercury cell in series with a 100K high stability resistor connected as shown to the titration cell containing 2 platinum electrodes. Across the electrodes is a 2.5K resistor used to set the voltage applied to the cell. In series with the electrodes is a 250 ohm wire-wound resistor across which the potentiometric recorder is connected. The current flowing through the electrodes is represented as a voltage across this resistor.

The sequence of operations is as follows: The controlling slider on the potentiometric

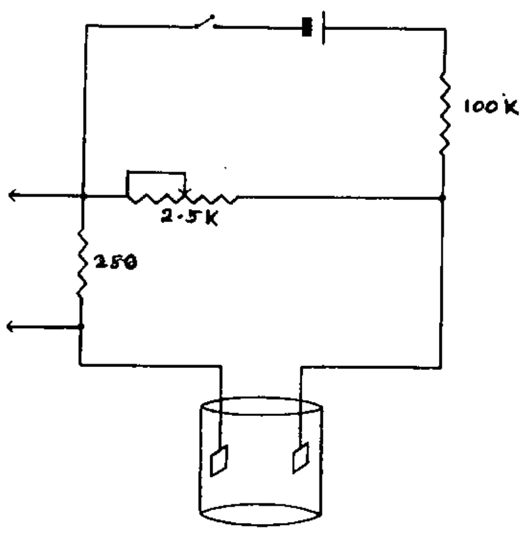

Fig. 3

recorder is set to 0.15 millivolts. As soon as a solution containing iodine is put into the titration vessel which is provided with an efficient magnetic stirrer a current flows producing a voltage across the terminals of the recorder which promptly runs up to a reading of the order of 2.5 millivolts. Closing SW 2 starts the chart drive motor and the synchronous motor driving the burette. As the titration proceeds towards the end-point the current through the cell decreases and the recorder approaches the set point of the controller. The moment this is reached the relay drops out stopping both the chart drive and the burette drive motors with little overrun as both motors are synchronous. While the titration is being carried out the technician will be preparing the next sample. There is no need for supervision as the whole process is carried out automatically. The switch SW 2 is opened as soon as the operator returns to the instrument and when another sample is placed in the titration vessel the recorder again runs up the scale, thus causing the relay contacts to close.

The system has been found to be completely reliable and has been of great assistance in speeding up the routine determination of iodine.

Acknowledgements. The authors wish to express their thanks to Mr. S. Willson for the construction of the motor driven burette and to Mr. R. Tollan for the modifications to the potentiometric recorder.

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□

CURRENT CHEMISTRY

STEROIDS OF MEDICAL INTEREST: CORTISOL

M. G. Metcalf

From the Steroid Section, The Medical Unit,
The Princess Margaret Hospital, Christchurch

HUMAN steroids are synthesised in the adrenal glands, the testes and ovaries. They are carried in the blood stream to the liver where they are reduced and changed to their more water soluble conjugates. It is as the conjugates sulphates and glucuronides that most steroids pass through the kidneys and are excreted.

Of the many steroids found in man, relatively few have biological activity; the adrenal steroids cortisol and oestradiol are potent exceptions. Aberrations in the biosynthesis of these hormones cause profound metabolic disturbances.

The steroid section of the Christchurch Medical Unit is concerned with the diagnosis of disorders of cortisol metabolism.

Cortisol is formed in the cells of the adrenal cortex from cholesterol in response to adrenocorticotrophic hormone (ACTH) which is released from the pituitary gland. The release is controlled in at least two ways—homeostatically by blood cortisol levels and directly by neural stress stimuli.

The normal secretion of cortisol is variously reported as being between 10 and 30 mg/day (1). Factors causing continuing de-

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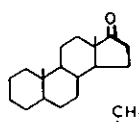
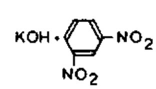
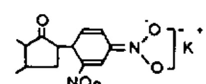
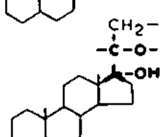
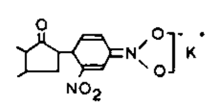
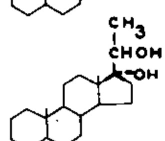
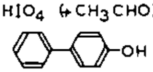
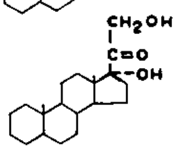
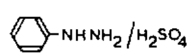
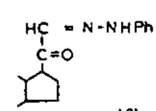
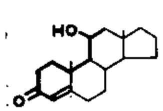
17 - Oxosteroids			 (2)
17 - Oxogenicsteroids (3)		$NaBH_4$, $NaIO_4$ (→ 17 - oxosteroid)	
21 - Desoxysteroids (4)		HIO_4 (+CH_3CHO) 	Mauve complex
17 - Hydroxysteroids (5)			 (6)
"Cortisol" (7)		CH_3CH_2OH/H_2SO_4	Yellow fluorescence

Table 1

viations from normal limits precipitate the onset of biochemical disease.

Assays for cortisol and its precursors are a necessary prerequisite for studies on cortisol metabolism. Because the analysis of individual steroids is laborious it is more usual to assay groups of urinary steroids. In Table I are listed some of the analytical methods used in this laboratory.

Using these methods, in combination with stimulation and suppression tests of the adrenal-pituitary axis, it is possible to define the nature of a cortisol disturbance, to locate it, to determine whether the cause is functional or due to tumour and, in the case of impaired cortisol biosynthesis, to identify the enzyme system responsible for the disorder.

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LETTER TO THE EDITOR

Dear Madam,

I could not agree more with Dr. Walker and others who wrote in your last issue deploring import control on scientific apparatus and I feel that this is a matter which should be taken further. Probably the Royal Society would be the best body to make representations on behalf of all scientists to the Government on this matter.

