

JOURNAL OF THE  
NEW ZEALAND INSTITUTE OF CHEMISTRY

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VOL. XVIII

AUGUST, 1954.

No. 4

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EDITORIAL

CO-ORDINATION OR CHAOS

In a letter published in this issue Dr. Briggs discusses the organisation of science in New Zealand. As he points out there have been two recent attempts to find a method whereby the thirty odd New Zealand scientific bodies could produce a permanent and satisfactory basis for co-operation using the Royal Society as the focal point. We, as an Institute, have stated that we do not wish to lose our identity by affiliation with the Royal Society, yet the need for permanent co-ordination remains. The Royal Society is the obvious focus should co-ordination at an institutional level become feasible and it certainly would not assist such co-ordination should a new body as, for example, a New Zealand Academy of Sciences, be formed for this purpose.

The attempts at co-ordination of New Zealand bodies at an institutional level having failed, Dr. Briggs' suggestion deserves your very serious consideration. We, each of us, can become members of the Royal Society to our mutual benefit. As an individual we prosper by contact with the broader fields of science, art and philosophy, and the Society becomes truly representative of science in New Zealand. Considerable criticism is heard concerning the methods of management within the Royal Society but is that not our own fault? An active interest by members in the management of the Institute of Chemistry has ensured a democratically managed body, the same is possible, if necessary, in the Royal Society.

There is every need for a body truly representative of science in New Zealand and it is important for the future of science and scientists in this country to show the non-scientific community that should there be the necessity we can quickly co-ordinate to become a unified and powerful body the opinions of which cannot be ignored. We have failed in the past but this new approach deserves your consideration and action. Let there be co-ordination, not chaos.

## *d*-Orbitals and Bonding

by C. J. Wilkins

Canterbury University College

The wave mechanical theory of valency, following as it did upon the wave theory of the atom, involves consideration of the nature of atomic bonding orbitals and of the way in which these orbitals can interact. Bonding results from an overlapping of atomic orbitals which markedly increases the density of negative charge in the region of overlap. The amount of overlap provides a useful, though approximate, measure of the strength of the bond, and indeed the arrangement of atoms in a molecule is such as to give the most effective overlap of atomic bonding orbitals. Thus the oxygen atom of a water molecule uses two *p*-type orbitals for bonding and the bond angle is consequently close to 90°.

It was pointed out by Pauling in 1931 that atoms might use 'hybrid' bonding orbitals derived from the mixing of suitable combinations of *s*-, *p*- and *d*-type atomic orbitals which do not differ greatly in energy. The resulting hybrid orbitals are usually more elongated than their generating orbitals and so give better overlap with orbitals of other atoms. It is generally accepted, for example, that in their 4-covalent compounds atoms of carbon and silicon use four equivalent tetrahedrally directed *sp*<sup>3</sup> type orbitals resulting from the mixing of an *s*-orbital with the three *p*-orbitals of the same quantum shell.

In bonds of order higher than unity it is convenient to distinguish the so-called  $\sigma$ - and  $\pi$ -components of the bond. The charge cloud forming the  $\sigma$ -bond is cylindrically symmetrical about the axis of the bond and that of the  $\pi$ -bond is disposed on either side of a nodal plane containing the atomic nuclei. The  $\pi$ -component of the carbon to carbon double bond in ethylene is formed from the interaction of the *p*<sub>z</sub> (or *p*<sub>y</sub>) orbitals of the carbon atoms to give the bun-shaped cloud representing the *p* $\pi$ —*p* $\pi$  bond.

The role of *d*-orbitals in bonding is somewhat more complicated than that of *p*-orbitals due to their greater number and more elaborate symmetry (fig. 1) and is at present the subject of considerable discussion. Under suitable conditions these orbitals, or hybrids derived from them may enter into the formation of either

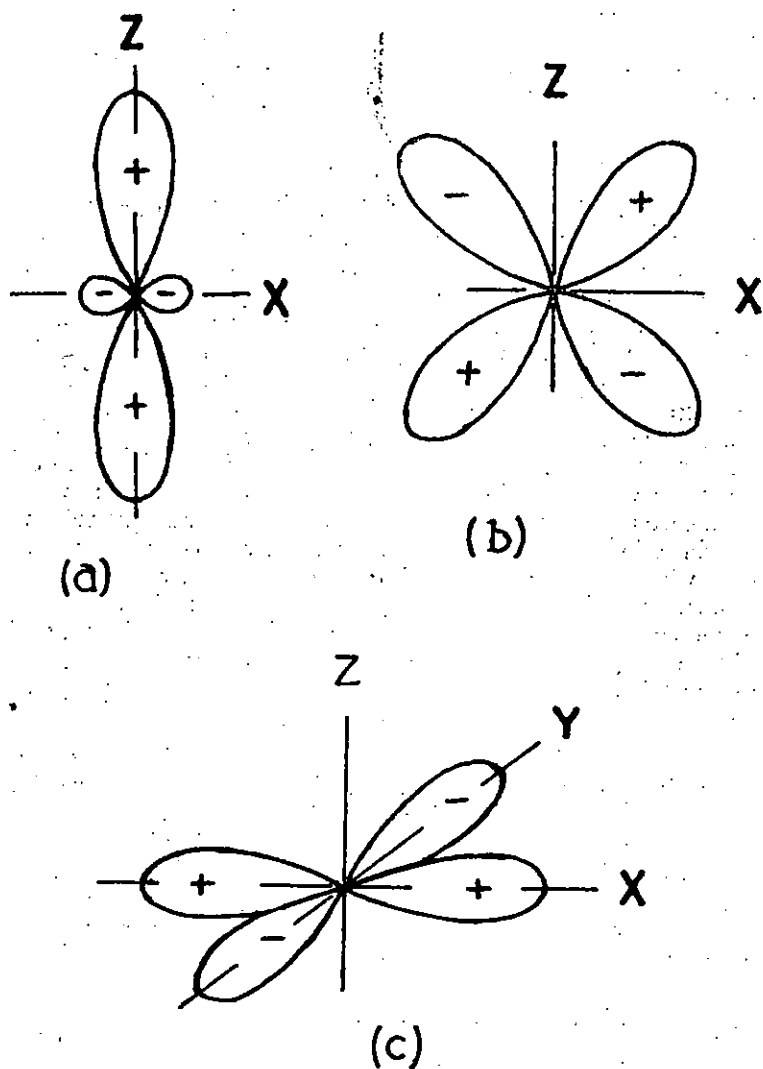


Fig. 1 — Configurations of  $d$ -orbitals with the signs of the wave functions in the various regions.

- (a) The  $d_{z^2}$  orbital. (b) The  $d_{xz}$  orbital, the axes of whose lobes lie in the XZ plane. Two other orbitals,  $d_{yz}$  and  $d_{xy}$ , are similarly disposed in the YZ and XY planes. (c) the  $d_{x^2-y^2}$  orbital.

$\sigma$ - or  $\pi$ -bonds. The various bonding possibilities have been critically examined in an important recent paper by Craig, Maccoll, Nyholm, Orgel and Sutton (1). The present review will make brief reference to a few of their more important theoretical conclusions.

