

THE  
**INSTITUTE OF CHEMISTRY**  
OF  
**GREAT BRITAIN AND IRELAND.**

**FOUNDED 1877.**

**INCORPORATED BY ROYAL CHARTER, 1885.**

**Patron - H.M. THE KING.**

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**JOURNAL AND PROCEEDINGS.**

**PART I: 1937.**

Issued under the supervision of the Publications Committee.

**RICHARD B. PILCHER,**  
*Registrar and Secretary.*

**30, RUSSELL SQUARE, LONDON, W.C.1.**

*February, 1937.*

# Publications Committee, 1936-37.

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**ERNEST VANSTONE**.

## Editorial.

**Science in Secondary Education.**—The place of science in secondary education was discussed by the Council and reported upon in the JOURNAL AND PROCEEDINGS in 1934.\* At that time, the discussion arose on a report of a Panel of Investigators appointed by the Secondary School Examinations Council to enquire into the School Certificate Examination held in 1931.

The matter has now arisen on a brochure, issued in December, 1936, by the Science Masters Association, entitled "The Teaching of General Science," consisting of an Interim Report of a Sub-Committee of the Association, which has been adopted by the General Committee. In this Report it is suggested that, of 451 periods (of  $\frac{3}{4}$  of an hour each) during a four years' curriculum, 197 be allotted to physics, 159 to biology, and 95 only to chemistry. Members interested in school teaching regard this proposal as undesirable from an educational point of view, and contrary to the national interest.

The proposal is to make all schools do a modified science course with only 21 per cent. of chemistry. This in itself is criticised by those who hold that general science should be an optional subject, and there is even a fear in some quarters that the teaching of chemistry is being discouraged except as "the hand-maiden of biology,"—a view which ignores the importance of chemistry as a basic science and its value as an educative subject. *Nature* (19th December, 1936, p. 1030) remarks on the reduction of the chemistry section of the syllabus as the weakest part of the scheme.

The matter will come again before the Council at an early meeting.

In the meantime, Professor H. V. A. Briscoe has kindly prepared a note on the Report, and Fellows and Associates are invited to contribute their views on the place of chemistry in a scheme of general science teaching intended for the bulk of pupils in secondary schools up to the age of 16 and leading to the preliminary examination of the Institute.

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\* *Journal and Proceedings*, Part II, 1934, pages 116–29; Part IV, 1934, pages 278–88; and Part V, 1934, 315–19 and 325–27.

## The Teaching of General Science in Schools

A Note by Professor H. V. A. BRISCOE, D.Sc.,  
Member of Council.

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THE Science Masters' Association has recently issued a brochure entitled "The Teaching of General Science" (London: John Murray—2s. 6d.), which is the Interim Report of a Sub-Committee appointed about two years ago:

"To consider the problems presented to teachers in Secondary Schools by the introduction of courses in General Science as a constituent of general education, and to make specific suggestions about:

1. The aims to be kept in view;
2. The basic principles of the subject, an appreciation of which should be inculcated;
3. The material to be included in such courses;
4. Methods of development and treatment of the material;
5. Time-table requirements at different stages."

Clearly this is a matter of direct concern to the Institute, as it may affect very materially, for good or ill, the nature of the preparation of candidates for the approved Preliminary Examinations. Therefore, I gladly accepted an invitation to consider the Report and express my views upon it.

In so doing, I claim to be an advocate of the extensive adoption of General Science as a School Certificate subject in schools which have suitable human and material equipment for its teaching; indeed, during my service as Secretary of School Examinations in the University of Durham I had some part in bringing about the introduction of what was, I believe, one of the first accepted syllabuses in General Science. I find, indeed, that I am entirely in sympathy with the Sub-Committee's statement of the aims of science teaching, and, indeed, with all their general expressions of opinion. Moreover, the *form* of the method by which they have approached the task of constructing a Syllabus seems excellently conceived and calculated to yield a thoroughly practical and well-balanced product. Much to my surprise and regret, therefore, I find on turning to the syllabuses thus produced by the Sub-Committee that they appear to be quite unbalanced

and so heavy that they may well prove unworkable in many schools.

The content of the syllabuses in physics and biology seems excessive for the School Certificate Stage, and, in both cases, greatly exceeds in magnitude and difficulty the content of the chemistry syllabus. Thus the chemistry to be taught will be quite inadequate to serve, as it should, as a basis for the pupil's outlook on many facets of his biology or properly to co-ordinate with his work in physics.

It is perhaps significant that the only syllabus which is re-stated in cursive form in the body of the Report is that for Biology. Can it be that in the production of this scheme for "General" Science the influence of biological specialists has predominated and that they, without recognising their disability, have been unable to see the many points at which chemical facts and theories impinge on the daily life of the child?

However this may be, there seems to be good reason why this proposed syllabus should be subject to a friendly but critical scrutiny by any who are, like ourselves, concerned that the many pupils who leave school at sixteen and, without graduating, are later on involved in some way in the practice of chemistry, should have received a good general education, including general science in which the study of elementary chemistry has its proper part. It is to be hoped that many members of the Institute will give some time and thought to friendly criticism of the Report and in due course express their opinions on it.

### COMMENTS.

**Metric Reform.**—Further correspondence has been received on the subject of Metric Reform as introduced by Mr. E. C. Barton, Chairman of the Decimal Association, in the JOURNAL AND PROCEEDINGS, Part V, 1936 (p. 340), but the Fellows and Associates who have written on the subject since the publication of Part VI are disinclined to favour any proposal to change the system in force in this country.

The Publications Committee proposes to close the discussion, for the present, with the following abstracts:—

An Associate remarks that there is nothing to prevent the use of metric measures by those who prefer them, nor anything to prevent a firm from doing its business so as to meet the convenience of metric-using customers. He suggests that Mr. Barton

appears to regard "metric" methods and "decimal" methods as interchangeable terms, and that it is not clear whether chemists are asked to support a change to metric weights and measures as well as a decimal system of money. Incidentally, this contributor shows that the people of the British Dominions are the greatest purchasers of our manufactures.

In reply, Mr. Barton maintains his chief arguments:

- (a) Suitability for use with modern machine methods of calculation, especially in division and multiplication.
- (b) Ease of use of International Statistics and Scientific Data.
- (c) Halving of records of stocks kept in trades,—notably tools.
- (d) Reduction of ready-reckoners to one-third the size.
- (e) Saving in school time, and greater efficiency in teaching mathematics.

A Fellow directs attention to the fact that, even in metric countries, specifications for drain pipes are drawn up *in inches of diameter*, and the pound (*la livre*) is still used. The same correspondent refers to the enormous cost which would be involved by changing "foot rules," maps and plans, geological surveys, etc.

To this Mr. Barton replies that no metric law ever affected the use of tool or pattern or plan for fifty years.

Another Fellow suggests that the Decimal Association should call itself the Metric Association. He mentions that metric countries use our British Imperial system in their cotton factories, and concludes—"Start by trying to decimalise the cotton industry, if you will, but to metricise it would be Utopian."

Mr. Barton says that the danger to all existing machinery of being destroyed under a metric law is imaginary. In 1907, this fear caused a panic among manufacturers, so that eminent decimalists wrote papers on the subject telling them how to change their lathes, etc. at the lowest cost. No machines were altered, or put out of commission. Everything went on as before except in the expediting department, where the boxes and goods had to be weighed in metrics, and the lengths of cloths measured also in metric lengths. If once the notion of scrapping everything were cleared away, the metric reformers could settle down to confine themselves to the reasons that

have made the present drive for decimal reform more real than it has been at any time during the last fifty years.

Then—returning to the attack—the last-mentioned Fellow says that Mr. Barton fails to show why we should adopt the metric system with its changed standards of weight and measure, rather than decimalise the inch or the yard, and the grain or the pound. He agrees that the scrapping of yard-sticks, and pound weights—as material things—should not be insurmountable, but suggests that Mr. Barton would find it a much more difficult task to tell cotton spinners and weavers how they should change over to the metric system than merely to tell “manufacturers how to change their lathes.” If it be the real object of the Decimal Association to introduce the metric system it should be called “The Metric Association.”

# Report of the Council: 1936–1937

(*To be submitted at the Fifty-ninth Annual General Meeting of the Institute, to be held on Monday, 1st March, 1937.*)

This Report covers the twelve months ending 29th January, 1937.

The Council is gratified to record that His Majesty King George VI has been graciously pleased to accord to the Institute the continued Patronage of the Crown.

## I. ROLL OF THE INSTITUTE.

Since the date of the last Report (31st January, 1936), the Council has elected 69 new Fellows, of whom 61 were formerly Associates, and 2 Fellows have been re-elected.

345 new Associates have been elected, of whom 119 were Registered Students. One Associate has been re-elected.

232 new Students have been admitted and 2 Students readmitted.

The Council regrets to report the deaths of 21 Fellows, 13 Associates, and one Student, viz.:—

### *Fellows*

Edgar Reginald Deacon, O.B.E.  
James Wallace Donald.  
Benjamin Henry Gerrans.  
James Francis Halpin, I.S.O.  
Henry Reginald Hirst.  
Sir Herbert Jackson, K.B.E., F.R.S., *Past-President*.  
Thomas Martin Lowry, C.B.E., F.R.S.  
Colin Henry Lumsden.  
Francis Grimshaw Martin.  
John May Herbert Munro.  
Thomas Jenkins Murray.  
George Samuel Newth.  
Stanley John Peachey.  
Percy Andrew Ellis Richards.  
William Rintoul, O.B.E.  
William Clement Rowden.  
Gustav Adolf Otto Schack-Sommer.  
Frank Scudder.  
Thomas Stenhouse.  
David Alexander Sutherland.  
Lawrence John de Whalley,

*Associates*

William Brash.  
 Reginald Arthur Salter Castell.  
 Thomas Elliss Clarke.  
 Alexander Crow.  
 Benjamin Jones.  
 Francis Charles Lewis.  
 Charles Herbert Moon.  
 Percy William Narracott.  
 Cecil Frank Newby.  
 Herbert William Rivett.  
 Jnanendra Nath Sinha.  
 James Cumming Slater.  
 Alton Ewart Clarence Smith.

*Student*

George Henry Rowland.

The Council has accepted the resignations of 5 Fellows, 40 Associates, and 47 Students. The names of 10 Associates and 73 Students have been removed from the Register in accordance with the By-laws.

On a report from the Censors, the name of an Associate of the Institute was removed from the Register, in accordance with By-law 57.

The Register at 29th January, 1937, contains the names of 2096 Fellows, 4683 Associates (in all 6779 members), and 746 Registered Students.

The number of members has increased by 266, and the number of Registered Students has decreased by 7.

## 2. THE COUNCIL, COMMITTEES & REPRESENTATIVES.

The Council has held 11 meetings; the Committees, Sub-Committees and Board of Examiners have held 60 meetings.

### COMMITTEES AND CHAIRMEN.

Appointments Register .. ..	..	The President.
Benevolent Fund .. ..		Patrick H. Kirkaldy (until October, 1936);
Finance and House .. ..		Bernard F. Howard (since October).
Legal and Parliamentary .. ..		Bernard F. Howard.
Nominations, Examinations and Institutions .. .. ..		The President.
		Patrick H. Kirkaldy, <i>Vice-Chairman</i> (until October, 1936).
Publications .. .. ..		Lewis Eynon.
Joint Committee with the Board of Education (National Certificates) .. .. ..		The President.

Joint Committee with the Scottish Education Department (National Certificates) . . .	G. G. Henderson, F.R.S.
Joint Committee with the Board of Education, Northern Ireland (National Certificates)	The President.

At the Annual General Meeting held on 2nd March, 1936, Dr. Robert H. Pickard, F.R.S., succeeded Professor Jocelyn F. Thorpe, C.B.E., F.R.S., as President.

Mr. H. J. Page resigned his seat on the Council on proceeding to an appointment in the Far East. Dr. James Brierley Firth was elected to fill the vacancy thus caused.

In October, 1936, the Council received with much regret the resignation, on account of ill-health, of Mr. Patrick H. Kirkaldy, from the position of Hon. Treasurer, which he had held for twelve years. Mr. Bernard F. Howard was appointed as his successor in that office, and Mr. Kirkaldy was co-opted a Member of Council in the place of Mr. Bernard Howard.

The Institute has been represented, as follows, by:—

Dr. Robert H. Pickard, F.R.S., President,—on the National Committee for Chemistry (Royal Society).

The President, with the Hon. Treasurer and the Registrar,—on the Sir George Beilby Memorial Fund Committee.

Mr. W. A. S. Calder, Member of Council,—at the Conference held in March, 1936, to initiate a British Management Council in order to ensure the representation of Great Britain at future International Congresses for Scientific Management, and at a meeting concerned with the same subject in January, 1937.

Sir Christopher Clayton, C.B.E., past President, and the Registrar,—on the Executive Committee of the Parliamentary and Science Committee.

Sir Christopher Clayton, C.B.E., past President,—on the Standing Advisory Committee for the Department of Scientific and Industrial Research in connection with a scheme for the testing of building materials.

Professor H. V. A. Briscoe, with Mr. H. W. Cremer, Dr. J. J. Fox, Mr. H. J. Page (and lately Dr. Ernest Vanstone, *vice* Mr. H. J. Page), Members of Council,—on the Joint Library Committee of the Chemical Society.

Dr. Harold G. Colman,—on the British National Committee of the World Power Conference.

Dr. Leslie H. Lampitt, Member of Council,—on the Congress of the Royal Sanitary Institute, held at Southport in July, 1936.

Dr. Leslie H. Lampitt and Dr. C. Ainsworth Mitchell, Members of Council,—as delegates to a Conference convened by the Royal Sanitary Institute to discuss the Administration of the Milk (Special Designations) Order, 1936, with respect to Accredited Milk.

Dr. E. A. Rudge and Mr. E. A. Tyler, Member of Council, were nominated to serve on a Committee of the Advisory Council for Technical Education in South Wales and Monmouthshire, to consider education for the metallurgical and chemical trades.

Mr. William Henry Simmons,—on a Technical Committee to examine the draft methods for the analysis of soaps and fats, prepared by the International Commission for the Study of Fats.

Professor J. F. Thorpe, C.B.E., F.R.S., past President, with Mr. F. G. Edmed, O.B.E., and Mr. Patrick H. Kirkaldy (until October, 1936), and Mr. W. A. S. Calder, Member of Council (since October),—on the Chemical Council.

Dr. J. F. Tocher,—on the Advisory Committee appointed under the Therapeutic Substances Act.

The Registrar,—on the Headmasters of Secondary Schools Employment Committee, Ministry of Labour.

The Assistant Secretary,—on the Chemical Trades Advisory Committee, and on the Chemical Trades Examination Board of the Union of Lancashire and Cheshire Institutes.

#### STATUTORY APPOINTMENT.

Dr. G. Roche Lynch, O.B.E.,—on the Poisons Board, constituted under the Pharmacy and Poisons Act, 1933.

The Council acknowledges the valuable services of Members who have represented the Institute on the Council of the Chemical Division and on Committees and Sub-Committees of the British Standards Institution, as follows:—

Dr. Leslie Aitchison,—Chemicals and Chemical Plant for Electro-plating, and at a Conference on the proposed Standardisation of Plated Finishes for Fittings and Equipment;

Mr. S. A. Brazier,—delegate to a Conference called to consider the desirability of making provision for the standardisation and co-ordination of tests for rubber and rubber products, and, later, Chairman of the Technical Sub-Committee to which the question was referred;

Mr. W. J. A. Butterfield,—on the Council of the Chemical Division;

Dr. Harold G. Colman,—Benzole for Motor Fuel; Sampling of Tar Products;

Professor C. H. Desch, F.R.S.,—Cement and Slag Cement;

Dr. J. J. Fox, O.B.E.,—Analysis of Chemicals and Materials used in Electro-plating; Reagents for Analytical Purposes;

Mr. Walter C. Hancock,—High Alumina Cements;

Mr. F. W. Harbord, C.B.E.,—Cement;

Mr. William Macnab, C.B.E.—Mechanical Handling and Treatment of Liquids and Gases;

Dr. James Watson,—Sand Lime Bricks and Portland Blast Furnace Slag Cement; Containers for Heavy Acids and Solvents;

Mr. W. T. Burgess, Dr. J. T. Dunn, Dr. A. G. Francis, Professor G. G. Henderson,\* F.R.S., and Mr. R. L. Collett, Assistant Secretary,—on Technical Committee C/8 on Standardisation of Scientific Glassware;

Dr. A. D. Mitchell,—Chemical Symbols and Abbreviations.

\* Professor Henderson has lately retired from this Committee and Professor H. V. A. Briscoe has been appointed in his place.

Draft Specifications for various Standards, in the preparation of which many Fellows and Associates have participated, have been referred to Fellows and Associates of the Institute for their observations.

### 3. THE FINANCE AND HOUSE COMMITTEE.

The Financial Statements for the year 1936 are attached to this Report.

The total receipts from normal sources exceeded those for 1935 by £465 14s. 8d. Expenditure, on the other hand, exceeded that of 1935 by £1,181 19s. 2d.,—mainly accounted for by the new issue of the Register (£831 6s. 7d.) and the additional contribution to the Chemical Library Fund (£265 17s. 6d.).

The balance in hand at the end of the year (£786 15s. 11d.), together with the balances in Australia and New Zealand (in all, £603 2s. 4d., reckoned for present purposes on the value of home currency), amounted to £1,389 18s. 3d. Against this a sum of £1,045 7s. 11d. was due for investment at the close of the year; while the Liabilities on the year's working (not including Prepaid Subscriptions), exceeded Sundry Debts to the Institute (not including Subscriptions in Arrear), by £534 os. 2d. It should be obvious, therefore, that the need for careful budgeting foreshadowed in previous Reports still remains.

Under the Constitution of the Chemical Council, the contribution from the general funds of the Institute towards the maintenance of the Library of the Chemical Society was assessed at £646 10s., but arrangements have been made under a Deed of Covenant (for seven years) whereby Income Tax will be recoverable on £550 of such contributions as being a direct charge on the taxed income of the Institute.

**PREMISES OF THE INSTITUTE.**—The Hall and Meeting Rooms of the Institute have been available for many meetings of other Societies and Institutions during the year.

The Council has come to an arrangement whereby under a Deed of Grant the University of London will build on to the west wall of the Institute's premises, in consideration of the payment of a sum of £160, which has been invested in the Capital Account of the Institute.

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With the concurrence of the Executors of the late Mrs. Meldola and that of the Royal Society, the gold Davy Medal awarded to Professor Meldola has been sold and the proceeds, together with the balance of the Meldola Library Fund, have been invested in order that the income therefrom may be devoted to a prize to be awarded annually to the recipient of the Meldola Medal.

#### 4. THE BENEVOLENT FUND COMMITTEE.

The Accounts of the Benevolent Fund Committee are attached to this Report.

The Committee desires to express its grateful thanks to all who contributed to the Fund during the past year, as well as to those who have very kindly collected Group Contributions.

The total contributions of all kinds—Subscriptions, Annual Subscriptions and Donations—exceeded those for 1935 by £113 12s. 11d., and the amount received in Loans Repaid during 1936 exceeded that received under this heading in 1935 by £64 19s. od.

Fewer appeals needing casual grants resulted in a reduction of expenditure on that account amounting to £250 2s. 8d., but the Regular Payments increased by £86 8s. 4d. It is to provide for these payments that the Committee is chiefly anxious to improve the general position of the Fund and to place it on a sounder foundation. The Committee was glad, however, to be able to pay off the debit balance at the commencement of the year and finish with a sum in hand of £134 12s. 6d. on Current Account.

A special pamphlet was prepared and issued to the Fellows and Associates at the end of 1936, giving full particulars of the position of the Fund on 15th December, and making a special appeal for Coronation year, in the hope that the capital of the Fund may be increased and a regular income secured from investments, as a definite revenue towards meeting appeals as they are received. The pamphlet also included a summary of allowances, grants and loans, and particulars of typical cases, with the rules, and the conditions under which the Fund may recover Income Tax on contributions made under Deed of Covenant. It must be understood, however, that members who contribute under a Deed of Covenant are debarred from receiving any benefit during the period covered by the Deed.

The response to the special appeal has so far resulted in an increase in receipts to date being £318 17s. 10d.

#### 5. THE LEGAL AND PARLIAMENTARY COMMITTEE.

The Council decided to address to H.M. the King in Council a petition against another body seeking the grant of a Supplementary Charter for the purpose, *inter alia*, of granting certificates

of purity, quality and merit for advertised commodities,—a practice which the Council and Censors of the Institute desire to discourage. The result of the Petition has not transpired. The Council, however, has intimated to the Privy Council that, if permitted to do so, it would be glad to support the Petition for a Royal Charter by another Body, viz.: the Institution of the Rubber Industry.

The Council gave consideration to the decision of the Civil Service Commissioners to eliminate "Everyday Science" from the compulsory subjects in examinations for admission to the higher grade in the Civil Service. The Council realised that candidates who had devoted considerable attention to science were at liberty to offer science subjects and could obtain good marks in them. While willing to support any practicable steps that could be taken to ensure that all who hold administrative positions in the Civil Service should have such a fundamental training in science as would give them a scientific outlook, the Council felt that the inclusion of "Everyday Science" as a compulsory subject in the examination in question did not achieve this object.

The Legal and Parliamentary Committee has been concerned with the Beet Sugar Bill and the Hydrogen Cyanide (Fumigation) Bill, as well as with the subject of "Air Raid Precautions." A report on the debate in the House of Commons on the Sugar Industry (Reorganisation) Bill, and particularly the employment of alien chemists and technologists in the industry, was dealt with in *JOURNAL AND PROCEEDINGS*, Part III.

The views of the Council of the Institute on the Hydrogen Cyanide (Fumigation) Bill were communicated to the Home Office and published in *JOURNAL AND PROCEEDINGS*, Part V.