We were recently involved in considerable paper work over an order for a vacuum pump giving an absolute pressure down to .01 mm. or better; we found out that this bother was due to the fact that vacuum pumps are being made in New Zealand for milking machines where the atmospheric pressure is reduced to about half. There seems to be a need in the Industries and Commerce Department for a man with a scientific background who can readily give a decision on these applications so that the time of both scientists and the staff in the Department can be saved.

One ray of light in this situation is with regard to technical journals which together with comics and pornographic magazines are all lumped together in one class under the customs tariff. However, I understand that the Government has indicated that scientific and technical journals will now be given special consideration. Perhaps by making use of this concession and reading the literature more thoroughly we may not have to buy so much apparatus!

S. G. Brooker.

TECHNICAL TOPICS

Readers are invited to contribute to this section.

A Cautionary Note for Users of Dual-Voltage (115/230 v) American Equipment

An increasing amount of American scientific apparatus is now being made available in dual-voltage versions but care should be exercised when first putting this equipment into operation. Dual voltage operation is commonly achieved by arranging for the mains transformer to be wound with two 115 volt primary windings which may then be connected in series (for 230 volt operation) or in parallel (for 115 volts).

It has been the author's unfortunate experience on several occasions to find that 115 volt ancillary sub-units, (such as event markers, chart drive motors, etc.) have been connected directly across the mains input leads and have therefore been grossly overloaded when the instrument was connected up for 230 volt operation. In order to avoid this type of expensive tragedy it is well worth while to check the input circuit of dual-voltage equipment; this may be done by inspection or by setting up the instrument for 230 volt operation *but connecting it to a 115 volt source,* such as a variable transformer* or step-down transformer, and measuring the voltage across each sub-unit; under these conditions the voltage across the sub-unit should read 50-60 volts if the input circuit is correctly wired.

A typical dual-voltage input circuit is shown below.

J. R. L. Walker,
Cawthron Institute, Nelson.

* We find a 1KVA variable transformer with a standard three-pin socket connected to its output terminals very useful for occasional voltage control and testing purposes.

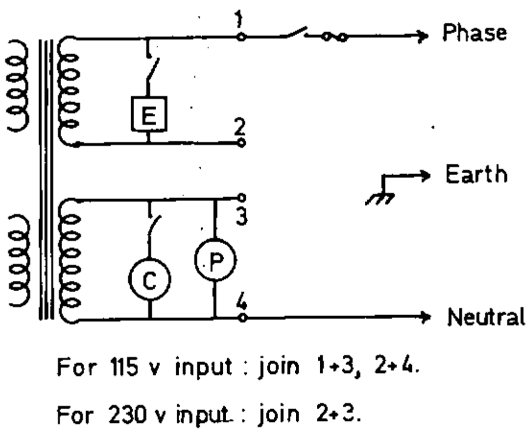


Fig. 1—Typical dual-voltage input circuit
(E = 115v event marker unit, C = 115v chart drive motor, P = 115v pilot light).

ANZAAS MEDAL

In accordance with Rules 5 (b) and (c) of ANZAAS, notice is given inviting nominations for a recipient of the ANZAAS Medal which will be presented at the 40th Congress at Christchurch, New Zealand, on 24 January 1968.

Nominations will close on Thursday, 24 August 1967 at 12 o'clock noon.

[A copy of the ANAZAS Medal Rules is held by the Editor, Journal of NZIC.] Please note, that to comply with Rule (6), a nominator must be a Fellow or Member of ANZAAS.

BRANCH NOTES

Auckland

The new Head of the Chemistry Department at Auckland University is Prof. Peter de La Mare who is expected to take up his duties in October. Professor de La Mare is Professor of Chemistry and Head of the Department at Bedford College, University of London. After graduating from Victoria University College, he went to work for his Ph.D. under Professor Ingold at University College, London.

Professor L. H. Briggs is at present acting head of the Chemistry Department.

Drs. C. L. Nobbs and P. S. Rutledge, recent graduates have been appointed as lecturers.

Student numbers in the Department which are slightly lower than last year, are as follows (1966 figures being in parentheses): Stage I, 712 (716); Stage II, 107 (141); Stage III, 79 (64); Honours 29 (31); Ph.D. 19 (15).

At the March meeting of the branch Mr. Seal gave his chairman's address "A Seal at the Pole". The lecture covered what is being done in Antarctica and why, and the chemical problems involved.

Waikato

R. S. Henzell, originally of Brisbane and later of I.C.I. in England, has been appointed to the Chromatography Section, Ruakura Soil Research Station.

R. Campkin after completion of a B.Sc. degree at Auckland has joined the staff of the Ruakura Soil Research Station. He will study potassium in soils.

Wellington

Dr. P. Blatner has joined the staff at Chemistry Division. Dr. Blatner is a graduate from the University of Basel and held a post-doctoral fellowship at the Canadian Geological Survey before coming to New Zealand.

Dr. and Mrs. R. Bailey have left Victoria University for Seattle.

Dr. R. M. Golding is on an overseas tour for four months.

Dr. M. Avrahami has joined the staff at the Soil Bureau.

New equipment in local laboratories includes a Mettler Thermobalance at Chemistry Division, a Du Pont Thermal Analyzer, a Perkin Elmer 337 Grating IR Spectrometer and a Carl-Zeiss microdensitometer, all at Soil Bureau.

A Varian V4502/15 e.s.o. spectrometer has recently been installed at Physics and Engineering Laboratory. This instrument has a single 100 kc microwave source and a new low impedance 12in. electromagnet. A range of accessories is available.

And in Nelson,

Dr. L. N. Gibbins, Thomas Cawthron Research Fellow at the Cawthron Institute, Nelson, has been appointed Assistant Professor in the Department of Microbiology, University of Guelph, Ontario, Canada. He has spent the past three years in Nelson working on fundamental aspects of the biochemistry of plant diseases, and will take up his new post in December of this year.

Lime & Marble Ltd., Mapua, Nelson, are currently cooperating with The American Smelting and Refining Co. in a geochemical survey of New Zealand. The analytical laboratory has recently installed a Techtron AA-4 atomic absorption flame photometer to aid in the assay of the survey samples for Cu, Pb, Zn, Mo, and other base metals.