### *Hybridisation of s-, p- and d-Orbitals*

The use of hybrid orbitals,  $d^2sp^3$ ,  $dsp^2$  and  $sp^3d$  by the central atom of a molecule has been generally postulated as responsible for the development of octahedral, square planar and trigonal bipyramidal configurations respectively (see table 2). With the transition elements these configurations occur in association with magnetic properties which are frequently explicable on the same hypothesis (2). The characteristic stereochemical configuration would develop irrespective of whether the  $d$ -orbitals belonged to the ultimate or penultimate quantum shell because symmetry properties alone are relevant. Thus both  $4s4p^34d^2$  and  $3d^24s4p^3$  hybrid combinations would be directed towards the corners of a regular octahedron. Craig *et alii* conclude on theoretical grounds that hybridisation of ultimate  $d$ -orbitals with  $s$ - and  $p$ - can be expected only when the ligands are of high electronegativity. Since the ultimate  $d$ -orbitals are particularly elongated their contribution would concentrate the bonding electrons closer to the ligand, as the high electronegativity difference would require. Significantly, non-metals do exert covalencies of five or six in combination with only the more electronegative atoms.

On the other hand highly electronegative ligands are not theoretically necessary to promote the hybridisation of penultimate  $d$ -orbitals. In the next section it will be seen that various features of the chemistry of the co-ordination compounds of the transition metals — which did not find adequate explanation on Pauling's original theory (2) — can be readily interpreted on the view that the hybrid orbitals entering into  $\sigma$ -bond formation may involve either penultimate or ultimate  $d$ -orbitals.

### *Some Applications to Transition Metals.*

Magnetic and other evidence was originally believed to indicate a sharp transition from covalent to electrovalent bonding in co-ordination complexes. It was suggested that in a diamagnetic complex as  $K_3Co(CN)_6$  the bond was covalent, while in  $K_3CoF_6$  containing four unpaired electrons bonding was electrovalent. The current view (1, 8) is that in the former compound the cobalt is using the  $3d^24s4p^3$  and in the latter the  $4s4p^34d^2$  combination which does not require pairing of  $3d$  electrons (table 1).

Table 1. — *Electron Configurations of Cobalt Ions.*

Ion	Electron Configuration		
	3d	4s	4p
Co <sup>2+</sup> (free ion)			
Co(CN) <sub>6</sub> <sup>4-</sup> (3d <sup>2</sup> 4s4p <sup>3</sup> octahedral bonds)			
Co(CN) <sub>6</sub> <sup>3-</sup> (3d <sup>2</sup> 4s4p <sup>3</sup> octahedral bonds)			
CoF <sub>6</sub> <sup>3-</sup> (4s4p <sup>3</sup> 4d <sup>2</sup> octahedral bonds)			

Six co-ordinated complexes of cobalt (II) and nickel (II) differ sharply in their behaviour towards oxidising agents, most of the latter being completely resistant to oxidation. These nickel complexes may well differ from the cobalt, in using a 4s4p<sup>3</sup>4d<sup>2</sup> hybrid with two unpaired electrons in low-energy 3d-orbitals (table 2). Certain nickel complexes from the very powerful chelating agent *o*-phenylenedimethylarsine differ in being diamagnetic, which is interpreted (\*) to indicate 3d<sup>2</sup>4s4p<sup>3</sup> binding with promotion of the two 3d electrons to the 5s orbital. Support for this hypothesis comes from the fact that the complex may be oxidised under suitable conditions to Ni (III) and Ni (IV) complexes — as should follow if electron promotion to a higher level has taken place.

Table 2. — *Electronic Configurations of Nickel Compounds.*

Type of Compound	Electron Configuration		
	3d	4s	4p
Ni <sup>2+</sup> (free ion)			
Ni(O) (4s4p <sup>3</sup> tetrahedral bonds as in Ni(CO) <sub>4</sub> )			
Ni(II) (3d4s4p <sup>2</sup> sq.-planar bonds)			
Ni(II) (4s4p <sup>3</sup> 4d <sup>2</sup> octahedral bonds)			
Ni(II) (3d <sup>2</sup> 4s4p <sup>3</sup> octahedral bonds)			
Ni(III) (3d <sup>2</sup> 4s4p <sup>3</sup> octahedral bonds)			
Ni(IV) (3d <sup>2</sup> 4s4p <sup>3</sup> octahedral bonds)			

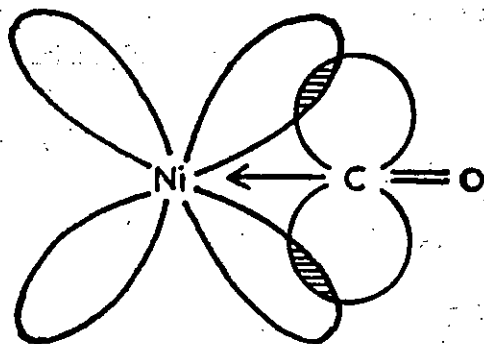


Fig. 2 — The  $d\pi - p\pi$  overlap in nickel carbonyl.

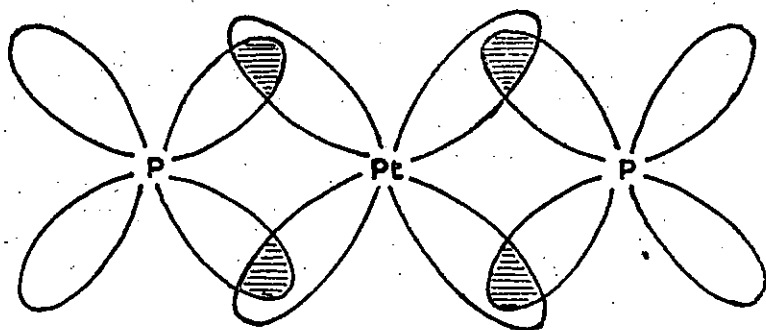


Fig. 3 — The overlap of  $d$ -orbitals in  $cis-(PEt_3)_2PtCl_2$ .

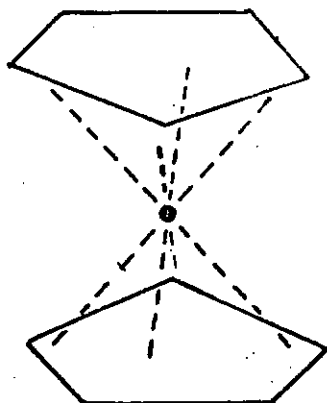









Fig. 4 — The  $Fe(C_8H_8)_2$  molecular sandwich. The axes of the  $dxz$  and  $dyz$  orbitals of the iron atom are shown (dotted) to indicate merely that they point towards the ring systems.

Similar principles may be applied for the interpretation of copper (II) complexes. The square-planar four coordinated cupric complexes contain one unpaired electron which cannot be removed by oxidising agents. This electron must therefore remain in a  $3d$  orbital as in table 3. The copper (III) compound  $K_3CuF_6$  contains two unpaired electrons, probably in  $3d$  orbitals. In this case the use by the copper of a  $4s4p^34d^2$  hybrid combination would be encouraged by the high electronegativity of the fluorine atoms.