**PARLIAMENTARY SCIENCE COMMITTEE.**—The Institute is represented on the Parliamentary Science Committee by Sir Christopher Clayton and the Registrar. Among other matters, the Council was asked by the Committee to consider a Memorandum prepared by Mr. J. D. Bernal, of Cambridge, for the development and finance of the Department of Scientific and Industrial Research. The Council came to the conclusion that some of the recommendations contained therein were political—touching on questions such as tariffs and State control of research,—and, therefore, that it did not seem possible to obtain a collective and

unanimous opinion on the scheme, which, however, is still under consideration of the Parliamentary Science Committee.

The Council was also asked to consider a request from the Thames Barrage Association to support the demand for a public enquiry on the question of the desirability of constructing a dam at Woolwich Reach, but the Council decided that the matter was not one on which the Institute should express an opinion.

## 6. LOCAL SECTIONS.

The following schedule records the main activities of Sections reported since the publication of the last Annual Report.

### ABERDEEN AND NORTH OF SCOTLAND.

- Dr. R. L. Mitchell . . . "Spectroscopic Analysis by the Lundegardh Method."  
Dr. J. A. Lovern . . . "Chemistry in the Aquatic Realm."  
Visit to the Torry Research Station.  
Mr. S. R. H. Edge . . . "Scientific Control in Paper-making."

### ABERDEEN, EDINBURGH AND GLASGOW.

- (Joint Summer Meeting at Glasgow.)  
Visit to the Marine Biological Station on the island of Cumbrae; survey by Mr. Elmhirst, the Director; visit to the survey ship "Nautilus."

### BELFAST AND DISTRICT.

- Professor H. Barcroft . . . "Chemical Aspects of Nerve Transmission."  
Practical Demonstrations.  
Dr. W. H. Gibson, O.B.E. . . "Industrial Biochemistry in Northern Ireland."  
Visit to the Works of Messrs. Gallagher, Ltd.  
Professor W. B. Morton . . . "William Thomson, Lord Kelvin."  
Dr. A. E. Everest . . . "The Institute."

### BIRMINGHAM AND MIDLANDS.

- Professor H. D. Kay, O.B.E. . . "Milk as a Food Stuff."  
Discussion on Training of Chemists. Opened by Professor R. H. Hopkins, Chairman of the Section.  
Annual Meeting, followed by a Visit to the Scientific Departments of the General Hospital, Birmingham.  
Dr. J. D. Bernal . . . "Science at the International Peace Congress."  
Dr. H. A. Krebs . . . "The Oxidative Breakdown of Carbohydrates in the Living Cell."  
Lt.-Col. Sir Arnold Wilson, K.C.I.E., M.P. . . . "The Work of the Parliamentary Science Committee."

### BRISTOL AND SOUTH-WESTERN COUNTIES.

- Dr. F. L. Pyman, F.R.S. . . "Medicinal Chemicals."  
Dr. F. H. Garner . . . "Newer Methods in Petroleum Refining."  
Dr. G. Roche Lynch, O.B.E. . . "Toxicology."  
Visit to the United Chemists' Association, Ltd., at Cheltenham.

- Dr. J. J. Fox, O.B.E. . . . "Some Reminiscences of an Old-established Laboratory."  
 Professor H. T. S. Britton . . . "Electrometric Methods of Analysis and Investigation."  
 Social Meeting at the invitation of Dr. A. C. Fryer.  
 Mr. R. H. Ellis . . . . "Water Supplies."  
 Mr. E. B. Anderson . . . . "Butter Fat."

## CAPE OF GOOD HOPE.

- Mr. W. S. S. Ladell . . . . "Muscle Metabolism."  
 Dr. C. B. O. Mohr . . . . "Nuclear Chemistry."  
 Col. J. G. Rose, D.S.O. . . . . "Water Softening in South Africa."

## CARDIFF AND DISTRICT.

- Dr. H. E. Cox . . . . . "Recent Advances in Food Chemistry."  
 Dr. E. A. Rudge . . . . . "The Training of the Chemist."  
 Dr. M. Jowett . . . . . "Some Chemical Aspects of Metabolism."  
 Dr. G. Roche Lynch, O.B.E. . . . . "Toxicology."  
 Professor W. E. Garner . . . . . "Decomposition of Solids."  
 Scientific Conversazione.

## EAST MIDLANDS.

- Professor F. G. Donnan, C.B.E.,  
 F.R.S. . . . . "Sewage as a Partially Dispersed System."  
 Dr. L. H. Lampitt . . . . . "Recent Developments in the Chemistry of Milk."  
 Symposium on the Institute of Chemistry and Professional Training.  
 Dr. A. D. Mitchell . . . . . "Indicators."  
 Dr. P. Lewis-Dale . . . . . "Chemistry and Railways."  
 Professor M. Polanyi . . . . . "Heavy Hydrogen and its uses in Chemistry."

## EDINBURGH AND EAST OF SCOTLAND.

- Dr. W. G. Hiscock . . . . . "Works Hygiene and Accident-Prevention."  
 Professor E. K. Rideal, M.B.E.,  
 F.R.S. . . . . . "Inter-action of Gases and Solids."  
 Mr. A. R. Jamieson . . . . . "Unusual Analyses."  
 Professor W. N. Haworth,  
 F.R.S. . . . . . "Cellulose and Related Carbohydrates."  
 Symposium on the Education of the Chemist.  
 Dr. Burrows Moore . . . . . "Fused Silica and Fused Silica Ware."  
 Mr. H. Lloyd Hind . . . . . "From Pasteur to 1936,—an Account of the Development of the Science of Brewing."  
 Dr. A. D. Mitchell . . . . . "Two New Types of Indicator."

## GLASGOW AND WEST OF SCOTLAND.

- Professor E. K. Rideal, M.B.E.,  
 F.R.S. . . . . . "Recent Developments in Surface Action."  
 Dr. S. Judd Lewis . . . . . "Twenty-five Years' Practice in Spectrum Analysis."  
 Mr. J. G. Roberts . . . . . "Electroplating Developments, 1925–35."  
 Dr. L. A. Jordan . . . . . "Implied Chemistry."  
 Dr. A. B. Crawford . . . . . Refresher Lecture on "Analytical Chemistry."

- Dr. Leonard A. Sayce .. "Photography."  
 Dr. F. S. Sinnatt, C.B., M.B.E., and Dr. E. W. Smith, C.B.E. "The Gas Industry and the Domestic Consumer."  
 Mr. J. Davidson Pratt, O.B.E. "Gas Defence from the point of view of the Chemist."

#### HUDDERSFIELD.

- Professor W. N. Haworth, F.R.S. .. "Carbohydrates and their Structure."  
 Annual General Meeting; Show of Industrial Films.  
 Summer Meeting with the South Yorkshire Section.  
 Dr. Robert H. Pickard, F.R.S., President .. "Textile Research."  
 Dr. M. W. Goldblatt .. "Modern Biochemical Problems."  
 Dr. J. Grainger .. "Chemistry of a Plant Virus."  
 Mr. W. R. Moore .. "Modern Advances in the Manufacture of Explosives."

#### INDIA.

- Mr. G. C. Mitter .. "Electrolytic Refining of Silver Bullion with special reference to the Balbach System."  
 Joint Easter Session of Scientific Societies in India: Dr. Gilbert J. Fowler—"Recent Advances in Sanitary Science."  
 Dr. Subbo Rao .. "Chemical and Biological Assay on some Indian Food Stuffs."  
 Joint Meeting with the Society of Biological Chemists: Dr. Gilbert J. Fowler—"The Moral Responsibility of Scientists in Modern Warfare."

#### IRISH FREE STATE.

- Dr. P. S. Arup .. "Unsaturated Fatty Acids."  
 Dr. R. G. Ault .. "Micro-analytical Methods."  
 Professor T. J. Nolan .. "Natural Organic Halogen Compounds."

#### LEEDS AREA.

- Professor C. K. Ingold, F.R.S. "The Chemistry of Heavy Hydrogen."  
 Film Exhibition: The Building of the I.C.I. Offices, Millbank.  
 Dr. A. E. Dunstan .. "The Refining of Petroleum."  
 Professor R. H. Hopkins .. "The Selective Fermentation of Sugars by Yeast."  
 Dr. L. L. Lloyd .. "Properties of Dyestuffs in relation to Fastness to Light and to Potting."

#### LIVERPOOL AND NORTH-WESTERN.

- Mr. Richard B. Pilcher, O.B.E. "From Boyle to Priestley."  
 Mr. H. E. Monk .. "Food Legislation."  
 Messrs. A. T. Parsons & H. L. Bolton .. "The Determination of Alcohol—a General Survey."  
 Mr. L. V. Cocks .. "Some Recent Technical Advances in Industry."  
 Dr. S. H. Piper .. "The Use of X-Rays in the Identification and Estimation of Mixtures of Aliphatic Compounds."  
 Professor C. O. Bannister .. "Cupellation and the Detection of Platinum Metals in Bullion."

## LONDON AND SOUTH-EASTERN COUNTIES.

- Mr. J. Davidson Pratt, O.B.E. "Protection against Toxic Acids in Industry."
- Dr. T. A. Henry . . . . . "The Chemotherapy of Malaria."  
(Joint Meeting with the London Section of the Society of Chemical Industry.)
- Visit to Battersea Power Station.
- Visit to the Home Office Industrial Museum: Short Lecture on Explosives caused by Dust of various kinds.
- Dr. S. Glasstone . . . . . "Oxidation and Reduction Potentials and their Practical Applications."
- Exhibition of Industrial Films.
- Dr. C. Ainsworth Mitchell . . . . . "Scientific Examination of Documents."

## MALAYA.

- Annual Conference at Kuala Lumpur: Visit to the site of the new Rubber Research Institute.

## MANCHESTER AND DISTRICT.

- \*Professor J. W. Cook . . . . . "A Chemical Contribution to the Cancer Enigma."
- \*†Mr. W. A. Silvester . . . . . "Patents as Industrial Property."
- §Dr. J. F. Wilkinson . . . . . "Chemistry and Medicine."
- Dr. H. Hepworth . . . . . "Chemistry and Business."
- Golf Competition at Wilmslow for the Chairman's Bowl; Summer Meeting at Marbury Hall Country Club.
- Dr. P. Lewis-Dale . . . . . "The Chemist and Transport."
- ||Dr. W. H. Coates . . . . . "Our Money."
- Dr. C. Ainsworth Mitchell . . . . . "Scientific Identifications in Criminology."
- \* Jointly with Soc. Chem. Ind.    \*† With Soc. Chem. Ind. and Inst. Rubber Ind.
- § With Chem. Soc.
- || With Soc. Chem. Ind., Soc. Dyers & Colourists and Manc. Lit. & Phil. Soc.

## NEWCASTLE UPON TYNE AND NORTH-EAST COAST.

- Dr. W. S. Patterson . . . . . "Studies in Metallic Corrosion."
- \*Mr. J. D. Bernal . . . . . "Modern Crystallography and Organic Chemistry."
- Mr. E. D. McCallum . . . . . "The Economist in the Modern World."
- Dr. L. A. Sayce and Dr. P. L. Robinson . . . . . "Microchemical Analysis."
- \*Professor C. H. Desch, F.R.S. . . . . "The Chemical Properties of Metals."
- Dr. J. L. Burn . . . . . "Air Raid Precautions."
- \*Professor J. C. Drummond . . . . . "Chemical Aspects of some Modern Nutritional Problems."
- †Dr. J. A. Lovern . . . . . "By-Products of the Fish Industry."
- ‡Mr. M. A. W. Brown . . . . . "Shipyard Metals."
- \* Bedson Club. † Jointly with Soc. Chem. Ind. ‡ Inst. of Metals.

## NEW ZEALAND.

- Annual Conference with the New Zealand Institute of Chemistry: Mr. G. A. Lawrence—"Chemistry and Specialisation"; papers by Professor R. P. Worley, Dr. R. Gardner, Mr. R. Edwards, Mr. L. H. James, Mr. T. H. McCoombs, W. Donovan; Works visits.
- Joint Meeting with the Wellington Branch of the New Zealand Institute of Chemistry; exhibition of films.

## SOUTH WALES.

- §Captain W. H. Cadman . . . "Home Produced Motor Fuels, with special reference to the Scottish Shale Oil Industry."
- Dr. V. E. Yarsley . . . "The Rôle of Cellulose Acetate in Modern Plastics."
- \*Mr. J. H. G. Moneypenny . . . "Some Modern Developments in Stainless Steels."
- Dr. R. P. Linstead . . . "Some Recent Discoveries among Natural and Synthetic Colouring Matters."
- †Professor I. M. Heilbron, D.S.O., F.R.S. "Lipochrome Pigments in Plants and Animals."
- \*Dr. C. J. Smithells . . . "Gases and Metals."
- Mr. J. Davidson Pratt, O.B.E. "The Defence of the Civil Population against Gas."
- †Dr. William Wardlaw . . . "Recent Progress in Inorganic Chemistry."

\* Institute of Metals Meeting. † Chemical Society Meeting.

§ Joint Meeting with Inst. Petroleum Technologists, S.W. Section.

## SOUTH YORKSHIRE.

- Mr. W. W. Stevenson . . . "A New Iodimetric Method for the Estimation of Inorganic Inclusions in Steel."
- Mr. W. A. Churchouse . . . "Electric Laboratory Furnaces."
- Mr. S. C. Turner . . . "The Use of Sodium Hexametaphosphate."
- Dr. A. D. Mitchell . . . "The Renaissance of Analysis."
- Sir Arnold Wilson, K.C.I.E., C.S.I., C.M.G., D.S.O., M.P. "The Work of the Parliamentary Science Committee."
- Joint Excursion with the Huddersfield Section to Worksop Priory, "The Dukeries," Ollerton and Edwinstowe.
- Visit to Grassmoor Colliery Coking Plant.
- Mr. G. W. J. Bradley . . . "Modern Coking Plant and Practice."
- Visit to Donnington Colliery Company's new Plant; and Brigg Beet Sugar Factory.
- Principal L. Orange, M.B.E. . . . "Chemical Warfare."
- Mr. W. W. Stevenson . . . "A Survey of Steelmaking, with special reference to the High Frequency Process."

The Conference of Hon. Secretaries of Local Sections was held on 20th June, 1936, at the Institute, the members being welcomed by Mr. H. Douglas Elkington, Vice-President. A report of the Conference was published in JOURNAL AND PROCEEDINGS, Part IV.

The President has visited the Huddersfield Section; Dr. A. E. Everest, Vice-President, the Belfast and Leeds Sections; Dr. Leslie H. Lampitt and Dr. P. Lewis-Dale, Members of Council, have visited the East Midland Section; Dr. Lewis-Dale has also visited the Manchester Section, and Dr. Gerald Roche Lynch,

Member of Council, the Cardiff Section; the Registrar, the Liverpool Section; and the Assistant Secretary, the Edinburgh Section.

The Council will submit a proposal at the Annual General Meeting to provide for the election of a District Member of Council for the area covered by the East Midlands and South Yorkshire Sections. The East Midlands Section includes most of Derby, Nottingham and Leicester, the Parts of Holland and the Division of Kesteven (Lincolnshire). The South Yorkshire Section includes Chesterfield, Worksop, and the Lindsey Division of Lincolnshire.

#### 7. THE NOMINATIONS, EXAMINATIONS AND INSTITUTIONS COMMITTEE.

The Nominations, Examinations and Institutions Committee (the Council in Committee) has held 10 meetings and has reported on 823 applications for Studentship, Examination and Membership, in addition to many enquiries in connexion with training for admission to the Associateship and Fellowship.

Many candidates have been interviewed orally for the Associateship and Fellowship by Sub-Committees and Local Interviewing Committees, and the Council is specially indebted to the Advisory Committee in India, and its Honorary Secretary, Dr. Gilbert J. Fowler, for assistance in connexion with enquiries and applications from that Empire.

Applications for Studentship and Membership are summarised below:—

*Applications for Admission to Studentship, including readmission*

Accepted .. .. .. .. .. ..	234
Declined .. .. .. .. .. ..	4
	— 238

*Applications for Admission to Examination for the Associateship*

Accepted .. .. .. .. .. ..	108
Declined .. .. .. .. .. ..	4
	— 112

*Applications for Election (and re-election) to the Associateship*

Accepted .. .. .. .. .. ..	346
Declined .. .. .. .. .. ..	6
Referred for Examination .. .. .. .. .. ..	16
	— 368

*Applications for Admission to Examination for the Fellowship*

Accepted .. .. .. .. .. ..	31
----------------------------	----

*Applications from Associates for election to the Fellowship*

Accepted .. .. .. .. .. ..	61
Declined .. .. .. .. .. ..	3
	—
<b>64</b>	
<i>Applications from Non-Associates for election to the Fellowship</i>	
Accepted .. .. .. .. .. ..	8
<i>Applications for re-election to the Fellowship</i>	
Accepted .. .. .. .. .. ..	2
	—
<b>TOTAL</b> .. .. .. .. .. ..	<b>823</b>
	—

**EXAMINATIONS.**—Examinations were held in April and September, 1936, and in January, 1937. The entries and results are here summarised:—

**SUMMARY OF RESULTS.**

<i>Associateship</i>		<b>EXAMINED.</b>	<b>PASSED.</b>
<i>General Chemistry</i>	.. .. ..	158	69
<i>Fellowship</i>			
Branch A. Inorganic Chemistry	..	2	1
Branch B. Physical Chemistry	..	—	—
Branch C. Organic Chemistry	..	5	3
Branch D. Biochemistry	.. ..	1	—
Branch E. Chemistry (including Microscop) of Food and Drugs, and of Water	.. ..	18	8
Branch F. Agricultural Chemistry	..	1	—
Branch G. Industrial Chemistry	..	8	4
		—	—
		<b>193</b>	<b>85</b>
		—	—

In the corresponding summary for 1935–36, the number of candidates examined for the Associateship was 110, of whom 52 passed, and the total number of candidates examined for the Associateship and the Fellowship was 155, of whom 81 passed.

The Council is indebted to the following Universities and Colleges for the use of laboratories and for facilities afforded in connexion with Examinations: Imperial College of Science, London; The University, and the College of Technology, Manchester; The University, Leeds; Central Technical College, Birmingham; Heriot-Watt College, Edinburgh; Royal Technical College, Glasgow; Leeds College of Technology; City of Liverpool Technical College; Blackburn Technical College; Northern Polytechnic, London; London School of Hygiene and Tropical Medicine; and also to Mr. William Bacon, for similar facilities.

The thanks of the Council are accorded to the Board of Examiners and to the Examiners in special subjects, as well as

to the Assessors who have examined records of research, specifications for patents, etc., submitted by candidates for the Fellowship.

**EXAMINERS.**—Dr. Joseph Kenyon, F.R.S., has been appointed as Examiner in General Chemistry for the Associateship, in the place of Dr. O. L. Brady, whose term of office in that capacity has been completed; and Dr. G. D. Elsdon has been appointed Examiner in Branch E—The Chemistry, including Microscopy, of Food and Drugs, and of Water—for the Fellowship, in place of Mr. S. E. Melling, who has completed his term of office.

**STUDENTS.**—The Council have found it necessary to remove the names of 73 Students from the Register for non-compliance with the Regulations.

**REGULATIONS.**—The Regulations were reprinted, with some verbal alterations, in May, 1936.

**INSTITUTIONS.**—The Coventry Technical College, the Robert Gordon's Technical College, Aberdeen, and Doncaster Technical College have been added to the list of Institutions recognised by the Council of the Institute for training candidates for admission to the Associateship.

**AWARDS.**—With the concurrence of the Society of Maccaebaeans, the donors of the Meldola Medal, two Medals will be awarded for 1936, namely, to Dr. Edward David Hughes, whose research work has been carried out at University College, London, and to Dr. Alexander Robertus Todd, whose work was carried out at the Universities of Glasgow, Frankfort, Oxford and Edinburgh.

The Sir Edward Frankland Medal and Prize for 1936 has been awarded to Arthur Walter Lewis, a Registered Student of the Institute at Merchant Venturers' Technical College, Bristol, for an Essay on Chemical Science and the Man-in-the-Street.

#### 8. APPOINTMENTS COMMITTEE.

The Council has reviewed the principles which should determine the circumstances in which the Institute is justified in intervening in matters relating to appointments for chemists. The Council holds that the Institute should not intervene officially in any question concerning relations between a chemist

and a private employer or an industrial concern, except where the public interest might be involved; but has authorised the executive officers of the Institute to continue, as they have done in the past, to give general advice to members on such matters, and to use their discretion as to whether questions concerning public appointments should be brought before the Appointments Committee. The Council reaffirms the view that the Institute should, so far as possible, discourage Local Authorities from offering professional chemical work to tender, and that the executive officers should bring to the notice of the Appointments Committee cases in which it is alleged that routine work is being undertaken for Local Authorities by State-aided institutions, or the analysis of routine samples, or consulting work, as distinct from research work, is alleged to be undertaken by such institutions, except in those cases where the institutions are known to maintain the only laboratories adequately equipped to carry out the work.

**APPOINTMENTS REGISTER.**—A Report on the working of the Appointments Register was published in *JOURNAL AND PROCEEDINGS*, Part VI. The number of Fellows and Associates known to be out of work at the present time is 97 (approximately 1·4 per cent.). The Officers of the Institute are anxious to hear from Fellows and Associates of any suitable vacancies for qualified chemists, in order that no opportunity for helping members to obtain employment may be overlooked.

#### 9. PUBLICATIONS AND LIBRARY COMMITTEE.

The *JOURNAL AND PROCEEDINGS* has been published in six Parts.

Part I contains a précis of Mr. E. R. Andrews' address on "Chemistry in Local Government Administration" (18th Streatfeild Memorial Lecture), given in 1935.

The following monographs have been issued during the year:—

"Protection against Toxic Gases in Industry,"—a lecture given by Mr. J. Davidson Pratt, O.B.E., before the London and South-Eastern Counties Section.

