

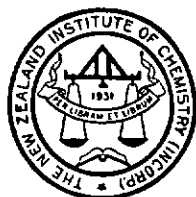
# JOURNAL OF THE NEW ZEALAND INSTITUTE OF CHEMISTRY

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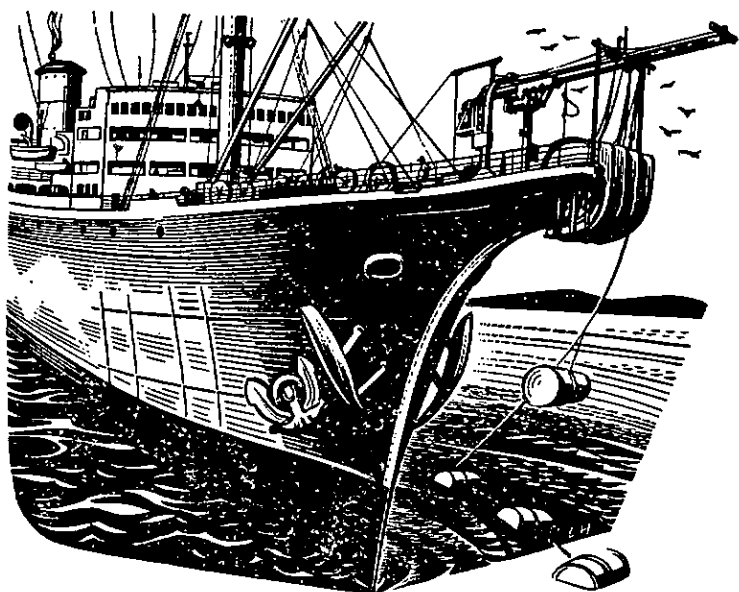
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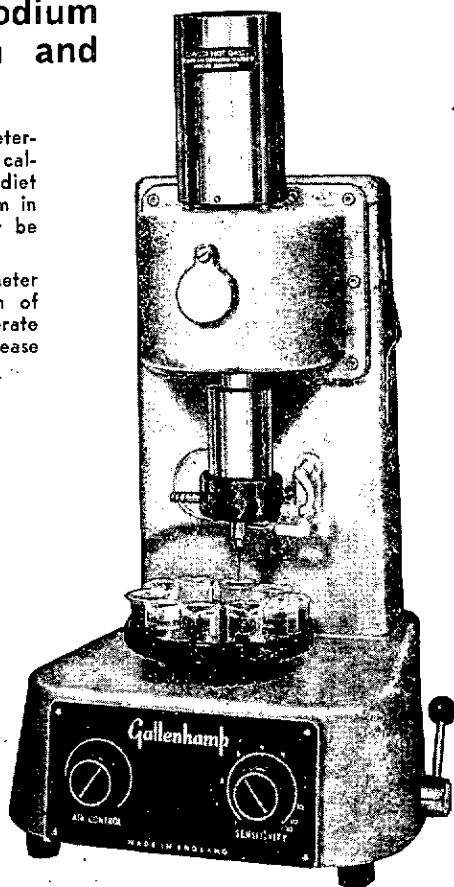
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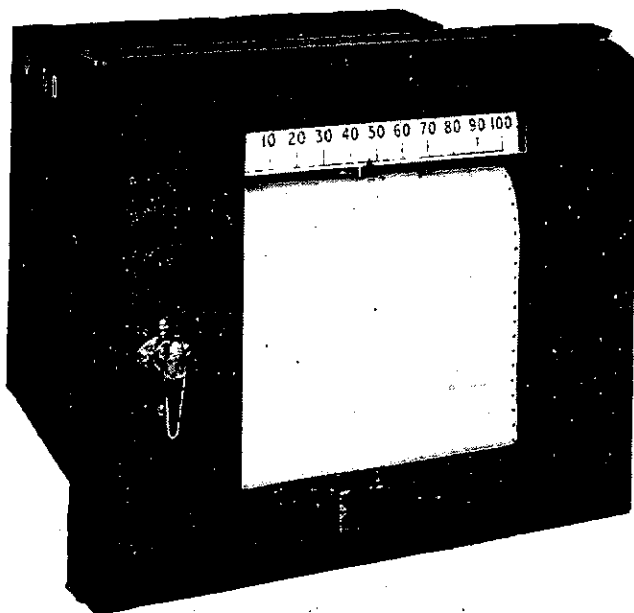
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# JOURNAL OF THE NEW ZEALAND INSTITUTE OF CHEMISTRY

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## EDITORIAL

Over the past few years attention has been focussing more and more clearly on the urgent need, not only in New Zealand, but in most other Commonwealth countries, for an ever-increasing supply of scientists, technologists and technicians. It is clear that if our industry, both primary and secondary, is to develop as it should, every effort must be made to match the Russian and United States output of highly trained personnel. To achieve this, change and development will be necessary in our systems of higher education but there is room for widely differing opinions on how these changes may best be effected and on their repercussions.

The Institute is already playing an active part in helping to arrange, with the Education Department and other interested bodies, suitable training courses for technicians, but the problem, first of making industry aware of its future requirements and then of meeting the demand for specialists, is a more far reaching one. The University itself must decide what part it is to play in the provision of technologists, how it can increase its output of chemists, physicists, etc., and to what extent general training can give place to greater specialisation. Industry and the country in general must then be made aware of exactly what these different types of workers have been trained for and what can be expected of them.

The future expansion of the University is a controversial subject with conflicting interests involved, particularly when problems such as overcoming accommodation difficulties by increasing the size of existing Colleges or establishing new ones, are discussed. Nevertheless the best way of supplying more technologists and scientists is a matter of vital interest to the Institute and all aspects of the problem deserve the attention of its members.

Some of these matters were dealt with by Dr. F. G. Soper, Vice-Chancellor of the University of Otago in his Graduation Address at Massey Agricultural College last April. Although his remarks were addressed particularly to the graduates of Massey College, they are capable of a much wider application. Dr. Soper, a Fellow of the Institute and formerly Professor of Chemistry at the University of Otago, has kindly consented, therefore, to the publication of his address in this issue of the Journal.

## RANDOM THOUGHTS AT GRADUATION TIME

BY F. G. SOPER,

*Vice-Chancellor, University of Otago.**(Based on Graduation Address, Massey Agricultural College, April, 1957.)*

First may I express my sense of the responsibility you have placed upon me in asking me to deliver your Graduation Address and also my appreciation of the honour of your invitation. It is now my special role to inflict upon many of the graduates and diploma holders their last lecture.

This is a time when many graduates can draw a sigh of relief: no more lectures, no more examinations; but with regard to examinations don't be too sure. I remember so well being in your position in 1920 and saying "well, no more examinations!" and finding an oral examination hanging over me again for higher degrees and in the 1930's having to sit an examination for promotion in the territorial army. Believe me it was just as hard as ever. Perhaps worse, for I didn't in my army examination know all the answers. My pass was a modest one with no flamboyant and unnecessarily high marks. There had obviously been a nicely calculated sufficiency of effort.

This brings me to the essential difference between the University with its examinations and external examinations of which I had also had some experience. All through a University calendar are regulations in small type requiring that before a candidate can sit the examination he shall forward a certificate of having pursued a certain course of practical work.

In other words every University knows that there are *certain types of knowledge which cannot be tested by examination*. Since one of the functions of a University is to assist the community by correctly labelling its graduates by certifying for example, that Mr. X possesses certain skills and knowledge, the University finds itself forced to say that there is only one way in which it can be sure that Mr. X possesses these skills and knowledge, and that is by insisting that Mr. X go through a prescribed course under supervision.

You here in Massey College are in no doubt as to the importance of attending the course, but nationally the problem is still to be solved—the problem of the external student who is encouraged by the belief held in some quarters, that knowledge and attitude can be adequately tested by examination alone. I wonder whether even in Arts subjects knowledge can be tested adequately by examination. I should be the last person to depreciate the value of the examination. It has its place, and an important place, but I am alarmed at this attitude, which continues to persist in New Zealand, that it should be possible to obtain the prestige of a University degree merely by sitting examinations and without

the person having been subjected to pursuance of the course and the close contact and interplay between his mind and the mind of the teacher.

However that is a problem which does not affect this centre for the moment, but as you will see, it may in the future when some of you present graduates may be making the decisions. Let me leave it like that.

Having spent most of my life in and around Universities I may be somewhat biased as to the value of its products. If I were asked to pin-point where the special value lies I should be hard put to decide between two or three features. One which stands high on my list apart from the essential one of professional competence is that a graduate of a University, if the University has done its job, has acquired something which enables him to go ahead independently in his subject. He has been subjected to various stresses and strains and intellectual stimuli during his training. He is a new ship and the tugs who are the University teachers have manoeuvred the young ship into the open sea and this young ship can now go ahead under its own steam and may in the course of its voyages discover new islands: some may discover even a large island or maybe just a sandbank. But the important thing is that he is under his own steam. He is not a clockwork motor that has to come back every so often to be wound up again by his teachers. There are certain technological trainings in which the operatives must have regular refresher courses if they are to be kept up to date. In general, I do not think that a University graduate is in that category of requiring regular refresher courses, though I would not deny that a community of intellectual interests will inevitably bring him frequently into association with others of similar interests and that he will benefit thereby. But he does not have to go back at intervals to be reindoctrinated. I do want to emphasise this point; that you, however weary of learning you may be at the moment, are now in reality starting rather than finishing, and that the vital fact of whether you have acquired a real University training or only what is needed to do the technical job, will be manifest in 20 years' time.