Table 3. — *Electron Configuration of Some Copper Compounds.*

Type of Compound	Electron Configuration		
	3d	4s	4p
$Cu^{2+}$ (free ion)			
$Cu(II)$ ( $4s4p^24d$ sq.-planar bonds)			
$CuF_6^{3-}$			

#### $\pi$ -Bonding by $d$ -Orbitals in Co-ordination Compounds.

Existence of a  $d\pi$  component in the co-ordinate linkage was postulated by Pauling on the following grounds. — (i) Particularly stable complexes are formed between transition metals (which can provide filled  $d$ -orbitals) and ligands such as cyanide (which can provide vacant bonding orbitals); (ii) The development of such a bond would remove the unfavourable accumulation of negative charge on the metal atom; and (iii) Bond lengths, where known, were shorter than would be expected for a single bond only.

Craig *et alii* have concluded that penultimate  $d$ -orbitals on a central atom can form moderately strong  $\pi$ -bonds with vacant  $p$ -orbitals of ligands, and further that an ultimate  $d$ -orbital can form a strong  $\pi$ -bond with a  $p$ -orbital on another centre even when it is considerably more elongated and diffuse than the latter. The former case is important for the transition metals and the latter for the non-metals.

Convincing evidence of a purely chemical nature that the bonding in the co-ordinate linkage does not merely involve a dative bond from ligand to metal has lately become available. If the link between a carbonyl group and the central nickel atom in nickel carbonyl involved a  $d\pi-p\pi$  bond (fig. 2) then certain other molecules such as phosphorus trihalides could reasonably be expected to co-ordinate. The donor powers of phosphorus trihalide molecules are feeble but their acceptor properties are moderately developed, so that weakness of the  $\sigma$ -bond should be off-set by

strength of the  $\pi$ -bond. It has in fact been found (5) that phosphorus trifluoride does form a volatile compound  $(\text{Ni}(\text{PF}_3)_4)$  analogous to nickel carbonyl, thus demonstrating the importance of the  $\pi$ -bond in this particular case.

Ligands in which the spear-head atom is able to function both as an electron-donor and electron-acceptor cause a loosening of groups in the *trans*-position in square-planar complexes. Chatt (6) suggests that this '*trans effect*' is due to a weakening of the  $d\pi$  overlap when the central atom uses the same  $d$ -orbital for bonding the two diametrically opposite ligands (fig. 3); because over-use of a single orbital for linking more than two atoms is known in other cases (in the so-called electron-deficient compounds) to produce rather weak bonding. It has been found too that the total bond strengths of the *cis*-isomers of  $(\text{PET}_3)_2\text{PtCl}_2$ ,  $(\text{AsEt}_3)_2\text{PtCl}_2$  and  $(\text{SbEt}_3)_2\text{PtCl}_2$  are considerably higher than those of the *trans*-isomers, as would be expected on the same grounds since the platinum atom of a *cis*-isomer must use two different  $d$ -orbitals the planes containing whose axes intersect at  $90^\circ$ .

Finally it may be mentioned that since the boron trifluoride molecule is unable to form a  $\pi$ -bond, the stabilities of the complexes formed between this compound and a series of ligands provide a comparative measure of the strengths of the  $\sigma$ -bonds which the ligands can form. When a number of ligands is arranged in order of increasing stabilities of the boron trifluoride complexes, as in table 4, the stabilities of their complexes with platinous chloride are found to be greatest toward the middle of the series, thus providing evidence of some additional bond-stabilising factor.

Table 4. — Order of Stabilities of Complexes.

CO,  $(\text{NH}_2)_2\text{CS}$ ,  $\text{Me}_2\text{S}$ ,  $\text{Me}_3\text{P}$ ,  $\text{MeNH}_2$ ,  $\text{Me}_3\text{N}$ ,  $\text{Me}_2\text{O}$

Increasing stability of boron trifluoride complexes  $\rightarrow$

$\leftarrow$  Increasing stability of platinous chloride complexes

#### Biscyclopentadienyl Compounds.

Mention is made of these remarkable compounds which are formed by many of the transition elements, because of the peculiar part played by  $d$ -orbitals of the metal atom in determining their structure. The compounds are of the type  $(\text{C}_5\text{H}_5)_2\text{MX}_{n-2}$ , where  $n$  ( $= 2 - 5$ ) is the valency of the metal and X is a halogen (7). Investigation of the compounds is still in its early stages, but so far as the available evidence goes they conform to a common structural plan in which the metal atom is sandwiched between the two symmetrical planar  $\text{C}_5\text{H}_5$  rings (fig. 4). It is reported that

the structure of the ferrous compound,  $\text{Fe}(\text{C}_5\text{H}_5)_2$ , may be interpreted as arising from an interaction of the two singly-occupied  $d$ -orbitals,  $d_{xz}$  and  $d_{yz}$ , of the iron atom with a  $\pi$ -type molecular orbital associated with each ring system (<sup>1</sup>).

#### *d $\pi$ -Bonding in Non-Metallic Halides.*

In these compounds evidence for  $\pi$ -bonding comes mainly from bond length data along with theoretical conclusions about effectiveness of overlap of various types of orbital. Bond lengths in covalent halides are usually considerably shorter than the sum of the covalent radii or even the values calculated by the empirical formula of Schomaker and Stevenson (<sup>8</sup>).

$$l_{AB} = r_A + r_B - 0.09 (x_A - x_B); \dots$$

where  $l_{AB}$  is the bond length,  $r_A$  and  $r_B$  are the covalent radii and  $x_A$  and  $x_B$  are the electronegativities of the atoms. Now in a series of covalent halides from the same periodic group, for example  $\text{NF}_3$ ,  $\text{PF}_3$ ,  $\text{AsF}_3$ , and  $\text{SbF}_3$ , the maximum 'contraction effect' occurs when the central atom belongs to the second short period, and does not become progressively greater with increasing period number of the central atom as the electronegativity trend would require. It is suggested that this maximum contraction is due in part at least to the second short period element providing (vacant)  $d$ -orbitals of such size as to provide the most effective overlap with the filled  $p$ -orbitals of the peripheral halogen atoms (<sup>9</sup>) so that the double bonded character of the linkage is greatest at this point in the series.

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**PROFESSOR H. N. PARTON**

Members of the Institute have been gratified to learn of the appointment of Dr. H. N. Parton to the chair of chemistry in the University of Otago in succession to Professor F. G. Soper who is now Vice-Chancellor.

At Canterbury College where Dr. Parton is associate professor of chemistry he enjoys a high reputation as a university teacher and administrator. He is at present deputy chairman of the professorial board, has been a member of the college council for a number of years and was dean of the faculty of science between 1948 and 1952. Dr. Parton was the energetic editor of our Institute's Journal from 1940 to 1947, and has served as chairman, and for several terms on the committee, of the Canterbury Branch.



Shortly after graduating from Canterbury College with first class honours he was appointed to the chemistry staff in 1930. A little later he was granted leave to carry out post-graduate research in England and gained his Ph.D. in 1934 for work carried out under the late Professor A. J. Allmand, F.R.S., at King's College, London. Upon his return to Canterbury College he assumed increasing responsibility for the teaching of physical chemistry. In 1945 he became lecturer-in-charge of physical chemistry and in 1947 was promoted to the newly created status of associate professor.

Until the end of June last, Dr. Parton was a member of the Canterbury College council as a representative of the professorial board. He sat on the council previously as a co-opted member representing the lecturers and has taken a leading part in the council's discussions.