"An Experiment in Co-operative Research in the Cotton and Other Textile Industries,"—the 9th Gluckstein Memorial Lecture, given before the Institute, by Dr. Robert H. Pickard, F.R.S., President.

"A Chapter in the Chemistry of Essential Oils,"—the 19th Streatfeild Memorial Lecture, given before the Institute by Professor John Read, F.R.S.

"Our Money,"—given before the Manchester and District Section by Dr. W. H. Coates.

On 14th May last, by the kind invitation of the Council of the Chemical Society, many Fellows, Associates and Registered Students of the Institute attended a lecture on "Modern Chemical Nomenclature," given by Dr. Clarence Smith, Editor of the Journal of the Chemical Society. The lecture was subsequently published and reprints were issued to Members and Students of the Institute.

The Council is glad to be able to announce that two lectures will be given by Professor Eric K. Rideal, M.B.E., F.R.S., on "Recent Work on Films,"—the first on 12th March.

The Committee also hopes to publish shortly a lecture by Dr. Samuel Glasstone, on "Oxidation-Reduction Potentials,"—given before the London and South-Eastern Counties Section and to be given before the East Midlands Section in March.

Facilities have been afforded to the Chairman of the Decimal Association to submit his views on the subject of Metric Reform, for the consideration of the Fellows and Associates of the Institute. The correspondence on the subject has not revealed any general enthusiasm, but it is suggested that a further opportunity for discussion might be afforded by one or more of the Local Sections.

**REGISTER.**—A new edition of the Register was published in November, 1936.

**LIBRARY.**—The thanks of the Council are accorded to authors, publishers, and others, who kindly presented books and journals to the Library of the Institute.

Under the Constitution of the Chemical Council, Fellows, Associates and Registered Students now enjoy the full use of the Library of the Chemical Society.

The officers of the Institute are also authorised to issue Requisition forms to Fellows and Associates desiring to use the Science Library, South Kensington.

The collection of lantern slides of the Institute continues to be useful to members for illustrating lectures on the history of chemistry.

#### 10. NATIONAL CERTIFICATES IN CHEMISTRY.

Reports on National Certificates in Chemistry for England and Wales, for Scotland, and for Northern Ireland, have been published in the JOURNAL AND PROCEEDINGS, with abstracts of reports of the Assessors.

#### 11. PEDLER RESEARCH SCHOLARSHIP.

Mrs. Janet W. Matthews, Fellow, has continued her work on microchemical analysis at the Imperial College of Science and Technology, and her tenure of the scholarship terminated at close of 1936.

#### THE CHEMICAL COUNCIL.

In JOURNAL AND PROCEEDINGS, Part III, Professor Jocelyn F. Thorpe, F.R.S., contributed an article entitled "Industry and the Profession of Chemistry," dealing with the work and aims of the Chemical Council and with the debt of industry to chemical science, indicating the opportunity afforded to those who reap benefit from the services and discoveries of chemists, to contribute to a fund for the more adequate publication of new knowledge and the maintenance of a Chemical Library.

The first Annual Report of the Chemical Council was published in JOURNAL AND PROCEEDINGS, Part VI, giving particulars with regard to the progress of the fund and the work of the Council in effecting economies in publications and making provision for the maintenance of the Library.

*29th January, 1937.*

*Institute of Chemistry,  
30, Russell Square,  
London, W.C.1.*

# THE INSTITUTE OF CHEMISTRY OF GREAT BRITAIN AND IRELAND.

*Founded 1877.*

*Incorporated by Royal Charter, 1885.*

**STATEMENT OF RECEIPTS AND EXPENDITURE FOR THE YEAR ENDED 31ST DECEMBER, 1936.**

## GENERAL ACCOUNT

1935 £ s. d.	RECEIPTS.		1936 £ s. d.	1935 £ s. d.	EXPENDITURE.		1936 £ s. d.
<i>Subscriptions—</i>							
3,327 17 0	Fellows .. .. .. .. ..		3,436 8 6	668 1 6	<i>Printing, Stationery, etc.—</i>		
6,559 17 0	Associates .. .. .. .. ..		6,834 3 8	435 10 1	Journal, Part VI, 1935, Parts I-V, 1936	648 5 9	
427 10 0	Students .. .. .. .. ..		424 17 6	257 7 11	Other Printing, Stationery, etc. .. ..	441 1 3	
<b>10,315 4 0</b>			<b>10,695 9 8</b>	502 12 11	<i>Postage—</i>		
<i>Dividends and Interest—</i>							
Gross .. .. (1,146 18 7)	.. .. .. .. ..		1,115 19 0	938 14 11	Journal and Lectures .. .. .. ..	257 14 9	
Less Tax .. .. (220 5 4)	.. .. .. .. ..		179 3 4	239 16 9	Ordinary .. .. .. ..	493 10 7	
926 13 3				4,791 19 6	Register (and Postage £207 1 6) .. ..	831 6 7	
35 8 4	Sale of Publications .. .. .. .. ..			251 18 0	Rent, Rates, Taxes, Insurance and Telephone .. ..	952 9 3	
10 9	Sundry Receipts .. .. .. .. ..			228 15 10	Repairs, House and Furniture .. .. ..	218 15 3	
5 5 0	Received for Use of Rooms .. .. .. .. ..			Salaries, Wages and Gratuities .. .. .. ..	4,997 4 8		
<b>1,198 1 0</b>	Examination and Assessment Fees .. .. .. .. ..		<b>1,365 0 0</b>	251 18 0	Advertisements .. .. .. ..	270 10 6	
285 10 0	Appointments Register .. .. .. .. ..			228 15 10	Gas, Water, Light, Power and Fuel .. .. ..	238 8 9	
113 4 9	Advertisements in Journal .. .. .. .. ..			842 7 0	Examiners, Assessors and Assistants .. .. ..	787 1 4	
75 0 0	National Certificates (England and Wales) A/c. .. .. .. .. ..			167 1 4	Apparatus and Materials .. .. .. ..	176 13 4	
25 0 0	National Certificates (Scotland) A/c. .. .. .. .. ..			250 0 0	Institute Library .. .. .. ..	31 1 9	
<b>12,979 17 1</b>			<b>13,445 11 9</b>		<i>Payment out of Taxed Income to—</i>		
<i>Balance, 1st January, 1936</i>							
— — —			3,445 8 3	498 11 10	Chemical Society, under Deed .. .. .. ..	646 10 0	
<i>Extraordinary Receipts—</i>							
<i>Funds for Investment—</i>							
889 7 0	Entrance Fees .. .. .. .. ..		862 1 0	456 10 10	Less Tax .. .. .. ..	130 12 6	
142 6 0	Life Composition Fees .. .. .. .. ..		78 15 0	212 12 11	Local Sections .. .. .. ..	515 17 6	
— — —	Received from the University of London; Party Wall Agreement .. .. .. .. ..		940 16 0	10 10 0	Section Secretaries' Conference .. .. .. ..	571 7 7	
3,202 1 9	Repayment of £3,202 1s. 9d. 5% N.Z. Stock .. .. .. .. ..		160 0 0	83 7 0	Donations .. .. .. ..	59 9 9	
8 8 0	Fees Retained .. .. .. .. ..		1,100 16 0	110 8 4	Miscellaneous .. .. .. ..	85 18 0	
<b>£17,221 19 10</b>					Officers' Travelling Expenses .. .. .. ..	98 17 8	
					Auditors' Honorarium .. .. .. ..	33 10 1	
					Lectures and Lantern Slides .. .. .. ..	42 0 0	
					Staff Assurance .. .. .. ..	233 18 4	
					Frankland Medal Award .. .. .. ..	215 2 3	
					Office Equipment .. .. .. ..	10 10 0	
					Members of Council Travelling Expenses .. .. .. ..	51 2 6	
						661 4 8	
						<b>12,923 2 1</b>	
<i>Extraordinary Expenditure—</i>							
					Repayment of Bank Overdraft .. .. .. ..	— — —	
					Premium on Redemption Policy .. .. .. ..	110 8 4	
					Investments (including re-investment of £3,202 1 9 5% New Zealand Stock Redeemed in 1935) .. .. .. ..	4,068 6 2	
					Fees Returned (1928-34 A/cs.) .. .. .. ..	102 7 6	
					Co-operation Expenses .. .. .. ..	— — —	
					Charter Jubilee Expenses .. .. .. ..	— — —	
					Due from Gluckstein Memorial A/c. .. .. .. ..	8 2 5	
					Due from Meldola Library Fund .. .. .. ..	1 0 7	
					Balance at Bank, 31st December, 1936 .. .. .. ..	786 15 11	
					<b>£18,000 4 0</b>		

Balances amounting to £603 2s. 4d. are also held in Australasian currencies in Sydney and Wellington.

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**STATEMENT OF ASSETS AND LIABILITIES, 31st December, 1936.**

<b>1935.</b>										<b>1936.</b>									
Value £ s. d.	Cost £ s. d.	Cost £ s. d.	Value £ s. d.	Subscriptions received in advance— £ £ £ s. d.	1935. £ s. d.	Cost £ s. d.	Cost £ s. d.	Value £ s. d.	Subscriptions received in advance— £ £ £ s. d.	1936. £ s. d.									
365 0 0	£500 Great Western Railway 2½%	384 16 3	372 10 0	£51 9 0 Fellows ..	£39 18 0				£51 9 0 Fellows ..	£39 18 0									
	Debenture Stock ..	..	..	67 15 3 Associates ..	75 10 6				67 15 3 Associates ..	75 10 6									
517 10 0	£500 London Midland and Scottish Railway 5% Redeemable Preference Stock ..	503 0 0	530 0 0	4 0 0 Students ..	2 7 6				4 0 0 Students ..	2 7 6									
1,660 0	£2,000 London Midland & Scottish Railway 4% Preference Stock ..	1,843 15 1	1,810 0 0	240 19 6 Application Fees in abeyance (1936) less deductions for Fees Forfeited ..	364 2 5				45 3 0 Application Fees in abeyance (1934-36) less deductions for Fees Forfeited ..	364 2 5									
4,240 0	£4,000 now increased to £13,000 3½%	13,554 16 8	13,682 10 0	75 0 0 Rent outstanding ..	45 3 0				75 0 0 Rent outstanding ..	45 3 0									
1,930 0	£2,000 Local Loans 3%	1,843 19 0	1,927 10 0	67 1 0 Accounts rendered and due ..	75 0 0				67 1 0 Accounts rendered and due ..	75 0 0									
749 0	£700 South Africa 3½%	1953-73 ..	670 7 0	735 0 0	178 0 9				30,519 19 8 Surplus Assets over Liabilities, 31st December, 1936 ..	178 0 9									
9,643 12 6	£8,950 Conversion Loan 3½% after† ..	1961 or ..	—	—	..				..	..									
1,060 0	£1,000 Port of London Authority 3½% Registered Stock, 1965-75 ..	1,033 4 9	1,045 0 0	29,335 6 6	31,976 12 2				29,622 10 0	32,756 14 5									
1,020 0	£1,000 Canada Loan, 3½% 1950-55 ..	973 17 0	1,020 0 0																
1,110 0	£1,000 Canada Loan, 4% 1953-58 ..	1,090 3 0	1,120 0 0																
1,150 0	£1,000 South Africa Loan, 5% 1945-75 ..	1,136 8 0	1,130 0 0																
1,145 0	£1,000 Southern Railway Co. 5% Redeemable Guaranteed Preference Stock, 1957 ..	1,174 6 2	1,160 0 0																
1,115 0	£1,000 New Zealand Loan, 5% 1949 ..	1,141 8 0	1,130 0 0																
—	£4,000 Australia 3½% Stock, 1964-74 ..	3,985 5 7	3,960 0 0																
25,705 2 6																			
3,445 8 3	Balance as at 31st December, 1936 ..	..	..	786 15 11															
—	Due from Gluckstein Memorial A/c ..	..	..	8 3 5															
—	Due from Meldola Library Fund ..	..	..	1 0 7															
122 17 0	Suspense A/c.: Fees in abeyance as at 31st December, 1936 ..	..	..	364 2 5															
1,744 11 8	Redemption Fund Premiums* ..	..	..	1,855 0 0															
53 8 0	Sundry Accounts due ..	..	..	119 2 0															
£31,071 7 5				£32,756 14 4	£31,071 7 5														

† Now Sold and re-invested in 3½% War Loan.

\* To realise £50,000 in March, 2010.

This statement does not include the value of the lease and premises of the Institute, furniture, library, apparatus, etc.

The above Investments are shown at cost; and at market value on 31 December, 1936.

**Subscriptions and Fees Paid and Retained in  
Australia and New Zealand.**

		Receipts.	Expenditure.
	£ s. d.	£ s. d.	£ s. d.
By Balance, 1st January, 1936		379 18 3	
Subscriptions—			
Fellows .. ..	77 14 0		
Associates .. ..	139 0 3	216 14 3	
Entrance Fees .. ..	.. ..	19 19 0	
Assessment Fees .. ..	.. ..	10 10 0	
Deposit Interest .. ..	.. ..	1 17 6	
Miscellaneous .. ..	.. ..	13 11	
To Section Grant .. ..	.. ..		20 0 0
Fee returned .. ..	.. ..		5 5 0
Bank Charges .. ..	.. ..		1 5 7
Balance at Bank, 31st December, 1936			
Deposit .. ..	573 15 6		
Current .. ..	29 6 10		603 2 4
		<hr/> <hr/> <hr/>	<hr/> <hr/> <hr/>
		£629 12 11	£629 12 11
		<hr/> <hr/> <hr/>	<hr/> <hr/> <hr/>

**BENEVOLENT FUND ACCOUNT**, for the year ended 31st December, 1936.

## **Current Account.**

Capital Account : 1936.

£	s.	d.		£	s.	d.		£	s.	d.		£	s.	d.
18	2	7	Balance, 1st January, 1936	..	..	192	19	7				..	..	..
174	17	0	Donations	..	..	192	1	9				192	19	7
—	—	—	Sale of Stock	..	..	1,292	2	0				Balance	..	..
—	—	—	Dr. Balance 31st December, 1936	..	..	17	10	3						
				£1,694	13	7		£192	19	7				
				£1,694	13	7		£192	19	7				

Loans Account : 1920-1936.

## BENEVOLENT FUND: Capital Account.

Investments held at 31st December, 1936.

1935.		Value.		Cost.		Value.			
		£	s.	d.	£	s.	d.		
1,145	0	0	£1,000 Consols 4%	..	..	..	..		
1,293	0	0	£1,200 Convention Loan 3½%*	..	..	..	..		
510	0	0	£500 Canada, 3½%, 1950-55	..	..	..	..		
530	0	0	£500 Port of London Authority 3½% Registered Stock, 1965-75	..	..	..	..		
386	0	0	£400 Local Loans 3%	..	..	..	..		
557	10	0	£500 New Zealand 5%, 1949	..	..	..	..		
—	—	—	£1,200 War Loan 3½%	..	..	..	..		
—	—	—	£400 Australia 3½% Stock, 1964-74	..	..	..	..		
192	19	7	Balance at 31st December, 1935: Current at Bank	—	—	—	—		
<i>Less</i>		<i>Amount over-invested during 1936</i>		..	..	..	..		
<b>£4,614</b>		<b>9</b>		4,715	13	6	4,767	0	0
				—	—	—	17	10	3
<b>£4,715</b>		<b>13</b>		<b>£4,749</b>	<b>9</b>	<b>9</b>			

\* Sold and re-invested in War Loan 3½%.

**Sir Alexander Pedler Scholarship Account:**

**31st December, 1936.**

	Receipts. £ s. d.	Expenditure. £ s. d.
By Balance, 1st January, 1936 .. . . . .	285 17 10	
Dividends and Interest .. . . . .	197 7 0	
Income Tax recovered .. . . . .	67 17 10	
Sale of £2,600 3½% Conversion Loan† .. . . . .	2,799 11 6	
To Payments to Scholar .. . . . .		150 0 0
Expenses .. . . . .		8 19 0
Purchase of £2,600 3½% War Loan .. . . . .		2,808 6 0
<i>Balances, 31st December, 1936—</i>		
On Deposit .. . . . .		370 0 0
Current at Bank .. . . . .		13 9 2
	£3,350 14 2	£3,350 14 2

† Re-invested in War Loan 3½%.

*Securities held at 31st December—*

	Cost. £ s. d.	Value. £ s. d.
£100 Great Western Railway 5% Con. Preference Stock* .. .	94 0 0	124 10 0
£900 Royal Mail Steam Packet Ordinary Stock* .. .	787 10 0	— — —
£2,600 War Loan 3½% .. . . . .	2,808 6 0	2,736 10 0
£500 Port of London Authority 3½% 1965–75 .. . . . .	516 17 11	522 10 0
£500 Southern Railway Company 5% Redeemable Guaranteed Preference Stock, 1957 .. . . . .	587 4 10	580 0 0
£500 New Zealand 5% Loan, 1949 .. . . . .	570 14 6	565 0 0
£300 4% Consols .. . . . .	323 1 0	337 10 0
£500 Canada 3¼% Loan, 1950–55 .. . . . .	486 18 6	510 0 0
£200 Local Loans 3% .. . . . .	184 18 6	192 15 0
	£6,359 11 3	£5,568 15 0

(\* Value when bequeathed.) The total value of the original legacy was £4,785 16s. 2d. net.

**Streatfeild Memorial Lecture Fund:**  
**31st December, 1936.**

£200 3½% War Loan. Value £210 10s. 0d.

	£ s. d.		£ s. d.
Balance .. ..	55 10 4	Lecture Expenses ..	17 1 7
Dividends and Interest .. ..	6 8 8	Balance on Deposit ..	44 17 5
	<u>£61 19 0</u>		<u>£61 19 0</u>

**Meldola Library Fund:**  
**31st December, 1936.**

£75 3¼% Australia Loan, 1964–74. Value £74 5s.

	£ s. d.		£ s. d.
Balance .. ..	28 2 1	Purchase of £75, 3¼% Australia Loan, 1964–	
Proceeds of Sale of Gold .. ..	45 10 2	74 .. .. ..	74 14 3
Medal .. ..	1 5		
Deposit Interest .. ..	1 0 7		
Dr. Balance paid by Institute .. ..	<u>£74 14 3</u>		<u>£74 14 3</u>

**S. M. Gluckstein Memorial Lecture Fund:**  
**31st December, 1936.**

£240 3½% Conversion Loan: Cost £198. Value £254 14s. 0d.

	£ s. d.		£ s. d.
Balance .. ..	15 6 8	Lecture Expenses ..	30 1 3
Dividends and Interest .. ..	6 11 2		
Dr. Balance due to Institute .. ..	8 3 5		
	<u>£30 1 3</u>		<u>£30 1 3</u>

### REPORT OF THE AUDITORS.

We have examined the books and accounts of the Institute of Chemistry for the year ended 31st December, 1936, and have compared with the vouchers the entries therein, and certify that the following statements are correct as shown by the books.

We certify that we have seen the certificates for the registered Stocks and we have received from the Bank of England, the Westminster Bank, Ltd., the Bank of Montreal, Ltd., and the Commonwealth Bank of Australia, Ltd., certificates that they hold on behalf of the Institute, the Stock investments as shown in the statement of assets and liabilities.

The subscriptions and fees paid and retained in Australia and New Zealand are not included in the Statement of Receipts and Expenditure and of Assets and Liabilities at 31st December, 1936.

DAVID HENDERSON }  
J. Y. FINLAY } *Chartered Accountants.*

J. HY. LANE }  
WALTER C. HANCOCK } *Hon. Auditors,*  
} 1936-37

11th January, 1937.

### BENEVOLENT FUND.

I hereby report that I have also examined the books and accounts of the Benevolent Fund and certify the statement as correct and in accordance therewith.

DAVID HENDERSON, *Chartered Accountants*

11th January, 1937.

## Proceedings of the Council.

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**Council Meeting, 22nd January.**—The President reported on further correspondence with the head of the Air Raid Precautions Department of the Home Office, whose attention had been directed to the willingness of the Local Sections to assist local authorities in matters relating to Air Raid Precautions.

Professor H. V. A. Briscoe was appointed one of the representatives of the Institute on the Technical Committee of the British Standards Institution dealing with Scientific Glassware and Laboratory Ware, in the place of Professor G. G. Henderson, F.R.S., who has resigned from the Committee.

A letter was submitted from the East Midlands Section expressing the hope that the Birmingham and Midlands Section would consider the desirability of dropping the term "and Midlands" from its title, in order to avoid confusion between the two Sections. Mr. Calder was asked to raise the matter with the Birmingham and Midlands Section.

The Council received from the Wellcome Foundation, Ltd., a replica of the Commemorative Medal struck in honour of the late Dr. F. B. Power, formerly Director of the Wellcome Chemical Research Laboratories, for which the Council passed a vote of thanks.

Dr. Edward Ardern was appointed to represent the Institute at the Health Congress of the Royal Sanitary Institute, to be held in Birmingham from 12th to 17th July next, on which occasion a special Section will be arranged to deal with the question of sewage disposal.

The President reported that the Administrators of the Beilby Memorial Fund had announced awards of one hundred guineas each to Dr. Bernard Scott Evans and Dr. William Harold Juggins Vernon.

The President submitted a report on the work of the Censors during the past year, recalling that the Council had been obliged, in accordance with By-law 57, to remove the name of an Associate for misconduct. Other complaints investigated and dealt with were of a comparatively less important nature.

The Council then proceeded to make arrangements for the nomination of the new Council. For the first time for many years no nomination was received under the provisions of By-law 56.

Thirteen Members of Council now in office, being eligible, were nominated for re-election and, in addition, the following:— Dr. O. L. Brady, Mr. W. J. A. Butterfield, Dr. Francis H. Carr, C.B.E., Dr. H. E. Cox, Mr. W. A. Damon, Mr. F. G. Edmed, O.B.E., Dr. A. G. Francis, Mr. W. Roscoe Hardwick, Mr. J. R. Johnson, Rev. Canon T. J. Kirkland, Dr. Hamilton McCombie, D.S.O., Mr. B. G. McLellan, Mr. F. M. Potter, O.B.E., Dr. R. E. Slade, Mrs. I. Smedley-MacLean, Dr. D. F. Twiss and Mr. A. W. M. Wintle.

