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EDITORIAL

The first Industrial Chemical Prize Essay, even in the abbreviated form in which it has been published, fulfils admirably the intention of those who originated the idea that such a competition should be sponsored by the Institute. Mr. Mason has provided an authoritative account of what is being done in the coal tar industry in New Zealand, and a balanced judgment of what could be done. If he scarcely brings comfort to certain irresponsible advocates of a large house building programme based on plastics, he nevertheless shows that our coal carbonisation industry can provide the raw materials for valuable industrial development.

That the publication of the Essay is timely is heavily underlined by the letter we publish in this issue from Dr. J. C. Andrews. Mr. Mason gives one answer to Dr. Andrews' question, "what part can science be expected to play in post-war reconstruction and development of New Zealand?" We believe the chemists and technologists of industries other than coal carbonisation have answers to give also. The Institute provides them with an opportunity to clarify their ideas and present them for examination. Entries for the second Essay Prize do not close till June 30th, four weeks after this reminder should be in the hands of members.

The regulations for the Essay state that "Industrial Chemistry" is to be understood in the widest sense. No member should feel that he has nothing to contribute. Dr. Andrews' letter contains seven questions. An answer to any one of them could be made an Industrial Chemical Essay. Administrators, industrial chemists, research chemists, teachers—can we not hope for at least one entry from every group within our membership?

INDUSTRIAL CHEMICAL ESSAY PRIZE.

The Prize for the best essay on a subject concerned with Industrial Chemistry is again offered this year. Entries must be received by the General Secretary not later than June 30th.

COUNCIL MEETING, MAY 17th, 1944.

At a Council Meeting held in Wellington on May 17th. the following items of general interest were considered.

Salary Survey.—Over 100 replies have so far been received to the questionnaire, of which about 400 copies were circulated to members and non-members.

Status of A.N.Z.I.C.—It was decided to advise the Assistant Secretary, D.S.I.R.: (1) that the commencing salary for a member of the Institute should be at least equal to that of a B.Sc.; (2) that the Institute does not distinguish between degree and non-degree members; (3) that the A.N.Z.I.C. is not granted solely on chemistry, and that particular stress is laid on practical experience

Membership Committee.—Dr. L. H. Briggs was asked to accept appointment on this committee to replace Dr. Evans, whose resignation was accepted with deep regret.

A report from the Medical Advertisements Sub-committee is to be forwarded to the Medical Advertisements Board.

Arising out of the fatal accident in which Mr. S. J. M. Hewitt met his death, Mr. M. L. Stewart was asked to edit an article on "Safety" for the Journal, and Mr. K. S. Birrell was thanked for his report on the accident.

The meeting of Council in person, and the Presidential Address will be held in Wellington this year.

The principle that the President hold office for one year was approved.

A suggestion was approved that every opportunity should be taken to keep the Institute's name before the public, and that elections of Fellows and similar information should be given to the press.

A scheme for assisting returned soldiers with their studies, in collaboration with the N.Z. Section of the Royal Institute of Chemistry, is to be put into operation.

The matter of the admission of chemists of foreign nationality is to be referred to the Branches.

Miss Enid Rowe (Christchurch) was elected Associate.

BRANCH NOTES

AUCKLAND BRANCH

Mr. K. M. Griffin, chairman of the Auckland Branch, is Government Analyst in charge of the Auckland Branch of the Dominion Laboratory, Department of Scientific and Industrial Research. He has been in Auckland since the establishment of the Branch Laboratory in 1924, and during the 20

years has given evidence in a number of outstanding criminal trials. Mr. Griffin graduated M.Sc. with 1st Class Honours from Victoria University College in 1922, and was elected a Fellow of the Royal Institute of Chemistry in 1927

In 1937, Mr. Griffin had a trip to the United States and Great Britain, during which he visited most of the forensic science laboratories of these countries.

Mr. Griffin has also been interested in water pollution prevention, and during his trip abroad, visited many water and sewage treatment plants, and on his return published a report on these investigations.

On the formation of the Auckland Chemical Society in 1925, Mr. Griffin took the position of Secretary, and was instrumental in calling the meeting leading to the foundation of the Institute.