Before Dr. Parton held a seat on the professorial board by right of his associate professorship he was a member representing the sub-professorial staff. He has also served on the academic board of the University of New Zealand as an elected representative of the lecturers of all colleges.

Among students Dr. Parton is one of the most popular members of the Canterbury College staff. In the lecture room students have found his teaching thorough, in research they have found his leadership stimulating and in their societies they have enjoyed his ready wit. He has frequently taken part in student discussions. On many occasions Dr. Parton has spoken of the relationship between science and society, on the historical and philosophical conceptions of science and on the place of science in the community.

Dr. Parton has published numerous papers dealing, broadly, with solutions of electrolytes, his lines of experimental approach covering electrochemistry, absorption spectroscopy and calorimetry. A high proportion of his research students has won overseas post-graduate scholarships.

During 1948-49 Dr. Parton spent refresher leave mostly in Britain and the United States. During this period he was one of New Zealand's official representatives at the conference in Beirut of the United Nations Educational, Cultural and Scientific Organisation.

## THE ORGANISATION OF SCIENCE IN NEW ZEALAND

The first body in New Zealand to which the term scientific could be applied was the New Zealand Society, founded in 1851, which later became the Wellington Philosophical Society. In 1867 the New Zealand Institute was established as the first national body for the advancement of science, becoming in 1933 the Royal Society of New Zealand. Member bodies of the Royal Society include the Auckland and Nelson Institutes, and the Wellington, Canterbury, Otago, Hawke's Bay and Southland Branches of the Royal Society. Very recently the Waikato Scientific Society has become a member body and the Rotorua Philosophical Society intends to join next year.

Science has greatly advanced since 1867 and with this advance has come the inevitable formation of scientific societies based on a single discipline, until now there are over thirty national scientific bodies in the country. Some are professional bodies with scientific interests like our own New Zealand Institute of Chemistry, the New Zealand Institution of Engineers, etc., some are purely scientific, e.g. the Ecological, and Entomological Society, some are semi-scientific, such as the New Zealand Grasslands Association, while others are branches of societies established in Great Britain, e.g. the Royal Institute of Chemistry. Although this fragmentation has occurred certain sectional interests based on specialised subjects have still been maintained within a member body of the Royal Society, e.g. in the Auckland Institute there are sections on Anthropology, Astronomy and Conchology.

The question which has concerned the Royal Society for some time has been "Is co-ordination of scientific bodies necessary and, if so, can they be organised either within the Royal Society or through some national federation, so that when the occasion demands the Royal Society or a similar federated body can speak and act for the whole of science in New Zealand?" To this end a meeting of representatives of the Royal Society and fourteen other national bodies was held last year to discuss co-ordination. No definite conclusions, however, were reached at this meeting. The larger societies like our own New Zealand Institute of Chemistry did not favour membership within the Royal Society, whereas smaller societies like the Institute of Forestry favoured representation on the Royal Society Council.

Further suggestions were made by member bodies of the Royal Society and these were fully discussed at the last Council meeting of the Royal Society. It dismissed the suggestion that all scientific societies should be represented on its Council as being too cumbersome and too expensive. It did not approve of a scheme to set up regional councils in each centre representative of the

national scientific bodies in that area, nor of a suggestion that it should be constituted similarly to the Australian and New Zealand Association for the Advancement of Science. The Auckland Institute explained that in addition to fostering the sectional interests mentioned above it has embarked on a policy of joint meetings with Auckland branches of national scientific bodies. In this way it hopes to keep in touch with all phases of scientific endeavour in the community. Where national problems arise within a specialised society these matters can be discussed in this way by both bodies and, through the local branch of the Royal Society, the help of the whole Royal Society can be enlisted.

As the result of these deliberations the Council of the Royal Society expressed the view that, while the Royal Society should take every opportunity of co-operation with other scientific societies, it would be preferable not to enter in a federal organisation affecting its constitution. (It should be noted that the constitution of the Royal Society [Trans. Roy. Soc. (1935), 64, 428] can only be altered by Act of Parliament, whereas the rules [Trans. Roy. Soc. (1936), 65, 474] of the Society may be altered by the Council of the Society).

Opportunity for further general discussion was given during the Eighth New Zealand Science Congress, when representatives of twenty-two national scientific bodies were present. After various expressions of opinion, however, the view-point of the Royal Society was accepted without amendment.

The writer feels that no federal organisation of scientific societies is necessary provided that every scientist interests himself not only in his own specialised society but also in the broad field of science, that is, by joining the member body of the Royal Society in his district. With the exception of Manawatu each centre of major scientific endeavour in the country has a branch of the Royal Society, and it is to be hoped that the Manawatu Branch will soon be reformed.

It behoves us all who have the qualifications to join the New Zealand Institute of Chemistry. At the same time we should not develop a narrow view of science, but take an active interest in science as a whole. This can best be done by joining the local branch of the Royal Society, which is usually founded not only for the promotion of science but also of art and literature. If all scientists joined the Royal Society, it would be able, through its democratically elected local councils and national council, to speak and act for New Zealand scientists as a whole. The machinery is already present for the democratic representation and control of the member bodies and through them the Royal Society Council itself.

Federation of scientific bodies does not appear to be necessary, but friendly co-operation can be very effective, as was well illustrated in organising the Eighth New Zealand Science Congress.

It should be emphasised that the Royal Society would still welcome any constructive suggestions for its better functioning as a national body.

L. H. BRIGGS,

Auckland University College.

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### SOME ASPECTS of BLOOD ANALYSIS

Summary of an address to Waikato Branch by R. R. White,  
biochemist, Ruakura Animal Research Station.

The speaker said that there were branches of the subject, other than those usually considered, as chemical, extensively employed and of great importance. No account of Blood Analysis could be complete without some description of them.

The first matter dealt with was the difficulties, encountered, in blood analysis due to the peculiar biochemical and physical properties of the fluid. Clotting, one obvious difficulty, is itself of fundamental physiological importance. The entities involved, such as thromboplastin, calcium ions, prothrombin, thrombin, fibrinogen and fibrin were described, together with the way in which they are believed to interact in the formation of a blood clot. It was emphasised that the scheme outlined was somewhat simpler than the true picture, which is still being elucidated by modern techniques, such as adsorption, electrophoresis and X-ray analysis.

Blood serum is used extensively in chemical analysis but for some analyses unclotted blood is necessary. It was pointed out that the clotting process could be arrested by blocking any one of the steps necessary for its completion. Particular emphasis was placed on the use for this purpose of oxalates or citrates to remove calcium ions from solution.

Means of preventing some biochemical changes in shed blood were next dealt with. The use of sodium fluoride to prevent glycolysis, thus stabilising glucose and inorganic phosphate, was mentioned. Pyruvic acid needs a complex preservative containing citric acid, sodium citrate, sodium fluoride and the quaternary compound Cetavlon.

Physical loss of carbon dioxide from blood not only invalidates the subsequent analysis of serum carbon dioxide but also affects the serum chloride. Specimens for such analyses are best collected under liquid paraffin.