Canterbury

The April meeting of the Branch took the form of an inspection of the recently completed chemistry block on the Ilam campus (see April cover). In a brief introductory talk the head of the department, Professor J. Vaughan, said that the chemistry department had 70,000 square feet of working space in a total floor area of approximately 110,000 square feet (a large increase compared with the previous quarters). Although there was ample room for expansion of undergraduate numbers, pressure on staff and research space was already great and after 1968 there would be a definite shortage. Members were conducted through the building in small groups by chemistry department staff. The main impressions gained were of extensive instrumentation in both the research and teaching laboratories and of the sheer size of the building—an hour and a half was too little time to inspect properly the eight working floors and the plant areas in the basement and roof.

Refresher Course: During the May vacation a refresher course on "Instrumental Methods of Analysis" was arranged by the Departments of Chemistry and Extension Studies, University of Canterbury, in cooperation with Chemistry Division, D.S.I.R., Gracefield. Methods dealt with were: I.R., UV-visible, and atomic absorption spectroscopy, gas-liquid and thin layer chromatography, and differential and thermogravimetric analysis. The lecturers were Professor L. F. Phillips, Drs. J. M. Coxon, W. S. Metcalf, G. A. Rodley, and G. J. Wright of the University and Mr. I. R. C. McDonald and Dr. J. F. Young of Chemistry Division. There was a good.. response to the course, the first of this nature to be held in the South Island, and there was considerable encouragement for future courses.

Personal: Mr. D. R. Castaing has resigned from the Christchurch Technical Institute to study for the Ministry at Christchurch College.

Mr. D. C. Reanney has been appointed a lecturer in biochemistry at Linclon College.

Prizes: The branch prize for 1966 for the best student in second year chemistry at Canterbury University was presented at the March meeting to Mr. W. B. Joss.

Last year the branch offered to the Christchurch Technical Institute a prize of £10 to be awarded to the best student in Stage III Chemistry of the N.Z. Certificate in Science. The first award was recently presented jointly to Miss Linda Crew of Chemistry Division, D.S.I.R., and Mr. Christopher Calvert of the Department of Chemical Engineering, University of Canterbury.

Otago

Mr. F. W. Oxley of Irvine Stephenson, St. George and Co. Ltd. has been transfered from Dunedin to the Pukekohe branch of that firm.

The first of this year's "Illustrated Lectures in Chemistry for 6th Form Pupils" was given by Mr. M. H. Buckenham and was attended by 150 people. His subject was "The Exploitation of Minerals'.

JUNIOR CHEMICAL GROUPS

Wellington Junior Institute of Chemistry

The first meeting this year was a combined meeting of the Juniors with members of the Wellington Branch. Professor Vaughan's talk was directed mainly at the Juniors, and many new junior members attended. Some of them came to the next Branch meeting to hear Mr. T. A. Peacock's address on the Szilard-Chalmers Reaction, despite the awe-inspiring title. Those who came found, howeevr, nothing awe-inspiring about Mr. Peacock nor his lecture and thoroughly enjoyed the evening.

On 10th April they had their first special Junior meeting when Mr. I. MacDonald of the D.S.I.R. told them of the work done by the D.S.I.R. for the paper industry. For many it was the first time they had considered a practical problem of industry and they showed great interest.

On 12th May Professor J. Duncan arranged an evening of A.N.Z.A.A.S. films.

Canterbury Junior Chemical Society

The first of this year's activities was a lecture on "Chemistry in the Antarctic" by Dr. D. A. Hause of the Canterbury University Chemistry department. The 1967 programme schedules two further lectures, visits to the departments of chemistry and chemical engineering of the University of Canterbury, a practical exercise, the annual selection of the four Unilver Award winners, and competition for the Shell Essay Prize—this year's topic "Minerals from the Sea". At the first meeting the Kempthorne Prosser Prize awarded to the member gaining highest marks in University Scholarship chemistry was presented to Mr. R. Newman of Riccarton High School by Mr. D. J. Higgins, Chief Production Manager of Kempthorne Prosser & Co. Ltd. Members of the Society were invited to the lecture on Polyacetylenes given to the Canterbury branch by Professor Sir Ewart Jones.

Chemistry in Action: The annual "Chemistry in Action" series was held during April. This was the 10th consecutive series and for the first time the three lectures were arranged about a theme—sulphur in industry and agriculture. The lectures were "Sulphur—The Neglected Element in Agriculture" by Professor T. W. Walker, Lincoln College; "The Industrial Uses of Sulphur" by Mr. D. J. Higgins, Kempthorne and Prosser & Co. Ltd., Christchurch; "Sulphur in Soils—Some Chemical Problems" by Professor A. T. Wilson, Victoria University of Wellington. It is hoped to publish the lectures later this year.

Continued from page 71

Deaths

The following deaths were noted with regret: FORSYTH, J. C., GARDNER, R.

Resignations

BLIGHT, Miss M. M.; CORDNER, G. D.; DARBY, F. J.; de BOER ,P. J.; GREGERSON, B.; SEARLE, E.; THOMPSON, Mrs. M.

Leave

JOHNSON, C. B.—one year with remission of subscription.

Names Removed from List of Members

AIYAR, K. R.; KIDSON, J. O.; NAIR, N. K.; SINHA, A. P.

THE REGISTRY

The following were elected on 31st March, 1967.

Fellows

BOLLARD, Edward George, B.Sc., Ph.D.(Cantab.), F.R.S.N.Z., Fruit Research Division D.S.I.R., Auckland (Head, Plant Nutrition Section).

NELSON, Donald Frederick, M.Sc., D.Crim (Calif.), Chemistry Division D.S.I.R., Auckland (Scientist).

O'CONNOR, Charmian Jocelyn, M.Sc., Ph.D. (Auck.), Chemistry Dept., University of Auckland (Senior Lecturer).