The following were nominated from whom four are to be elected as Censors:—Sir G. Christopher Clayton, C.B.E., Mr. Lewis Eynon, Sir Gilbert T. Morgan, O.B.E., F.R.S., Professor Robert Robinson, F.R.S., Professor Jocelyn F. Thorpe, C.B.E., F.R.S.

Messrs. C. A. Bassett and J. Arthur Heald were appointed Scrutineers to report on the ballot.

(Voting papers for the election of Officers and Members of Council and Censors must be returned to the Secretary so that they be received at the Institute not later than 8 p.m. on Saturday, 27th February, and proxies so that they be received not later than 8 p.m. on Friday, 26th February.)

Reports were received from the Standing Committees. The Finance and House Committee reported that the accounts for the year 1936 had been audited and that statements had been prepared for inclusion in the Report of Council. It was agreed to subscribe 25 guineas to the British Standards Institution and £25 to the Parliamentary Science Committee.

The Benevolent Fund Committee reported an increase in contributions over those received up to the same date in 1936, and mentioned that the commitments for regular payments to widows, orphans, etc. during 1937 were estimated at £990 10s. New cases for consideration include the widow of an Associate with nine children and very small means.

The Publications Committee reported that Professor Rideal would be able to give his promised lectures on "Recent Work on Films" in March or April.

The Nominations, Examinations and Institutions Committee reported on a large number of applications for Studentship,

Associateship, Fellowship, etc., and recommended the appointment of Dr. G. D. Elsdon as Examiner in Branch E.: The Chemistry (including Microscopy) of Food and Drugs and of Water. Dr. Elsdon was appointed.

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**Council Meeting, 29th January.**—The Council received replies from members nominated for election to the Council, and the acceptance by Dr. G. D. Elsdon of the appointment as Examiner in Branch E: the Chemistry (including Microscopy) of Food and Drugs, and of Water.

Further communication was received from the British Management Council stating that it had been decided to form a Permanent Council to ascertain and represent both nationally and internationally the views of those concerned in management in Great Britain, to co-operate with similar bodies in other countries, and to act as the representative of its constituent members in international congresses concerned with management.

Correspondence was submitted from Professor G. R. Clemo and from Mr. J. A. Stevenson referring to the brochure recently issued by the Science Masters' Association on "The Teaching of General Science."

The correspondents pointed out that the Sub-Committee of the Association had suggested that 453 periods of 45 minutes each, devoted to science in the curriculum of a boy from his first science lesson to School Certificate stage, should be allotted as follows:—

Physics .. ..	197	43·5% of total.
Biology .. ..	159	35·1% of total.
Chemistry .. ..	97	21·4% of total.

The correspondents suggested that the above syllabus was overweighted as to physics, and that chemistry did not receive an adequate share of time. The importance of chemistry as a basic science and its possibilities as an educative subject were overlooked.

The President called upon Professor Briscoe, who had been asked to consider the matter, to express his views on the brochure referred to, and a general discussion ensued (see pp. 3-5).

The President recalled that the matter had been before the Council in 1934. The proceedings were then reported in the JOURNAL, and summarised in Part V of that year, when it was stated that the Council had not arrived at a unanimous decision.

Before proceeding further with the matter, the Council decided that it should be again open for discussion by the Fellows and Associates, and that they be invited to contribute their views for inclusion in the JOURNAL AND PROCEEDINGS.

The Report of Council for the year 1936–37, prepared under the supervision of the Publications Committee, and the Financial Statements for the year 1936, duly audited, were approved for issue to the Fellows, Associates and Registered Students.

The Council received the Report of the Nominations, Examinations and Institutions Committee embodying the Report of the Board of Examiners on the January Examinations, and a recommendation regarding the award of the Meldola Medal, to which reference is made in the Annual Report.

The Council also received the report of the Assessor on the award of the Sir Edward Frankland Medal and Prize, which is recorded in the Annual Report.

Preliminary consideration was given to the production of the ninth edition of "Official Chemical Appointments," and Members of Council were asked to offer suggestions for the improvement of the publication.

## Local Sections.

*[The Institute is not responsible for the views expressed in papers read, or in speeches delivered, during meetings and discussions.]*

**Aberdeen and North of Scotland.**—A meeting of the Section was held in the Chemistry Department, Marischal College on 29th January,—Professor J. Hendrick in the Chair.

A paper was read by Mr. S. R. Edge entitled

### “Scientific Control in Papermaking.”

Mr. Edge gave an account of the various types of problems confronting a research worker in the papermaking industry before scientific control became possible. The methods adopted to avoid the spasmodic precipitation of pitch, problems connected with engine sizing, the control of acidity in paper, methods of colour measurement to ensure uniformity of production over comparatively long periods of time, and the methods adopted in attempting to determine the exact condition of the cellulose in samples of wood or rag pulp, were dealt with in some detail.

Mr. Edge concluded by indicating the various stages in the manufacture of paper, and indicated the points at which scientific control was actually practised or was desirable.

**Bristol and South-Western Counties.**—Mr. F. E. Needs presided over a meeting of the Section held in the Chemical Department of the University of Bristol, on 21st January, when a lecture was given by Mr. E. B. Anderson on—

### “Butter Fat.”

Mr. Anderson first explained that very little was known of the origin of the butter fat in the udder, especially in the case of those fatty acids with a low number of carbon atoms.

He discussed these fatty acids in detail showing how the percentages of the different members varied under different conditions of feeding, and dealt with the conditions affecting the less known constituents of butter fat, such as lecithin, cholesterol, carotene and vitamin A.

Turning from the purely chemical side, the lecturer next dealt with the physical condition of butter fat in milk and explained, in detail, various theories concerning the formation of the cream layer and the effects of various processes on this.

In conclusion, Mr. Anderson spoke of the numerous theories that have been devised to explain the formation and properties of the membrane which surrounds the globules of fat in milk.

A discussion followed in which the Chairman and Messrs. Lewis, Ellis, Tribley, Walker and Wild participated.

**Birmingham and Midlands.**—On 18th November, 1936, Dr. J. D. Bernal, of Cambridge, gave an address on:—

### **"Science at the International Peace Congress,"**

of which the following is a précis—

During the last few years the shadow of war in Europe has caused anxiety to many people. The League of Nations—attended by the official representatives of governments—failed to secure peace, so the International Peace Congress was organised, and met in Brussels in the summer of 1936, to bring together those who ardently desired peace and were prepared to work for it. The five thousand people (from about thirty different countries) who attended, grouped themselves into various Sections and Sub-Sections, and each of these proceeded to draft a syllabus for its own use in studying the causes, processes and prevention of war.

In the Science Sub-Section, of which Dr. Bernal was elected Chairman, the majority of the members did not adopt the isolationist attitude of the pacifist, but thought it better to remain in the community and to work hard among members of their own professional or trade organisations, in the interests of peace, here and now, while there is the possibility of doing something to avert war.

The scientist knows the objective effects of war; he knows, too, that when war comes he has not the liberty to pursue his own researches—his life work—because his activities probably have to be turned in other directions. Knowing all this, and realising what science can do for the benefit of humanity and what disasters can accrue if it be used in the other direction, scientists were urged to apply their training to work out by study what are the causes and courses of modern war, by search of published information to find out what is being done in various countries

in preparation for war, and to combat the pseudo-scientific arguments put forward to support war.

In the discussion, one speaker remarked that the lecturer had failed to crystallise suggestions for avoiding war, but realised that the nebulous nature of the report was due to the fact that it was an account of the beginning of preliminary work, and that much study and hard thinking will be necessary before concrete proposals could be reached.

Dr. Bernal suggested that scientists in the Midlands should form a committee to work in co-operation with the International Peace Campaign.

The hope was expressed that another meeting of Midland chemists would be called further to consider this suggestion.

On 2nd December, 1936, Dr. H. A. Krebs, of Sheffield, lectured on

### **"The Oxidative Breakdown of Carbohydrates in the Living Cell."**

The breakdown of carbohydrates in living cells furnishes energy for the maintenance of life—such energy being obtained from two different types of chemical reaction, oxidation and fermentation. Oxidation, or respiration, is the combustion of organic foodstuffs by molecular oxygen, and fermentation the inter- or intramolecular oxido-reduction in which molecular oxygen is not involved. The chemical methods of study of oxidation and fermentation may be divided into two groups, the first dealing with the intermediate stages of the breakdown, and the second concerning itself with the nature of the enzymes which bring about these reactions. Thanks to the work of Harden, Embden and Meyerhof, the intermediate products of alcoholic fermentation (by yeast) and lactic fermentation (in muscle) are known fairly completely, but our knowledge of the intermediate stages of the oxidation of carbohydrate is less complete.

Recent experiments have shown that, as in the case of fermentation, intramolecular oxido-reductions play an essential rôle in the oxidative breakdown. In *Bacillus coli* for instance, glucose can be oxidised by fumaric acid in the absence of air, the fumaric acid being reduced to succinic acid while the glucose is oxidised. If air be admitted the succinic acid reacts with molecular oxygen to form fumaric acid. Succinic acid may thus

act as an oxygen carrier; the molecular oxygen does not act directly with the organic molecule but via the succinic and fumaric acids. Similar reactions occur in animal tissues: for instance, succinic acid is formed from pyruvic acid by intermolecular oxido-reductions, and, similarly, citric acid may be formed from malic and pyruvic acids.

Recent work by Warburg has thrown light on the mechanisms by which the transport of hydrogen is brought about in these oxidations. Two groups of catalysts have been identified; the active grouping of the first is an alloxazine derivative, and that of the second the amide of nicotinic acid. Double bonds in these groupings undergo reversible hydrogenation or dehydrogenation and act in this way as catalysts for the hydrogen transport. The alloxazine derivative is the active principle of vitamin B<sub>2</sub>. The physiological rôle of this vitamin can thus be described as that of a catalyst concerned with intramolecular oxido-reduction.

On 20th January, 1937, Lt.-Col. Sir Arnold Wilson, K.C.I.E., C.S.I., C.M.G., D.S.O., M.P., gave an account of

#### **"The Work of the Parliamentary Science Committee."**

After reference to the origin and constitution of the Committee, Sir Arnold explained its chief function was to provide facilities for learned and technical societies to keep in touch with current legislation, and, at the same time, for members of Parliament interested in, or concerned with scientific developments, to maintain contact with the appropriate scientific bodies when the House discussed matters in which science might play an important part.

He described the drafting of a Bill, and the various processes through which it has to pass before it can be placed on the Statute Book. He then spoke of ways and means of procuring the full discussion of a measure in some cases, and of avoiding lengthy discussion of other subjects on which the opinion of scientific societies was sufficiently unanimous to justify cutting short a debate. After indicating the stages at which the views of these societies may be most usefully gathered, and where, on the other hand, the societies themselves have the opportunities—through the Parliamentary Science Committee—of getting proper expression of their own ideas, he gave several instances in which useful amendments were secured by the

Committee, and then briefly discussed some of the matters which its members now have under consideration.

**Cardiff and District.**—A meeting of the Section was held on 10th December, at the University College, Cardiff,—Dr. J. H. Quastel presiding. A paper was read by Professor W. E. Garner on

### “The Decomposition of Solids.”

Professor Garner gave an account, illustrated by lantern slides, of researches conducted by himself and his pupils on this subject.

(It is hoped that a summary of the lecture may be received for publication in JOURNAL AND PROCEEDINGS, Part II.)

A social event, taking the form of a Scientific Conversazione, was held on 9th January at the Assembly Hall of the Technical College, Cardiff. The attendance of members was excellent, and the Section was able to entertain many visitors connected with business and industry in the area.

Exhibits and demonstrations were shown illustrating the varied activities of local chemists. In view of the fact that this area of South Wales is notable for the small number of chemists employed in its industries, it was surprising to find the considerable part which chemistry plays.

Details of some of the exhibits are here given—A collection of azo-dyes, shown by Mr. H. Ll. Bassett, arranged to show how the constitution of the two generators affects the colour of the dyestuff. An exhibit, by Dr. S. T. Bowden, of a number of those remarkable substances, free radicals, including a specimen of solid triphenylmethyl; and methods for the determination of surface tension.

Specimens of organic compounds exhibiting chromoisomerism, such as picrylaniline and picryl-*p*-toluidine, and X-ray rotation photographs of the two forms,—shown by Dr. N. M. Cullinane. (It was interesting to note that in spite of the great difference in the colour and appearance of the crystals of the two forms of picrylaniline, the X-ray photographs were identical. In the other case, however, the two modifications were shown to be chemical isomerides.)

The results of a thermal analysis of binary mixtures of diphenyl oxide and diphenyl sulphide, diphenyl sulphide and diphenyl selenide, and diphenyl selenide and diphenyl telluride are in harmony with the relationships between the elements oxygen, sulphur, selenium, and tellurium. Melting-point and

thaw-point diagrams for mixtures of diphenyl oxide and sulphide show that a continuous series of mixed crystals is not formed, the melting-point curve exhibiting a eutectic. The other mixtures mentioned above yield continuous series of mixed crystals.

The importance of micro-methods in practical biochemistry was illustrated by the exhibit of Mr. D. R. Davies. The extraordinary sensitivity of the test for phosphate, using ammonium molybdate and a reducing agent, was demonstrated. It was notable that change of reducing agent from hydroquinone to stannous chloride had a remarkable effect on the sensitivity of the test. The use of ceric sulphate for the micro-determination of reducing agents was explained.

A collection of organic derivatives of nitrogen, phosphorus, arsenic, and antimony was shown by Dr. W. Cule Davies, with the object of indicating similarities and differences in the behaviour of corresponding compounds.

Dr. J. F. J. Dippy, with the assistance of Mr. J. E. Page, exhibited a number of rhythmic phenomena, including Liesegang rings and periodic mineral formation, as in banded agate and fluorspar. Specimens showing rhythmic crystallisation of melts of organic compounds were of particular interest. These had been obtained by allowing thin films of the melts to crystallise spontaneously. The need of an air interface and of supercooling was demonstrated. Among the substances which give good results are salol, piperonal and, particularly, 3:5-dichloro-4-methyldiphenyl.

An apparatus was shown by Dr. D. P. Evans by means of which the *pH* of unbuffered solutions (e.g. pure water or dilute salt solutions) could be determined using a glass electrode.

Mr. S. U. Evans showed the apparatus and materials required for a graded series of laboratory experiments as used in the teaching of chemistry in the secondary school.

Illustrated by numerous samples and diagrams of the processes involved, the extraction from the natural sources and the synthesis of substances of medicinal value was the subject of a large exhibit by Mr. A. G. Fishburn.

An attractively arranged exhibit showing the products of the Powell Duffryn Associated Collieries was given by Dr. W. Idris Jones.

Mr. P. V. Lloyd showed a number of samples of pitches and methods for determining their suitability for use in the briquetting of coal.

Mr. L. T. Lowe chose as his subject, "The importance of lime in the soil," which was illustrated by examples of plants and grasses and by photographs. Simple tests by means of which the reaction of the soil could be determined were demonstrated.

It was of great interest to find the considerable importance of clay, shale, chalk and limestone to the industries of the area. Mr. F. F. Miskin exhibited a large number of locally made products of these minerals, including cement, the process of manufacture of which was explained, bricks of many kinds, pottery, and numerous newly developed building materials.

Demonstrations of micro-methods of analysis used at the Cardiff City Mental Hospital were given by Dr. M. Jowett, Dr. J. H. Quastel and Mr. A. H. M. Wheatley. These included a method for the determination of choline and of phenylpyruvic acid.

Dr. E. A. Rudge exhibited specimens of wood showing the processes of decay, usually termed dry rot, in support of his theory of decay. In addition there was an interesting display of medieval and Saxon timbering recovered during reconstruction at Coventry.

From the Treforest School of Mines, Mr. H. G. Davey and Mr. S. B. Watkins gave an attractive display of coal by-products.

**East Midlands.**—Dr. G. Malcolm Dyson presided at a meeting of the Section, held in the Lecture Theatre of Loughborough College, on 4th February, when a symposium was held on

#### "The Determination and Identification of Fats"

Mr. F. C. Bullock opened the discussion with a résumé of the general methods of analysis. He said that, unlike analyses of the type of carbon in iron or of proteins, in this case the actual fat was isolated and estimated. He described the various standard methods of determination of the percentage of fats in human foodstuffs and animal-feeding materials. Turning to the question of the identification of the individual fats, he explained the difficulty of giving precise estimates of the particular constituents present and, by means of lantern slides, showed the limits of the various values of standard commercial samples and also examples of abnormal results he had encountered.

Mr. K. A. Williams followed and elaborated the nature of the difficulties mentioned by Mr. Bullock. He explained that while it was easy to distinguish pure individual fats, great difficulties

were experienced with mixtures, as all standard tests, when applied to such samples, gave average values which might apply to many mixtures. In this way it was very difficult to distinguish adulterants, and care had to be exercised to discriminate where there had been adulteration, and others where abnormal results could be obtained, due to peculiarities in the natural method of production. He spoke of the inadequacy of colour tests, and summed up by saying that, in this realm, the analyst had to assess the results carefully and "diagnose" the constitution of the sample.

Mr. E. Richards Bolton gave an interesting account of the growth of the study of fats, comparing present-day conditions with those of 75 years ago. He compared and contrasted the methods and relative productions of the two periods and proceeded to describe the early history of this branch of chemistry. He criticised some of the methods previously discussed, and described modifications of standard methods which he had found better and easier to perform.

Dr. Dyson, Mr. L. P. Priestley and Mr. E. R. Ling also contributed to the discussion.

**Edinburgh and East of Scotland.**—A meeting of the Section was held, jointly with the Local Section of the Society of Chemical Industry and the Scottish Section of the Institute of Brewing, in the North British Station Hotel, Edinburgh, on 15th December, 1936.

Mr. John H. Hardie, chairman of the Scottish Section of the Institute of Brewing, presided and introduced Mr. H. Lloyd Hind, who gave a most interesting lecture, entitled

**"From Pasteur to 1936: a Study of the Development of Science in Brewing."**

Mr. Hind outlined early explanations of fermentation phenomena and showed how the work of Pasteur and later experimenters had given chemists and brewers extremely valuable knowledge of the processes that were carried on in a brewery, although much work of a fundamental nature still remained to be done.

During his lecture the speaker showed a large number of photographs of modern plant in use in continental breweries.

[This lecture has been printed at length in *Chemistry and Industry*, 6th February, 1937.]

An Ordinary Meeting of the Section was held, jointly with the Local Section of the Society of Chemical Industry, on 21st January, in the North British Station Hotel. Dr. David Bain, chairman of the Local Section of the Society of Chemical Industry, presided, and introduced Dr. A. D. Mitchell, who read a paper on

### **“Two New Types of Indicator.”**

Dr. Mitchell said that the chief reason for his selection of the subject was to introduce new methods, although he was well aware that a healthy scepticism of many of the newer analytical methods was quite reasonable. The oxidation-reduction type of indicator changed colour over a change of oxidation-reduction potential, while the ordinary indicator used in acidimetry changed colour over a change of *pH* range. In 1924, the stimulus to the investigation began with the work of Knops, and the subject has now become more and more involved as the number of indicators has increased.

Dr. Mitchell discussed the Fe''-Fe''' equilibrium and explained the cause of the unsuccessful use of diphenylamine, and the efficiency of diphenylaminesulphonic acid because of its higher potential. The fineness of the method had resulted in this method being introduced for micro scale work, using N/250 dichromate and giving results with less than  $\frac{1}{2}$  per cent. error.

One advantage of these “redox” indicators was that they might be used in varying amounts of acid, although complications might occur in cases where the oxidation-reduction potential was affected by change in *pH*.

The use of indicators in the titration of zinc with ferrocyanide, the application of ceric sulphate and the use of triphenylmethane-sulphonic acid types of indicator was explained and a titration using cyanol FF was demonstrated.

In introducing adsorption indicators, the lecturer carried out one of Fajans' classic experiments with bromide and eosin. Here the importance of the greater solubility of the silver salt of the indicator or dye over that of the halide being precipitated was necessary for the successful working of the indicator.

The lecturer concluded with an appeal to those interested in analytical work to try out the methods and asked for a more sympathetic and up-to-date attitude towards analysis in general, for a survey of the subject on indicators alone showed up this country in a very poor light as far as research was concerned.

**Glasgow and West of Scotland.**—Members of the Section were present, by invitation of the Glasgow Section of the Society of Chemical Industry, at a meeting held in the Royal Technical College, on 15th January, when papers were given on

**“The Gas Industry and the Domestic Consumer.”**

The lecturers were Dr. F. S. Sinnatt, Director of Fuel Research, and Dr. E. W. Smith, C.B.E., Technical Director of Woodall-Duckham Companies.

A meeting of the Section was held in the Royal Technical College, Glasgow, on 22nd January, when Mr. J. Davidson Pratt, O.B.E., read a paper on

**“Gas Defence from the point of view of the Chemist.”**

Dr. P. F. Gordon, Chairman of the Section, presided.

Representatives of the Chemical Society, the Society of Chemical Industry and other scientific bodies were present by invitation.

Mr. Pratt first dealt with the necessity for maintaining public morale in the event of an enemy air-raid, and pointed out how panic among the civil population could be allayed by the knowledge that proper precautionary measures were fully organised. He then outlined the possible forms an air attack might take and mentioned some of the properties of gases that might be used. He discussed the possibility of collective protection by means of gas shelters, and dealt fully with individual protection by gas masks, remarking that these had now reached a very high state of efficiency. Having explained the testing of gas masks for efficiency, Mr. Pratt dealt with organisation for detection and identification of gases, methods of decontamination, and the procedure to be taken in the event of new gases being employed. A large number of poison gases were known, but by no means all of these were suitable for use on a large scale. He mentioned some of the better known members of each class, discussing briefly some of their physical and chemical properties, with their physiological action, possible tests and methods of neutralisation.