Mr. White mentioned difficulties encountered due to the ease with which the red corpuscles haemolyse. Danger lies in the fact that some constituents exist at much higher concentrations inside the cells than in the serum, while for others the reverse is the case. In analysing serum haemolysis must be kept to a minimum.

Actual methods of analysis were dealt with under the following headings:—Physical, Cytological, Physiological, Immunological and Chemical.

Physical methods, such as specific gravity, viscosity and pH determination, were outlined but it was suggested that they were of more academic than practical interest at present.

It was stated that perhaps the most widely used methods of practical analysis are those known as Cytological. Methods of enumeration and differentiation of red and white corpuscles were described, reference being made to the modern attempt at photoelectric enumeration of red cells, which, when perfected, should reduce the time of counting from minutes to seconds with a coincident considerable increase in accuracy.

Physiological tests, such as clotting time, prothrombin time, bleeding time, etc., were next dealt with. These are relatively quantitative but are used fairly extensively in cases of liver disease and especially in the haemorrhagic states such as the haemophilias and purpuras.

Considerable attention was paid to Immunological methods, including agglutination reactions and complement-fixation tests used in the diagnosis of numerous bacterial and viral infections, such as typhoid, syphilis and glandular fever. Knowledge of the mechanisms underlying the reactions is largely empirical, principally because of the complex, proteinaceous nature of the systems involved.

The speaker finally dealt with Chemical Analysis, saying that the magnitude of the field was sufficient to preclude anything like a comprehensive survey. Methods employed ran the whole gamut of available techniques. Inorganic analyses could be said to be fairly specific as to results and employed the usual inorganic methods. In the case of organic substances specificity was often too low and might be decreased or increased to an irregular extent in abnormal conditions of the animal. Chromatography was proving to be of impressive value in raising the specificity of many tests, although it often increased the difficulty of analysis.

In conclusion some impressions were given of differences noted between human and ruminant bloods. Generally speaking it appeared that with regard to certain constituents ruminants could suffer alterations from normal to a greater degree than could humans, without showing clinical symptoms.

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Dr. J. C. Hawke, a member of the Defence Scientific Corps, has returned from Singapore where he has been conducting consumer trials with dehydrated meat prepared by the Chemical Engineering Section, D.S.I.R. The tests were most successful and interest in the product is growing both in military and manufacturing circles.

Dr. E. B. Davies, Senior Chemist of the Rukuhia Soil Research Station at Hamilton, has left on a visit to soil research institutions in Australia, Great Britain, Eire, and some Scandinavian and European countries. Dr. Davies is to be away for about 5 months.

Mr. H. M. D. Wilson recently addressed the Otago Branch on "Trends in Surface Coatings." Popular versions of this and Mr. Rogers' Chairman's address on "Chemical Developments in the Mineral Industry" have been published in the Evening Star, in which they appeared as feature articles. It is hoped to have two further addresses published similarly. The Otago Branch Committee considered it highly desirable to keep the public informed about chemists and chemistry, stressing the importance of the work that is done and the effect of it on the general standard of living as well as on the national economy. They also considered it desirable that the public should realise that the majority of chemists are involved in peaceful pursuits.

At the May meeting of the Wellington Branch, Dr. R. H. Locker delivered an address on "The Machinery of Muscle."

## NEWS AND NOTES

The Auckland Branch listened with pleasure at its meeting on June 1st to an interesting discourse on "The Chemist in Sewage Treatment" given by Dr. H. Wilson, Ph.D., B.Sc., A.M.C.T., President of the Institute of Sewage Purification, who is a member of the panel of overseas experts at present investigating the disposal of Auckland's sewage. Dr. Wilson pointed out that all major developments in sewage purification originated with the chemist and once again Britain supplied the basic ideas but, as in other chemical fields, it was left to technologists outside Britain, in this case America, to apply and develop the methods. Dr. Wilson discussed the very fertile field for research, practically untouched, that is available to the physical chemist, the biochemist and the biologist in furthering our knowledge of the fundamentals of sewage purification.

At the 8th New Zealand Science Congress held in Auckland during the May vacation Professor L. H. Briggs was chairman of the organising committee and Stan Brooker was one of the secretaries. These two well known members of our Institute are to be congratulated, with all the others who assisted them, on the success of the Congress. Seven hundred people attended meetings covering the sciences and related technologies. Chemical matters were discussed in a number of symposia in which physicists, agriculturists and silviculturists all took part. Dr. Askew, our President, was Chairman of section B (chemistry) and discussed "Biology and Trace Elements" in his Chairman's address.

A very interesting symposium "The Impact of Substitute Materials on our Primary Products" was contributed by S. G. Brooker, Margarine, F. B. Shorland, Butter Substitutes, J. Melville, Wool Substitutes, C. P. McMeakin, Effect of Substitutes on Farm Management.

On the Wednesday night of the Congress the Auckland Branch under the able Chairmanship of Jim Ricketts invited visiting chemists to celebrate the May meeting by touring the Waitemata Brewery and subsequently to sample the brew with supper at their cafeteria. Louis Jagger who, besides being a chemist, is at present President of the Auckland Film Society, showed several films between suppers, the whole evening was voted a major success by all who were present.

May and Baker N.Z. Ltd. have advised us that they have sets of printed cards, five in all, giving details of atomic weights, flash points, conversion factors, equivalent weights and percentage composition, etc. of bench reagents. These cards are suitable for pasting on the wall or in your notebook and are available on application.

Messrs. W. Edwards Ltd. of England, vacuum specialists, have advised us that they have recently opened a new factory in one of England's satellite towns where they hope to produce even better equipment and we hope that they will grace us by advertising it in the Journal.

On May 6th the Auckland Branch were privileged to listen to a most informative lecture on "Developments in Spectrochemical Analysis" by Dr. A. C. Menzies of Messrs. Adam Hilger Ltd.

Professor F. J. Llewellyn has been reappointed the Auckland University College professorial board's representative on the college council until the end of the year.

Dr. R. W. Green, senior lecturer in chemistry at the University of Malaya, is in Auckland with his family on four months' leave.

Dr. J. C. Andrews has been re-appointed by the Governor-General-in-Council as a member of the Auckland University College Council.

## BOOK REVIEWS

*Silicones And Their Uses*, by Rob Roy McGregor, 300 pages, 1954, published by the McGraw Book Co. Inc. (London), 42/6.

In his introduction the author states: "This book is intended to serve as a practical manual on silicones for engineers, designers, and others who wish to use these products. It is not intended primarily for the chemist, and accordingly an attempt has been made to use non-chemical language in so far as possible. The larger part of it is given over to descriptions of the available commercial products, their properties, and how they can be used." Although not written specifically for the chemist the book has much of interest for him particularly if in the industrial or consulting fields. Even to the chemist in research such a well propounded treatise can be of value in enabling him to appreciate the practical application of these relatively new compounds to processing problems associated with his investigation. After an interesting historical study chapters two, three and four dealing with commercial silicones, physiological response and industrial application and cost contain sufficient detail and references for the chemist or designing engineers to be able to give any specific application ample consideration before actual trials are begun. This well produced book should be available in all technical libraries.—G.M.W.

*Instrumental Analysis*, by John H. Harley and Stephen E. Wiberly, 440 pages, March, 1954, published by John Wiley and Sons, Inc. (New York), 6.50 dollars.