Another facet of University training—and I realise that I must tread warily here—is the benefit of living for three or four years alongside other students who are pursuing a variety of courses. There is something which you acquire by friendships with those whose interests are in other disciplines. I believe that it is an appreciation of the worthwhileness of other studies. *There is nothing so destructive of the cultural life of a community as the existence of separate groups of specialists each of which can see no value, or only limited value, in the interests of the other groups.* Most Universities try to introduce measures which will bridge the channels which exist between these groups. One of

the easiest bridges is provided by community life in Residential Halls and Colleges. In Britain several different measures are being tried. Some Universities have voluntary lectures at a special time each week when no other class lectures can be held, with the object of introducing to the student subjects which he might otherwise never discover for himself: lectures on art, on the history of science, on diplomacy. One College in Britain has a compulsory first year common to all students, a first year which is balanced between the humanities, the social sciences and experimental sciences. Western German Universities since the war have arranged lectures and seminars, visits to theatres and museums, chamber music groups, political discussions, on a certain number of free days each term. This is called the *studium generale*. The students take a full share in helping to arrange these activities. Apparently the experiment is spoken of with enthusiasm by staff and students alike. The French approach is rather different in that some of their leaders hold that the solution is more rather than less specialisation, because it lightens the amount to be learnt and so leaves the student with more mental energy and more leisure to broaden himself.

There is one point on which however, all Universities are agreed in principle, however much they depart from it in practice: that in building this general culture the most dangerous enemy is the inflation of the curriculum and the overloading of courses. I know how difficult it is to resist that overloading of a course, having been myself a professor of the University for 17 years, and realising how much of a subject may be needed by a student in his future activities. So on the British, German and the well-known American plan, the tendency is to provide somewhere in the University curriculum some lectures or courses which all students can take, whereas the French tendency or at least the tendency of their discussion, is to plough more deeply by increased specialisation. This is all germane to Massey College for as part of the University you are concerned not only in providing the country with graduates in Agriculture but in adding to the intellectual spirit of the country, and whether that can be achieved only through lectures and courses on what are commonly called cultural subjects, or on the other hand, by increasing specialisation, is a matter of very considerable interest to you.

The public expects some quality of mind from all University graduates whatever the Faculty. If we could agree and define what this quality is we should help in the solution of that very difficult problem of University education. It has been said that culture is *the capacity for discriminating judgment* but may I suggest that discriminating judgment needs some understanding of what are the more permanent satisfactions in living and this surely is wisdom. I doubt if wisdom can be acquired without experience.

All that I can suggest as to the nature of this quality is a negative attribute that one does not expect from a graduate half-baked opinions—opinions which are ill-considered, based on hearsay and prejudice, and this applies to whether the subject is one within the graduates special field or outside it. One expects, through a process of interplay of keen minds fostered through living together at the most intellectually formative period of one's life, that the graduate learns to recognise the half-baked sentiment and the second rate, and to guard against it.

Sir Eric Ashby, the Vice-Chancellor of the University of Belfast, in a recent article suggests that *one rough and ready way of defining general culture is to study the men who by common consent exhibit this virtue*. And if we do, he goes on to say, we find that most of such men are specialists and are ignorant of whole continents of knowledge outside their specialism; and if we look more closely at their writings or listen to them as they talk, we find that the quality of their minds depends not so much on the diversity of their knowledge, as upon the way that knowledge is linked together and upon the attitude they have to knowledge. I would imagine that in a specialist agricultural college such as this is, there are special problems to be faced: you can become efficient specialists in agriculture and nothing else, or you can weave your specialist knowledge into the fabric of society and so add to what is general culture. You start with a great advantage which may outweigh the advantages of multiplicity of courses in the constituent colleges. I refer to the fact that you enjoy residential life which has such potentialities for personal education.

What of the future of Massey? Will you have some day the Faculties of Arts and Science as well? I have no yes or no opinion on this controversial matter. But, on the other hand, I have an opinion as to the benefits of the small University or University College as against the large one, so long as adequate staff can be provided. Many of the Universities and University Colleges in Great Britain have less than 1,000 students and yet in Britain new University Colleges are being founded and there is at present, talk of founding more. It depends what a country is prepared to pay for its University education. Let me give you the number of Arts and Science students attending some of the London Colleges. The largest is University College, with 1976, then comes King's College with 1,246, Bedford has 707, Queen Mary 644 and Royal Holloway 346. In Scotland, Edinburgh and Glasgow are very large in comparison with others. They have 2,730 and 2,690 students in Arts and Science: St. Andrews 1,122, Aberdeen 960. In Wales there are four constituent Colleges, Aberystwyth, Bangor, Cardiff and Swansea. The numbers are 929, 687, 1,183, 747. There are no provincial Universities in England with more Arts and Science students than 2,000, except Manchester with 2,597 and Exeter, Hull, Leicester, North Staffordshire and Southampton have less

than 1,000. I am excluding the Universities of Oxford, and Cambridge with their multiplicity of comparatively small Colleges. These figures relate to Arts and Science students for the Academic Year 1952-53 and there has been little change in total numbers since that date. In this country Auckland had in 1956, 2,417 internal students in Arts and General and Victoria 2,262, and it is predicted by educational authorities that these numbers will double in a relatively few years. Admittedly there are larger Universities in Australia. But the problem before New Zealand is whether one wants to develop as regards University education along the lines of Sydney and Melbourne or along the lines of Universities in Great Britain. The Rt. Hon. Sir Earle Page faced this problem of University development in Australia, when he spoke at a Ceremony at Canberra University College in March, 1950. He said on that occasion that the solution to overcrowding was not to have fewer students but to have more Universities. He was definitely on the side of the merits of the small University.

Last year I was visiting Leicester University College, now a University with about 800 students, and was being taken over their new Union. It was being built for a maximum 1,200 students and it was the wish of the Principal and Council that the University should not exceed 1,000. With these numbers every student is known to some three or four professors and is in reasonably frequent contact with them. With the large Universities, although numbers of staff are expanded at the lower levels, there is never the same opportunity as in the small University for the young student to make contact with the senior University teachers, and so to speak, be infected by the inspiration of his professor. There is reality in this point of view. If you would agree, as some of us think, being biased, that election to a University Chair is a very good assessment of a person's love of a subject and of the inspiration he himself has received from his teachers, and in general from his environment, I can put forward as evidence the quite remarkable and disproportionately high number of Professors of Chemistry including the present Waynflete Professor of Organic Chemistry in the University of Oxford, who received their undergraduate training in a small Chemistry Department of one of the small University Colleges of Wales, and there came closely under the inspiring influence of teachers who were themselves chemists of renown.

Inevitably the cost per student is higher if the Universities are smaller for in each Department a minimum of staff is required for adequate coverage of the subject. In Great Britain today there are 84,000 students and the Government Grant to the Universities excluding capital grants is about £30,000,000. On a per capita basis each student costs the Government £357 for tuition alone apart from bursaries and maintenance grants. In New

Zealand the cost per head obtained by dividing the total Government Grants by the student numbers is about £200. Nevertheless in New Zealand a greater proportion of our population become University students so that the contribution of the public per capita of the population towards higher education is not so different from that in Britain.

Which way the Universities develop in this country depends on Government finance. If it is adequate I have no hesitation in commending the British system of a high standard but small Universities.

When that day arises, I am sure that Massey College with its magnificent site, its residential facilities and its existing dignified buildings will wish to see development to a full University.

### APPENDIX A.

#### RETURNS FROM BRITISH UNIVERSITIES AND UNIVERSITY COLLEGES FOR ACADEMIC YEAR 1954-55 (UNIVERSITY GRANTS COMMITTEE, 1956).

Numbers of full-time students	.....	.....	81,705
"    " part-time students	.....	.....	16,146
Numbers of Full-time Students in Faculties of		Arts and Science	
Birmingham	.....	1,038	657
Bristol	.....	1,117	720
Durham Colleges	.....	771	327
King's College, Newcastle	.....	692	512
Exeter	.....	557	332
Hull	.....	421	306
Leeds	.....	1,284	557
Leicester	.....	413	225
Liverpool	.....	836	693
Manchester	.....	1,579	1,018
Nottingham	.....	948	642
Reading	.....	455	315
Sheffield	.....	590	466
Southampton	.....	538	426
Aberystwyth	.....	629	341
Bangor	.....	419	288
Cardiff	.....	703	421
Swansea	.....	380	273
Aberdeen	.....	713	315
Edinburgh	.....	2,075	610
Glasgow	.....	1,757	773
St. Andrew's	.....	758	432
King's College	.....	737	542
Queen Mary College	.....	366	388
University College	.....	1,151	758

For comparison the numbers in 1956 of full-time and part-time internal Arts and General students (Arts, Dip. of Education, Divinity, Commerce, Law, Music, Science, Intermediate for Medicine, Dentistry and Engineering) are as follows:—

	Auckland	Victoria	Canterbury	Otago
	2,417	2,262	1,734	1,118
Equivalent Full-time Students	1,829	1,694	1,333	972

## SMALL-SCALE QUALITATIVE ANALYSIS FOR ELEMENTARY STUDENTS

BY W. E. DASENT,

*Chemistry Department, Victoria University College.*

Well-justified criticism has been levelled at elementary teaching courses in qualitative analysis or "group separations". The essence of such criticism is often that much of the chemistry involved is of insufficient importance to warrant the time spent on it. Thus while a number of important principles (for example that of solubility product) can be well brought out, many of the detailed reactions are of such restricted application that they are seldom encountered outside of qualitative analysis tables. Furthermore, the net gain to the student's analytical technique is likely to be negligible—a state of affairs which is largely a consequence of the average student's capricious conception of what constitutes "a small quantity". Very commonly, in spite of careful instructing, volumes of reagents soon get out of control, the fume level in the laboratory rises, large proportions of material are surreptitiously committed to the drains, and the familiar manifestations of "bucket chemistry" become woefully apparent. If qualitative analysis is to retain a place in elementary classes, it is desirable that the student should derive some clear benefit from it, and it is suggested that a reduction in the scale on which the operations are carried out has a considerable remedial effect. Since the chemistry involved remains unaltered, it is not claimed that a reduction in scale removes all the difficulties, but it certainly removes many of them.