In common with the President and the immediate Past President, Mr. Griffin was prominent in athletics during his University days.

SOME CHEMO-THERAPEUTIC AGENTS.

Capt. Roger Lewis, U.S. Army. 20th April, 1944.

Capt. Lewis devoted his remarks to three drugs, the sulphanilamides, atabrine, and penicillin. Dealing with the sulphanilamides he said sulphasuccidine has now largely replaced sulphaguanidine as, due to its lower solubility, a higher concentration can be built up in the intestine. Sulphamerazine is similar to sulphadiazine, but has certain advantages over the latter as it is very rapidly dissolved from the intestine. The sulphanilamides are always used with alkalis as they dissolve the very insoluble acetylated product. The sulpha drugs are active in concentrations of 5 to 10mg. per cent (100 ml.). As the drugs poison the carbonic anhydrase mechanism responsible for the elimination of CO_2 from the blood stream, the drugs are never given to active flying personnel.

During the last war when quinine became scarce in Germany, methylene blue was used with moderate success as an anti-malarial. To-day, the best substitute is atabrine, although it is not as good as quinine. It is a moderately strong base which is not very soluble, it has a bitter taste and is not ordinarily toxic. The dose is about 0.6 grams per day and this builds up a concentration in the blood plasma of about 1 in 100,000,000. A peculiar fact is that different individuals have very different atabrine levels in the serum with the same doses.

Capt. Lewis then spoke about penicillin and explained the difficulties of its manufacture. It is non-toxic and has about the same field of usefulness as the sulpha drugs. It is thought

to act on glucose giving H_2O_2 which is toxic to bacteria.

In conclusion, Capt. Lewis said that modern chemo-therapy was getting away from the organo-metallic compounds and concentrating on the purely organic ones which have proved more active and less toxic.

WELLINGTON BRANCH

The new chairman, Dr. E. B. Davies, was educated at Nelson College and Victoria College, graduating M.Sc. in Chemistry in 1931. He was transferred to the chemical laboratory of the Dept. of Agriculture in 1926 and has remained in the department, at the present time being in charge of the laboratory more concerned with seeds, fertilisers, and general works for the Fields Division. In 1935 he left for England on leave for study purposes and to attend the third International Congress of Soil Science at Oxford. A research grant offered by the Macaulay Institute of Soil Research, Aberdeen, with later assistance from the N.Z. Government, enabled him to carry out there an investigation into the estimation of manurial requirements of soils. Graduating Ph.D. from the University of Aberdeen in 1937, he returned to N.Z. to his present position. The journey home enabled him to visit briefly some of the agricultural experiment stations of the U.S.A..

The Wellington Branch of the N.Z. Institute of Chemistry held its first meeting for the year at Victoria College on the 18th April. The chairman, Dr. E. B. Davies, gave his address on "The Estimation of Manurial Requirements." He pointed out the vital nature of the question of soil fertility, as the ultimate source of all our food and clothing is, in fact, the soil. Among the various essentials for healthy plant growth is an adequate supply of available nutrients. Of the total amount of any element present in the soil but a very small portion is at the disposal of the plant. It was the question of how to assess this important fraction that the lecturer dealt with. After a description of the essentials of the field experimentation, pot cultures and two biological methods, the various forms of phosphate in the soil were differentiated and possible mechanisms of plant uptake were discussed. A selection of chemical methods of estimating available phosphate was then studied in the light of present knowledge. With the urgent need for increased production and the limited supply of fertilizers, it is essential that the amounts available be directed to where they are most needed. The fact that during 1942 some 113,000 soil analyses has been carried out by research institutes in Great Britain in facing the problem shows the value they place on chemical methods..

CANTERBURY BRANCH.