"This book has been written as a text for a course in instrumental analysis given to senior and graduate students at Rensselaer Polytechnic Institute. The course is designed to familiarise the students with the major analytical instruments and the possible applications of these instruments to their research problems and their future work in the field of chemistry." The authors have adequately achieved the objective they have clearly stated in this quotation from the preface. The need to familiarise students with sufficient basic principles, variations in commercially available instruments and some of the applications of the various methods of instrumental analysis so that he can adapt such methods of analysis to his own needs is most desirable and the authors are to be congratulated in presenting such a satisfactory exposition. All instrumental methods at present being used are discussed and include the various systems of spectrophotometry, spectroscopy and ionic measurements in solution. The final chapter is a series of experiments complete with operating instructions for a specific instrument considered typical of the types available. A useful book having a very up to date approach.—G.M.W.

*A French-English Dictionary for Chemists*, 2nd Edn., by A. M. Patterson, 476 pages, March, 1954, published by John Wiley and Sons, Inc. (New York), 6.50 dollars.

Patterson's translation dictionaries for chemists have become a standard feature of most chemical libraries. It is fortunate, then, that he should have taken the opportunity to "thoroughly revise" his French-English dictionary "with the aid of all available new vocabularies." A further 7000 terms and meanings from chemistry, related sciences and industry have been added and "chemical nomenclature has been revised to accord with the most recent decisions." This second edition containing about 4,500 words and phrases should be a part of every chemist's library. It is well printed but so it should be at the price.—G.M.W.

*Pocket Book of Chemical Technology*, by V. Stannett and L. Mitlin, 283 pages, 1953, published by George Newnes Ltd. (London), 30/-.

In the preface the authors state: "The need for a handbook containing information frequently needed by chemical technologists in a less bulky and extensive form than in the very complete American works has long been felt by the authors . . . An attempt has been made to present the matter in such a way that it should be equally useful to the specialist and to those without a formal technical education." For its price this compendium is excellent value. The matter chosen for inclusion has been selected with care and should prove adequate for general day to day requirements. An interesting and useful section is the list of isotopes and labelled compounds available from the British Radiochemical Centre. The physical properties of organic and inorganic compounds are listed in 70 pages of close type and other useful purely chemical data are given. In the engineering section there are short chapters on the theory, including relevant data tables, of fluid flow, heat transfer and distillation. This is followed by the properties of metals and alloys and an excellent table of "Average Plastic Properties." Finally there is a glossary of technical terms and common names of minerals and chemicals. A very useful book that has been well printed and bound.—G.M.W.

*The Buttermaker's Manual, Vol. I, Butter and Buttermaking*, 976 pages, *Vol. II, Butter Factory Operation and Technology*, 825 pages, by F. H. McDowall, 1954, published by the New Zealand University Press (Wellington), £10/10/-.

Dr. F. H. McDowall, Chief Chemist, N.Z. Dairy Research Institute, is as well known by the dairy trade, particularly in Australia and the U.S.A., as he is by factory managers in New Zealand. Basing his manual on a lifetime of work as chemist and technical adviser to the dairy industry of New Zealand Dr. McDowall has a very practical approach in his *Buttermaker's Manual* but in this he has not ignored the requirements of the research worker for every subject discussed appears to have been adequately referenced. Several thousand references augment the work and these are listed under appropriate sub-headings at the end of each chapter. References up to 1953 are included and most chapters have an appendix in which relevant material not available at the time of setting up the chapter has been included so that the Manual includes the latest information available. In a work of this magnitude it is almost impossible for a reviewer to effectively cover all the detail presented but one is amazed at the amount of material Dr. McDowall has covered and the excellent coverage he has given. A butter factory manager must be a man of many parts and consequently the "*Buttermaker's Manual*" is equally versatile. Dr. McDowall has discoursed on his problems authoritatively, amongst the problems discussed are the economies of the dairy industry, theory of butter and buttermaking, production and composition of milk and cream, the design of dairy factories and the selection of equipment including considerations of the mechanical principles involved, economies of buttermaking, factory quality control and testing. 79 pages of index ensures excellent coverage and the volumes are very well illustrated with 330 illustrations in line and half-tone. For the dairy chemist, for the student of dairy practice and for the butter factory manager and his staff McDowall's Manual fills a pressing need and is the last word in an authoritative journal on butter, its manufacture and nature. It also includes much of direct and indirect value and interest for chemists and managers in the food industry. The printing and binding are excellent.—G.M.W.

*Industrial and Manufacturing Chemistry, Inorganic. Vol. I, II, 6th Edn.,* by Geoffrey Martin, revised by Wilfred Francis and others, Vol. I 600 pages, Vol. II 488 pages, 1954, published by the Technical Press Ltd. (London), each volume 70/-.

These encyclopaedic volumes contain a great deal of information in a digest form and sources of further information are given with each chapter. The sections on fuel and related processes have been completely rewritten and new sections on pyrometry, principles of combustion and combustion appliances have been added to make this department more complete. Other sections have been revised in part or have had addenda covering recent developments added. Some sections, such as the one on water receive a somewhat archaic treatment because they have only been extended instead of being completely rewritten from a modern point of view, a new section on water treatment has been included but this only serves to emphasise the deficiency of the rest of the chapter. Another section which had not been adequately revised was that on ion exchange resins. Production tables and costs have in most cases been related to post-war conditions. There are new chapters on refrigeration, liquefaction of gases and atomic power. These volumes contain a vast amount of purely chemical information as well as much related to the chemical engineering field and will continue to be a valuable source of much of the information on chemicals and chemical processes required by those who advise on Inorganic Industrial and Manufacturing Chemistry. The volumes are well printed and bound.—G.M.W.

*The Van Nostrand Chemist's Dictionary,* published by the D. Van Nostrand Co. Inc. (New York), 761 pages, 1954, our copy from Messrs. Macmillan and Co. (London), 60/-.

Although containing over eleven thousand chemical definitions and descriptions this dictionary does not supply anything that is not already readily available in other standard chemical dictionaries. Perhaps its only claim to fame is the vast number of reactions, reagents and laws that are listed by the name of the author. With most definitions there appears to be insufficient detail to justify the time spent in looking them up and it was surprising the number of words that should have been left in the Oxford Dictionary. The reviewer was disappointed in this dictionary.—G.M.W.

*Chromatographic Methods of Inorganic Analysis,* by J. F. W. McOmie and F. H. Pollard, 1953, 192 pages, published by Butterworths Scientific Publications (London), 36/-.

The methods discussed are primarily those based on paper chromatography. This book has concentrated all the available information, both historical and practical, in a well presented discussion by two well known exponents of chromatographic techniques. Besides a theoretical discussion of chromatography, in non-mathematical terms, as it affects inorganic analysis care has been taken to include sufficient practical details of the various procedures and the apparatus employed to allow the uninitiated to try his hand with confidence. Two new schemes of qualitative analysis, developed by the authors, using chromatographic methods entirely are given and the whole treatise is extensively referenced. For all those interested in Inorganic Analysis the book is an excellent summary of the application of chromatographic methods and includes extensive tables of solvent mixtures for both cations and anions. Printing and binding are good; the captions for the frontispiece have been transposed.—G.M.W.