At Victoria College a course in small-scale qualitative analysis has been carried out with a group of some fifty first-year students. The course follows the orthodox separation schemes for the common cations and anions, except that materials used throughout have been reduced to one-tenth of the usual macro quantities. This means that an ordinary group separation is carried out on 0.5 ml. of solution. The only major change in method is that filtration is replaced by centrifugation. The results have been wholly satisfactory, and indicate that analysis on this scale is quite within the capabilities of the most ordinary student; indeed the advantages are such that no reason can be seen why such a course should not be taken even by senior students in secondary schools. Foremost among the advantages is the fact that the student acquires experience and confidence in dealing with small amounts of material; he realises that clear-cut and unambiguous analytical results can be obtained in this way, and that much of the messiness and unpleasantness associated with substances like hydrogen sulphide can be avoided, without loss of accuracy, simply by using less of them. A valuable addition to the student's manipulative skill is thus

provided. It has also been found that small-scale work is cleaner, and that the majority of students prefer it. The saving in materials is of course considerable, and compensates for the small additional amount of equipment needed. Apart from simple hand centrifuges (cost about £5), of which one is required for every half-dozen or so students, the special pieces of equipment necessary cost only a few shillings. A summary of method and equipment is given below. A low-priced manual on the subject is "Small-Scale Inorganic Qualitative Analysis" by J. T. Stock and P. Heath, published by the University Tutorial Press Ltd., London. It should be easy, however, to modify any one of the usual schemes of separation and redraft it for small-scale work, provided the tests are worked through to ensure suitability.

#### *Summary of Course:*

*Equipment:* Each student is provided with a special set, which occupies little space and is easily and neatly stored (see Figure 4), comprising—

- 6 10 x 75 mm. pyrex test tubes.
- 1 glass stirring rod, about 15 cm. x 3 mm.
- 2 "medicine dropper" pipettes.
- 1 micro beaker, about 10 ml.
- 1 watch glass, about 4 cm.
- 1 test tube stand—simply a block of wood drilled with holes to take the test tubes.
- 1 hydrogen sulphide delivery tube, consisting of 15 cm. of thick walled glass tubing—outside diameter 5 mm., inside 2 mm.—with a short length of rubber tubing fitted around one end, such that a snug fit in a test tube mouth is possible.

Apart from the above items, a spatula, porcelain crucible, a couple of larger beakers, and the usual Bunsen burner, gauze and tripod are required, but since these form part of normal laboratory equipment they are not regarded as "special". The centrifuges used are simple two-bucket single speed affairs capable of about 2,000 revolutions per minute. The rotating head is unprotected and has not proved dangerous.

*General Technique:* Solutions for cation analysis contain between 2 and 5 milligrams of each cation per ml. of solution, and separations are carried out on about 0.5 ml. All reagents are added dropwise. After centrifugation, supernatant liquids can be removed either by decantation or with a dropping pipette; nearly all precipitates pack sufficiently firmly to permit the former.

Direct heating of the small test tubes over a flame is unsatisfactory and usually leads to ejection of the contents. Heating is therefore carried out by immersing the tube in a water bath. (Figure 2). If boiling is required, the material is emptied into a

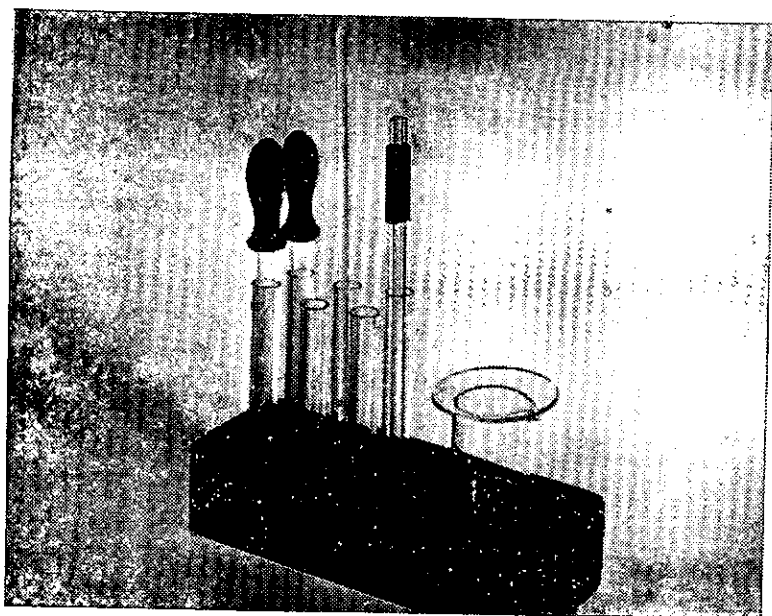
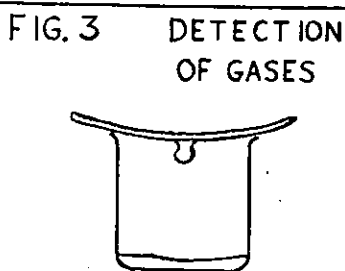
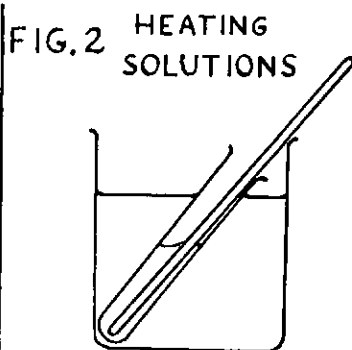
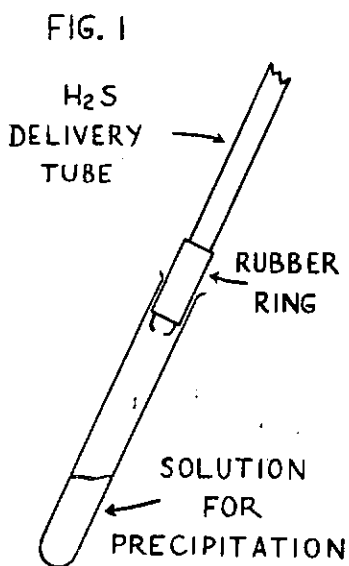


Fig. 4.

porcelain crucible and heated on a gauze over a very small Bunsen flame. Micro burners are a possible refinement here, but quite satisfactory results can be obtained without them.

*Hydrogen Sulphide:* Group 2 sulphides are precipitated with hydrogen sulphide. The pressure of gas required is quite low and several leads can be taken from a single Kipp's generator. The gas is not bubbled through the solution; instead the delivery tube described above is held at first loosely in the test tube mouth to displace air, and then thrust in tightly and the solution agitated in the resulting hydrogen sulphide atmosphere (see Figure 1). Used in this way, hydrogen sulphide is by no means the highly offensive material it is commonly considered to be, but for those with a constitutional aversion to  $H_2S$  generators, thioacetamide ( $CH_3CSNH_2$ ) is a recent and very satisfactory alternative among several available. An 8% solution of this substance, added directly to an equal volume of the solution for precipitation, is stable in the cold but hydrolyses on warming, yielding a solution saturated with hydrogen sulphide. Unfortunately thioacetamide is expensive—100 grams costs several pounds. It is obvious that this cost is prohibitive for large classes using it on a macro scale, but for small-scale work its use is a more reasonable proposition.

*Tests for Anions (Acid Radicles):* The procedure for anion detection follows the usual schemes available, and the only difficulty likely to be encountered is in the identification of small amounts of gases like carbon dioxide from carbonates. One simple method for coping with these is to suspend a drop of reagent solution (e.g. lime water for carbon dioxide) on the under or convex side of a watch glass, which is then placed over a 10 ml. beaker in which the unknown substance is undergoing reaction (see Figure 3).

In conclusion, it should be said that no originality is claimed for the above, all of which is available in standard works on semi-micro methods. Many of these however describe such a multiplicity of techniques and special pieces of equipment that the simplicity and usefulness of small-scale work in teaching is anything but obvious. The above outline is deliberately sketchy—it is no more than a brief description of one course which has been found to work well in practice, but naturally all sorts of modifications and refinements are possible. The extension of small-scale methods to phases of practical courses other than qualitative analysis is of course possible. Elementary organic chemistry, where reagent costs are relatively high, would appear to be particularly amenable to small-scale treatment. Indeed, it seems that the 20 ml. test tube might well be deposed from its traditional place of honour in the elementary laboratory, in favour of something a little smaller. And if control and economy of materials, and ease and cleanliness of manipulation count for anything, such a change would have a good deal to commend it.

**THE PERFORMANCE OF UNIVERSITY STUDENTS**

*A Survey of the Records of Students who commenced studying first-year Chemistry during the years 1951 and 1952.*

BY H. S. MASLEN,

*Chemistry Department, Auckland University College.*

The University frequently faces criticism from various sources on the grounds that it rejects as failures a large proportion, if not the bulk, of those who enrol as undergraduate students. Such criticism has recently been levelled at first-year Chemistry classes in particular. Almost invariably this criticism is based on the annual examination statistics and assumes that the class performance in any one subject furnishes a reliable guide to any particular student's prospects of success in that subject. This is not necessarily the case and this survey was undertaken on the basis of individual performance rather than the average class performance in the hope that it would throw a little more light on the problem of failures in Chemistry I and also enable a better assessment of the University's standard in first-year Chemistry to be made.