The October meeting for 1943 was addressed by Mr. C. D. Ellyett, of the Physics Department, Canterbury College. He dealt with some recent developments in physics, which are of interest and value to chemistry. His first topic was the electron microscope. When it was recognised that the laws of optics apply to electrons, it became possible to design electric or magnetic fields to deflect electron beams in a controlled way. Busch showed that a non uniform magnetic field of a short coil has the properties of a lens. Gradual improvement led to a simple electron microscope in which a hot barium-activated metal cathode produces an enlarged image, enabling transitions in the crystal lattice of the metal to be observed. The modern compound electron microscope was described by comparison with the usual optical instrument, and the theory was clearly explained. Resolution of points 50A° apart (50×10^{-8} cms) is possible, this distance being of the order of the larger structures, such as organic molecules, studied by X-rays. Another advantage is that the intensity of illumination by the electron beam is immensely greater than for the best possible light source, so that very small masses containing a few thousand atoms scatter sufficient energy to affect a photographic plate. On the other hand, practical difficulties exist in voltage control, high vacuum technique, and the necessity for providing very thin specimens, less than 1000A° thick. A number of photographs were shown and explained, medical specimens such as viruses and bacilli being of special interest.

Mr. Ellyett then described some uses which electronics is finding in the chemical industry. He first outlined the functions of the various components of the modern radio set-up, and described how such knowledge of the behaviour of valves and circuits has recently been applied to the construction of apparatus for the control of industrial processes. As examples, the use of phototube circuits for the measurement and control of temperature, for chemical titrations, and for humidity determinations was briefly described.

It was then pointed out that considerable advances had taken place through the use of circuits employing wave-forms other than the simple sine-wave. In particular, the operation of a trigger circuit actuated by sharp-fronted impulses was explained, and it was shown how a unit consisting of a series of such circuits, each in conjunction with its detector stage, could be used to count the total number of impulses entering the unit. The application of such a unit for the counting of particles emitted from natural or artificially radioactive materials was described. The unit can also be used to record exact time intervals of as short a duration as 1/500,000 sec. Such a

unit is one of a group of circuit arrangements now known, by means of which any measuring, sorting or grading process can be simply and automatically carried out.

The third topic treated by Mr. Ellyett concerned the newer particles obtained from reactions involving atomic nuclei. A concise tabular summary of the types of particles and classes of reaction occurring in nuclear physics was shown by means of a blackboard diagram.

As one example of the use of this knowledge the behaviour of artificially radioactive atoms as "tracers" was explained by typical examples. The use of such atoms allows the journey of a particular element to be followed through physical, chemical or biological processes.

In conclusion, Mr. Ellyett pointed out that enormous technical advances had been made overseas, largely as a result of the war, and it had become realized, especially in America, that it was now necessary for considerable sections of the community to have a reasonable understanding of the basic principles underlying modern technical equipment, and the method of approach to scientific problems. Because of this changed outlook, a number of American universities now included a liberal science course for students of the arts and humanities. New American text-books were shown covering such courses, and it was suggested that it was not too soon to consider whether a similar course would be justified in the University of New Zealand.

THE DEHYDRATION OF VEGETABLES.

An address on the dehydration of vegetables was given before the Canterbury Branch of the New Zealand Institute of Chemistry on Friday, April 21st, by Dr. J. C. Andrews, Vice-President of the Institute and Deputy-Chairman of the Council of Scientific and Industrial Research. Among the guests of the Branch were Sir Theodore Rigg and the Dominion Analyst, Mr. R. L. Andrew.

After explaining the advantages to be gained under war conditions by dehydration of bulky foods, such as the saving of shipping space and tin containers, Dr. Andrews emphasised the importance of grading the vegetables to be processed. U.S. experience with beetroot showed 29 per cent loss during preparation for dehydration with ungraded roots, while when three grades were treated separately the losses were 9 per cent for large roots, 15 per cent for medium and 28 per cent for small. The raw product must be of good quality, and if the vitamin content is satisfactory, the loss is less than in home cooking. Four main methods of peeling were described, by