Finally he dealt with the search for tests which would be specific and mentioned a few that had been tried.

(The lecture was subsequently delivered before the London and South-Eastern Section and will be published separately.)

**Huddersfield.**—A meeting of the Section was held on 19th November, 1936, in Field's Café, Huddersfield, the Chairman, Mr. W. D. Scouller, introduced the lecturer Dr. M. W. Goldblatt, who gave an address entitled:—

### **"Modern Biochemical Problems."**

Dr. Goldblatt dealt with hormones and their reactions, describing principally those of insulin, histidine and the sex-hormones.

The effect of insulin on the concentration of blood sugar, and the consequent effect on animal and human metabolism and the nervous system, were fully described and the lecturer quoted instances of the highly successful treatment of diabetes, at the same time indicating some of the precautions which must be observed to avoid ill effects.

In particular it was pointed out that the correct dosage and frequency were most important since over-dosage was liable to reduce the concentration of blood sugar below the minimum necessary for life.

The lecturer described the trend of modern research into the biochemistry of hormones and the efforts which were being made to isolate these in pure form and to increase the knowledge of their reactions on the human body.

In the discussion which followed, Messrs. G. B. Jones, H. Wignall, F. J. Corby, C. E. Randolph, H. S. Pink, and Dr. A. Y. Livingstone participated.

At a meeting of the Section held in Field's Café on 15th December, 1936, Mr. C. E. Randolph presided in the absence of Mr. W. D. Scouller and introduced Dr. J. Grainger of the Tolson Memorial Museum, Ravensknowle, Huddersfield, who gave an address on

### **"The Chemistry of a Plant Virus Disease."**

The following synopsis has been kindly supplied by the lecturer.

Virus diseases of plants produce varying symptoms upon their hosts. The commonest type is a mottling of the normal green leaf with yellow areas, the so-called "Mosaic" diseases. There are also diseases which produce a general chlorosis and stunting of the host; these are known as the "Yellows" type. Other miscellaneous effects are produced.

The causal agent or virus is an ultramicroscopic particle, that of the Ordinary Tobacco Mosaic being  $18-27\mu$ , according to a recent estimation (Smith and Doncaster<sup>9</sup>). Graduated collodion filters prepared according to the method of Elford<sup>3</sup> were used for determining particle size.

Many virus diseases are transmitted from plant to plant by the agency of insects, some of which carry a specific virus. An incubation period of a virus on the insect is often found.<sup>8</sup> Some diseases caused by virus are capable of being transmitted to healthy plants by mechanical means, such as inoculation with expressed sap, or by slight abrasive rubbing with diseased material.

Symptoms are often masked by growth of the host at relatively high temperatures<sup>6,7</sup> and the lecturer has shown that a similar low temperature masking takes place.<sup>5</sup> His experiments indicate that the virus has an optimum temperature of activity different from that of the host,<sup>5</sup> and its rate of movement within the tissues cannot always be accounted for by the normal movements of water and solutes within the plant.<sup>4</sup>

Several quotations from published literature<sup>10,11,12</sup> were made to show that a virus particle is a protein, but different from the normal protein of the host plant.<sup>12</sup> Changes induced in the metabolism of the host by viruses of the mosaic type were illustrated from the work of Cordingley, Grainger, Pearsall and Wright<sup>2</sup> and Barton-Wright and McBain.<sup>1</sup> Diseased leaves contain less carbohydrate, but more insoluble and amino-nitrogen, than healthy leaves. There are indications that the virus condenses the amino-acids, formed during normal plant metabolism, into its own protein-complex. This would reduce the supply of amino-acids necessary for growth, and would withdraw the raw materials for the manufacture of the protein matrix of the chloroplasts. Two common features of a mosaic disease, namely stunting of the host, and chlorotic mottling of the leaf, could thus be explained.

The lecturer propounded the thesis that the activity of a plant virus exhibited a degree of autonomous organisation, which would exclude it from the sphere of complex, non-living reactions and would indicate that it was a living organism. Most of its characters such as its size, the rate of multiplication, the thermal limits of its activity and its protein nature, could be interpreted either chemically or vitally, but its independent temperature relations and its apparent autonomous movement

within the host, are difficult to align with a purely chemical hypothesis.

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At a meeting of the Section held on 19th January,—Mr. W. D. Scouller being in the Chair—Mr. W. R. Moore, of Imperial Chemical Industries, Ltd. (Explosives Group), gave a lecture on

#### "Modern Developments in the Technology of Explosives Manufacture."

After giving a definition of an explosive and indicating the nature of the main classes of explosives, namely, propellants, initiators and high explosives, the lecturer went on to give a brief resumé of the history of explosives manufacture in order to show the lines on which it has been necessary for the explosives chemist to proceed.

The first actual explosive known was gunpowder or black powder which is still used to-day, while the first instance of a high explosive was recorded by Braconnet—namely nitro-cotton. This was followed by nitro-glycerin which Alfred Nobel was able, in 1860, to manufacture on a large scale and to explode with certainty under confinement.

Subsequent developments were the production of dynamite and blasting gelatin. These explosives required detonators, and for many years fulminate of mercury was the only detonator used.

The trend of modern development had been to produce explosives which are:—

- (1) Safer to use;
- (2) More suitable for the work to be undertaken;
- (3) More economical to manufacture.

The first high explosives used for blasting purposes were dynamite and blasting gelatin (nitroglycerin and nitro-cotton) these were too strong for some purposes, and by the introduction of an oxidising agent and carbonaceous material explosive substances were produced which were cheaper and more satisfactory. The oxidising agent first used was potassium nitrate in conjunction with specially ground sawdust. During the war, potassium nitrate had to be substituted by sodium nitrate, which has the disadvantage of being hygroscopic and necessitates wrapping the explosive cartridge in waxed paper.

In recent years ammonium nitrate has been used as the oxidant, because the greater volume of gas produced gives a stronger explosive and allows of a reduction in the percentage of nitroglycerin in the mixture; this is of importance in view of the impending world shortage of glycerin.

For many years a considerable number of accidents occurred through the use of frozen explosives and their thawing in an unauthorised manner, and about 1926 the Government insisted that only low freezing explosives should be used in this country. The manufacture of these has been made possible by the addition of poly-glycerol or ethylene glycol to the glycerin before nitration.

Explosives for use in coal mines have to be tested and approved by the government and the final test is carried out under conditions resembling those in a coal mine and indicates the minimum charge of the explosive required to cause fire damp or coal dust to explode.

Any explosive which fires the gas at less than a prescribed charge limit is rejected.

A recently introduced method of reducing the danger is to blanket the explosive from the fire damp or to reduce the temperature of the detonation by introducing inert substances such as sodium chloride.

In all explosives it is advisable that there should be a small oxygen balance available in order to prevent the formation of poisonous gases such as carbon monoxide and oxides of nitrogen. This prevents the addition of increased quantities of materials such as wood meal, but the desired effect of density reduction has been achieved by using the very low density material known as bagasse or a special quality of peat.

Sheathed explosives have been recently developed as a means of improvement in safety, the sheathing material being either a mixture of gypsum and fluorspar or more recently sodium bicarbonate. This makes the explosive four times as safe as unsheathed explosive.

Further research will no doubt produce a more nearly ideal explosive which will still further reduce accidents.

Non-nitroglycerin explosives, i.e. those consisting essentially of ammonium nitrate and T.N.T., have the disadvantage that they all absorb moisture readily, but the users are not troubled with headache. The most readily prepared explosives of this class are those containing potassium chlorate or perchlorate with various hydrocarbons, and these find considerable use.

One of the latest developments in blasting agents is the use of liquid gases such as oxygen or carbon dioxide. These are detonated by means of a heating agent. The former gas has not found any great favour because of a number of accidents, but the latter is much safer although requiring a carbon dioxide plant for efficient working.

"Hydron" is a mixture of sodium nitrate and ammonium chloride which decomposes on heating. This is used in steel tubes and the charge is fired by a powder fuse.

Percussion caps or detonators are usually made from mercury fulminate mixed with potassium chlorate and antimony sulphide and in modern practice are ignited by means of an electric detonator of either the high or low tension type. By introducing safety fuse between the fuse head and detonator a delayed action can be obtained.

Substitutes for mercury fulminate are trinitrophenyl methyl nitramine and lead azide, the latter being cheaper than fulminate and now coming into general use.

In order to detonate several explosive charges at the same time a detonating fuse is used, which in its latest development is made by spinning a covering of jute and cotton round a core of pentaerythritol tetrinitrate. The velocity of detonation is approximately 6,500 metres per sec.

Propellant explosives are divided into two classes, namely sporting powders and military powders. The former are all made from nitro-cotton, the most common being "Smokeless Diamond."

Military propellants are Ballistite and Cordite which are mixtures of nitroglycerine and gun cotton, the variations being in the physical form of the material. One of the recent developments in this direction has been the production of Cordite N.D. which contains centralite, does not require a volatile solvent in its manufacture, and is very stable.

Nitro-cotton of high nitrogen content is an explosive that will either burn or detonate according to the conditions. Nitro-cotton of low nitrogen content cannot be made to detonate. It has been, of course, very much used in recent years in industry for a wide variety of purposes.

In the discussion which followed, Messrs. C. E. Randolph, N. Hall, D. Hanson and others, took part and it emerged that by far the greater proportion of explosives produced in this country were used in industry, the amount used for military purposes being very small.

**Irish Free State.**—A meeting of the Section was held on 9th December, 1936, in University College, Dublin—Dr. P. S. Arup in the Chair.

Professor T. J. Nolan read a paper on

**"Naturally Occurring Organic Halogen Compounds"**  
of which he has kindly provided the following summary:—

Tyrian purple, obtained from the glands of *murex brandaris*, was isolated in a crystalline condition by Friedländer in 1909. He showed that the dye contained bromine and established its constitution as 6:6' dibromindigo, a substance synthesised by Sachs and Kempf six years previously.

From the axial skeleton of the coral, Dreschel isolated in 1895 the protein gorgonin, which on hydrolysis yielded an iodo amino acid called iodogorgonic acid, the formula of which was established as 3:5 di-iodotyrosine by Wheeler and Jamieson in

1905. In 1886 Bauman discovered the presence of organically bound iodine in the thyroid gland; it was later shown that the organic compound containing iodine was attached to a characteristic globulin. The globulin-free compound (thyroxin) was isolated in crystalline form by Kendall in 1918, and its constitution established by Harington and Barger in 1926. They showed it had the formula  $C_{18}H_7I_4O_4N$  and was built up from two molecules of 3 : 5 di-iodotyrosine, one of which had lost its side chain and had then taken the place of the phenolic hydrogen of the other molecule.

Prior to 1934 no naturally occurring organic compounds containing chlorine were known. In that year Koller, St. Pfau and the author, independently isolated chloratranorin  $C_{19}H_{17}O_8Cl$  from certain lichens. In his studies of the chemical constituents of Irish lichens the author has now isolated five further compounds containing chlorine. Three of these  $C_{18}H_{14}O_5Cl_3$ ;  $C_{16}H_{11}O_5Cl_3$ ;  $C_{16}H_{10}O_5Cl_4$ ; have the same skeleton structure and are depsidones derived from orsellinic acids. The remaining two  $C_{26}H_{21}O_{10}Cl_3$  and  $C_{24}H_{20}O_9Cl_2$  have not yet been fully examined.

It is interesting to note that whereas organic compounds containing bromine and iodine are found in the animal body, organic compounds containing chlorine have been found only in the vegetable kingdom.

**Leeds Area.**—A meeting of the Section was held on 18th January, at the Bradford Technical College,—Dr. R. D. Abell in the Chair.

Dr. L. L. Lloyd read a paper on

#### **"Properties of Dyestuffs in relation to Fastness to Light and to Potting."**

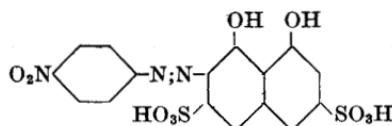
Dr. Lloyd has kindly supplied the following summary:

In the woollen trade coloured fabrics are sometimes "potted" in order to obtain definite properties in the material that can only be produced by this process. Potting consists of submitting the fabric to boiling water under definite conditions; the water should be neutral or mildly alkaline but it must not be acid. This process is perhaps the most severe to which coloured materials are submitted during their finishing operations. In many cases the material is immersed in boiling water for many hours, and only few dyestuffs will withstand this treatment,

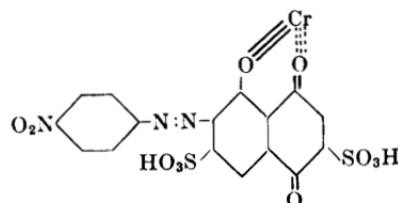
without showing defects due to colour "bleeding" from one portion and being partly transferred to another. Should the material have designs of undyed wool, this must remain white, and differently coloured design must not be blemished by one colour bleeding into another. The dyestuffs that withstand this treatment, with the exception of Logwood, are the chromium lakes of *di-o-dihydroxyazo*-dyestuffs. They are not only fast to potting but are of exceptional fastness to milling and to light.

G. T. Morgan and J. D. Main Smith in a paper on "The Co-ordination Theory in its Application to the Study of Mordant Dyes" (*Journ. Soc. Dyers and Colourists*, 1925, 233-241) suggested constitutions for many chrome lakes of dyestuffs.

### Chromotrope 2B.

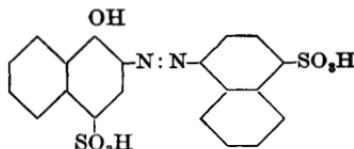


by dyeing and after-chroming will give the following chrome lake:

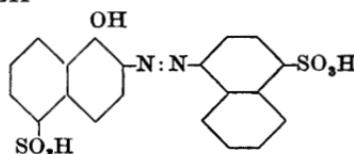


The stability of the lake should account for its fastness to milling but it is not fast to potting.

### Carmoisine WS

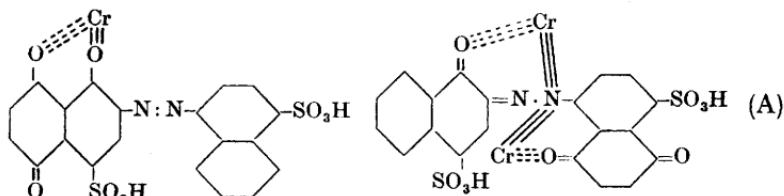


### and Carmoisine LK

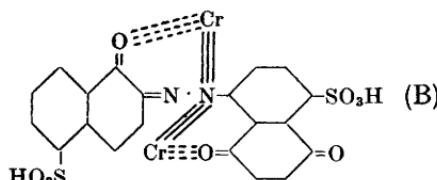


are converted by after-chroming into chromium lakes, but the oxidation is slow compared with that of chromotrope 2B. The chromium lake of the LK dye is much faster to potting than the chromium lake of the WS dye.

With the WS dye there is a possibility of the production of different lakes:

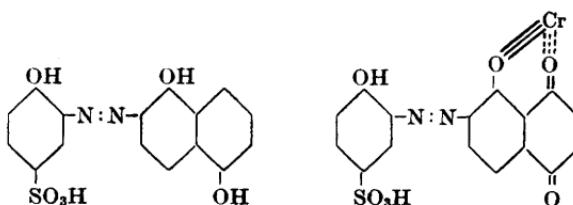


Similarly the LK dye can furnish two lakes:



The structures (A) and (B) are "composite," i.e., each one represents two formulae.

Diamond Black PV was the first synthetic dyestuff of outstanding fastness to potting. Morgan and Smith (*loc. cit.*) give structures for the chromium lake of the unoxidised dyestuff and the cobalt lake of the oxidised dyestuff. Assuming that the chromium lake of the oxidised dyestuff has a constitution similar to the cobalt lake, its structure would be:



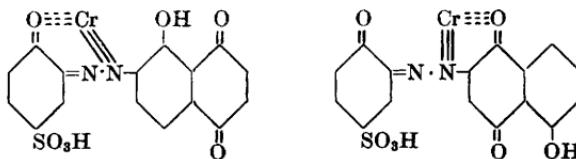
Diamond Black PV.

Oxidised Dyestuffs Cr. Lake.

The lake structure is exactly similar to that of the lake of the chromotropes, and since it is at present assumed that the

properties of the dyestuffs are governed by their constitution, there is no reason why the Diamond Black PV should be faster to potting than the Chromotropes.

The actual structure of the quinone derivatives of the naphthalene group is not yet known, but there are two possibilities which would furnish the following possible formula for this dyestuff lake:



These theoretical possibilities are only of interest in that they may lead to further work on the actual constitution of these important dyestuffs.

In the above formulae the dotted lines denote co-ordinate linkings and each Cr atom is, of course, combined with three molecules of the original azo-dye.

Dr. F. A. Mason has been elected Chairman of the Section.

**Liverpool and North-Western.**—A meeting of the Section was held at the Constitutional Club, India Buildings, Water Street, Liverpool, on 14th January,—Mr. L. V. Cocks in the Chair,—when Professor C. O. Bannister, of Liverpool University, spoke on

#### “Cupellation and the Detection of Platinum Metals in Bullion.”

Professor Bannister described the process of cupellation, as used for the determination of silver, gold and platinum metals. This method is seldom used by analytical chemists outside metallurgical laboratories and is one capable of giving extreme accuracy, as is necessary when dealing with such valuable material. It is capable of indicating and being used for determining as little as two parts per million of gold or silver. As a result of the cupellation of bullion, beads of metal are obtained having beautiful crystalline surface structures and these structures are quite characteristic for gold and for silver respectively. In the presence of very small quantities of certain other valuable metals such as platinum, iridium, rhodium, ruthenium and

palladium, a variation of the structure results, and thus an examination of the beads obtained often gives valuable information. The various structures described were illustrated by means of lantern slides.

Dr. W. F. Higgins, Mr. E. Gabriel Jones, Mr. A. E. Findley and Mr. E. T. Williams participated in the discussion.

**London and South-Eastern Counties.**—On 20th January, Dr. C. Ainsworth Mitchell was expected to give a lecture at the Institute on recent advances in the scientific examination of documents, but owing to influenza, was unable to attend. Mr. J. Davidson Pratt was asked, and kindly consented at very short notice, to give a lecture which he had prepared for the Glasgow and West of Scotland Section on

#### **“Gas Defence from the Point of View of the Chemist.”**

(The subject is of such importance and general interest that the lecture, with Mr. Davidson Pratt's concurrence, will be printed and issued as a separate monograph.)

**Manchester and District.**—At a meeting of the Section, held on 14th January, presided over by Mr. C. J. T. Cronshaw, Dr. C. Ainsworth Mitchell addressed a large audience on—

#### **“Scientific Identifications in Criminology.”**

Dr. Mitchell said that criminal investigation was largely concerned with the scientific identification of either persons or objects associated with a crime.

Although only certain indirect aspects of scientific criminal identification had a chemical bearing, the subject was one upon which chemists in our Dominions and Colonies were consulted from time to time, and was thus of some importance to chemists in general.

After commenting on the advantages and fallacies of identification by photography and by the Bertillon method, the lecturer gave some account of the methods of reconstructing the face upon a skull, and then proceeded to give an outline of the independent discovery of the finger-print system by Herschel and by Faulds, and of its extension to the patterns on the soles of the feet and to the identification of the pores upon the ridges of the skin.

The mechanical development of latent prints depended upon

the principle that, materially, finger prints consisted of infinitesimal particles of fat which, when dusted over with a fine powder (e.g. grey powder, graphite and, in the experience of the lecturer, methylene blue) retained it, whilst the surface free from finger prints did not. If the surface material were non-absorbent, as for example window glass or polished metal, the latent prints would remain indefinitely, but the permanence of prints upon paper varied with the absorption-capacity of the paper; on fine blotting-paper latent prints would not be developed with a powder after the lapse of a few hours, whereas on highly-sized paper they were practically as permanent as when left on polished wood.

The principle involved in the staining-method of developing latent prints upon paper was that the fat of the finger prints would repel an aqueous solution of dyestuff or a diluted ink (e.g. blue-black ink), whilst the rest of the paper would be stained, thus giving a "negative" print.

In the lecturer's experience the most satisfactory method was still the one that he had devised many years ago, viz:—that of developing latent prints with osmium tetroxide vapour (the microscopist's "osmic acid") heated in a basin; this gave sharply defined permanent prints, owing to the reduction of the osmium tetroxide by the fat.

It was more effective than development with iodine vapour, although the latter method had the advantage that it could be used for searching documents for latent prints without revealing that a search had been made; when once the iodine prints had disappeared they could not be sharply restored by re-treatment with iodine vapour or in any other way.

In describing the identification of various objects which might possibly be associated with a crime, Dr. Mitchell gave some account of cases in which the presence of certain vegetable or animal fibres had been an important part of the evidence against a suspect.

Finally he referred briefly to certain new methods that had been applied in the identification of documents, notably to the use of ultra-violet rays and infra-red photography. In his experience infra-red photography of charred documents had only a very limited application, and the best results were still obtained by the method of controlled calcination which he had devised.

In the discussion which followed the following took part,

Dr. Blench, Mr. C. J. T. Cronshaw, Dr. A. Coulthard, Mr. Frazer, Mr. P. Gaunt, Dr. Radley and Dr. D. H. Hey.

Mr. G. H. Frazer touched on the possibility of two persons having the same finger-prints. He considered that there must be something like 1,000,000,000,000,000 different characteristics in finger-prints in order that the possibility be nil. He discussed the Hauptmann case and referred particularly to the strength of evidence with regard to nails and pieces of wood.

The lecturer replied that the possibility of the finger-prints of two persons being alike was about one in thirty million. With regard to the Hauptmann case, he would say that the two sets of nails referred to were of a similar class, but he certainly would not like to convict on that evidence alone.