The years 1951 and 1952 have been chosen for this survey because all students in the group have now completed their sojourn in Chemistry I, having either obtained a pass or dropped the subject. The group has been further divided into two sections:—

- A. Those who entered the Chemistry Department straight from school.
- B. Those who did not enter the Department straight from school.

Categories A and B are susceptible to further division as follows:—

- A. (i) Those who studied chemistry to a higher level than U.E. at school.
- (ii) Those who studied chemistry to only U.E. level at school.
- (iii) Those who studied chemistry to a lower level than U.E. at school.
- B. (i) Those who enrolled in the University straight from school but did not take Chemistry I in their first year.
- (ii) Those who had engaged in some outside occupation for one or more years before enrolling in the University.

Each student has, in the case where he enrolled more than once in the Department, been followed throughout his career in Chemistry I and the results obtained listed under first, second, and so on, attempt.

The results obtained by these students have been tabulated within the above categories under the headings:—

Pass; Fail; Withdrew; Fail terms; Did not sit the final examination but had obtained terms; Obtained an aegrotat pass; Passed in the February "special" examinations.

As a matter of interest the statistics in Group A have been broken down into students from Auckland schools (i.e. Auckland city and suburban schools, including Howick and Otahuhu) and students from Provincial schools. It should be borne in mind that in Chemistry I terms are awarded mainly on attendance, so the two categories "Withdrew" and "Fail terms" are probably synonymous, the latter students having merely failed to notify the College office.

#### *The Pass/Failure Rate.*

The interpretation of these sets of results (or of others) leading to a pass/failure rate must be done with care, particularly, as the current bogey—wastage—implies consideration of the failure rate. The failure rate is not always simply 100 minus percentage passes.

The College normally supplies annual statistics under the headings:—

(a) Total enrolments; (b) Withdrawals; (c) Obtained terms; (d) Sat finals; (e) Gained passes.

Accordingly the pass rate may be expressed in one of four ways:—

- (a) As a percentage of total enrolments.
- (b) As a percentage of (total enrolments minus withdrawals); i.e. as a percentage of those who presumably attended the complete course.
- (c) As a percentage of those who obtained terms.
- (d) As a percentage of candidates who sat the degree examination in Chemistry I.

All these methods are open to certain minor and at least one major objection.

Method (a) leads to a low pass rate as it includes students who may of their own volition drop the subject at perhaps the end of the first term, also students who have no intention of sitting finals, etc. Such students can hardly be termed failures.

Method (b) involves the assumption that all those who give up the course at any stage in the year officially withdraw at the College office. This is not so, and consequently this method presents a false picture which again depresses the pass rate.

Methods (c) and (d) commonly furnish a false result which, if anything, flatters the University compared with (a) and (b). The results depend largely on the method whereby terms are

awarded and this generally differs from one department to another. If any selection based on results of tests, etc., during the year is made, some who fail terms should undoubtedly be classed as failures and should consequently appear in "failure" statistics. Any one of these methods may serve as an indication of the performance of one year's class compared with that of other years within the same department. They would seem to be of little use, however, when comparing one department with another, or when discussing the success or failure of students coming to the College.

As mentioned earlier all these methods are open to objection on one major ground. This is, briefly, that while the number of enrolments made, or terms awarded, can be, and generally is, greater than the actual number of individuals who attend any stage of a subject, the number of passes obtained cannot exceed the number of individuals since any one student may make a number of enrolments in successive years but passes once only. The annual figures mentioned earlier are always made up of students making their first attempt together with those making their second, third or even later attempt. The impact of this on the percentage pass rate is not always obvious in annual figures, but it becomes apparent if figures are quoted for, say, a four-year period. To take a hypothetical example: let 300 students enter a department for the first time in any year, all obtain terms, sit the degree examinations and 180 obtain a pass. The remaining 120 return for a second attempt and of these 95 pass, the 25 failures proceeding to a third attempt. Of these 20 pass and the remaining 5 make a fourth attempt and all pass. Clearly, since all have passed, the group has been 100% successful. However, a total of 450 enrolments ( $300 + 120 + 25 + 5$ ) have been made and the pass rate, as a percentage of enrolments is only 67. If in the example some had been allowed to fail terms the pass as a percentage of terms holders would have been greater than 67, but still less than 100. In this example the number of passes is perhaps unrealistic, but the ratio of first to second, etc., attempts is based on actual ratios. It is apparent then that the University is belittling its own efforts and results when it computes pass or fail statistics by any of these methods as a pass rate of 67% implies that 33% of those who attempted the course found it too difficult, when actually none did so.

It would appear then that some method, other than those already mentioned, of striking the pass rate is desirable. As one man can obtain only one pass, the pass rate should be struck on the basis of entrants. Not all those who enrol in a Stage I class make a serious attempt to obtain a pass in that unit and consequently are not failures. These people should be subtracted from the total entrants to leave the number of bona fide entrants. To take a specific example, in Table I, category Ai, there are 209 original

entrants and of these 26 either withdrew, failed terms or did not sit the degree examinations in their first year. Twelve of these 26 students did not continue in a subsequent year and hence the number of bona fide entrants has been taken as 197 (209 - 12). This number of bona fide entrants is a satisfactory base number for the calculation of the pass rate.

Students who are not successful at their first attempt may proceed to a second, third, or even fourth attempt. This is shown in Table I where the number making various attempts is shown

TABLE I:

	Total	Pass	Fail	Withdrew	Fail terms	Did not sit	Aegrotat passes	Passes in specials	Bona fide entrants
Ai									
After first year .....	209	98 (+3)	85 (-3)	9	6	11	—	3	197
After second year .....	83	52	28	2	—	—	—	—	—
After third year .....	15	9 (+1)	4 (-1)	1	—	—	—	—	1
After fourth year .....	2	2	—	—	—	—	—	—	—
Aii									
After first year .....	53	9	24	4	4	12	—	—	43
After second year .....	25	11	13	1	—	—	—	—	—
After third year .....	3	2	1	—	—	—	—	—	—
Aiii									
After first year .....	15	0	6	1	4	4	—	—	9
After second year .....	9	3	4	—	1	1	—	—	—
Bi									
After first year .....	23	8	10	1	3	1	—	—	18
After second year .....	8	5	1	1	1	—	—	—	—
Bii									
After first year .....	6	0	5	—	—	1	—	—	6
After second year .....	5	5	—	—	—	—	—	—	—

Note: The category "Passes in Specials" refers to Intermediate students who failed the November degree examinations and passed in the special examinations in the following February. They appear in the Pass/Fail entries of the table as adjustments in parenthesis. For the purposes of calculating the percentage success these passes have been considered to be passes in the November degree examination.

together with the results obtained at that attempt. It is apparent from Table I that the total number of passes obtained by the group is mounting year by year. The cumulative success of this group of students at various times after the first enrolment is shown in Table II. As mentioned earlier, all the students in this group have ceased attendance at Chemistry I so this is a "closed" table.

The question of when to strike a pass rate now rises. In view of the substantial improvement shown after the first year it would seem hardly sensible to take the first year figures. The logical time might be when the table is "closed", i.e. when all a particular year's intake have ceased to attend classes. This may, however, unduly prolong the calculation as at least one student has been known to attempt a first year unit (not Chemistry I) for seven

TABLE II.  
Cumulative success for entrants to Chemistry I  
1951 and 1952.

Category	Percentage success after			
	1 year	2 years	3 years	4 years
Ai Auckland schools	55	77	83	84
Provincial schools	40	79	83	
Total	51	78	83	84
Aii Auckland schools	22	47	54	
Provincial schools	20	47		
Total	21	46	51	
Aiii	0	33		
Bi	44	72		
Bii	0	83		
Total A	44	71	75	76
Total B	33	75		
Total A + B	43	71	75	76

Note: The Provincial schools contributed 27% of Ai and 34% of Aii. The intake from these schools for the other categories was negligible.

successive years. On the other hand it may perhaps be argued in favour of first attempt figures that a student who fails a unit at his first attempt is not a worthy student in the University and his continued presence should not be encouraged. In an attempt to resolve this question the College records of each student in 1951-52 Chemistry I group were scrutinised. On the basis of his overall record each student was classified as "Satisfactory", "Fair" or "Poor". The requirements for this classification were:—

*Satisfactory:* (i) Intermediate students who had completed their Intermediate within two years.

(ii) B.Sc. students who had at any time in their career passed two advanced units (i.e. Stage II or III) in the same year.

*Fair:* (i) Intermediate students who had completed the Intermediate within three years. (There were 7 of these students and data on post-Intermediate results was available for only two of these. They were both engineering students and they completed the first professional examination in their first year at the Engineering School at Ardmore. In view of this success such students can hardly be described as "Poor").

(ii) B.Sc. students to whom the satisfactory test above cannot apply, as a combination of two advanced units in one year has not been attempted, but who have obtained at least 5 units towards a B.Sc. within four years. It can be argued that failure to attempt such a combination of units is a sign of a poor student but one such student in this group has graduated already and since he has been presented "as a fit and proper person, etc." he can hardly be described as "poor". Also from data tabulated in D.S.I.R. Bulletin No. 113 ("The academic record of science students in the University of New Zealand") it would appear that any student who obtains five units is almost certain to graduate eventually.

*Poor:* All those students who could not satisfy the foregoing requirements.

*Note:* (i) B.A. etc., students taking Chemistry I have been assessed to a similar standard to B.Sc. students.