means of abrasive rollers, hot caustic soda solution, a short flame treatment at 1200° centigrade, and by steam. The Riccarton plant is to use the abrasive method. After peeling, some vegetables, such as potatoes, require to be dipped in brine or sulphite solution to prevent discoloration. Wastage occurs during the trimming process. Dr. Andrews showed samples which illustrate different trimming methods, carrots being diced, cabbage shredded, onion sliced, and potatoes cut into strips. Before dehydration, the vegetables are blanched in steam to inactivate enzymes, which must be destroyed if satisfactory appearance, flavour and vitamin C content are to be obtained. Dehydration is carried out by subjecting the vegetables to hot air in tunnels through which trays pass continuously. At Riccarton, a two stage tunnel will be used, a higher temperature being applied in the first stage when much surface moisture is present. The water content is reduced to a low figure, from about 90 per cent in the raw state to 7 per cent in the case of potatoes, and 4 per cent for onions. It appears that these figures are low enough for satisfactory storage, if the correct storage temperature is maintained.

Scientific control of temperature, air flow, and humidity is essential for successful working of the plant.

One interesting result of dehydration experiments has been the discovery of small holes in the usual tinned food container. Usually these holes are sealed by the liquid present with canned foods, the surface tension being enough to prevent leakage. Better cans are required for dehydrated products, and American can makers have succeeded in meeting the demand.

The samples which Dr. Andrews showed were cooked during the lecture, and tested by an interested audience.

PROFESSOR J. PACKER, M.Sc.(Melb.) D.I.C., F.N.Z.I.C.

The appointment of Mr. John Packer as Professor of Chemistry at Canterbury College, in succession to the late Professor H. G. Denham, has been widely welcomed by New Zealand chemists. Professor Packer is a graduate of Melbourne University, receiving his early chemical training under Professor D. O. (later Sir David) Masson. As an undergraduate he was awarded Dixon Scholarships in Chemistry III and Honours Chemistry and a non-residential scholarship at Ormond College. His research for the M.Sc. was in organic chemistry on cupritartrates, but as a post graduate research scholar he carried out physico-chemical investigations under Professor A. C. (now Sir David) Rivett. In 1921 and 1922 he was tutor-lecturer in chemistry at Queen's College, and in the latter year was engaged in control work on an industrial scale

investigation of a low temperature coal-carbonisation process. This was followed by a brief period as research chemist in the Munitions Supply Branch of the Commonwealth Defence Department, from which position he resigned to come to Canterbury College as lecturer in 1923.

In his new position, Professor Packer took over the teaching of organic chemistry. In 1926 he was granted one year's leave, which he spent at Imperial College, London, under Sir Jocelyn Thorpe, where he began the studies of the glutaconic acids which have been his main research interest since. This work has involved measurements of rates of recemisation, as well as the study of proposed new methods of syntheses. For his work under Thorpe, he obtained the Diploma of Membership of Imperial College (D.I.C.). While Acting Professor during 1943, he was elected representative of the Canterbury College Professorial Board on the Academic Board of the University, and on the Lincoln College Professorial Board. He was also appointed Member of the Chemical Panel and the Local (Canterbury) Panel of the Defence Scientific Advisory Committee.

The important role which Dr. H. G. Denham has played in the development of industrial research in New Zealand was at least in part, made possible by the complete reliance he was able to place on his second-in-command in his department. Chemists who have received their University training at Canterbury College are well aware of the influence Professor Packer had on their development, and have shown their satisfaction at the College Council's recognition of his services.

As one of the foundation members of the Canterbury Branch of the Institute, and one of the first Fellows, Professor Packer has been one of the stalwarts of the Branch, as chairman in 1936, as Council delegate, as committee member, and frequently as a lecturer on a variety of topics treated with his unfailing clarity. His Denham Memorial Address last year, the first of its kind in the Institute's history, set a standard for other speakers to aim at, when the work and influence of scientific men is being evaluated, as it should be.

Professor Packer was President of the Canterbury Branch of the Royal Society of N.Z. in 1934, and has always given support to the furthering of other branches of science.

The initiation of courses in applied chemistry and chemical engineering in the University Colleges owes much to Dr. Denham, and his successor has already given outstanding service in the actual launching of the new venture. With the appointment referred to below, of a specialist lecturer in applied chemistry under Professor Packer, the Canterbury College Chemistry Department, with its sister departments in the other colleges,

has every hope of playing a valuable part in the future of New Zealand Chemistry.