TOMLINSON, John Woollen, A.R.C.S., B.Sc., Ph.D.(Lond.), D.I.C., F.R.I.C., Chemistry Dept., Victoria University of Wellington (Professor of Physical Chemistry).

WALKER, John Richard Lawrence, B.Sc.(Hons.), Ph.D.(Leeds), Cawthron Institute, Nelson (Biochemist).

WRIGHT, Douglas Elliott, M.Sc., Ph.D., Ruakura Agricultural Research Centre, Hamilton (Leader, Ruminant Metabolism).

Associates

BROOKS, Kenneth Barrett, B.Sc., Morrison-P.I.M. Ltd., Petone (Technical Manager).

FEATHERSTONE, John Douglas Bernard, B.Sc., Chemical Industries N.Z. Ltd., Lower Hutt (Technical Manager).

McCONNELL, John Gordon, Thames High School, Thames (Teacher).

McSWEENEY, Garry, B.Sc., N.Z. Fertiliser Manufacturers' Research Association, Auckland (Chemist).

MAY, Alan Victor, B.Sc., Chemistry Division, D.S.I.R., Auckland (Scientist).

NISBET, Trevor John, B.Sc., Salmond and Spraggon Ltd., Wellington (Chief Analytical Chemist).

PULLEN, Donald Robert, B.Sc., Dept. of Health, Christchurch (Chemical Inspector).

RAE, Alan David, M.Sc., Ph.D.(Auck.), Chemistry Division D.S.I.R., Gracefield (Scientist).

ST. JOHN, Donald Allister, Chemistry Division D.S.I.R., Gracefield (Technical Officer).

SANDERSON, Wayne Barry, B.Agr.Sc.(Dairy Tech.), M.S., Ph.D.(Wisconsin), N.Z. Dairy Research Institute, Palmerston North (Research Chemist).

SHEPPARD, Douglas Robert John, M.Sc.(Otago), Bayfield High School, Dunedin (Teacher).

SMITH, Ernest William, A.R.A.C.I., Onehunga Knitting Mills Ltd., Auckland (Chemist).

Continued at foot of Col. 2 on previous page

Book Reviews . . .

Organometallic Syntheses. Vol. I. Transition—Metal Compounds. Edited by John J. Eisch and R. Bruce King. (Vol. I by R. Bruce King). Academic Press, New York and London, 1965. Price $6.50.

Since the discovery of ferrocene in 1951 there has been a great expansion in transition—metal organometallic chemistry. The organometallic compounds have served as key reagents in synthetic chemistry both in organic and inorganic chemistry and also as catalysts in many organic reactions. Due to the specialised techniques involved in handling substances which are often poisonous, inflammable and sensitive to moisture and air, chemists engaged in synthetic work of this type need some initial guidance in the preparative chemistry of these compounds. The purpose of the present volume is to initiate a series of reliable procedures for the preparation of important organometallic compounds including a general discussion of special laboratory techniques required. The second volume of the series will deal with non-transition metal compounds.

The book is divided into two parts. Part I deals with general techniques in transition metal organic chemistry, and Part II with the preparation of a wide variety of organometallic compounds. The preparation of bis-cyclopentadienyls, metal carbonyls, cyclopentadienyl metal carbonyls, olefine and acetylene metal complexes, metal-arene complexes, carbonyl hydrides, carbonyl halides, nitrosyls, etc., are described in detail. In all 72 preparations are given.

The book will be extremely useful to anyone contemplating work in the field of organometallic chemistry.

R. W. Hay.

The Alkaloids, Part II, by K. W. Bentley. Interscience Publishers, 1965. Price (N.Z.) £3 0s. 9d.

This book is Volume VII of a series "The Chemistry of Natural Products" edited by K. W. Bentley, University of Aberdeen, who is also the author of Volume I "The Alkaloids, Part I". In Volume I, he states that the aim of the series is to supply the undergraduate student with an account, shorn of frills, of the salient features of the degradative and synthetic work on which the structures of representatives of the major groups of natural products are based. Volume I covered ten important groups of alkaloids.

This book here reviewed, "The Alkaloids, Part II" has chapters on the following further eight groups of alkaloids—imidazole, quinazole, pyrrolizidine, Amaryllidaceae, steroid, indole, Lycopodium and diterpene series, together with chapters on miscellaneous alkaloids and the biogenesis of alkaloids. As these are contained in 228 pages, the author could not go into great detail. Alternate pages contain text and structural formulae. The narrative is concise and clear. There are frequent references both to research and review literature, many of them in the 60s. Clearly drawn structural formulae illustrate the degradative and synthetic steps outlined on the opposite pages. Although the author has limited his approach largely to degradation and synthesis, the evidence of modern physical methods is referred to when appropriate.

The author achieves his stated aim. The book is a good introduction to the structure of these alkaloids not only for undergraduates but also for research students who might be considering work in one of these fields.

D. F. NELSON.

The Chemistry of Selenium, Tellurium and Polonium, by K. W. Bagnall. Elsevier Publishing Company, Amsterdam/London/New York, 1966. 200 pages. English price 70/-.

This book is No. 7 of the Elsevier series "Topics in Inorganic and General Chemistry" edited by Professor P. L. Robinson. It commences with a discussion of the occurrence, properties, uses, toxicity and analytical determination of the elements. Succeeding chapters deal with hydrides, oxygen compounds, halides and carbon compounds. The coverage in this last chapter is deliberately less extensive than in the others since earlier reviews of organic derivatives are available.

In a monograph of this kind opportunity for drawing illuminating comparisons with corresponding compounds of other elements is limited and the initiative rests with the reader, but the reviewer does feel that more frequent comparisons between selenium and tellurium could have been made. There are notable differences (some not well understood) in the chemistry of these two elements. The particular strength of the book lies in its presentation of up-to-date factual material on a wide range of compounds, the compilations of well chosen references at the end of each chapter and the authorative treatment of polonium chemistry. Altogether the author has done a valuable service in drawing attention to the range and inadequacy of knowledge of "a somewhat neglected group of the periodic table".