(ii) Where a student has been transferred from one degree course to another he has been judged on his performance for the degree for which he was reading when he enrolled in Chemistry I. Certain students warrant a different rating in their subsequent courses. This has been remarked on at the appropriate point.

The results of this investigation are summarised in Table III. It is apparent that, while a reasonably large proportion of those who will eventually graduate had failed in this subject at the end of the first year, virtually all of these had passed by the end of two years. It is suggested, therefore, that the pass rate for entrants in any particular year should be determined at the end of the succeeding year and that it should be determined on the basis of the number of passes in the two years divided by the total of bona fide entrants and multiplied by one hundred to bring this to a percentage. A comparison of the pass rate for the pair of years 1951 and 1952 calculated in the various methods mentioned shows the dependence of the result on the method of calculation. The percentage of passes to enrolments is 41.5, of passes to enrolments minus withdrawals is 43.5, of passes to those who gained terms is 47.2 and of passes to those who sat the degree examinations is 51.2. The success of entrants within two years is 71 per cent.

This summary deals with students studying Chemistry I, but this subject is not alone in having an apparently low annual pass rate. The ratio of passes to enrolments for most Stage I classes of 20 or more students has been calculated for 1951 and 1952, the pass rate is less than 50% for about a third of the subjects. It may well be that a similar investigation of these subjects would furnish success figures comparable to those obtained for Chemistry I. If this is so it could be a matter of some importance to the

TABLE IIIa.

Distribution of the three types of student between the various categories.

	Satisfactory	Fair	Poor
Ai	121	27	49
Aii	13	6	24
Aiii	3	0	6
Bi	10	4	4
Bii	5	0	1

TABLE IIIb.

Passes in Chemistry I at the first, second or later attempt grouped according to the type of student.

	1st attempt passes				2nd attempt passes				3rd attempt passes			
	Satis.	Fair	Poor	Total	Satis.	Fair	Poor	Total	Satis.	Fair	Poor	Total
Ai	87	8	6	101	33	10	9	52	1	8	3	12
Aii	7	2	0	9	6	2	3	11	0	1	1	2
Aiii	0	0	0	0	3	0	0	3				
Bi	7	1	0	8	3	2	0	5				
Bii	0	0	0	0	5	0	0	5				
Total	101	11	6	118	50	14	12	76	1	9	4	14

TABLE IIIc.

Cumulative success of various types of students.

Type of student	Percentage success after		
	1 year	2 years	3 or more years
Satisfactory	66	99.4	100
Fair	30	68	92
Satisfactory + Fair	59	93	98.4
Poor	7	21	26

University as there is at the moment a widely held belief that the University is failing the greater proportion of its entrants. This leads to the often strongly expressed opinion that the University is failing in its duty to the nation to supply an adequate flow of graduates for the teaching and other professions. If such views are incorrect they should not be allowed to persist.

### Some Observations on Tables I and II.

(a) The largest group of entrants is composed of students straight from school who have studied chemistry there to a higher standard than University Entrance. These students account for 72% of the bona fide entrants.

(b) Students who have studied chemistry to only University Entrance standard comprise the next largest group (16% of bona fide entrants). From other data it would appear that the bulk of these students have studied other subjects to a higher level than

University Entrance at school, and that chemistry has been dropped at that level or possibly included late in a course and carried consequently to a low level.

(c) It is apparent then that little information can be gained about the standard at University Entrance from the performance of first-year students. If any information can be gleaned about school standards (and this is debatable) it is about post-University Entrance standards in Chemistry.

(d) The best group at the end of the first year is the group with the highest chemistry preparation at school (Ai). This is probably not surprising. It is generally believed that students from the larger secondary schools in the University centres have a better record at the University than those from provincial schools. This may be so at the end of the first year but it is certainly not so by the end of the second year. The disparity between the city and provincial groups at the end of the first year could well be due to factors other than the particular secondary school attended. For example, all those from provincial schools are of necessity living away from home and the bulk of those from city schools are not.

(e) Overall it would seem reasonable to observe that if a different and presumably more efficient, screening of entrants to the College from the present University Entrance requirements could be operated it would bring about little change in the performance of students in first-year classes. The problem would rather seem to be that of achieving the success now attained at the end of the second year by the end of the first year. This is a domestic problem which must be faced in the first-year classes.

### **The Predictability of Students' Performances.**

It has been stated that it may be necessary for the University at some future date to operate some sort of selection for admission to its classes. Various ways of accomplishing this selection have been suggested but as the necessity has not yet arisen they remain untried. However, any such system, purporting as it does to separate the satisfactory student from the unsatisfactory, i.e., potential graduates from others, is based on the assumption that students are consistently good or consistently bad in their work or progress. Such an assumption can be investigated and to this end the subsequent records of those in the 1951-52 Chemistry I group who failed in the degree examination for Chemistry I have been analysed. In interpreting these results the significance of the fail grades "D" and "E" must be born in mind. Two methods of awarding these grades are current.

- (i) Based solely on the marks obtained in the degree exam. D is given to results from 40%—49%, and E is given to results below 40%.
- (ii) Based on the future prospects of the candidate. The grades are awarded without consideration of the mark obtained in the examination, "D" being given to those who, in the opinion of the examiner, are probably capable of passing the subject at a future attempt and "E" to those who are not.

In this department a combination of the two systems has generally been used, it is generally found impossible in practice to separate the second from the first, but most emphasis has been placed on the second method. In awarding these grades in Chemistry I the year's work,—practical work, etc.,—has also been taken into account and it can be claimed that in grading candidates "D" or "E" a sincere attempt has been made to indicate their future prospects. Thus if the students are consistent in their work, attitude and understanding from one year to the next, then the grades awarded will have some significance. The rather surprising result emerges from this analysis that thirty-seven of the sixty who failed and were graded D at their first attempt obtained a pass at the second attempt; the passes comprising eight A, fourteen B and fifteen C grades. Also twenty-seven of the seventy who failed, and were graded E passed at the second attempt, one gaining an A pass, thirteen a B pass and twelve a C pass. It is apparent that the differentiation between "D" and "E" has little significance. In fact, of those who passed at the second attempt, after failing "E" at the first attempt, more obtained "B" than "C"—they did rather more than just scrape through.

The number of passes obtained in their first year at the College by the students in the 1951-52 Chemistry I group who have eventually proved themselves satisfactory students is shown in Table IV. While it is gratifying to find that the largest group is that passing 3 + units (Medical, etc., Intermediate or four units) a large proportion has passed only one or no units.

In Bulletin No. 113 of the New Zealand Department of Scientific and Industrial Research (The Academic Record of Science Students in the University of New Zealand—I. D. Dick, R. M. Williams and Dermot Straker) a selection of the marks obtained by candidates in the New Zealand University Entrance Examination by male students from 1942-45 has been compared with the subsequent record of these people in the science faculty. The Entrance marks selected are the total marks obtained in English and Mathematics (compulsory subjects), the best language and the best science subject at the first attempt. They show that one person with a total Entrance mark between 60 and 79 obtained a B.Sc. and that two with marks between 110 and 119 gained an

M.Sc., one with second class honours in Chemistry. They draw the conclusion that: "No realistic 'pass' level for admission to the science faculty could be suggested that would not have eliminated a number of potential graduates."

On the basis of the results shown in Table IV, it would seem that it is also impossible to operate any realistic selection after a student has spent one year at the University.

These conclusions may be unpalatable to those who believe that the number of students at the University must be limited or reduced in some fashion, but they may be of some use to those who seek to enlarge the facilities of the various Colleges to deal with expanding numbers.

TABLE IV.

*Performance of "satisfactory" students in their first year at the College.*

Number of students passing various numbers of units.						
Number of units passed:	0	1	2	3	3+	Total
Ai	8	20	15	15	63	121
Aii	2	1	7		3	13
Aiii	0	3				3
Bi	0	6	2	2		10
Bii	3	2				5
Total	13	32	24	17	66	152
%	8½	21	16½	11	43	

#### *The Pass Standard for Chemistry I.*

This survey provides an excellent opportunity to have a look at the pass standard for Chemistry I.

In 1951 and 1952, there was a total of 306 entrants. Thirty-three of these did not complete one year's work in the subject, 208 obtained a pass and 65 did not.

#### *The Passes:*

The 208 passes were made up as follows:—152 by students rated satisfactory, 34 by those rated fair, 22 by students whose overall record can only be described as poor.

#### *The Failures:*

The 65 failures comprised three students who were rated fair and 62 rated poor. Two of the "fair" students were reading for a B.A. degree and Chemistry I was the only science unit they attempted. Their rating of "fair" was determined by their performance in arts subjects. The third was a woman who made two desultory attempts at Chemistry I, the first as a science student and the second as an arts student. Although she made fair progress towards obtaining a Bachelor's Degree, she has now apparently abandoned her courses. Of the 62 poor students, 50 have

ceased attendance at the University, six have transferred to other Colleges, one is still taking courses in science and five have transferred to other faculties—3 to Accountancy, 1 to Arts and 1 to Commerce. Of the five transfers the Arts and one of the Accountancy students can be described as satisfactory in those faculties. Of the remaining Accountancy students one is fair and the other poor. The man taking Commerce has not done so for long enough for an assessment of his worth to be made.

It can then be said that the standard for Chemistry I is satisfactory as all those who appear to be capable of obtaining a degree in science or one of the allied faculties (Medicine, Engineering, etc.) and about a quarter of the remainder who are probably incapable of obtaining a degree have passed.