The appointment of Mr. Stanley Robert Siemon, B.Sc., M.App.Sc., of Brisbane, as lecturer in applied chemistry at Canterbury University College, has been approved by the college council. Mr. Siemon is to commence his new duties at the earliest possible date.

Born in 1916, Mr. Siemon was educated at Brisbane Grammar School and at the University of Queensland, where he obtained the degree of bachelor of applied science with first-class honours in 1938. Two years later he took the degree of bachelor of science, and in 1941 the degree of master of applied science. He is an Associate of the Australian Chemical Institute, and a graduate member of the Institution of Chemical Engineers. Recently he passed the qualifying examination for associate membership of the Institution of Chemical Engineers.

Since his graduation Mr. Siemon has been employed by the Queensland Meat Industry Board, where he has built up a routine laboratory and established a plant control system for edible fats, tallows, fertilisers, and animal food production. In addition, he took part, in association with mechanical and civil engineers, in the design of refrigeration equipment, including water-cooling towers and ammonia condensers. In 1942 and 1943 he was a part-time lecturer at the Central Training College, Brisbane.

OTAGO BRANCH.

Dr. S. N. Slater, the Branch Chairman for 1943, was University Senior Scholar in Chemistry in 1936, and graduated M.Sc. from Otago University with 1st class honours in 1937, obtaining a post-graduate scholarship in Science. He carried out synthetic work on sterols at Oxford under Sir Robert Robinson, for which he was awarded the degree of Doctor of Philosophy in 1940. He joined the Chemistry Department staff at Otago University in 1941, lecturing in organic chemistry and continuing his research interests. Recently Dr. Slater has shown considerable interest in cabinet-making and home-science. This development is believed to foreshadow an imminent change in status.

CURRENT RESEACH AT THE CAWTHRON INSTITUTE

On Wednesday, 22nd September, an informal dinner was held in honour of Sir Theodore Rigg. Afterwards Sir Theodore addressed a joint meeting of the Royal Society and the Institute of Chemistry, where he outlined the more important

current investigations being carried out by the Cawthron Institute, of which he is Director.

He stated that the work of the Cawthron Institute was organized into entomological, mycological, soil, and biochemical departments. A museum illustrating natural history subjects formed an integral part of the Institute. In New Zealand, the general public, perhaps, was more familiar with the insect investigations of the Institute, although the trace element and soil investigations of the Institute had attracted a great deal of attention, both in New Zealand and overseas.

The entomological work of the Institute had been greatly strengthened in recent years by the location of the Entomology Division of the Plant Bureau, Department of Scientific and Industrial Research at the Cawthron Institute, thereby bringing about the maximum co-operation in the conduct of insect investigations throughout New Zealand. For the most part, the biological control of insect pests by the introduction of suitable parasites was the principal line of work carried out by the entomologists. The surprising success of Aphelinus mali in the control of woolly aphis, and of Habrolepsis dalmani parasite for the control of the golden oak scale, had been followed up by the introduction of parasites for the control of the horntail borer of pine trees and codlin moth in apple orchards. For the horntail borer, the Rhyssa parasite had been successfully established at Hanmer and also in the Nelson district. It would appear that this parasite would exert a very beneficial effect in controlling the depredations of the horntail borer in our pine plantations. In regard to the parasite of the codlin moth, it was too early to make any statement, but parasites had been successfully reared at the Institute, and small liberations had been made in Nelson orchards.

Considerable success had attended the work of the Entomology Division of the Plant Bureau, located at the Institute, and their work on the control of the white butterfly, and the diamond-back moth was now well known to farmers and the general public.

In the case of the white butterfly, observations made last season showed that it had been successfully held by the pupal parasite, while the larval parasite introduced from North America had become well established in the Nelson district. From the limited data at present available, it can be said that the larval parasite is exercising a beneficial effect on the control of the white butterfly.