C. J. WILKINS.

New Trends in Chemistry Teaching. Published by UNESCO.

The professional chemist takes for granted that he has ready access to the literature of his research field. The teacher of chemistry does not. Although the number of journals directed towards matters of interest in schools has increased in recent years, the library services necessary to provide quick access to a particular paper, in general, are most inadequate. This means that although many schools subscribe, for example, to "Journal of Chemical Education", in practice problems of circulation and storage make it seem that the wanted back issue is invariably missing. If the school is a relatively new one, such files are simply not to be found. "New Trends in Chemistry Teaching" is a valuable attempt to circumvent these difficulties by providing a source book of the best of papers printed in journals in this field in the year 1964.

Published by UNESCO it is the first volume of a series offering a selection of articles aimed at presenting a picture of areas where chemistry is developing rapidly. Also included are descriptions of new teaching methods and experimental work. The fifty odd papers reprinted in the volume have been carefully chosen chiefly from "Journal of Chemical Education", "Education in Chemistry" and "Chemistry". Four are from foreign journals and written in French. The sections in which they are grouped include: Atomic structure and the periodic table; Molecular structure; Stereochemistry; Energetics and kinetics; Reactions in aqueous solution; Elements and their compounds; Models and experiments.

The papers selected are uneven in difficulty, generality and usefulness. That by R. S. Nyholm and H. F. Halliwell entitled "Energy as a Unifying Concept in the Teaching of Science" is, in the reviewer's opinion, a model of simplicity and of sufficiently general importance to be required reading for all teachers of the subject.

On the other hand, in his paper "Ligand Field Theory", Professor F. A. Cotton states "The presentation of ligand field theory in the first College chemistry course cannot be said to be essential—If time is limited or (the students) not well above average, I believe there are many other topics which can be more profitably discussed." But teachers with an interest in transition metal chemistry will wish to ensure that their presentation is not erroneously simplified even at a very elementary level. For them this account is a definitive one.

Also is included a section on curriculum reform and work in progress. A summary of the now well known Nuffield project, recent American courses and other projects in Australia and elsewhere are described. It is to be hoped that absence of comment on recent developments in the teaching of chemistry in New Zealand do not lead overseas observers to infer that inertia or complacency is widespread here. The absence of flamboyant "crash" programmes in this country may well be due to a longstanding awareness of the need for continuous if unspectacular evolution.

For graduate students in teachers' colleges this book is to be particularly recommended. In fact this collection should prove of great value to teachers at all levels who wish to present chemistry in a manner compatible with sound modern thinking.

T. R. HITCHINGS.

This publication is available from the UNESCO agent: Government Printing Office, 20 Molesworth Street (Private Bag), Wellington, or from the Government Printing Offices in the main centres.

The Identification of Plastics and Rubbers. K. J. Saunders. Chapman and Hill, 1966. 54 pages.

This is not a pretentious book but I would thoroughly recommend it to chemists faced with the problem of identifying plastics and rubbers. The scheme of identification is logically presented and follows closely the methods I have used successfully for many years. The methods are essentially simple, and demonstrate that worthwhile results can be obtained in laboratories not necessarily equipped with infra-red instruments. This book has a further value in training students to appreciate the various types of plastics and rubbers. This naturally follows from the author's classification of these materials into four classes:

Rubbers—flexible chains cross linked;

Flexible thermoplastics—flexible chains and not cross linked;

Rigid thermoplastics—rigid chains—not cross linked;

Thermo-setting resins—rigid chains cross linked.

Together with the identification of the polymers the book includes a worthwhile section concerning the identification of inorganic filters.

I. R. McDONALD.

Basic Chemical Thermodynamics, Jurg Waser. Published by W. A. Benjamin, New York, 1966. 278 pp. Price $6.00 Australian.

Before reviewing another addition to the long, long list of textbooks on thermodynamics I felt that at least it should have had a fair trial, so I kept it handy during the preparation of a new set of chemistry Honours I lectures. The result has turned out to be a pleasant surprise.

I consider that this book can be very strongly recommended to students who intend to advance in chemistry. Each topic that is discussed is clearly introduced, without the author falling into the common error of producing so much talk that the reader is likely to forget where he came in. There are many particularly interesting illustrations of thermodynamic principles; Feynman's and Tolman's perpetual motion machines alone are almost worth the price of the book. The necessary mathematics is used without apologies. There are useful problems at the end of each chapter with solutions at the end of the book; there is a bibliography; and the variety of appendices includes one on the handling of expressions involving inequalities.

Three features particularly endear this book to me; (1) The second law is expressed in the form of an existence theorem for entropy, rather than as the outcome of a series of half-baked Carnot cycles. (2) Standard e.m.f.'s are defined in terms of *reduction* potentials. (3) Sensible symbols are used for the thermodynamic functions, most notably U for internal energy, G for Gibbs free energy and A for Helmholtz free energy.

As a book for the thermodynamic specialist "Basic Chemical Thermodynamics" is probably not in the same class as Lewis, Rendall, Pitzer and Brewer, but for the non-specialist it seems to be ideal.

L. F. PHILLIPS.

Advanced Inorganic Chemistry. A Comprehensive Text by F. Albert Cotton and Geoffrey Wilkinson. A second revised and augmented edition. Interscience Publishers, 1966, New York. Price (N.Z.) £6/10/6.

This second edition of the well known text by Professors Cotton and Wilkinson needs no introduction to the chemical community. The first edition was widely claimed as a teaching text all over the world and has had an enormous impact on the teaching of inorganic chemistry. This second augmented edition follows much the same layout as the first, although several sections have been rearranged. The book has been increased in size to over 1,100 pages but it is still intended to be a teaching text and not a reference book.