#### *SUMMARY.*

The Chemistry I and overall College records of the students entering Chemistry I in 1951 and 1952 have been examined. As a result a case has been made for determining the pass rate on the basis of 'number of passes divided by the number of bona fide entrants per cent'. This pass rate should be struck at the end of two years, i.e., at the end of 1953 for 1952 entrants. On this basis the Chemistry I pass rate for the entrants in 1951 and 1952 is 71%.

An attempt has been made to determine the predictability of a student's work at the College. The only conclusion which can apparently be drawn from these records is that students are consistently inconsistent. It has been shown to be impossible to separate all potential graduates from the rest of the students at the end of the first year's work at the College.

The performance in all other subjects attempted by Chemistry I students in this group has been investigated in an attempt to determine whether or not the Chemistry I standard is too high or too low. It would appear to be eminently satisfactory, if anything, a little low, as a reasonable number of "poor" students have obtained passes.

It would appear from the results of this survey that the problem which does exist is not how to select better students or how to lower standards but how to encourage and assist students to obtain a pass at the first attempt rather than at a later attempt. This problem would appear to be capable of solution and in fact has been solved to a certain extent since this survey was made.

## NEWS AND NOTES.

### AUCKLAND BRANCH.

The Australian Pulp and Paper Industries Technical Association held its Annual Conference at Rotorua from 29th March to 5th April. About 200 delegates attended, including a number of Australian visitors and members of the Auckland Branch associated with the pulp and paper industry.

The Branch, and the Institute as a whole, offers its congratulations to Dr. L. H. Briggs on his recent appointment to the Chair of Chemistry, at Auckland University College. Professor Briggs' work is extremely well-known and his appointment will be welcomed by Chemists in New Zealand and overseas.

The Chemistry Department at Auckland University College is the biggest in the country and the Senate recently approved a second Chair of Chemistry at Auckland. Dr. D. R. Llewellyn, a brother of Dr. F. J. Llewellyn, former Professor of Chemistry at Auckland and now Rector of Canterbury University College, has been appointed to this Chair.



PROFESSOR L. H. BRIGGS

The Auckland Branch records with regret the passing of one of its foundation members, the late Mr. C. P. Worley.

### WAIKATO BRANCH.

Dr. D. D. Perrin has resigned from Ruakura and is taking up a Research Fellowship at the John Curtin School of Medical Research at the Australian National University, Canberra. His departure will be felt particularly at Ruakura, as we lose also his wife, Mrs. D. R. Perrin, who has made a considerable contribution to milk chemistry.

Mr. K. J. McNaught is leaving in May for a tour overseas. He is to be away about six months, and is to visit Agricultural and Horticultural Research Stations in Britain, the Netherlands, and the U.S.A. His main interest will be in plant and soil analysis for crops.

### MANAWATU BRANCH.

Dr. C. R. Barnicoat, Vice-President of the Institute, has returned recently from refresher leave. After attending the International Dairy Congress in Rome last September, Dr. Barnicoat worked at London Hospital Medical College on histochemical problems relating to the detection of alkaline phosphatases.

## WELLINGTON BRANCH.

At the April meeting of the Wellington Branch, the subject, "The Determination of Alcohol and the Interpretation of the Results in Connection with Driving Offences", was discussed by a panel of four speakers: L. H. Davis, Dominion Laboratory; Dr. W. H. B. Bull, Director of Police Medical Services; A. E. Forsyth, Assistant Commissioner of Transport and a member of the legal profession. Marked interest was shown at the meeting, and also following the meeting, judging by the series of articles and statements in the local press. It was of interest to note that all speakers other than Mr. Davis condemned the use of alcohol determinations in blood or urine in connection with driving offences.

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**EQUIPMENT PAGE**

*PAPER CHROMATOGRAPHY—(Contributed by Dr. R. W. Bailey,  
Plant Chemistry Laboratory, Palmerston North.)*

The following notes are based on several years' experience in using this technique in work with sugars and related compounds.

*Tanks:* Moulded glass tanks which can be easily cleaned and used for different solvents are well worth the initial expense. Such tanks, which will take papers up to 20 inches square, are available from the Shandon Scientific Company. These tanks are excellent, although a trifle cramped when filled to rated capacity.

*Spraying:* The Edwards rotary compressor has been found ideal for working most glass sprays. Provided the substances being separated are insoluble in the spraying solution dipping the paper is a better and cleaner technique.

*Driers:* A common means of drying spots on paper is to use a hand electric hair dryer. The type in which air is drawn in from the rear (e.g., General Electric model) is preferable to the side intake type. This is possibly due to better cooling of the motor and bearings. If the drier has been used continuously for some time it should be put down carefully; a sudden knock can easily break the hot heating element.

*Paper:* For very clear resolution it is well worth while to wash the paper with dilute hydrochloric and dilute ammonia. This is particularly so when resolving sugar phosphates. Fibre glass paper is worth investigation, particularly in paper ionophoresis. It can be used repeatedly and permits the use of sprays containing strong sulphuric acid.

*Capillaries:* Using heavy walled pyrex tubing (about 20 mm. dia.) and an oxygen flame, two people can easily draw 10-20 ft. lengths of suitable capillary tubing. In this way a large supply of capillaries for qualitative work can be readily obtained.

*Paper Ionophoresis:* Although commercial instruments are now available for this technique a satisfactory one can be built using the directions of Foster (Chem. & Ind. 1952, 1050, & J. Appl. Chem. 1953, 3, 19). This particular design is excellent for resolving sugars and oligo- and polysaccharides.

*Dosimeters:* Although the quantities of radiation to which research workers are likely to be exposed when using radioisotopes in tracer applications are normally well within safety limits, it may be advisable for some laboratories to invest in dosimeters. The "Stephen" Quartz Fibre Dosimeter seems to be a very well-built model and the 0.2 roentgen range would be the most suitable in tracer work. These dosimeters are worn in the pocket and retain their charge despite mechanical shocks.

*Remote Control Pipettes:* The dispensing of radioactive solutions should be done using a remote control pipette, particularly when working with gamma-emitters. Physicists at the Dominion X-Ray and Radium Laboratory, Christchurch, have recently built a very satisfactory type, and details are available on request.



Mr. E. W. HULLETT,  
Conference Chairman.



Mr. A. FISCHER,  
Conference Secretary.

**CONFERENCE, 1957  
N.Z.I.C. AND R.I.C.**

**Christchurch, August 27th - 30th.**

*Programme:* Papers offered cover a wide range of topics to interest all members. A highlight of the programme will be the symposium on "Repercussions in Chemistry of Advances in Other Sciences."

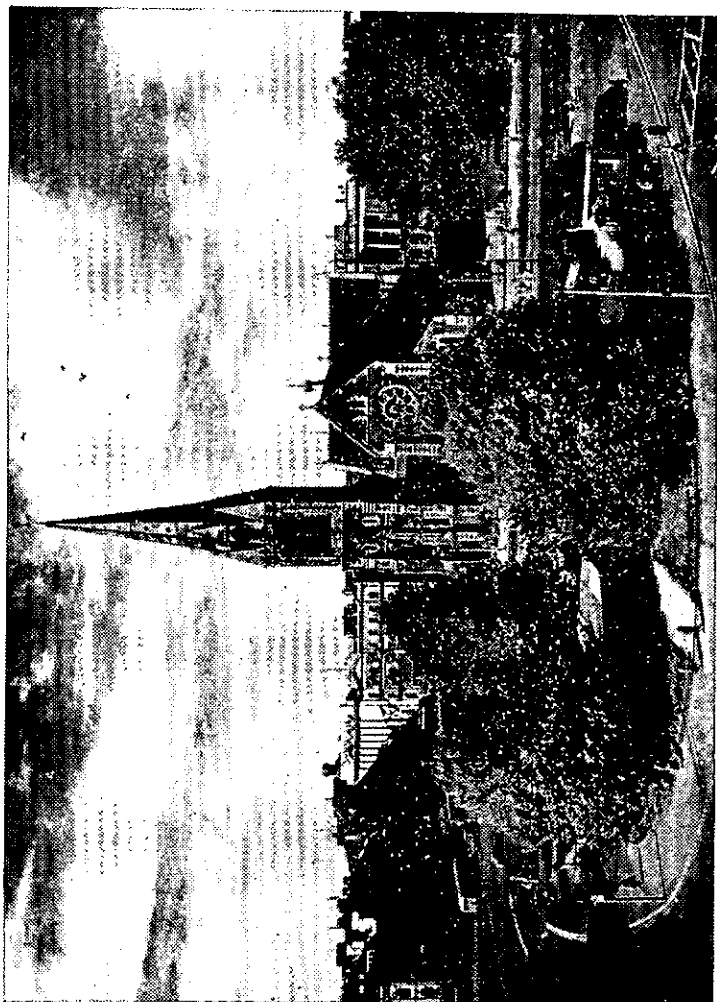
*Excursions:* In place of the usual variety of excursions to local factories, plans are in hand this year to take the entire Conference to Lincoln to observe the work of the Canterbury Agricultural College and the D.S.I.R.'s Crop Research Division.

*Wives:* Wives will be welcome at Conference and arrangements are well in hand for their entertainment.

*Social Evening:* It is the aim of the Committee to make this entertainment so novel, interesting and enjoyable as to appeal to the tastes of all Conference members and their friends.

*Guest Lecturer:* At the time of going to press there are good prospects that Professor T. A. Geissman of the University of California, Los Angeles, will attend the Conference and deliver the guest lecture. He is visiting Australia under Fulbright auspices and is interested in the chemistry of natural products, particularly plant pigments and alkaloids.

*See you at Christchurch in August!*



*A scene that will be familiar to members attending Conference — a recent view of Cathedral Square, CHRISTCHURCH.*

(Has Christchurch no parking problem!—Ed.)