Great progress has been made in the control of the

diamond-back moth. Last year a very great improvement in the appearance of cruciferous crops was noticeable throughout the districts which were examined. Field surveys showed that both the larval parasite, Angitia, and the pupal parasite, Diadromus, had established well, and that the degree of parasitism had very considerably increased during the past four years, from an average of combined parasitism of 3.9% to nearly 78%. The data definitely suggest that commercial control of the diamond-back moth will be secured by the operation of the two parasites.

COBALT INVESTIGATIONS.

The valuable work which has been carried out by the Institute in connection with cobalt deficiency in Southland, Nelson, and on the West Coast, has been continued. In recent years, the value of certain cobalt-containing limestones in Southland has been demonstrated, and it has been shown that certain ground limestones exert an appreciable effect on the cobalt status of Southland pastures for a period of several months. There can be no doubt that the high reputation of liming in Southland was partly connected with the fact that by a fortuitous circumstance, certain limestones contained appreciable amounts of cobalt which was needed in the treatment of well-defined areas at Morton Mains and other Southland localities.

At the present time work is being carried out by the Institute concerning the value of the more insoluble cobalt compounds, and also concerning the value of small, frequent applications of cobalt as against large infrequent applications. In regard to the more insoluble cobalt compounds such as cobalt phosphate, cobalt oxide, cobalt carbonate, the work has shown that these are all valuable for the treatment of cobalt deficient pastures. Mixtures of cobalt sulphate and ground limestone, or cobaltized superphosphate and ground limestone have likewise given satisfactory results for the top-dressing of pastures. Amounts as low as 2oz. of cobalt sulphate per acre have given marked increases in the cobalt content of pastures, and has prevented the onset of sickness in lambs and hoggets on cobalt deficient country. The effects of such small applications disappears rather quickly, and does not extend much longer than three or four months after pasture treatment. Four ounce applications of cobalt sulphate per acre carry over to a second season, but the amount is not sufficient to give security to stock in the second season. Large applications of cobalt sulphate (up to 20oz per acre) have given, on the other hand, very satisfactory results over a period of at least three years, without further top-dressing treatment.

TOMATO INVESTIGATIONS.

One of the interesting features of the Nelson tomato industry has been the adoption by tomato growers of steam sterilization. This has become a regular practice for the majority of Nelson tomato growers, and has materially raised the yield of grasshouse tomatoes. Experiments carried out by the Institute indicate that the omission of steam sterilization even for a single year, results in a marked reduction in both vigour of plant and yield of fruit. In one experiment carried out by the Institute, the yield on the unsterilized plot was 5lb 6oz per plant, as against 8lb per plant for the steam sterilized plot. The factors which operate in producing this beneficial result are being worked out by the Institute. The presence of eel-worm in Nelson tomato houses is one likely cause of low yield on the unsterilized plots. Chemical determinations, however, show that steam sterilization has an important effect on the nitrogen status of the soil, the figures for ammonia nitrogen being almost double on the steam sterilized plots, as compared with the unsterilized plots.

A great deal of time has been devoted to the study of a physiological ailment of tomatoes known locally under the name of "cloud." This disorder detracts from the appearance of the tomatoes, and in certain seasons causes a considerable reduction in value. Steam sterilization of the soil tends to increase the amount of fruit affected, but house management factors have the greatest influence on the amount of "cloud" appearing in the crop. As a general rule, the first and second bunches are affected rather badly, but fruit above the fifth bunch seldom shows symptoms of ailment.

FRUIT RESEARCH

One of the interesting features of the fruit investigations has been the identification of premature defoliation of apple trees as a magnesium deficiency. This trouble appears to be increasing in amount in certain parts of the Nelson district, where the soils have a low mineral status. It is one of the few recorded cases of magnesium deficiency occurring in fruit under commercial conditions. The experiments have shown that applications of ground dolomite or Epsom salts at the rate of 6-7lb per tree exert a beneficial effect, and greatly reduces the amount of defoliation. Epsom salts give a more rapid effect, which, however, does not persist to the same extent as that associated with ground dolomite.