**N.Z.I.C. - R.I.C. COMBINED CONFERENCE, 1954**

**Summary of Arrangement as at 26th June, 1954**

*Time & Place.*

Tuesday, 24th August - Friday, 27th August, at Nelson. All meetings will be held at Nelson Girls' College.

*Programme.*

In outline the programme is as follows:—

*Tuesday, 24th August.*

8.15 p.m. Opening Ceremony.

*Wednesday, 25th August.*

9 - 10.30 a.m. Papers.

11 - 12.30 " 10.30 - 11 a.m. Morning Tea.

2.30 - 4 p.m. "

4.30 - 5.30 " 4 - 4.30 p.m. Afternoon Tea.

8 p.m. N.Z.I.C. Presidential Address (Dr. Askew).

*Thursday, 26th August.*

9 - 10.30 a.m. Papers.

11 - 12.30 " 10.30 - 11 a.m. Morning Tea.

2.30 p.m. N.Z.I.C. & R.I.C. Annual General Meetings (not simultaneously).

8 p.m. Discussion Groups.

*Friday, 27th August.*

9 - 10.30 a.m. Papers.

10.30 - 11 Morning Tea

11 Presentation of Easterfield Award & Winner's Address.

Afternoon Excursion

8 p.m. Social gathering

At the Opening Ceremony it is anticipated that the speakers will be the Mayor of Nelson (general welcome to Nelson), Mr. E. R. Neale, M.P., Chairman of the Cawthron Institute Trust Board, who will officially open the Conference, and Dr. J. K. Dixon (President, R.I.C.), who will reply. Sir Theodore Rigg, the Conference chairman, will take the chair, and supper will be served after the ceremony.

As regards the lecture programme, it appears that there will be 15-20 papers covering a wide range of fields; inorganic, organic, biochemical, chemical engineering. It is probable that there will be no need to have concurrent sessions.

*Excursions.*

No decision has yet been made as to the nature of the excursions although there will certainly be one, and possibly two.

*Trade Display.*

A Trade Display will be held as usual and several firms have indicated their intention to prepare exhibits.

*Conference Booklet.*

This will be prepared and distributed to members who have enrolled shortly before Conference. It will as usual contain a full detailed programme and abstracts of all the papers to be presented.

*Accommodation.*

As it is not possible to arrange for hostel accommodation, all members who do not have personal friends or relatives in Nelson, or who do not live there will be staying in hotels or boarding houses.

## MINUTES OF COUNCIL MEETING

MINUTES OF A MEETING OF THE COUNCIL OF THE NEW ZEALAND INSTITUTE OF CHEMISTRY HELD IN THE COUNCIL ROOM OF THE AUCKLAND UNIVERSITY COLLEGE ON WEDNESDAY, MAY 19th, 1954, AT 9 A.M.

1. *Present*: Dr. H. O. Askew, President, in the chair; K. M. Griffin, vice-president; J. Ricketts, Auckland delegate; F. M. Mason, Waikato delegate; Dr. J. W. Lyttleton, proxy for Manawatu; Dr. L. G. Neubauer, Wellington delegate; J. Rogers, Otago delegate; V. J. Wilson, Registrar; W. G. Hughson, Hon. General Secretary.
2. *Apologies*: C. V. Fife, Manawatu delegate, and O. H. Keys, Dunedin. F. H. G. Johnstone, Canterbury delegate.
3. *By Invitation*: The Journal Editor, Mr. G. M. Wallace, and the Assistant Editor, S. G. Brooker, were present for a period to discuss Journal matters.
4. *Welcome*: The President welcomed Mr. Fred Mason, Waikato delegate, to his first Council meeting.
5. *Minutes*: The Minutes of the previous meeting M624-628 were taken as read and confirmed subject to the following amendment:—  
The conclusion of Item 34 on M628 to read:—  
"The Vice-President and Canterbury delegate recorded dissentient votes."  
VP/ Wellington.
6. *Dates of Council Meetings*: The following dates were fixed tentatively:—  
(1) August 24th (Tuesday), 10 a.m., in Entomology Library, Cawthron Institute, Nelson.  
(2) Annual Meeting, November 27th (Saturday), 9 a.m., Wellington possibly D.S.I.R. Council Room.
7. *Conference 1954*: Dr. Neubauer and the President reported among other things that:—  
1. Sir Harry Jephcote, President of the R.I.C. (London) would not now be coming to New Zealand.  
2. General arrangements for Nelson, August 24-27th, were working out quite well.  
3. A final circular would be issued early in June and prompt replies would be necessary.

RESOLVED: Vice-President/Wellington:—THAT the reports be received.

8. *Future Conferences*: In view of a proposal by the Royal Society to forego its next triennial Congress and to support a meeting of the Australian and New Zealand Association for the Advancement of Science (ANZAAS) in Dunedin in 1957, it was suggested that Council set out a tentative list of proposed Conference meeting places.

1954	At Nelson	organised by	Wellington Branch
1955	Palmerston North	" "	Manawatu "
1956	Christchurch	" "	Canterbury "
1957	Auckland	" "	Auckland "
1958	Hamilton	" "	Waikato "
1959	Dunedin	" "	Otago "

RESOLVED:—Auckland/Manawatu — THAT the above tentative list be incorporated in the Minutes for the guidance of Branches.

9. *Examinations Committee*:—*Insurance Policy*

RESOLVED:—Vice-President/Wellington — THAT information relating to the number of candidates sitting each year in each centre be obtained from the Examinations Committee and that the Hon. Gen. Secretary be empowered to take out a policy with the State Fire and Accident

- Insurance Co. to cover Laboratory Assistants sitting examinations each November.
10. *Regulation 1. See M625*: The final draft of Regulation 1 relating to the examination syllabus for persons desiring admission to the Institute by examination is in the hands of the Examinations Committee. The only clause considered by Council was number 1.5. (see A318 & M625). Two points were made (1) That an Associate of the Institute should be required to have attained a certain standard in Mathematics (2) That if the candidate has not passed Maths. His standard must be considered by the Committee under the second part of the clause which heads "or an examination of equivalent standard." RESOLVED, Auckland/Manawatu:—THAT Clause 1.5 as on A318 which reads:—"The candidate must provide evidence that he has received a pass in Pure Mathematics I of the University of New Zealand or an examination of equivalent standard" be confirmed but that a footnote be added to the effect a pass in the N.Z.U. terms examination might be regarded as equivalent.
11. *Laboratory Assistants' Examination*: RESOLVED:—President/Wellington:—THAT where an applicant for the above examination is not working under a member of the Institute the applicant may nominate a member who is able and willing to oversee his practical work. The member nominated must be approved by Council.
12. *Journal*: About two hours was set aside for the consideration of Journal matters with the Editor, Mr. Garth Wallace and the Assistant Editor, Mr. Stan Brooker. Points are summarised as follows.
1. RESOLVED Secretary/Otago:—THAT the number of Journals printed per issue be raised to 800.
  2. Mr. Wallace (Editor) will be in Palmerston in August and will discuss with Dr. McGillivray the project of transferring the Editorship to the Manawatu Branch at a convenient date. Dr. McGillivray has only just returned from overseas.
  3. *Business Manager and Advertising* — Obtaining regular advertising material to help in the financing of the Journal is a task of considerable magnitude and one in which we would appreciate help from Branches and members. Commercial Grade Chemicals might be advertised. Advertisements might be obtained from overseas possibly through an overseas agent. In N.Z. the business manager or a specially appointed member of the Institute, rather than an agency, should approach the Head Office of selected firms. It is suggested that Council and Wellington Branch give some preliminary thought to such a development when the Journal transfers from Auckland.
  4. *Free Exchanges* — Mr. Brooker said we had a large number of exchanges with other Journals and exchanges and free Journals amounted now to 200. The list would be critically reviewed.
  5. *Books Reviewed* — RESOLVED Vice-President/Auckland — THAT the present policy be continued whereby the reviewer retains the book reviewed.
  6. *Finance* — The Editor (see A324) reviewed the Journal finances. RESOLVED — Wellington/Auckland — THAT a grant of up to £75 be authorised for the present year if required by the Editor.
  7. *Publicity for Conference* — RESOLVED — President/Wellington — THAT it be a recommendation to the Conference Committee that it consider the practicability of making a donation to the Journal for the cost of covering Conference publicity.
  8. *Publication of Prize Entries* — The Editor considered that the Journal should adequately cover winning prize entries either as a full or abstracted entry.