## NEW REGISTRAR.

Members are advised that the new Registrar may be contacted as follows:—

L. J. Rollo: Postal address, P.O. Box 250, Wellington. Office: Room 24, 2nd Floor, Ascot Chambers, 81 Ghuznee Street, Wellington. Telephone: 51-416.

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### ABRIDGED MINUTES OF A MEETING OF COUNCIL-IN-PERSON OF THE NEW ZEALAND INSTITUTE OF CHEMISTRY (INC.), HELD IN THE CONFERENCE ROOM, D.S.I.R., WELLINGTON, ON THURSDAY, 7th MARCH, 1957, AT 10 A.M.

#### *PRESENT:*

W. A. Joiner, President (in the Chair), W. E. Russell (Auckland), Dr. E. B. Davies (Waikato), Dr. W. A. McGillivray (Manawatu), A. P. Oliver (Wellington), Dr. R. M. Allison (Canterbury), A. J. Ellis (Otago) and Dr. W. E. Harvey (Hon. General Secretary). The Registrar (L. J. Rollo) was present for part of the meeting. An apology was received from the Vice-President (Prof. C. R. Barnicoat) who is at present overseas.

#### *CONFERENCE, 1957:*

Dr. Allison presented a review of the Conference Committee's progress to date. The Conference will be held from Tuesday, 27th August until Friday, 30th August and a notice to this effect has already appeared in the *Journal*. The first notice, calling for titles of papers has been sent out to members, and the second notice which will list titles of papers to be presented will be distributed in mid-May. The Conference booklet will be published about 10th August.

The Conference Committee sought Council's opinion on the tentative timetable presented, but after discussion it was agreed that, as at this stage it was not possible to finalise the timetable, the matter should be left to the Conference Committee.

*Regional Specialisation.* Most Branches are not in favour of the adoption of any hard and fast policy regarding regional specialisation at Conference and it was pointed out that there are several weighty arguments against the idea, and also that there is a natural tendency for some specialisation in any case. *Resolved:* THAT the matter be left to the discretion of the Branch concerned.

#### *EXAMINATION COMMITTEE:*

*Use of Slide Rules.* The Examination Committee asked Council to consider banning the use of slide rules in Calculations, Theoretical Chemistry and Practical Chemistry. The examiners had reported that many otherwise good results had been spoilt by the incorrect use of slide rules.

After discussion it was agreed that the fact that some candidates could not use a slide rule correctly did not justify banning slide rules and thereby penalising those candidates who could use them. Candidates could perhaps be warned of the dangers of a little knowledge of slide rules.

*Award of L.A.C.* The following have fulfilled the requirements for the L.A.C. and were awarded the certificate on the recommendation of the Examination Committee.

BREEN, John Newman, Dairy Laboratory, Wallaceville.

EDWARDS, Stuart, Soil Bureau, Wellington.

PEARSON, Ellen Shirley, McLeod Bros., Dunedin.

SPENCER, Anne Marsden, Forest Research Institute, Whakarewarewa.

THOMPSON, Millicent Kirkpatrick, Auckland City Council Laboratories.

VOWLESS, Anne Laura, Forest Research Institute, Whakarewarewa.

#### *JOURNAL:*

Dr. McGillivray read a report from the Business Manager detailing expected income from advertising in the coming year. It is very difficult to attract new advertisers and it appears that only a concerted drive will improve the advertising revenue significantly. The Editor reported that he was considering the possibility of producing, once a year, a larger issue of the Journal of more general interest to industry in particular, possibly containing articles on developments in chemistry, a survey of work being done in New Zealand, lists of agents, etc. Such an issue should attract a good number of advertisers.

It was agreed to print 100 extra copies of Dr. Burns' Presidential Address.

#### *UNION MEMBERSHIP:*

Dr. McGillivray stated that a number of members of the Institute had been approached by Union representatives with requests that they join a trade union. It appeared that chemists in dairy factories were the ones chiefly concerned. *Resolved:* THAT the Hon. General Secretary contact the Department of Labour and attempt to get the position clarified.

#### *SALARIES COMMITTEE:*

It was agreed to defer the appointment of a new Salary Committee.

#### *PRIZES:*

*Resolved:* THAT the I.C.I. Prize, and the Morcom Green, Edward's Prize be offered for competition this year, and that the Chemical Essay Competition be held, the value of this prize to be £25.

#### *REGISTRAR:*

The Hon. General Secretary reported on talks he had had with Mr. Rollo who had only recently been able to take over the duties of Registrar. Many Branches expressed extreme dissatisfaction at the way routine matters had been neglected in the past, stressing in particular the fact that letters appeared to go unanswered or alternatively were answered only after an unreasonably long delay. The Secretary reported that he was at the moment investigating several complaints of this kind.

It was agreed that a statement should be drawn up clearly indicating the duties and responsibilities of the Registrar. It was further agreed that the Registrar should be present at all meetings of Council if required.

#### *ROYAL CHARTER:*

The Manawatu Branch hope to have a full report ready for presentation to the next meeting of Council. However, in order to avoid unnecessary delay the Manawatu delegate reported that:

- (1) It was generally agreed that the Royal Charter would enhance the prestige of the Institute.

- (2) The cost would apparently not be as high as previously thought.
- (3) Council should approach the Prime Minister's Department regarding procedure.
- (4) Council should advise the R.I.C. that it is considering applying for a Royal Charter and ask for R.I.C. support for the application.

*A.N.Z.A.A.S.:*

The President reported briefly on the A.N.Z.A.A.S. Council meeting in Dunedin.

The Otago delegate asked other delegates to convey to their Branches the thanks of the Otago Branch for donations made to assist in defraying the cost of entertaining chemists. The dinner arranged had been a most successful function attended by about 150 chemists and wives.

*BALANCE SHEET:*

The Hon. General Secretary reported that he had been informed that the auditors had not yet finished auditing the Balance Sheet.

*Trust Funds. Resolved:* THAT the sum of £75 be transferred to the Trust Account and the sum of £25 be transferred to the Overseas Visitors Fund.

*MEMBERSHIP:*

*Application for Leave:* N. H. Law, Wellington.—Noted.

*Resignation:* The following resignation was accepted with regret:—G. H. McLellan.

*W. G. Hughson:* It was agreed that it would be appropriate to make a presentation to W. G. Hughson in recognition of his services to the Institute. Council was of the opinion that a general appeal for contributions from Branches and individual members should be launched and arrangements made for the presentation to take place at the next Annual General Meeting.

*RULES:*

Dr. Fastier and Mr. Clare submitted interim reports on suggested modifications to the procedure for the election of Officers of the Institute. It is hoped that a full report will be available for the next Council meeting.

*Next Meeting:* Tentatively—Friday, 10th May.

W. E. HARVEY,

Hon. General Secretary.

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*LIST OF PAPERS READ BEFORE BRANCHES — 1955-56.*

*AUCKLAND:*

- Fats used in Cooking—S. G. Brooker.
- Antibiotics and Food Preservation—Dr. F. E. Deathrage.
- Sulphur in Agriculture—Dr. B. W. Doak.
- Assay of Sex Hormones—Dr. J. B. Brown.
- Corrosion and Metal Fatigue—Flt./Sgt. G. Kells.
- Some Aspects of Our Sewage Problems—R. Hicks.
- Do Scientists Make Good Managers?—D. D. McClure.
- Some Modern Trends in Chemistry—Dr. M. M. Davies.

**WAIKATO:**

- Muscular Contraction—Dr. R. P. Newbold.  
 Current Research at Birmingham University—Dr. R. W. Bailey.  
 Sulphur in Agriculture—Dr. B. W. Doak.  
 Toxic Principles of Plants—E. P. White.  
 The City of Bombay Milk Supply—Dr. W. G. Whittlestone.  
 The Colorimetric Estimation of Mo, W & V in Plants and Soil—  
 J. Watkinson.  
 Silage Chemistry—R. J. Lancaster.  
 Maintaining a Chemical Balance in a Sulphate Pulp Mill—  
 Dr. L. G. Neubauer.

**MANAWATU:**

- Liquid-Vapour Equilibria in the Purification of Cream—  
 Dr. F. H. McDowell.  
 Recent Advances in Endocrinology with Special Reference to the  
 Estimation of Oestrogens—Dr. J. Brown.  
 Recent Advances in Science in America and Britain—Dr. A. T. Johns.  
 Organic Matter Complexes in the Soil—Dr. R. H. Jackman.  
 Some Physical and Chemical Effects of the Homogenisation of Milk—  
 Prof. W. L. Dunkley.  
 The Properties and Uses of Ionising Radiations—G. McNaughton.

**WELLINGTON:**

- The Soil Bureau over the past 25 Years—Dr. J. K. Dixon.  
 The Design of Solar Salt Works—S. R. Siemon.  
 The Browning Reaction in Food—Dr. E. L. Richards.  
 Research Organisation—Dr. W. M. Hamilton.  
 MELLOR LECTURE—A Chemist Looks at Geology—Dr. W. S. Fyfe.  
 SYMPOSIUM on Analytical Techniques—Approach to a Problem and  
 Applications of Radio-Isotopes—T. A. Rafter.  
 E.D.T.A. Titrations and Masking Flame Photometry—J. A. Ritchie.  
 Applications of Infa-red Spectra—Dr. B. Cleverley.  
 Chemical Riddles in Media-Making—Dr. G. M. Richardson.  
 CURRENT RESEARCH at Victoria University College—  
 Picrotoxinin—Ghulum Hassan.  
 Experiments on the Synthesis of Nootkatin—L. G. L. Ward.  
 Nitric Oxide Complexes—W. A. J. Mahon.  
 Dissociation Constant of Phenol in Methanol—P. Fraser.