An interesting aspect of the fruit work has been the investigation of Vitamin-C content in Nelson fruits. The

Sturmer variety of apple has given values of 18·36 milligrams Vitamin-C per 100 grams of apples. Delicious and Dougherty varieties on the other hand have given only 2-6 mgm. Vitamin-C per 100 grams of fruit. The high value for the Sturmer variety is a matter of considerable interest to the general public, in view of the great shortage of citrus fruits at the present time.

TOBACCO INVESTIGATIONS.

The Nelson district has some 3000 acres of tobacco, practically the whole of the crop grown in New Zealand. Experience has shown that Nelson climatic conditions and soils are suited to the growth of high quality flue-cured tobacco, and it would be advantageous to the district and New Zealand to extend tobacco culture in the Nelson district. In view of the association of high quality tobacco with soils of the sand and sandy loam texture, it is very necessary to identify those types of soil which have the right texture and mineral composition for the best results with tobacco. Soil surveys carried out in the Waimea County, Nelson, have shown the possibility of allocating another 2000 acres, which are not at present used for the tobacco crop. It is hoped to complete the survey of tobacco soils during the next 18 months, when a more detailed statement can be made concerning acreage of suitable land which would be available for the extension of the crop.

One of the major disease problems of tobacco in the Nelson district has been mosaic, a virus disease which has resulted not only in a reduction of yield, but also a reduction in the value of the leaf which is harvested. Experiments carried out in co-operation with the Tobacco Research Station, Riwaka, have definitely shown the possibility of almost eliminating mosaic from commercial crops. At the Riwaka Station, the amount of mosaic has been reduced during a period of four years from over 80% to less than 5%. The carrying out of simple precautions in handling the tobacco plants, particularly in the seedling-bed stage of tobacco culture, have been the more important factors in securing control of mosaic disease.

Another important aspect of tobacco research has been that devoted to the chemistry of both green and cured tobacco leaves. The results of the investigations indicate that quality of tobacco leaf is associated with low nitrogen and high sugar content. A comparison of the chemical composition of American and Nelson leaf shows that for leaf of similar grade, the percentages of nitrogen and sugars in Nelson leaf compare favourably with those in American leaf of the same grade. In mineral composition, Nelson leaf is rather higher in lime and

magnesia, but it is somewhat lower in potash than American leaf. Fertilizer studies of tobacco are being carried out at the Tobacco Research Station, and the field results are being correlated against the chemical composition determined at the Institute. The use of adequate amounts of nitrogenous manure in the manurial treatment of tobacco on sandy soils is one of the important points brought out by the work at the Research Station, but great care must be exercised that certain limits of nitrogen are not exceeded, otherwise the quality of the tobacco is adversely affected. The chemical studies carried out at the Institute provide an important check on the results obtained in the field experiments.

CORRESPONDENCE.

Sir,

Throughout the British Empire and the United States of America, considerable attention is being paid to the question of post-war reconstruction. The provisions of the Atlantic Charter and the disbanding of the Commintern by Russia are momentous political declarations giving hope to the war-worn world, but so far little of a concrete nature has been brought forward. The Food Conference at Hot Springs, attended by representatives of some 44 nations, was, however, notable in that it showed a remarkable unanimity of opinion with regard to food supply and agricultural problems. The resolutions of that conference, however, must remain sterile if the corresponding problems of international politics, finance and commerce are not handled with the same unanimity and honesty of purpose. Whatever may be the outcome, it is clear that no return to pre-war conditions is either possible or desirable. Such being the case, it is most desirable that all sections of the community in New Zealand should be thinking and planning for the future, and examining present day social organisation for possible defects and methods for the removal of such.

One of the outstanding facts which has come to light during the present conflict, is the extremely important part science is playing in all phases. Recognising this position, scientific organisations in the United Kingdom and the United States of America are giving serious thought to the future and are submitting a laudably frank self analysis of the place science occupies in these countries and the responsibilities it will have to assume in the future. Consequently it seems appropriate for members of the Institute to give serious thought to the part science in general and chemistry in particular can play in overcoming the problems of reconstruction and

development in New Zealand. The problem is great. Courage and initiative are required. Numerous questions come to one's mind but a few examples should be sufficient to stimulate thought along these lines.