It was decided that examiners should make recommendations to the August meeting of Council when prize entries would be under consideration.

9. *Dr. Bottomley's Article on Salaries* — RESOLVED Auckland/Otago — THAT the Salaries Committee be asked to consider Dr. Bottomley's article on behalf of Council and that subject to a favourable report 200 copies be run off and distributed by the Institute.
10. *Scientific and Technical Publishers Association* — RESOLVED:— President/Otago — THAT the Editor represent the Institute at a meeting of the above organisation to be held in Auckland on May 20th at 5 p.m.
11. *Presentation* — The final item under "Journal" was a presentation by the President on behalf of Council to Mr. S. G. Brooker who retired from the position of Editor at the end of 1953. The present consisted of 4 volumes of the Journal from 1936 to 1953. Mr. Brooker replied that he was very pleased to receive these volumes from Council. He paid a tribute to the work done by his Editorial Committee in Auckland.
13. *Sub-Committees of Council* — Full reports covering a 12-month period to June 30th are asked for from all sub-committees of Council. These should be sent in to Box 250, Wellington, during July so that they can be cyclo-styled for presentation to members at the General Meeting held in August at the Conference time.
14. *Prizes*
  - (1) *Easterfield Award*:—Information was received that the Secretary of the local section of the R.I.C. had received seven entries. According to regulations the President N.Z.I.C. is one of the examiners.
  - (2) *I.C.I. Prize*:—One entry received. Examiners:—President & Vice-President with power to co-opt assessors.
  - (3) *Morcom Green, Edwards Prize*:—One entry received, Examiners:—President and Vice-President with power to co-opt assessors.
  - (4) *Industrial Chemical Essay Prize*:—No entries.
15. *Membership* — RESOLVED:—Wellington/Auckland:—THAT J. H. Goodey, Chemist, Auckland Gas Co., be re-elected as an Associate subject to his resignation in 1936 having been in order.  
RESOLVED—Auckland/Wellington:—THAT the election of the following Associates be approved:—
  - Robert Harry Brickell, B.Sc., C/- I.C.I. (N.Z.) Ltd., P.O. Box 900, Auckland, C.I.
  - Clifton Roberts Tilly, B.A., B.Sc., C/- Huntly Post-primary School, Huntly, Lower Waikato.
  - Graham Wesley Butler, M.Sc., Fil.dr. (Lond.), Box 623, (Grasslands Division), Palmerston North.
  - Stuart Neil Dawes, B.Sc., C/- Dominion Lab., Sydney St. West, Wellington.
  - Pieter Johannes de Boer, Dip.Chem.Eng., Pinchin Johnson & Company (N.Z.) Ltd., 1-19 Stone St., Wellington, E.4.
  - Edmund Francis Hubbard, C/- Laboratory, N.Z. Railways, Hutt Workshops, Woburn, Wellington.
  - Dr. Dora Suuring, Queen Margaret College, Hobson St., Wellington.
  - Charles Colin Watson, M.Sc., Dominion Lab., D.S.I.R., Wellington.
  - Hugh McDougall Rankin, C/- Ballins Breweries (N.Z.) Ltd., Byron St., Christchurch.
  - Douglas Watson Lockhart, M.Sc., King's High School, Bay View Rd., Dunedin.

16. *Leave* — A formal application from Mr. O. H. Keys for leave from the Institute during an official trip to Great Britain and U.S.A. was approved.
17. *Resignation* — A. J. Beckwith has accepted a post in England. He has tendered his resignation but wishes to subscribe to the Journal. *Agreed.*
18. *Accounts* — The accounts set out on A325 with the addition of an account for £8/12/6 for Binding Journals, Total £249/7/-, were approved for payment. Wellington/Manawatu.  
The Registrar asked that Branches forward subscriptions to Wellington to provide funds for the payment of accounts.
19. *Rules* — The *second* amended draft of the Rules was set out fairly fully on A306 - 314. The *third* draft on A320 - 322 was set out as a series of minor amendments either to the second draft or to the Rule Book. Council considered the amendments on A321 - 322 individually and *passed them all* with the following exceptions or modifications:—
- (1) To Rule 7.3. on A307 add after "cancellation":—"if the Council so resolves."
  - (2) In the Rule Book page 8 Rule 13.9 line 4, retain the word "such" and do not substitute the words "the draft".
  - (3) In the Rule Book page 8 Rule 13.12 shall read:—"At all meetings of the Council a quorum shall consist of six".  
(In connection with the above it was considered unnecessary to distinguish between officers and delegates or their duly appointed proxies and since the membership of the Council is outlined elsewhere there is no need to say "six members".)
  - (4) Rule 21.4. Otago considered this Rule was still very inadequate. After prolonged discussion the following draft was approved:—
    - 21.4.1. Each Branch shall in the month of October in each year, or at such other time as the Council may determine, hold a general meeting of its members, of whom 10 shall constitute a quorum, and at such meeting officers of the Branch shall be elected.
    - 21.4.2. Each Branch Committee shall consist of a Chairman, Secretary, Treasurer (or secretary-treasurer) and four ordinary members who shall be elected by members of the branch. Branches may elect the immediate past chairman and the Branch Editor to be members of the Branch Committee.
    - 21.4.3. The Branch shall elect a Branch Editor and an Auditor, and one committee member shall be elected to be delegate to the Council.
    - 21.4.4. The alteration of 21.4.4. of A313 that suggested on A322 was adopted.
  - (5) Rule 22. The amendment relating to "one of the Vice-Presidents" on A314 is cancelled and the addition after "member" in line 8 on page 13 of the Rule Book shall read "either by post or by *notification* in the Journal."
- This concludes several years of discussion on amendments to the Rules and it is hoped to publish a new Rules Book as soon as possible.
20. *International Union* — It was agreed that, according to the information given by Dr. Lampitt, it was not possible with the present organisation of the Institute for us to join to International Union of Pure and Applied Chemistry.

W. G. HUGHSON,  
Hon. Gen. Secretary.

# B. D. H.

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