Like the earlier text the first part, 190 pages, introduces general inorganic theory including the nature of chemical bonding and the structure, stability and nomenclature of co-ordination compounds. It has most of the basic material necessary for understanding inorganic reactions and is nicely balanced so as to include on the one hand elementary wave mechanics, and on the other hand the theory of electrostatic bonding, including thermodynamic cycles such as the Born-Haber cycle. It has truly been said that inorganic chemistry is an advanced subject which at university level in the British Commonwealth cannot be taught adequately until second year at least. This is because such a large amount of it depends upon the application of physical chemical principles to real systems. The first chapter of Cotton & Wilkinson's book reflects this feature for a substantial amount of it assumes quite advanced physical chemical theory.

The second part, approximately 400 pages, consists of a survey of the chemistry of the nonmetals. This is by no means entirely descriptive, but throughout introduces concepts like wavefunction, entropy, hydrogen bonding, standard free energy, and oxidation reduction potentials to explain the reactions which are taking place. A large amount of it also refers to the structures of the compounds involved, which are not only frequently explained in terms of energetic considerations but are also used to make predictions and explain the behaviour of the chemicals involved with clear diagrams.

The third part refers to the chemistry of the transition elements and covers some 500 pages. It is here that the vagaries of chemical theory become particularly apparent. Great stress is of course laid, as is conventional, on crystal field theory. This is used to discuss a variety of physical-chemical techniques such as electron spin resonance, ultra-violet absorption, infra-red and N.M.R. It is this particular group of elements which highlights the difficulty of providing a universally adequate theoretical basis for all types of chemical compounds. There is a very valuable section in which the advantages and limitations of the valence bond method, the molecular orbital method and the crystal field approach (as a special example of an ionic treatment) are discussed; and in this section too, various compounds such as the sandwich type (ferrocene) which do not satisfactorily fit into the conventional types of bonding theory are treated. This is extremely valuable because it is most important that student of inorganic chemistry should not be led to believe that all of chemistry is at present explicable in terms of a single theory. Indeed if the book serves no other purpose than to highlight the greatest single problem of inorganic chemistry at the present time, namely the need to treat all chemical systems using a single unified theory, then it will have adequately served its purpose. Perhaps the diversity of the behaviour of chemical systems can best be illustrated by the later chapters of Cotton and Wilkinson's book which include a detailed study of the second and third transition series, the lanthanides and the actanide elements.

The book concludes with an appendix on energy units, which I am very pleased to see because of the necessity for inorganic chemists to be well versed in manipulating chemical calculations, an appendix giving the Tanabe-Sugano, and a list of general references. In the preface the authors say they improved the handling of documentation by including more references to review articles and by introducing footnotes to original research references in each chapter.

Perhaps the only unsatisfactory feature of the book is the price. From the viewpoint of the student this is a real barrier to purchase, although of course the book adequately covers all inorganic chemistry from second year through to that of the professional inorganic chemist at Ph.D. level. It is certainly a worthwhile purchase both for the undergraduate student intending to specialise in inorganic chemistry and also for the graduate requiring a convenient reference book to the whole of the subject.

J. F. Duncan.

Cahiers De Synthese Organique, by Jean Mathieu et Andre Allais. Masson et Cie. 1966 Paris. Vol. XII. 294 pages. 120 Francs.

This is the final volume in a series of which we have reported the previous members from time to time, and completes a work that the authors may well be proud of. It is almost equally divided between text which concludes the synthesis of heterocyclic compounds and copious indexes including author, compound, functional groups and ring indexes.

There is no doubt that this series, covering the literature up till 1964 in a very systematic way, is a valuable addition to the literature of organic chemistry and deserves wider recognition than it has so far received.

S. G. Brooker.

INTERNATIONAL CALENDAR

1967

June 12-16: International Symposium on Macromolecular Chemistry, Brussels-Louvain, Belgium.

June 21-29: Europäisches Treffen für chemische Technik und Achema-Tagung, Frankfurt, Germany.

July: Second International Symposium on Photochemistry, Enschede, Netherlands.

July 10-12: International Symposium on Naturally occurring Phosphoric Esters, Newcastle-upon-Tyne, U.K.

July 25-27: International Symposium on Solution Properties of Natural Polymers, Edinburgh, U.K.

August 21-26: Seventh International Congress of Biochemistry, Tokyo, Japan.

August 28-September 1: International Symposium on Reactions of Oxygen with Organic Compounds, San Francisco, U.S.A.

August 28-September 2: Third International Symposium on Organometallic Chemistry, Munich, Germany.

August 27-September 3: Twenty-fourth Conference of IUPAC, Prague, Czechoslovakia.

September 4-10: Twenty-first International Congress of Pure and Applied Chemistry, Prague, Czechoslovakia.

September 4-8: Symposium on Thermodynamics of Nuclear Materials, with Emphasis on Solution Systems, Vienna, Austria.

September 12-15: Symposium on Progress in Chemical Thermodynamics, Heidelberg, Germany.

September 12-16: Tenth International Conference on Coordination Chemistry, Tokyo, Japan.

September 13-15: Colloquium on the Chemistry of Small Ring Compounds, Louvain, Belgium.

September 18-23: Centenary Celebrations of the Deutsche Chemische Gesellschaft, Berlin, Germany.

September 19-23: International Symposium for the Chemistry and Technology of Rape-seed Oil and other Cruciferae, Golansk, Poland.

September 20-23: International Conference on the Utilization of Radioactive Isotopes in Pharmacology, Geneva, Switzerland.

1968

March: Symposium on Modern Chemistry in Industry, Eastbourne, U.K.

June 17-21: Symposium on the Structure and Chemistry of Solid Surfaces, Berkeley, California, U.S.A.

July: Second International Symposium on the Chemistry of Organic Silicon Compounds, Bordeaux, France.

July: Second International Symposium on Pharmaceutical Chemistry, Münster Wf., Germany.

July 8-13: Fifth International Symposium on the Chemistry of Natural Products, London, U.K.