Mr. J. A. Radley asked the lecturer for information on the minimum number of points of similarity in finger-prints that were required for conviction. He suggested an alternative method to that of using iodine vapour for examining finger-prints, namely the finger-prints could be sprayed with quinine sulphate and a fluorescence photograph then taken. He made enquiries with regard to the possibility of spraying the iodine stained finger-prints with starch solution and subsequently discharging with sulphur dioxide. Speaking of the Hauptmann case, he referred to the fluorescence method of examining pieces of wood to determine correspondence and also to the microscopic method for the examination of the nails which should show characteristic lathe marking. He then referred to screens for fluorescence photographs and considered that, from his experience, readily available, and cheaper, than cerium ammonium nitrate.

The lecturer replied to the various points raised and stated that, in legal proceedings, 12 to 14 points of similarity of the finger-prints supplemented by similarity in porosity were usually considered as very strong evidence. He stated that by dusting the iodine-treated fingerprint with starch, the sharpness of the print was impaired, the most satisfactory method for producing sharp prints being to take a photograph through a screen. For fluorescent work, he agreed that quinine sulphate should give good results in the use of Brose's fluorescence method for multi-coloured prints. With regard to the examination of pieces of wood, the most that could be safely said from such evidence was that one piece corresponded with another, and with regard to characteristic lathe marks on nails one must not forget the possibility of coincidences. He referred to a cell containing a

solution of cerium ammonium nitrate, which he himself had recommended for use as a screen in fluorescence photography. He certainly would give sodium nitrite a trial, however.

Mr. P. Gaunt referred to a method which was employed in China for determining whether a particular person had just fired a gun or pistol. A thin film of paraffin wax was applied to the hand and wrist, the wax was then removed and a special solution applied to it. If blue spots developed on the wax, it was taken as evidence that the man had just discharged a firearm, and was probably a test for the presence of nitrite.

Dr. Mitchell replied that the particular solution employed may well be a diphenylamine solution.

Mr. Radley asked whether it was possible to forge finger-prints, for example, by applying them to the outside of gloves which would then be worn by the criminal in order to leave misleading finger-prints.

Dr. Mitchell replied that it is certainly possible to forge finger-prints by means of a gum bichromate stamp.

Dr. A. Coulthard asked questions with regard to foot-prints, particularly those of babies, and wondered whether they were sufficiently clear to be readily distinguishable, and also whether they reached a maximum in clarity as the age of the individual increased and then gradually faded with further increase in years.

Dr. Mitchell replied that the foot-prints of babies were quite clear; the patterns continued unchanged throughout life; but, like finger-prints, foot-prints showed indications of "weathering" in old age.

Dr. H. A. Thomas discussed the question of whether finger-prints possessed hereditary characteristics. He also enquired why Dr. Mitchell stated that the method of taking finger-prints in this country had become of ill-repute. With regard to the possibility of reading ink writing on charred documents, he suggested the use of a blue-green colour filter which would make the reddish iron oxide from the ink look black against a bright background.

Dr. Mitchell replied that there was some evidence of heredity in types of finger-prints, though consistent results were not obtained, so that, generally speaking, no reliable conclusion could be arrived at with regard to heredity from an examination of the finger-prints. With regard to the finger-print method in this country, it was not permitted now for finger-prints to be taken against the express wish of a person not under conviction.

Mr. Frazer enquired whether the method of deciding parentage by means of blood test had been developed further recently. The lecturer replied that the blood test had been elaborated and there were more sub-divisions now and so more possibility of gaining information on parentage. The methods only enabled persons to be classified into groups, however.

Dr. D. H. Hey asked for further information on methods of restoring faded inks.

The lecturer replied that a full account of such methods was given by Dr. Alexander Scott in publications of the British Museum. Chloramine T and hydrogen peroxide vapour were frequently employed for this purpose. Ordinary iron tannate inks left iron oxide on fading and the writing which had faded could be developed by means of ammonium sulphide vapour, or a solution of tannin.

Dr. Blench, City Police Surgeon, referred to the question of anthropology, in which he was particularly interested when he listened to a previous lecture given by Dr. Ainsworth Mitchell. He thought that the question of infra-red photographs and their relation to blood pigment was of particular interest. He gave his views on forensic chemistry and considered this should be associated closely with legal medicine. He stated that a Medico-Legal Institute in London was being developed. With regard to the paraffin wax method of showing up the presence of nitrite, he knew that about ten years ago the police were employing a similar method with burns in coats, to determine whether they had been caused by a bullet.

Dr. Mitchell, replying, said that an infra-red photograph of a negro showed a white skin, since infra-red rays did not penetrate below the surface, but were reflected, probably owing to the action of protein material, not pigment. He had taken infra-red photographs of a mackerel which showed that the rays were absorbed, not reflected. It seemed probable that the water in which the fish lived afforded protection against heat rays, whereas in terrestrial animals the skin proteins were the protective agent.

**Newcastle and North-East Coast.**—On 18th December, 1936, in the Chemistry Lecture Theatre, Armstrong College, at a Joint Meeting of the Newcastle Sections of the Institute

of Chemistry and the Society of Chemical Industry, Dr. J. A. Lovern, of the Torry Research Station, gave a lecture on

### **“By-Products of the Fishing Industry.”**

Fresh fish waste is made into fish meal. The waste, consisting mainly of head, bone (with adhering flesh) and skins, is treated in a manner depending upon whether it is “non-fatty” (e.g. white fish—cod, haddock, etc.) or “fatty” (e.g. herring).

In the case of the “non-fatty” fish, the process consists of mincing, drying in a rotary dryer to about 8 per cent. water and grinding to a fine powder. This process takes only about 2 hours and frequently, therefore, the animal obtains fresher fish than the human. The composition of the material (within certain limits) must be guaranteed according to Government regulations. This meal consists of 30 per cent. mineral salts, 3 per cent. fat, 8 per cent. water and the remainder protein. This type gives the best fish meal and it does not tend to make fat.

The “fatty” waste cannot be processed as above because the fishy flavour makes it unsuitable for a feeding stuff. This material is either boiled with water, screw-pressed to a pulp of 50 per cent. water-content and dried to a low grade (high fat) fish-meal, or else solvent extracted (by such solvents as trichloroethylene).

The lecturer stated that most fish meal was exported and that this industry indicated the conservatism of British farmers. In 1892 fish meal manufacture was a flourishing industry on the Continent. Fish meal was first made in this country in 1905 but all for export, and it was not until 1916 that fish meal was consumed at home.

Stale fish waste is no use as a feeding stuff, but treatment by similar methods yields a valuable fertiliser. Fish waste, particularly the skins of such fish as cod, finds another industrial use in the manufacture of fish glue. Bones and heads are also used but give inferior yields. There is some co-operation between the manufacturers of meal and glue in this matter, since the skin is to be avoided in making meal.

The process consists first in removing salt by leaching with water. The waste is then cooked in steam jacketed vessels with a preservative (e.g. boric acid) and acetic acid to decompose bone and make the residue amenable to pressing. The glue liquor is drawn off and the residue pressed and dried for manure. The liquor is evaporated and essential oils added to disguise

the flavour. Zinc oxide is added for use in carpentry. The yields of glue from skins, bones and heads are about 60, 25 and 15 per cent. respectively.

A further limited use for the skins of certain fish is in the production of leather. So far only shark skins appear to have been successfully exploited.

The cleaned and dried swim bladders of certain fish (principally sturgeon) constitute the isinglass of commerce.

The production of fish oils is an important by-product industry. The oil segregates in different parts of different fish. Body oils are produced as co-products in the fish meal and manure industries. They are generally obtained from mixed species and their main uses are in the soap, edible fat and paint industries.

The production of liver oils for pharmaceutical purposes is an old industry, and the lecturer gave an interesting historical survey showing the improvements in methods of extraction. In the early days the livers were allowed to rot and the rancid oil so collected had a high acidity. The yield was very small and the residues valueless. Later, the livers were sorted by freshness and then by species (the livers have characteristic shapes). The livers were treated by live steam and brought to the boil for a few minutes and the oil on the surface tapped off. The second extract was not so good, and the third extracts were sold as "black oil." Liver oils are now extracted in the crude state on the trawlers which have cookers on board. The "black oil" and veterinary oil of the older process are now disappearing from the market since they are discarded at sea. At the shore factories, the crude oil is freed from water by centrifugal separation. It is then chilled to  $-3^{\circ}$  and pressed to remove stearin (this makes it "non-freezing"). Although golden-coloured oil has a higher vitamin-content, the public prefer it pale, and therefore it is partially bleached and deodorised by fuller's-earth. The vitamin potency varies considerably owing to a number of factors. Sunlight destroys vitamin A, hence the use of dark bottles. Halibut-liver oil is superior to cod. The oil cannot be obtained by steaming and is extracted by a patented process involving alkali digestion with a carefully controlled *pH*. Tunny, sword fish and sturgeon livers are just as rich as halibut in vitamin D. The amount of vitamin in the liver increases with the age and depends on the season (starved fish yield less oil

but are richer in vitamin), on the area in which the fish was caught, and on the length of time of steaming.

Because of the seasonal variation, the oils are blended in order to obtain a standard product throughout the year.

Apart from its medicinal and veterinary uses, cod-liver oil is used in the soap and leather industries.

Certain fish oils find particular uses. For example, the head and jaw oils of the porpoise and dolphin are non-spreading and used for clocks, etc. This oil sells at £25 per gallon.

The lecturer indicated further possible uses of fish products, such as in the production of hormones hitherto obtained from mammalia. Fish liver extract was found to be very potent in the treatment of pernicious anaemia, and cheaper than animal liver.

# January Examinations, 1937.

## Abstract of the Report of the Board of Examiners.

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The following papers and exercises were given:—

### Examination for the Associateship in General Chemistry.

*MONDAY, 4th JANUARY, 10 a.m. to 1 p.m.*

(Attempt FIVE questions only. Answer concisely and to the point. Give formulae and equations where possible.)

1. Give a concise account of the methods available for the determination of molecular weights.
2. Discuss the conditions of equilibrium for typical gas-solid systems.
3. Describe the manufacture, properties and uses of any THREE of the following:—  
(a) graphite, (b) potassium permanganate, (c) sodium hexameta-phosphate, (d) white lead, (e) sodium cyanide.
4. Indicate the principles which govern the distribution of a solute between two immiscible solvents. Describe THREE instances in which distribution methods have proved of service in the laboratory.
5. Write an essay on EITHER (a) the theory and practice of electro-plating, or (b) the manufacture and uses of ferro-alloys.
6. What significance is nowadays attached to the term "bond" as used in chemistry? Discuss the nature of the various bonds present in the following compounds:—  
(a) sodium chloride, (b) nitric acid,  
(c) nickel carbonyl, (d) aquo-pentammino cobaltic chloride  
$$(Co(NH_3)_5 \cdot H_2O)Cl_3$$
.
7. It can be shown that ferric chloride is not completely reduced by sulphur dioxide in solutions containing high concentrations of hydrochloric acid. State exactly how you would investigate the reaction quantitatively. What explanation of this phenomenon can you suggest? What experiments would you devise to test the truth of your explanation?

*2 p.m. to 5 p.m.*

(Attempt FIVE questions only. Answer concisely and to the point. Give formulae and equations where possible.)

1. Give an account of the methods employed in the determination of the solubility of gases in liquids.  
In what way does the solubility of a gas in a liquid depend on (a) pressure, (b) temperature?
2. Write an essay on EITHER (a) persulphates and percarbonates, OR (b) heavy water and isotopes of hydrogen, OR (c) the mechanism of catalytic reactions.

3. What are (a) plaster of Paris, (b) Portland cement? How are they made and how do you explain their setting?

4. Give a critical account of the views which have been held from time to time regarding the state of electrolytes in solution.

5. Select one of the following groups of elements and justify the position assigned to it in the periodic table:—

- (a) iron, cobalt, nickel;
- (b) sulphur, selenium, tellurium.

6. Indicate the more important contributions to chemistry associated with the names of Scheele, Davy and Graham.

7. Write an essay on some topic in inorganic or physical chemistry which has interested you and, preferably, which has not been dealt with in your other answers.

TUESDAY, 5th JANUARY, 10 a.m. to 1 p.m.

(Attempt FIVE questions only. Answer concisely and to the point. Give formulae and equations where possible.)

1. Discuss, in the light of modern theory, the valency of nitrogen in such compounds as the nitro-paraffins, the cyanides, the isocyanides, the quaternary ammonium salts, the amines and the amine oxides.

2. Describe the commercial preparation of  
(a) oxalic acid and (b) indigo.

3. Write a short account of EITHER (a) keto-enol tautomerism, OR (b) the Baeyer strain theory, OR (c) the special properties of conjugated systems.

4. Show by equations how the following compounds may be prepared in the laboratory from readily available material:—

- (a) cinnamaldehyde, (b) acetone dicarboxylic acid, (c) nitromethane,
- (d) *m*-dichlorobenzene, (e) benzidine.

5. Indicate the researches which resulted in the establishment of the constitution and in the synthesis of ONE of the following:—

- (a) ascorbic acid, (b) papaverine, (c) uric acid.

6. Write a short account of the optical activity of EITHER (a) spiro-compounds, OR (b) organic nitrogen compounds.

7. Describe, with examples, the use in organic chemistry of FOUR of the following reagents:—

- (a) potassium permanganate, (b) amyl nitrite, (c) selenium dioxide,
- (d) concentrated sulphuric acid, (e) "ammonium sulphide,"
- (f) 2: 4-dinitro-phenylhydrazine.

8. Indicate briefly the general methods for the preparation of aliphatic and aromatic monocarboxylic acids.

2 p.m. to 3.30 p.m.

Translate into English:

Werden 10 g (Triacetyl-galloyl)-tetracetyl-glucose erst mit 30 ccm Alkohol und dann im Wasserstoffstrom bei Zimmertemperatur mit der gleichen Menge Alkohol, der vorher bei 0° mit Ammoniakgas gesättigt ist, übergossen, so tritt beim Umschütteln rasch klare, schwach gelbbraune Lösung ein, die nach 45 Minuten unter verminderter Druck verdampft wird. Der zurückbleibende Sirup beginnt häufig nach einigem Stehen von selbst zu krystallisieren. Sicherer tritt das ein, wenn man impfen

kann. Bewahrt man dann bei 30° auf, so schreitet die Krystallisation rasch durch die ganze Masse fort. Nach längerem Stehen streicht man auf Ton oder preßt ab. Die noch etwas klebrige Masse wird in 25 ccm heißem Amylalkohol gelöst. Beim Abkühlen auf 30°, Impfen und Reiben, verwandelt sich die Flüssigkeit rasch in einen Brei mikroskopischer, lanzettförmiger Nadeln, die oft igelartig vereinigt sind. Nach 24-stündigem Stehen bei Zimmertemperatur, Absaugen und Nachwaschen mit etwas Amylalkohol beträgt die Ausbeute 5,8 g oder 72% der Theorie.

Zur Analyse wurde noch zweimal aus Amylalkohol krystallisiert, erst an der Luft und dann bei 78° und 0,2 mm über Phosphorpentoxyd getrocknet.

On peut obtenir par électrolyse aqueuse du manganèse métallique absolument pur sous forme d'une plaque d'un blanc argenté, bien adhérente et lisse, de structure micro-cristalline. Cette plaque est très dure et se laisse polir. Il convient de travailler avec une anode de manganèse commercial (96% de manganèse) et une cathode en feuille de cuivre soigneusement nettoyée et polie. L'anode et la cathode sont séparées par un diaphragme poreux. Le meilleur électrolyte est une solution aqueuse à 300-400 gr. au litre de chlorure de manganèse et à 30 gr. au litre de chlorure d'ammonium. La densité du courant doit être de 20 amp./dm<sup>2</sup>, le voltage de 4,5 à 5,5 et la température 26° C. Une vigoureuse agitation du catholyte est nécessaire.

L'électrolyte doit être fréquemment renouvelée car l'anode en manganèse ayant une très haute tension de dissolution enrichit le bain en manganèse. D'autre part, des hydroxydes insolubles se forment: Mn(OH)<sup>2</sup> si l'anode est en manganèse et Mn(OH)<sup>3</sup> si elle est en platine. Pour combattre ce dernier inconvénient on ajoute des sels d'ammonium et on emploie des cellules à diaphragmes.

*The use of Dictionaries was allowed.*

#### PRACTICAL WORK: 1ST WEEK.

*WEDNESDAY, 6th JANUARY, 10 a.m. to 4.30 p.m.*

- From the acetyl derivative (A) prepare a crystallised specimen of the compound from which it is derived. (Acet-β-naphthalide.)
- From the dimethylaniline (B) prepare a crystallised specimen of *p*-nitrosodimethylaniline.
- From the aldehyde (C) prepare a crystallised specimen of the carboxylic acid. (Anisaldehyde.)

The Examiners will consider quantity as well as quality in judging the specimens.

*These exercises may be completed to-morrow.*

*THURSDAY, 7th JANUARY, 10 a.m. to 4.30 p.m.*

- Complete yesterday's exercises.
- Report on the sample (D) offered for sale as potassium tetroxalate. (Pure potassium tetroxalate.)
- Identify the compound (E). (Cinnamic acid; or *p*-hydroxybenzoic acid; or salicylic acid.)

*FRIDAY, 8th JANUARY, 10 a.m. to 4.30 p.m.*

- Identify the substance (F). (Lead molybdate; or sodium phosphotungstate; or sodium phosphomolybdate.)

The result must be handed in by 1 p.m. in a separate notebook.

- Determine the amount of silver and barium in the solution (G) of silver and barium acetates. The silver is to be determined both gravi-

metrically and volumetrically and the barium gravimetrically. Express your result as grammes of silver and grammes of barium per 100 c.c. of solution.

The volumetric determination must be completed to-day; the gravimetric determinations may be completed to-morrow.

*SATURDAY, 9th JANUARY, 10 a.m. to 4.30 p.m.*

1. Complete the gravimetric determinations which were commenced yesterday.
2. Make a qualitative analysis of the inorganic mixture (H) which contains six radicals. (Calcium fluoride, magnesium borate, manganese carbonate; or cadmium sulphate, magnesium borate, manganese phosphate; or calcium carbonate, magnesium borate, manganese phosphate.)

#### PRACTICAL WORK: 2ND WEEK.

*TUESDAY, 12th JANUARY, 10 a.m. to 4.30 p.m.*

1. From the acetyl derivative (J) prepare a crystallised specimen of the compound from which it is derived. (Aspirin.)
2. From the sample of ethyl acetoacetate (K) prepare a crystallised specimen of phenylmethylpyrazalone.
3. Isolate one constituent in a pure crystalline condition from the mixture (L) of two compounds. (*p*-Toluidine and nitrobenzene.)

The Examiners will consider quantity as well as quality in judging the specimens.

*These exercises may be completed to-morrow.*

*WEDNESDAY, 13th JANUARY, 10 a.m. to 4.30 p.m.*

1. Complete yesterday's exercises.
2. Report on the sample (M) offered for sale as pure formic acid. (Acid containing 11% of acetic acid and 8% of water.)
3. Identify the compound (P). (Urea; or formamide; or urethane.)

*THURSDAY, 14th JANUARY, 10 a.m. to 4.30 p.m.*

1. Identify the substance (Q). (Molybdenum; or silicon; or molybdenite.)

The result must be handed in by 1 p.m. in a separate notebook.

2. The given solution (R) contains sulphates of copper and magnesium. Estimate the copper volumetrically and the magnesium and sulphate gravimetrically. The results should be returned as grammes of copper, grammes of magnesium and grammes of SO<sub>4</sub> radical per litre of solution.

*The volumetric determination must be completed to-day; the gravimetric determinations may be completed to-morrow.*

*FRIDAY, 15th JANUARY, 10 a.m. to 4.30 p.m.*

1. Complete the gravimetric determinations which were commenced yesterday.
2. Make a qualitative analysis of the inorganic mixture (S) which contains six radicals. (Magnesium phosphate, bismuth oxycarbonate, zinc borate; or aluminium phosphate, magnesium sulphate, zinc borate; or barium phosphate, zinc fluoride, lead carbonate.)

The Examinations were held at the Institute from the 4th to the 9th January, and from the 12th to the 15th January.

Forty-eight candidates presented themselves, of whom twenty-four passed. Of these twenty-four, twelve satisfied the examiners in part of the examination in which they had previously failed, and of the twenty-four unsuccessful candidates twelve failed to satisfy the examiners in part only of the examination.

*Inorganic and Physical Chemistry.*—The work of the candidates was of the usual standard and calls for little comment. It is interesting to record that question one in the first paper, on the methods available for the determination of molecular weights, brought many excellent answers. Questions five and seven were the least popular. Most candidates attempted question seven in the second paper, which gave them an opportunity of writing an essay on a topic chosen by themselves, and generally their attempts met with marked success. The practical work in Inorganic Chemistry was very well done by the successful candidates.

*Organic Chemistry.*—The answers to the written paper showed encouraging signs that many candidates were becoming better acquainted with modern views on organic chemistry. The practical work of the successful candidates was rather better than usual.