What part can science be expected to play in post-war reconstruction and development of New Zealand and how far is it possible for maximum effort to be achieved, and if not, what steps should be taken now to prepare for the future effort?

Are sufficient personnel available, and if not, what steps should be taken to remedy this position. Is the University of New Zealand catering properly for the requirement of the Dominion, and if not, what changes are necessary?

What is the position of research in New Zealand and how may it be improved? Is the Dept. of Scientific and Industrial Research giving a proper lead in these matters? Is the Government sufficiently aware of the potential value of research?

How can industry be placed on a better and more efficient basis to meet the problems of the future?

As a responsible body representing an important section of the scientific community, I feel that the Institute should give careful thought to these problems in the interests not only of the profession itself, but the future well being of New Zealand and as a contribution to the hoped for World Peace.

Yours faithfully,

J. C. Andrews.

Calculation of relative humidities from thermodynamic data for electrolyte solutions.

In work such as food dehydration and the control of the physical properties of paper, it is often of interest to know how the equilibrium moisture content of the material depends on the relative humidity of the atmosphere. For this purpose the method described by Makower and Dehority (Ind.Eng.-Chem., industrial edition, 1943, 35, 193) is convenient. The sample is placed in an evacuated desiccator over a solution of which the water vapour pressures are known as a function of temperature and concentration. The system is maintained at a constant temperature until equilibrium is established, after which the moisture content of the sample is determined by the appropriate method. The equilibrium composition of the con-

trolling solution then measures the corresponding relative humidity.

The object of this note is to draw attention to the fact (perhaps not appreciated by many workers) that there is available a large body of recent experimental work from which relative humidities over electrolyte solutions may be computed. Since the humidity sections of most laboratory handbooks usually contain only a few values for saturated solutions, often based on very old determinations, some remarks on the use of the more modern data may be of interest.

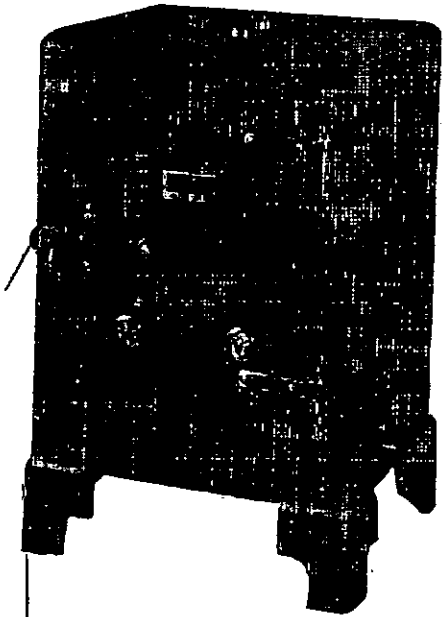
Numerous papers have been published on the thermodynamics of electrolyte solutions, the results usually being given as values of the osmotic coefficient g, the stoichiometric activity coefficient y, or the water activity a, at various concentrations. An extensive tabulation of y values, and over 100 references, are given by Robinson and Harned (Chemical Reviews, 1941, 28, 419-476).

The relation between water activity and relative humiditiy is simply: R.H. $= 100a = 100p/p_0$, where p is the vapour pressure of the solution and p_0 that of pure water at the same temperature.

The osmotic coefficient is defined by $g = \frac{-55.51}{n\ m} \log a$, so that $\log_{10} a = \frac{-mng}{127.84}$ where m is the molality (moles of solute per 1000g of water) and n is the number of ions formed from one molecule of the salt. The activity coefficients, y, require rather more calculation to give relative humidities, the relation being $\log_{10} a = -\frac{n}{127.84}[m + 2.303 \text{ integral } m\ d\log_{10} y]$.

To obtain the integral, it is necessary to plot m as ordinate against log y as abscissa up to the required concentration, (extrapolating to m=o at log y =o), and count squares under the curve. Since y is a decreasing function of concentration at first, care must be taken with the signs, especially if the curve returns on itself at higher concentrations as usually happens.

R. H. Stokes,
Auckland University College



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