July 15-19: Conference of the Society for Analytical Chemistry, Nottingham, U.K.

August: Sixth International Conference on the Reactivity of Solids, Schenectady, New York, U.S.A.

August 19-28: Meeting and Symposium of the International Association of Geochemistry and Cosmochemistry, Prague, Czechoslovakia.

September 2-7: Eleventh International Conference on Coordination Chemistry, Haifa and Jerusalem, Israel.

September 3-6: Third International Conference on Fermentation, New Brunswick, U.S.A.

1969

4th week in April: Symposium on the Chemistry of Natural Products, in particular Steroids and Terpenes, Mexico.

September:

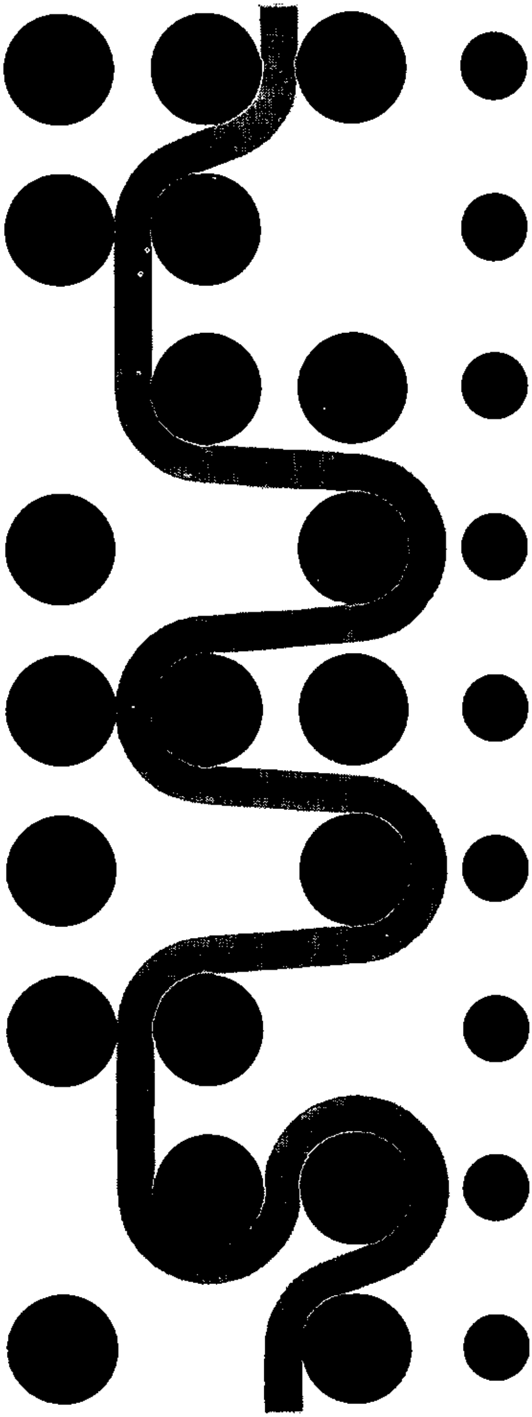
International Symposium on Analytical Chemistry, Birmingham, U.K.

Twenty-sixth International Conference of IUPAC.

Twenty-second International Congress of Pure and Applied Chemistry, Australia.

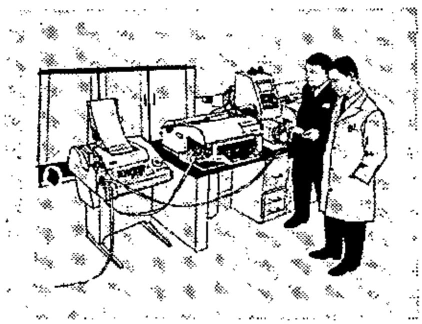
For further information regarding these conferences, contact—

Mr. G. Markham,
Executive Secretary,
Royal Society of New Zealand,
P.O. Box 196,
Wellington.



Help for harassed dyers

To speed the work of textile dyers and printers has always been a major objective for ICI's colour chemists. Recently they solved a long-outstanding problem of these dyestuffs users: how to match colours accurately other than by lengthy trial-and-error. Using ICI's new Instrumental Match Prediction service (IMP), dyers and printers in a dozen countries can now receive, by teleprinter, a dyeing 'recipe' for any shade *within hours of asking for it.* A computer in Manchester and special instruments in ICI technical service laboratories overseas make this rapid colour-matching possible.



Not only the changing needs of colour users come under the scrutiny of ICI's 10,000 research and development workers. Important technical advances are being made almost daily in fields as varied as paints, plastics, fibres, medicines and crop-protection chemicals. The resulting ultra-modern chemical materials are made available throughout the world by ICI's network of selling organizations.

ICI

IMPERIAL CHEMICAL INDUSTRIES (N.Z.) LTD.