#### PASS LIST.

##### *Examination in General Chemistry for the Associateship.*

- Barnett, George, Central Technical College, Birmingham.
- Bayne, Charles, Heriot-Watt College, Edinburgh.
- Bebington, Norman Sidney John, City Technical College, Liverpool.
- Dowson, William Montague, B.Sc. (Lond.), University College, Nottingham.
- Dunford, Raymond Archibald, Merchant Venturers' Technical College, Bristol; and The Polytechnic, Regent Street.
- Eaton, Edward Foster, City Technical College, Liverpool; and Sir John Cass Technical Institute, London.
- Fry, Sydney, Central Technical College, Birmingham.
- Gross, Ronald Frederick John, B.Sc. (Lond.), University College, Leicester.
- Holburn, William, Municipal Technical College, Halifax.
- Honick, Kenneth Robert, Central Technical College, Birmingham.
- Ingham, Jack Shore, B.Sc. (Lond.), King's College, London.
- Mansell, George Frederick John, City Technical College, Liverpool.
- McKeag, Alfred Hamilton, B.Sc. (Lond.), Sir John Cass Technical Institute, London.
- Melvin, John Stannislaw, Royal Technical College, Glasgow.
- Pay, Arthur Stafford, Sir John Cass Technical Institute, London.
- Peel, Robert Edwin, City Technical College, Liverpool.
- Pleydell, Frank Harry, B.Sc. (Lond.), The Polytechnic, Regent Street.
- Proudfoot, Norman Findon, City Technical College, Liverpool.
- Taylor, William Edward Leslie, Municipal Technical College, Hull.
- Tracey, George, Municipal Technical College, Blackburn.
- Wilkins, Frank Spencer, Central Technical College, Birmingham.
- Wilson, Andrew Cook, Royal Technical College, Glasgow.
- Wood, Claude Helm, City Technical College, Liverpool.
- Wright, Denis Eric, Sir John Cass Technical Institute, London.

## Notes.

**Sir George Beilby Memorial Awards.**—The Administrators of the Beilby Memorial Fund—the Presidents, Treasurers and Secretaries of the Institute, the Society of Chemical Industry and the Institute of Metals respectively—have announced awards of 100 guineas each to Dr. Bernard Scott Evans and Dr. William Harold Juggins Vernon.

Dr. Evans was educated at Faversham Grammar School and gained his first experience in chemistry in the laboratories of Mr. Leo Taylor, O.B.E., and subsequently with the late Mr. Lawrence Briant, with whom he continued working until the War. He also attended King's College and graduated B.Sc. (Lond.) in 1904. He passed the Examination for the Associate-ship of the Institute of Chemistry in 1909 and was elected to the Fellowship in 1915.

In September, 1914, he enlisted in the Artists' Rifles, was gazetted to the Queen's Regiment in 1915, and proceeded to France to join the 4th Suffolks in 1916. In the following year he was seriously wounded and was awarded the M.C. Thereafter he was engaged on scientific work in the Chemical Warfare Department of the Ministry of Munitions, and received the decoration of M.B.E. Since 1919 he has been attached to the Research Department, Woolwich, where he now holds the position of a Scientific Officer. He was awarded the degree of Ph.D. (Lond.) in 1923 and D.Sc. in 1932. He has published numerous analytical methods for the separation and determination of metals, and contributed the chapters dealing with the methods of analysis applicable to lead, bismuth, arsenic, antimony, tin, iron, chromium and metallic constituents of steel in Mitchell's "Recent Advances in Analytical Chemistry."

Dr. Vernon received his scientific training at Aston and Birmingham Technical Schools, the University of Sheffield and the University of Birmingham. He graduated B.Sc. (Birm.) in the first division in 1919, Ph.D. (Lond.) in 1924 and D.Sc. (Lond.) in 1927. After some experience as Works Chemist with Messrs. Walker and Hall, Ltd., Sheffield, he held the appointment of Demonstrator and subsequently Lecturer in Metallurgy at the

Birmingham Municipal Technical School (later, Central Technical College) until the War, when he served as a Leading Mechanic and Petty Officer at the Royal Naval Experimental Station, Stratford. He was subsequently engaged as Analyst in the Admiralty Laboratories in Birmingham before resuming his academic post. In February, 1921, he was appointed Investigator to the newly-formed Atmospheric Corrosion Committee of the British Non-ferrous Metals Research Association. His experimental work was carried out at the Royal School of Mines, South Kensington, under Sir Harold Carpenter, F.R.S., until 1927, when the investigation was taken over by the Department of Scientific and Industrial Research and continued under Sir Gilbert Morgan, F.R.S., at the Chemical Research Laboratory. In the course of this work, which included early quantitative determinations of invisible oxide films on metals, a number of generalisations on atmospheric corrosion phenomena (ferrous and non-ferrous) have been established. Dr. Vernon was elected to the Associateship of the Institute of Chemistry in 1920 and to the Fellowship in 1927, in which year he received the Diploma of the Imperial College. His publications have included "A Bibliography of Metallic Corrosion" (Arnold), the First and Second Reports to the Atmospheric Corrosion Research Committee (each of which formed the subject of a General Discussion by the Faraday Society), and other papers in various Transactions or Journals.

**Benevolent Fund.**—A Fellow, writing from Canada, suggests that each contributor to the Benevolent Fund, should ask a member whose name has not appeared in the list of contributors for 1936 whether he has responded to the Special Appeal for Coronation Year.

The Report of Council shows that, so far, there has been an improvement in receipts amounting to over £320, but the Committee is hoping for a much more substantial addition to the Capital Account of the Fund before the end of 1937.

An Associate who sends 10s. 6d. suggests that if every member would subscribe a penny a week, the Benevolent Fund would be "in clover."

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Mr. Edward Ernest Howard Thorne, *Fellow*, has been appointed an Officer of the Most Excellent Order of the British Empire,—O.B.E.

**Local Sections.**—The approximate number of members at present attached to each Local Section is given below.

Section.	No. of members.
Aberdeen and North of Scotland .. .. .. ..	51
Belfast and District .. .. .. ..	47
Birmingham and Midlands .. .. .. ..	429
Bristol and South-Western Counties .. .. .. ..	217
Cape .. .. .. ..	44
Cardiff District .. .. .. ..	80
East Midlands .. .. .. ..	190
Edinburgh and East of Scotland .. .. .. ..	191
Glasgow and West of Scotland .. .. .. ..	335
Huddersfield .. .. .. ..	64
India .. .. .. ..	216
Irish Free State .. .. .. ..	52
Leeds Area .. .. .. ..	268
Liverpool and North-Western Counties .. .. .. ..	424
London and South-Eastern Counties .. .. .. ..	2596
Malaya .. .. .. ..	28
Manchester and District .. .. .. ..	508
Newcastle and North-East Coast .. .. .. ..	169
New Zealand .. .. .. ..	61
South Wales (Swansea) .. .. .. ..	78
South Yorkshire .. .. .. ..	98

**"Air Raid Precautions": Erratum.**—In the note on "Air Raid Precautions," published in JOURNAL AND PROCEEDINGS, Part VI, on page 481, it is stated that "A cloud of smoke should cover nine times the size of the area to be masked. Thus a factory occupying 600 square yards requires a smoke cloud of a mile square," . . . Professor Douglas Creese Harrison has directed attention to this passage, which should read:—"A factory occupying a site 600 yards square,"—not "square yards."

**Professional Conduct.**—The annual report of the General Council of the Bar contains some points of interest to those members of the Institute who are either members of the Bar or have occasion in the course of their work to make arrangements with a barrister for journalistic or other not purely legal work.

The Bar Council discourages the publication of opinions of Counsel with their names attached, but is unable to say that there is necessarily any breach of etiquette in so doing.

An advertisement notice on the jacket cover of a book should not refer to the author as a practising barrister, but there is no objection to a statement of the offices he holds or has held and the fact that he is a barrister.

A barrister holding such a post as the independent chairman of a statutory or similar committee should not do legal work for the

body or its members, when arising under the scheme constituting the committee.

A barrister when holding a position in advisory capacity to a federation of employers should not also practise at the Bar.

**Leverhulme Research Fellowship, 1937.**—Application is invited for (i) Fellowships and (ii) grants in aid of research. The Fellowships are intended primarily to provide for senior workers a period of freedom from routine duties during which they may undertake or complete researches which are being delayed through the pressure of other work. The grants are intended to provide for senior workers, who may not require release from their ordinary duties, such assistance as may be necessary to enable them to expedite or complete their work. Neither Fellowships nor grants are awarded to graduates doing research with the object of obtaining higher degrees. Applicants must be British-born and normally resident in the United Kingdom. In exceptional circumstances the trustees may waive the conditions as to residence. The duration of the grants will not normally extend over less than three months or more than two years, and the amount will depend on the nature of the research and the circumstances of the applicant. Any subject which may add to human knowledge may be proposed for a Fellowship, but preference is given to subjects in which other provision for research is inadequate.

The first Leverhulme Fellowships were awarded by the trustees in 1933 and the total number of Fellowships and grants in aid of research for 1933–1936 is 94.

Forms of application may be obtained from the secretary, Dr. L. Haden Guest, Leverhulme Research Fellowship, Union House, St. Martin's-le-Grand, London, E.C.1. Applications must be received on or before 1st March, 1937. Awards will be announced in July, and the Fellowships or grants will date from September 1st, 1937.

**Legal**—The terms contained in Contracts of Service are not infrequently ambiguous. A case arising from the wrongful dismissal of a company secretary, which is the subject of a contribution by Dr. W. G. H. Cook to a recent issue of *The Secretary*, is of interest in this connection.

In *Salt v. Power Plant Company, Ltd.*, S. was employed by the defendant company upon the terms of a letter, dated 24th

December, 1925, which provided that the engagement would be for a minimum of three years, subject to the company's right to cancel the agreement in case of wilful default. The letter continued: "The company shall have the right to terminate the agreement after the expiration of the above-mentioned period by giving six months' notice in writing prior to the ensuing 31st December, and in the absence of such notice the engagement to remain in force as a permanent one." The company gave S. six months' notice, to expire on 31st December, 1935. S. brought an action for wrongful dismissal, but lost his case. The Court of Appeal (Greer, Slesser and Scott, L.J.J.) allowed an appeal from Horridge, J.

"In giving the judgment of the Appeal Court, Greer, L.J. said that the letter of the 24th December, 1925, meant that at the end of the three years S. was to have quite a different status from that which he had before the beginning of the three years, namely, that he was to have a permanent employment, i.e., an employment for life, subject to his continuing to perform his duties to the satisfaction of the directors. The company had then continued to employ S. on the said terms until 26th June, 1935, when they sent him a letter containing the words:—'In accordance with our agreement with you and with reference to the second paragraph of our letter to you dated 24th December, 1925, we hereby give you six months' notice expiring on 31st December, 1935.'

"In the opinion of the Court of Appeal the time for the company to give their notice had long expired; the notice was bad, and it did not terminate the employment. In those circumstances S. had been unlawfully dismissed; and unless the parties agreed to a reference as to the amount of damages to an official referee, there would be an order for the case to be remitted to the trial judge for assessment of damages. [(1936) 3 AII E.R. 322.]"

**The Sir John Cass Technical Institute, Aldgate,** has arranged a series of five lectures for chemical engineers and others connected with the chemical industries. On 22nd February, Mr. P. Hamer, on "Principles of Water Conditioning"; on 1st March, Mr. W. A. Damon, on "Some Aspects of the Alkali Act"; on 9th March, Mr. J. Davidson Pratt, on "Fire and Explosion Risks in Chemical Works"; on 15th March, Mr. H. Douglas Elkington, on "Patents in relation to Chemical

Processes and Chemical Engineering"; on 22nd March, Mr. B. Samuels, on "Steam Generation related to Chemical Plant."

The lectures will be delivered on Monday evenings, as above, at 7 p.m. Fee 10s.

On 19th January the Presidents and Councils of the British Association of Research for the Cocoa, Chocolate, Sugar, Confectionery, and Jam Trades; and the British Food Manufacturers' Research Association, held a Reception at the Joint Laboratories of the Associations at Dalmeny Avenue, Holloway, on the occasion of the opening of a new extension by Sir William H. Bragg, P.R.S.

**The "Diseases of Fish" Bill** has passed through all its stages in the House of Lords. Its main object is to combat the disease of furunculosis, which particularly affects salmon trout. The Bill will shortly be before the House of Commons.

**Board of Education Short Course for Teachers of Chemistry in Technical Colleges and Schools, 1937.**—A successful course for Chemistry teachers was held by the Board of Education last July in London and was attended by teachers from various parts of the country. It included lectures by Prof. Cook, Prof. Paneth, H.M. Inspectors and others, a visit to the National Chemical Research Laboratory (by the courtesy of Sir Gilbert Morgan), to the works of British Drug Houses Ltd. (on the invitation of the Directors), and practical work in chemistry, glass-blowing and simple metal work. The Board are now making arrangements for a similar Short Course in Chemistry for teachers in recognised Technical Colleges and Evening Institutes in England and Wales, to be held in *London* from Monday, 12th July to Friday, 23rd July inclusive. Teachers who desire to attend should make application on Form 106 U(T), as soon as possible, and in any case not later than 31st March, 1937. If the applicant is teaching in a school working under the direction of a Local Education Authority, the Form must be returned *through the Authority*.

All communications to be addressed to the Secretary, Board of Education.

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## Obituary.

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ALFRED HENRY KNIGHT died at Oxon, Birkenhead, on 2nd February, in his 79th year.

He studied for four years under J. S. Merry, of Swansea, and passed the Advanced Stage Examinations of the Science and Art Department, in chemistry, metallurgy and geology. Subsequently he acted as assistant to Mr. Merry for two years before he joined a firm of mineral importers and smelters in the same town, where he remained for a further two years before he established a practice as metallurgical and consulting chemist in Liverpool, in 1883. In 1919 he was joined by his son, Mr. Leslie Knight, A.R.S.M., Fellow, who continues to carry on the practice.

He was a keen Volunteer, and for thirteen years commanded the Mersey Division (Submarine Miners) Royal Engineers, which force was entrusted with the mine defences of the Port of Liverpool. He retired as full Colonel in 1905. He gained the Volunteer Decoration.

He was elected a Fellow of the Institute in 1888, and served as a Member of Council from 1914–18.

CHARLES HERBERT MOON died, as the result of injuries received in a motor accident, on 19th December, in his 25th year. Educated at Poole Grammar School, he entered Bristol University in 1930, graduating B.Sc. in 1933. He continued as a research student at Bristol, and published various papers, jointly with Dr. W. E. Garner and Dr. E. B. Maxted, in *Nature*, *The Journal of the Chemical Society*, the *Society of Chemical Industry*, and the *Transactions of the Faraday Society*. In September, 1936, he was appointed Chemist to Imperial Chemical Industries, Ltd., Explosives Group.

He was elected an Associate of the Institute in 1936.

PERCY WILLIAM NARRACOTT died in London on 19th December, 1936, in his 53rd year. He obtained his training in chemistry at the Borough Polytechnic and at the Sir John Cass Technical Institute, and, in 1905, he was appointed Chief Assistant in the chemical laboratory of the City of London Electric Lighting Co., Ltd., where he remained until 1916, when he became engaged in the wet assay laboratory of Messrs. Johnson & Sons, Smelting Works, Ltd. In 1916 he entered the service of the Gramophone Co., Ltd., at Hayes, Middlesex, as general works chemist in charge of laboratory work; in 1918 he was appointed an assistant chemist in the Directorate of Chemical Inspection at the Royal Arsenal, Woolwich, and, in 1923, analytical chemist to the St. Marylebone Electricity Department, where he remained until his death.

He was elected an Associate of the Institute in 1922.

RALPH DAVID OWEN died on 2nd February at Builth Cottage Hospital, in his 45th year.

Educated at St. Dial's School, Cwmbran, he was engaged in a steel works laboratory in South Wales for two years before the war. In 1914 he volunteered for service, gained a commission from the ranks, serving in the Royal Flying Corps and the Royal Air Force, and was mentioned in despatches. Later he was a Wireless Officer and, after the war, Captain and Officer-in-Charge of the Cwmbran detachment, 2nd Battalion, Monmouthshire Regiment (T.A.). On demobilisation he continued his study at the Newport Technical Institute and the Cardiff Technical College, and then specialised in coke oven and blast furnace practice, before he joined the Cwmbran Chemical Co., Ltd., where he remained until 1930, when he was obliged to undergo an operation owing to industrial gas poisoning. He attended the National Institute for Research in Dairying, Shinfield, with the intention of changing his branch of work, and subsequently became chemist-bacteriologist in a dairy in Yorkshire, and in 1934 became chief chemist and bacteriologist to the Farma Cream Product Co., at Bourton, Dorset.

He was elected an Associate of the Institute in April, 1927.

PERCY ANDREW ELLIS RICHARDS died at Church Crookham on 22nd December, 1936, in his 69th year. He was educated at St. Paul's School, and proceeded to King's College, London, where he studied under the late Prof. C. W. Heaton, becoming his Assistant and later succeeding him as lecturer in chemistry at Charing Cross Hospital Medical School. In 1893 he was appointed public analyst for the District of St. Martin's in the Fields, and subsequently public analyst for the City of Westminster and the Borough of Hammersmith. He was for over twenty years professor of Chemistry at Queen's College, London, and lecturer in chemistry and metallurgy at the Royal Dental Hospital, also serving the former as bursar and the latter as honorary treasurer for many years. He carried out much work on the "facing" of rice, on vinegar, and on preservatives in imported meat, for the Local Government Board (now the Ministry of Health) and served on the Departmental Committee on Preservatives and Colouring Matters in Food. He was Honorary Secretary of the Society of Public Analysts from 1905 to 1921 and President of that Society for 1922 and 1923. He was the author of a *Guide to Practical Chemistry* (1896), and *Practical Chemistry and Toxicology* (1904). He contributed many papers to *The Lancet*, *The British Medical Journal*, *The Chemical News* and *The Analyst*, not only on matters relating to food and drugs, but also to a wide range of other subjects, such as the saline waters of Boston Spa and of Salsomaggiore, the composition of ancient Russian and Irish bog oak, and the determination of aluminium in alloys.

He was elected an Associate of the Institute in 1891, and a Fellow in 1894; served as a Member of Council from 1901-04, and as Examiner for the Associateship in Branch (e): The Chemistry of Food and Drugs, and of Water, from 1911-15.

LAWRENCE JOHN DE WHALLEY died at Orpington, Kent, on 9th January, in his 84th year. On obtaining a Royal Exhibition he entered the Royal School of Mines, where he worked under Huxley, Valentine, Guthrie and Sir Edward Frankland, becoming Assistant to Frankland until he was appointed lecturer in chemistry at the Whitgift Grammar School. He subsequently worked for two or three years in the laboratory of H. S. Carpenter, and then joined the firm of Messrs. Forbes, Abbott and Lennard, as chief chemist. In 1890 he was appointed chemist at the

refinery of Messrs Abram Lyle & Sons (now Tate & Lyle, Ltd.), where he became chief chemist and remained until his retirement in 1930. He was a pioneer of the use of kieselguhr for sugar filtration in this country, and was one of the first to utilise Molisch's alpha-naphthol test for sugar liquors and the sulphide stain method for sulphites. He had a wide knowledge of the use of bone charcoal and of filtration, and was responsible for the introduction of affination at the Plaistow Wharf. He also made many improvements in the manufacture of golden syrup. He was a representative at the Royal Commission on Sugar Supply during the War, and was an abstractor for the *Journal of the Society of Chemical Industry*, in the sugar section, from 1896 to 1915.

He was elected a Fellow of the Institute in 1911.

## Books and their Contents.

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The following books have recently been presented by the authors or publishers. Copies may be seen in the Library of the Institute.

**"Nota Bene: Anatomy of Chemistry."** S. B. Davies. Pp. 16. (London: Longmans, Green & Co., Ltd.) 6d.

A pamphlet of definitions, laws, hypotheses, etc.

**"Applied Chemistry for Engineers."** A. F. H. Ward. Pp. xii + 128. (London: Longmans, Green & Co., Ltd.) 5s.

A practical course in applied chemistry mainly for engineering students, but also useful to students of technological chemistry.

Water examination; boiler water treatment; corrosion; coal and oil; Appendix I: standard solutions; Appendix II: hydrogen ion concentration; Appendix III: atomic weights; Appendix IV: logarithms and anti-logarithms.

**"Chemical Arithmetic."** F. W. Goddard. Pp. viii + 100. (London: Longmans, Green & Co.) 1s. 6d. net.

A small book dealing with the arithmetical aspect of elementary chemistry to School Certificate Standard.

Law of conservation of mass; law of constant composition or definite proportions; gas laws; solubilities; equivalents; chemical combination by weight; atomic weights, valency; chemical combination by volume, Gay Lussac's Law; Avogadro's Hypothesis; vapour density; chemical equations; gravimetric analysis; volumetric analysis; logarithms and antilogarithms.

**"Gravimetric Analysis: A Laboratory Manual with Special Reference to the Analysis of Natural Minerals and Rocks."** W. Van Tongeren. Pp. xii + 278. (Amsterdam: D. B. Centen's Uitgevers-Maatschappij N.V.; London Agents: Messrs. H. K. Lewis & Co., Ltd., 136, Gower Street, London, W.C.1.) 14s. net.

Operations: analysis of silicates; salt deposits and mineral waters; analysis of ore minerals; organic minerals and rocks; analytical factors; apparatus; reagents; references; and index.

A review of this book will appear in JOURNAL AND PROCEEDINGS, Part II, 1937.

**"The Extra Pharmacopoeia."** Martindale. Twenty-first edition. Volume 1. Pp. xxxiv + 1,182. (London: Pharmaceutical Press). 27s. 6d. net.

Published under the direction of the Council of the Pharmaceutical Society of Great Britain, under a Revision Committee, with Mr. C. E. Corfield as Editor.

The bulk of the book consists of *materia medica*, alphabetically arranged. This is followed by vaccines, sera, toxins and antitoxins; chapters on blood transfusion and poisons; the Poisons List; schedules; legislation, statutes and regulations; and a therapeutic index of diseases and symptoms. The work also contains tables, thermometric equivalents and atomic weights.

"A School Physics: Revision Notes and Questions." S. R. Humby and F. W. Goddard. Pp. viii+236. (London: Longmans, Green & Co.) 3s. od.

Hydrostatics: Density and specific gravity; pressure; Archimedes' Principle. Heat: Expansion of solids, liquids and gases; calorimetry; change of state; heat transmission; mechanical equivalent of heat. Light: Rectilinear propagation of light; photometry; nature and effects of light; reflection; spherical mirrors; refraction of light; lenses; optical instruments; spectra. Sound: sound waves; resonance. Tables of Logarithms, antilogarithms, and trigonometrical functions.