**CANTERBURY:**

- Fluidisation and its Application in Chemical Industry—S. C. J. Smith.  
 Recent Investigations in Meat Biochemistry—Dr. F. E. Deatherage.  
 Fibre Science and Leather—Dr. H. Phillips.  
 Recent Developments in Algal Production—N. W. Vere-Jones.  
 Crystallinity in Living Systems—Dr. B. R. Penfold.  
 Vitamins in Bread, Flour and Baked Products—Dr. J. B. N. Coppock.  
 Geothermal Steam: Chemical Engineering Aspects—G. M. Smith.  
 Some Current Trends in Chemistry—Dr. M. M. Davies.  
 Bond Length Determination by Infa-red Spectroscopy—  
 Dr. M. T. Christiansen.

**OTAGO:**

- Science and Brewing—D. A. Dick.  
 The Scientists' Salary—Dr. F. H. Fastier.  
 Gasoline Additives—E. S. Borthwick.  
 Geothermal Chemical Work—A. J. Ellis.  
 Metabolism of Pyrimidines—Dr. R. D. Batt.  
 Current Trends in Chemistry—Dr. M. M. Davies.  
 Duke of Edinburgh's Conference—G. W. Broughton.

## BOOK REVIEWS.

*THE DYNAMICS OF LIVING PROTOPLASM*, by L. V. Heilbrunn.  
Published by Academic Press Inc., New York, 1956. 327 pages.  
Price 6.50 dollars.

This is a book whose scope and nature is not immediately apparent from its title which the author himself admits is perhaps redundant but is chosen to stress the importance of studying protoplasm when it is alive and not merely after it is dead. This approach to the chemistry of protoplasm is stressed throughout the book and is one which will appeal to biochemists, physiologists and others interested in the functioning of this complex substance.

In this small and very readable text the author devotes most attention to showing how our present knowledge of the colloidal chemistry of protoplasm can help to explain its behaviour under the varying conditions in the living cell. He has not attempted to cover all aspects of the activity of the living cell but, as he puts it, if the living machine can be compared to an internal-combustion engine, he has concentrated on the mechanisms of energy conversion within what corresponds to the cylinders. He has not considered the nature of the fuel, what happens when it is burnt, or how it finds its way into the place where it is utilised.

Within these limitations of scope, this text is an extremely valuable contribution. It is lavishly produced on good quality paper, well illustrated and adequately referenced.

*COLORIMETRIC ANALYSIS. Vol. 1. Determinations of Chemical and Biochemical Significance. (2nd Edition)*, by N. L. Allport and J. W. Keyser. Published by Chapman & Hall, Ltd., London, 1957. 424 pages. Price 50/-.

This is the first volume of a revised edition of N. L. Allport's well-known text on colorimetric analysis which first appeared in 1945. The great growth of colorimetry since that time has made it necessary, even with the most careful selection, to extend this revised work into two volumes. The first volume deals with determinations of clinical and biochemical significance. It thus covers, with many new additions and improvements to previous procedures, the determinations formerly included in Section III and portions of Section IV of the first edition as well as a number of determinations from other parts of the book concerned with metals and acid radicles occurring in body fluids and tissues. Volume II, to appear later, will deal with colorimetric methods applicable to metals, foods, pharmaceuticals, etc.

The general approach to the subject is the same in this volume as in the previous edition. Methods, of many of which the authors have first-hand knowledge, are described in sufficient details that the determinations may be carried out without reference to other literature and in all cases the limitations of the methods are clearly indicated. As in the previous edition, the authors get straight into their subject without, as is so often the case in books of this type, wasting space on elementary theoretical considerations which are already known to the chemist and are of no interest to the technician.

The emphasis is mainly on clinical determinations, the estimation of about 100 constituents of blood, other body fluids and biological materials being dealt with in detail. In addition, outlines of suitable methods and references to the original literature are given for a number of less common substances.

The text is well referenced and will find a useful place on the bookshelves of most chemists whatever their field.

—W.A.McG.

*THE FIRST ONE HUNDRED AND FIFTY YEARS—a history of John Wiley & Sons, Incorporated, 1807-1957. Published by John Wiley & Sons, Inc., New York, 1957. 242 pages. Price 7.50 dollars.*

This book is an extremely high quality production worthy of a firm with the background of John Wiley & Sons. In all aspects—print, paper, illustrations and binding—it reflects great credit on this publishing firm and we offer them our congratulations on the achievements of their first 150 years, which it records.

The book is however more than a record of the development of the firm over this period; it is more than a mere catalogue of Wiley Books. Twenty-eight contributors, all well-known writers in their own fields, and many of them authors of books published by John Wiley & Sons, have attempted to trace the development of the book-publishing business against the background of change and industrial expansion associated with the growth of the nation.

*MASSANALYSE (Volumetric Analysis). By G. Jander and K. F. Jahr. 303 pages. Berlin: Walter de Gruyter & Co., 1956. DM 4.80 (about 8/-.)*

This is one of the "Sammlung Goschen" series appreciatively referred to in our issue for October last and discusses the theory and practice of common operations in volumetric analysis, including conductometric titrations, all in a very handy booklet size, serving as a very useful introduction to the subject for students.

—S.G.B.

#### BOOKS RECEIVED.

*INTRODUCTION TO SOLID STATE PHYSICS, by Charles Kittel. Published by John Wiley & Sons, Inc., New York, 1956. 617 pages. Price 12.00 dollars.*

*PHOTOCONDUCTIVITY CONFERENCE (held at Atlantic City, November 4-6, 1954), edited by R. G. Breckenridge, B. R. Russell and E. E. Hahn. Published by John Wiley & Sons, Inc., New York, 1956. 653 pages. Price 13.50 dollars.*

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# *The Dairy Research Institute (N.Z.)*

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Applications are invited for the position of Assistant Chemist in the Dairy Chemistry Laboratories of The Dairy Research Institute (N.Z.) located at Massey Agricultural College, Palmerston North.

Commencing salary according to qualifications and experience, but within the range £720 to £1,000 per annum.

Further particulars on application to—

The Secretary,  
The Dairy Research Institute (N.Z.),  
Massey College P.O.,  
PALMERSTON NORTH.

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Applications are called for a Chemist to take charge of the Soil Department of the Cawthron Institute.

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Applications should be addressed to the Director of the Cawthron Institute, P.O. Box 175, Nelson, N.Z., from whom further particulars can be secured.



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**MASSEY AGRICULTURAL COLLEGE**

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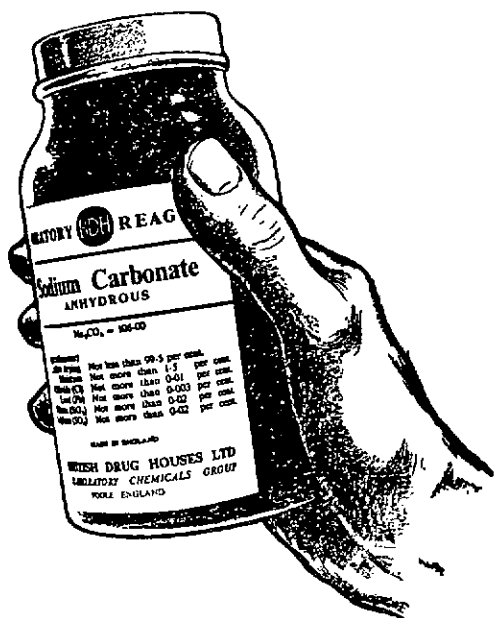
Massey Agricultural College,

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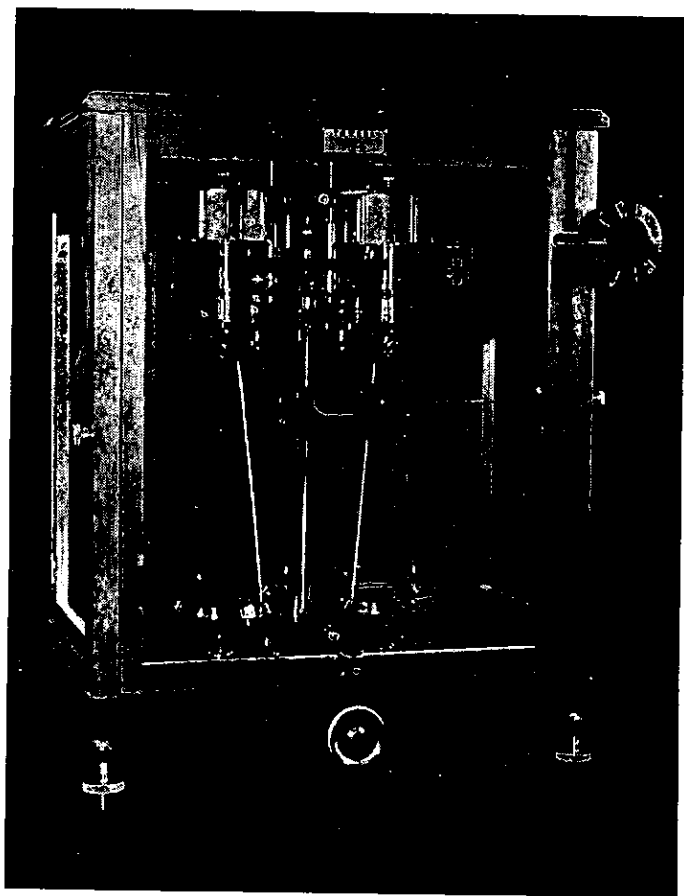


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