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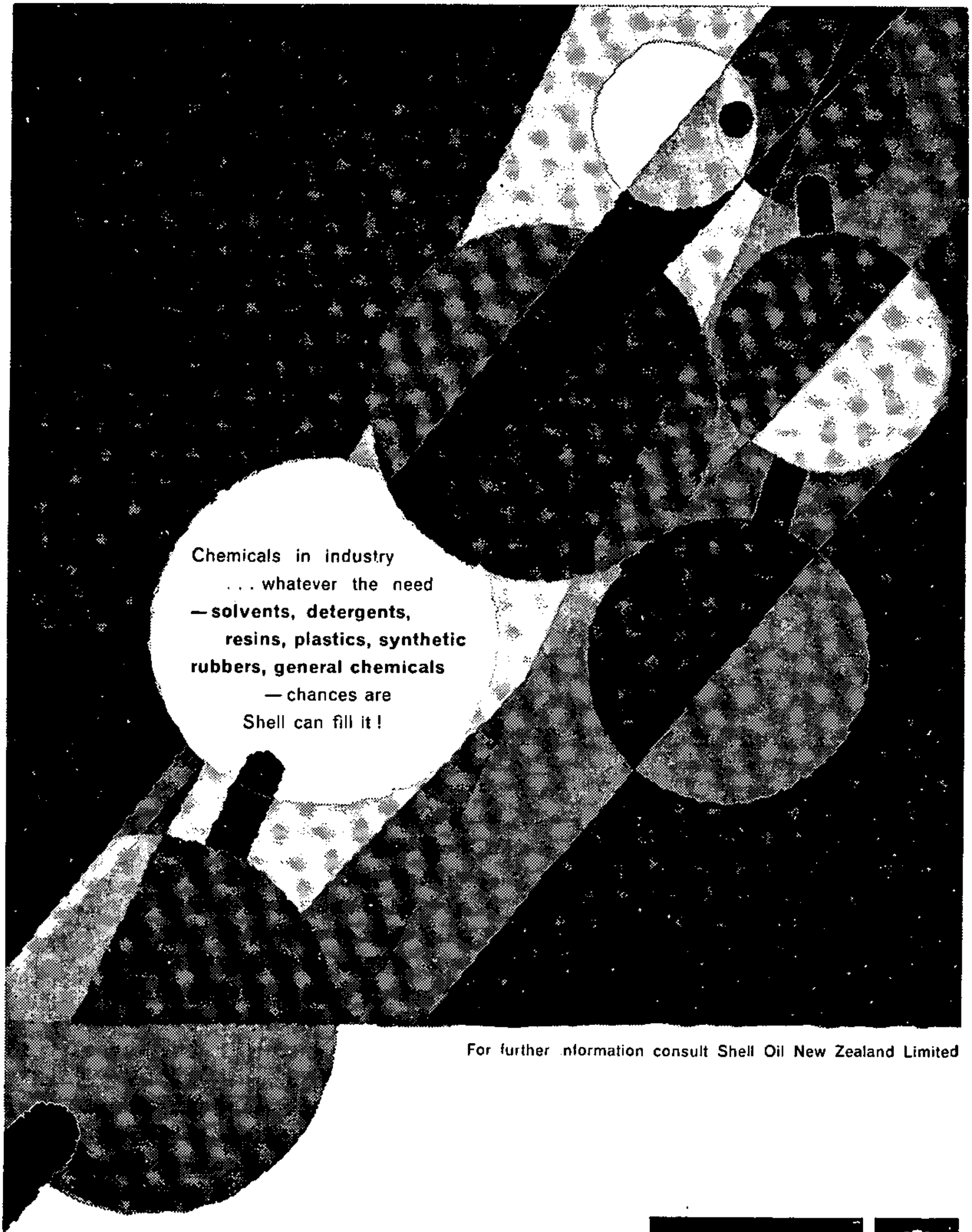
Chemicals in industry
. . . whatever the need
— **solvents, detergents, resins, plastics, synthetic rubbers, general chemicals**
— chances are
Shell can fill it !

SHELL OIL NEW ZEALAND LIMITED

Staff appointments

At the end of this year Shell will be offering employment to men (or women) with degrees in Chemistry, Civil or Mechanical Engineering, Agricultural Science and Commerce. There may be also a few opportunities for graduates in other subjects, e.g. Economics, Law or Arts.

POSITIONS AVAILABLE
Most of the graduates will initially be stationed in Wellington.
Each man is appointed as soon as possible to a position best suited to his qualifications, talents and interests and he is asked to follow a planned programme to enable him to use all his knowledge and ability at an early opportunity. The work is accepted as qualifying for corporate membership of professional Institutions or Societies.

Chemists will begin in the Central Laboratory on product development and testing, technical service, and the supervision of quality control, and may also be employed in chemicals marketing.

Engineers are responsible for design, development, construction and maintenance of oil storage facilities, processing plants, buildings, pipelines and road tankers.

Agricultural Science graduates are appointed to the Shell farm trade organisation, acting as specialist advisers on the marketing, development and application of chemicals for agricultural purposes.

Commerce graduates are employed primarily in finance, where the responsibilities include quarterly accounts, treasury, taxation, credit, investment, audit, payroll, costing, budgets and management accounting.

Data Processing with a Systems 360 60 IBM computer also offers a field for graduates with the necessary aptitudes for systems analysis, programming, operational research, etc.

ADVANCEMENT
As well as specialising initially in work for which he is qualified the graduate will be trained to take a comprehensive view of Shell activities generally.

The Shell group of companies, which is international in character, scope and shareholding, is engaged in New Zealand and throughout the world in two industries, petroleum and chemicals. Both are growing in volume and complexity and show ample prospect of development in the future.

Shell Oil New Zealand Limited is staffed by New Zealanders, of whom the most able may be eligible for promotion to senior positions overseas. With individual recognition, supervision and guidance each graduate is encouraged to progress towards the most senior position he is capable of filling. His own efforts towards self development may be aided in several ways, including overseas training for the most promising men.

SALARIES
Young graduates have a special salary scale and it is Shell's policy to offer salaries and conditions of employment (including retirement benefits) at least comparable to those offered by other large firms.

VACATION EMPLOYMENT
A few vacation jobs will also be available in Wellington next summer for students now in their second to last year of a degree course in Engineering, Commerce or Chemistry. No unusual obligations are imposed but preference will be given to men seriously interested in the eventual prospect of a Shell career.

ENQUIRIES
More detailed information is available in the booklet
"A guide to graduate employment with Shell Oil New Zealand Limited".

Interviews can be arranged to suit any students who may be interested.

Enquiries may be addressed to:
The Staff Manager, Shell Oil New Zealand Limited,
Shell House, The Terrace, PO Box 2091, Wellington. Telephone 45-060

or Shell House, Albert Street, PO Box 1084, Auckland. Telephone 32-240

or St. Elmo Courts, Hereford Street, PO Box 2095, Christchurch. Telephone 62-939

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