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International Commission for Uniform Methods of Sugar Analysis: Report of the Proceedings of the 9th Session (1936). Pp. 42. 2s. od. net.

**British Standards Institution.**—Specifications recently issued by the British Standards Institution include:—

"Ready Mixed Paints (Oil Gloss)": 1936.

- 261. White Ready Mixed Paint (White Lead Base).
  - 262. Tinted Ready Mixed Paints (White Lead Base).
  - 277. White Ready Mixed Paint (Zinc Oxide Base).
  - 278. Tinted Ready Mixed Paints (Zinc Oxide Base).
  - 293. Green Ready Mixed Paints.
  - 294. Black Ready Mixed Paints.
  - 295. Red Oxide of Iron Ready Mixed Paints.
  - 371. Purple Brown Oxide of Iron Ready Mixed Paints.
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688. 1936. Bituminous Filling Compounds for Electrical Apparatus (excluding those used for Cable Boxes).

718. 1936. Density Hydrometers.

C.E.(B) 1776. An Addendum to the Specification for Turpentine (Types 1 and 2) and White Spirit for Paints (B.S.S. 244-1936).

65. 1937. Salt-Glazed Ware Pipes (superseding 65-1934).

**The Smithsonian Institute** has kindly presented copies of the following:—"The Approach to the Absolute Zero of Temperature," by F. Simon; "Discovery and Significance of Vitamins," by Sir Frederick Gowland Hopkins, O.M., F.R.S.; and "The Salinity of Irrigation Water," by Carl S. Scofield.

The Cambridge University Press announce the publication of "**An Introduction to Comparative Biochemistry**," by Dr. Ernest Baldwin. The book is intended for those who have a general interest in science, as well as for beginners in Biochemistry.

The Cambridge University Press will also shortly publish **The Metabolism of Living Tissues**, by Dr. Eric Holmes, with a Foreword by Sir F. Gowland Hopkins, F.R.S.

**The British National Committee of the World Power Conference** announces the publication of the "Statistical Year Book" dealing with resources and statistics for 1933-1934. (Obtainable from Mr. C. H. Gray, British National Committee, World Power Conference, 36, Kingsway, London, W.C.2., 20s. net, but obtainable by the Institute as a Member-Body of the British National Committee at 15s. Inland postage 6d. extra.)

The contents embrace international statistics of power resources, development and utilisation: coals, brown coal, lignite, and peat; wood; petroleum, benzoles, alcohols; natural gas; water power; electricity.

**The Science Museum** has published a brochure on "Electric Illumination," being an account of the principles, applications, and development of electric lighting, compiled by W. T. O'Dea. (H.M. Stationery Office, 6d. net.) Pp. iv + 40.

**Central Agricultural and Scientific Bibliography**, The Science Library, The Science Museum, South Kensington.—Bibliographies are obtainable under Section 5 (Industrial Chemistry and Physics) covering a large variety of subjects, including—glass mirrors; bone charcoal; cellophane and glassine; carbon tetrachloride; gas burners; lubrication and lubricants; plastics; refrigeration; gypsum plaster; plaster board; electro-precipitation of rubber; asphalt; liver extracts; acid-proof cements; chemical stoneware; fire-proof paints; matches; starch; oxygen, nitrogen and hydrogen; etc.

The Chief Librarian of the Manchester Public Libraries has forwarded a copy of *The Manchester Review* (Spring 1937) containing a Bibliography of books and pamphlets dealing with the subject of "Choosing a Career."

## Scientific and Industrial Research.

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The Report of the Department of Scientific and Industrial Research for 1935-6 has recently been published (H.M. Stationery Office, 3s. net).

The Report is in its usual form and consists of the Report of the Committee of the Privy Council and of the Advisory Council, and an account of the work done by the National Physical Laboratory, the Chemical Research Laboratory, the Research Boards and the Industrial Research Associations, with the usual appendices giving information with regard to personnel, expenditure and publications.

The Advisory Council notes that industry is showing increasing readiness to make use of scientific method and scientific knowledge. There is a steady increase in the total sum which industry as a whole provides annually for the development of Research Associations. In the year 1932-3 a total sum of £167,370 was supplied by all the industries concerned for the support of the Research Associations organised by them. In the year just closed this figure has grown to £232,468, or nearly 40 per cent., in three years. The grants made by the Department for Research Associations have increased in the same period by £39,239, that is, from £68,212 to £107,451. The Council regards this development as encouraging, but considers that the position of the Research Associations as a whole is not yet completely satisfactory nor that adequate advantage has always been taken by the grants offered.

The following passage from the Report of the Advisory Council is of such importance that it is quoted verbatim:—

“From the point of view of industry, research is only a means to an end. The end is the application of scientific knowledge to all the stages of production and the development of new processes. The application and development of scientific ideas in industry depend upon a complete understanding of the way in which industry can make use of science and scientific method. This application and development can be fully attained only if the

problem of this co-operation is studied by the man of science as well as by the industrialist. Between men of scientific education and most of those engaged in productive industry there are differences of training, experience and outlook which are not always present to the mind of those who are anxious to secure the potential benefits which science, wisely used, can bring to the community. The scientist has to meet the industrialist half way. For that reason one of our most important tasks is so to organise the conduct of research as to promote contact with industry.

"The historian of the future will probably point to the last five years as a period marking an important development in the industrial outlook of this country. These years have witnessed the fruition of the policy adopted by several large industrial undertakings of setting well-balanced teams of research workers, including chemists, physicists, engineers and where necessary biologists, to solve a particular problem or to develop a new product.

. . . . .

"This country has never been lacking in men of genius whose inventive capacity can give birth to the ideas which bring about industrial advances. What is new, in this country, in present times, is the way in which industry has taken up these new ideas and brought them to the stage of industrial application by team work in which the scientists, the technical men, and in fact all the departments into which a great business is organised have worked side by side in the practical attainment of an objective. Partly for economic reasons, partly because of the high degree of specialisation which the advance of knowledge has made inevitable in scientific fields, the future no longer lies with industries that are content to make sporadic advances at the call of the brilliant individualist. Co-operation, team work, and an extensive organisation on the technical side are essential for success. Co-operation can never win its fullest success until the contacts between men of ideas in industry and men of ideas in science are as closely knit as possible.

"It is for all these reasons that we attach so much importance to the development of the research association movement. It provides the opportunity for the industrialist to state his problems to the man of science and to determine the order of priority, in terms of their economic importance of the objectives

of particular proposals for research. Nothing can be more unfortunate than a vague hope that science can offer ready-made solutions of industrial problems. The contributions which science can make to their solution are to be obtained only by persevering effort on the part of industry and by close co-operation with science. It is because the staff of a research association, envisaging the day to day problems of the industry and bringing to their solution a knowledge of science, can do so much in the laboratory and in the works to promote the application of science, that we are so concerned to see the Associations successful."

In addition to the work represented by the Research Associations, the Department is in contact with a wide range of industry, and examples are given of the various methods adopted to secure contact with and co-operation by industry.

Members interested in the detailed work of the Department should obtain copies of the full Report.

# The Register.

At the meetings of Council held on 22nd and 29th January, 1937. 8 Associates were elected to the Fellowship, 58 new Associates were elected, 28 Students were admitted, and 2 Students were re-admitted.

The deaths of 3 Fellows and 3 Associates have been reported.

### **Associates elected to the Fellowship.**

- Bell, James jun., B.Sc., Ph.D. (Glas.), 3A, Finnart Terrace, Greenock.  
 Bubb, Frederick James, B.Sc. (Lond.), 28, Thames Eyot, Cross Deep, Twickenham.  
 Burns, Ronald Hosendoff, B.Sc. (Lond.), 54, The Woodlands, Esher, Surrey.  
 Driver, John Edmund, M.Sc., Ph.D. (Lond.), 16, Gregory Street, Notting-ham.  
 Fife, James George, B.Sc. (Lond.), 20, Parkland Road, Woodford Green.  
 Hirst, Joseph Frederick, B.Sc. (Lond.), The Laboratory, Custom House, London, E.C.3.  
 Jones, George Bishop, A.M.Inst.C.E., 2, Reinwood Road, Lindley, Hudders-field.  
 Thacker, Gilbert Doe Dwyer Way, B.Sc. (Lond.), c/o Shell Petroleum Corporation, Norco, Louisiana, U.S.A.

### **New Associates.**

- Alexander, William Alastair, B.Sc. (Lond.), Chemical Laboratory, 4, Lindsay Place, George IV Bridge, Edinburgh.  
 Barnett, George, 103, Holly Lane, Smethwick, Staffs.  
 Bashford, Leslie Arthur, B.Sc. (Lond.), A.R.C.S., 14, Venetian Road, London, S.E.5.  
 Bayne, Charles, 4, Viewforth Street, Kirkealdy, Fife.  
 Bean, Charles Ernest, B.Sc. (Lond.), A.R.C.S., 55, Wyndham Road, Salisbury.  
 Bebington, Norman Sidney John, 28, Brookfield Avenue, Crosby, Liver-pool, 23.  
 Best, Arthur Pickup, B.Sc. (Lond.), 10, Bloomfield Court, Bishop's Road, London, N.6.  
 Brown, Cedric John, B.Sc. (Birm.), 11, The Mount, Caversham, Reading.  
 Butterworth, Eric Collins, M.Sc. (Vict.), 32, Redcross Street, Rochdale.  
 Christian, Harold William, B.Sc. (Lond.), 87, Hartington Road, London, W.4.  
 Clegg, Robert Stanley, B.Sc. (Sheff.), 2, Moss Terrace, Winnington, Northwich.  
 Consden, Raphael, B.Sc., Ph.D. (Lond.), 21, Ansford Road, Bromley, Kent.  
 Dasappa, Belvadi, B.A. (Mysore), B.Ag. (Bombay), Ph.D. (Lond.), 112, Gower Street, London, W.C.1.  
 Diamond, Leslie George, B.Sc. (Bris.), Ashbourne, Green Lane, Leigh, Lancs.  
 Dowson, William Montague, B.Sc. (Lond.), 40, Kenilworth Road, Beeston, Nottingham.  
 Drewitt, James Gordon Napier, B.A. (Oxon.), 22, Courtfield Avenue, Harrow.

- Dunford, Raymond Archibald, 152, Windermere Avenue, Wembley.  
 Eaton, Edward Foster, Endothwait, Tile Kiln Lane, Bexley.  
 Fairclough, Fred, A.M.C.T., 61, Bourne Road, Stoke, Coventry.  
 Firmin, Laurence William George, 89, The Broadway, London, W.13.  
 Gross, Ronald Frederick John, B.Sc. (Lond.), 19, Midway Road, Leicester.  
 Hartley, Frank, B.Sc. (Lond.), Ph.C., 73, Jeffreys Road, London, S.W.4.  
 Hilton, John, B.A. (T.C.D.), The Laurels, Inchicore Road, Dublin, I.F.S.  
 Holburn, William, 23, Ryburn Buildings, Sowerby Bridge, Yorks.  
 Honick, Kenneth Robert, 45, Daniels Road, Birmingham, 9.  
 Ingham, Jack Shore, B.Sc. (Lond.), 50, Victoria Road, London, N.W.10.  
 Law, Norman Heyworth, M.Sc. (N.Z.), New Zealand House, Strand  
     London, W.C.2.  
 Loudon, Alexander, B.Sc. (Witwatersrand), c/o Mr. F. Parker, 144, Whitton  
     Road, Twickenham, Middx.  
 Macfarlane, John, B.Sc. (Glas.), A.R.T.C., 2, Jane Street, Glasgow, S.W.1.  
 Mansell, George Frederick John, Rowen, Wharfedale Avenue, Prenton,  
     Birkenhead.  
 McDougall, Edward Ian, B.Sc. (Lond.), 30, Douglas Road, London, E.4.  
 McKeag, Alfred Hamilton, B.Sc. (Lond.), c/o Mrs. Morgan, Aberfoyle,  
     Shaftesbury Avenue, Kenton, Middx.  
 Melvin, John Stannislaus, 61, Sharphill Road, Saltcoats, Ayrshire.  
 Mitchell, Thomas James, A.R.T.C., 5, Glen Street, Greenock, Renfrew-  
     shire.  
 Page, James Ernest, B.Sc. (Lond.), 32, Morden Road, Newport, Mon.  
 Pay, Arthur Stafford, 34, Nethercourt Avenue, London, N.3.  
 Peel, Robert Edwin, The Lodge, Ince, Chester.  
 Pleydell, Frank Harry, B.Sc. (Lond.), c/o Mrs. Creek, 24, West Court,  
     North Wembley.  
 Potts, Frederick, B.Sc.Tech. (Manc.), B.Sc. (Lond.), 163, Causeway Head  
     Road, Dore, Sheffield.  
 Pragnell, Bernard Archie, B.Sc. (Lond.), The Residence, National Smelting  
     Co., Avonmouth, nr. Bristol.  
 Proudfoot, Norman Findon, 4, Brynmor Road, Mossley Hill, Liverpool, 18.  
 Rogers, Frank, B.Sc. (Lond.), 11, Abbey Grove, The Wells Road, Notting-  
     ham.  
 Rose, Maurice James, B.Sc. (Lond.), 19, Furnival Street, London, E.C.4.  
 Scott, Barry Alderson, B.Sc. (Lond.), A.R.C.S., 53, Carleton Road, London,  
     N.7.  
 Sergeant, Stanley Victor, B.Sc. (Lond.), 54, Highfield Road, Dartford.  
 Silman, Richard Samuel, 22A, Albert Bridge Road, London, S.W.11.  
 Smith, Harold Cecil, B.Sc., Ph.D. (Dun.), 4, Priory Crescent, Sudbury,  
     Wembley.  
 Taylor, William Edward Leslie, 91, Southcoates Lane, Hull.  
 Thompson, Hubert Morris, B.Sc., Ph.D. (Liv.), 10, Lang Lane, West  
     Kirby, Wirral.  
 Tracey, George, 6, Eagle Street, Blackburn.  
 Venkatachalam, Venkateswarier, M.A. (Madras), Janakam, Bazulullah  
     Road, Thyagaraya Nagar, Madras, India.  
 Weatherall, Harry, 67, Evered Avenue, Walton, Liverpool, 9.  
 Wild, George Lewis Edgar, B.Sc., Ph.D. (Lond.), Walden, Uphill Road,  
     London, N.W.7.  
 Williams, Evan, M.Sc. (Wales), 52, Station Road, Hirwaun, Aberdare,  
     Glam.  
 Wilson, Andrew Cook, 4, Harrison Drive, Glasgow, S.W.1.  
 Wood, Claude Helm, Parkside, Prescot, Lancs.  
 Wright, Denis Eric, 44, Spring Park Avenue, Shirley, Surrey.  
 Young, Geoffrey Tyndale, B.Sc. (Birm.), Department of Chemistry, The  
     University, Bristol, 6.

### New Students.

Banks, John, 22, Paisley Avenue, Edinburgh, 8.  
Barton, Alec William Henry, 52, London Road, Canterbury.  
Birtwell, Stanley, 27, Padiham, Sabden, nr. Blackburn.  
Briebach, Albert Victor, 5, Gaynes Road, Upminster.  
Brownlee, George White, Ph.C., M.P.S., Thornloe, Old Cummock, Ayrshire.  
Caygill, Frederick James, 63, Church Road, London, S.W.13.  
Clayton, Hollis jun., Miles, Stisted, nr. Braintree.  
Cooper, Cyril Jack, Glenside, Old England Estate, Chatham.  
Cowin, Robert Archibald, 27, Bare Avenue, Morecambe.  
Davison, Anthony Stuart, 90, Gainsborough Road, Crewe.  
Dromgoole, Frederick John, 69, Dentons Green Lane, St. Helens.  
Entwistle, Donald, 42, Ellenbrook Road, Boothstown, Manchester.  
Freedman, Norman, 22, Mount Street, London, E.1.  
Ganday, Raymond, 113, Derby Road, Long Eaton, Notts.  
Gordon, Robert Hill, The Harbour, Annalong, Co. Down.  
Lassam, Robert Errington, 2, Chandos Road, Harrow.  
Lewton-Brain, Norman, 11, The Parade, H.M. Dockyard, Portsmouth.  
Matthews, William, 80, John Heywood Street, Clayton, Manchester, 11.  
Moir, Murdo Logan, Roy Cottage, Evanston, Ross-shire.  
Mouat, Harold Anderson, 254, Chillingham Road, Heaton, Newcastle-on-Tyne.  
Pennington, Joseph Donald, 5, Stanley Road, Walkden, nr. Manchester.  
Rostern, Alan, 983, Middleton Road, Chadderton, Oldham.  
Searle, Kenneth Noel, Bluntisham, Huntingdon.  
Smith, Robert Roy, 82, New Street, Sutton, St. Helens.  
Steele, Roy Johnstone, 14, Hayward Avenue, Strood, Rochester.  
Wasserman, Haimee, 130, Lambeth Walk, London, S.E.11.  
Watts, James, 23, Rolt Street, London, S.E.8.  
Young, William Hamilton, 110, West Side, Clapham Common, London, S.W.4.

### Re-admitted Students.

Hullah, Ralph, 250, Upper Woodlands Road, Bradford.  
Idle, Hubert Alfred, Rosecroft, Skeena Hill, London, S.W.18.

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### DEATHS

#### Fellows.

Alfred Henry Knight.  
Percy Andrew Ellis Richards.  
Laurence John de Whalley, B.Sc. (Lond.).

#### Associates.

Charles Herbert Moon, B.Sc. (Bris.).  
Percy William Narracott.  
Ralph David Owen.

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### CHANGE OF NAME.

Frank Levy, *Fellow*, to Frank Stephenson,—by Deed Poll.  
Alice Watson Stewart, B.Sc. (Aberd.), *Associate*, to Alice Watson Garrow,—on her marriage.

## Coming Events.

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**1937**

**February**

- 15–26 BRITISH INDUSTRIES FAIR: Olympia and the White City, London, W. (9.30 a.m. to 7.30 p.m.), and at Castle Bromwich, Birmingham (10 a.m. to 6 p.m.).
- 18 INSTITUTION OF MINING AND METALLURGY: General Meeting at the Rooms of the Geological Society, Burlington House, Piccadilly, London, W.1, at 5.30 p.m.  
THE CHEMICAL SOCIETY: Ordinary Scientific Meeting, at the Chemical Society, Burlington House, Piccadilly, London, W.1, at 8 p.m.
- SOCIETY OF CHEMICAL INDUSTRY (Birmingham and Midlands Section): "Present-day Purine Chemistry." Professor J. M. Gulland, at Nottingham.
- 19 THE CHEMICAL SOCIETY: "Ionic Migration." Prof. J. Kendall, F.R.S., at the Royal Technical College, Glasgow, at 7.30 p.m.  
THE CHEMICAL SOCIETY: "The Unravelling of Complex Reactions." Prof. H. M. Dawson, F.R.S., at the Chemistry Lecture Theatre, The University, Sheffield, at 5.30 p.m.  
INSTITUTE OF CHEMISTRY (Bristol and South-Western Section): "Fluorescence Analysis as an aid to the Chemist." Dr. J. Grant, in the University Chemical Department, Woodland Road, Bristol, at 5.30 p.m.  
INSTITUTE OF CHEMISTRY (Newcastle upon Tyne and North-East Coast Section) and SOCIETY OF CHEMICAL INDUSTRY (Newcastle Section): "Chemistry at High Temperatures." Dr. A. Eric J. Vickers, in the Chemistry Lecture Theatre, Armstrong College, Newcastle upon Tyne.
- SOCIETY OF DYERS AND COLOURISTS (Manchester Section): "PH Control in Textile Works Practice." Dr. John Muir, at the Constitutional Club, Manchester, at 7 p.m.
- 19–20 INTERNATIONAL SOCIETY OF LEATHER TRADES' CHEMISTS: Symposium on "Scientific and Technical Aspects of Wetting and Detergency," in the Mathematics Lecture Theatre, Huxley Building, Imperial College of Science and Technology, South Kensington, London, S.W.7; February 19th, 10 a.m. to 6 p.m.; February 20th, 10 a.m. to 1 p.m.
- 22 INSTITUTION OF THE RUBBER INDUSTRY: "Improvements in the Performance and Testing of Rubber." Dr. S. S. Pickles, at the British Empire Club, 12, St. James's Square, London, S.W., at 7.30 p.m.
- 24 THE CHEMICAL SOCIETY (Liverpool Section): "Some Aspects of Modern Analytical Chemistry." Dr. J. J. Fox, in the Chemistry Lecture Theatre of the University, Liverpool, at 6 p.m.

**1937**  
**February**

- 24 INSTITUTE OF CHEMISTRY (Birmingham and Midlands Section): "Chemical Investigations as an Aid to Diagnosis of Cancer." Dr. D. L. Woodhouse, at the University Buildings, Edmund Street, Birmingham, at 7.30 p.m.
- INSTITUTE OF CHEMISTRY (Irish Free State Section): Exhibits and Demonstrations.
- LEICESTER LITERARY AND PHILOSOPHICAL SOCIETY (Chemistry Section) and the INSTITUTION OF THE RUBBER INDUSTRY (Leicester Section): "The Correct Use of Anti-oxidants." Mr. Maldwyn Jones, at the College of Technology, Leicester, at 7.30 p.m.
- ROYAL SOCIETY OF ARTS: "Alloys." Prof. W. L. Bragg, F.R.S., at John Street, Adelphi, W.C.2., at 8 p.m.
- 25 SOCIETY OF CHEMICAL INDUSTRY (Birmingham and Midlands Section): "Topical Matters on Paint and Painting." Dr. L. A. Jordan, at the University Buildings, Edmund Street, Birmingham, at 7.30 p.m.
- INSTITUTION OF CHEMICAL ENGINEERS: 15th Annual Corporate Meeting: At the Hotel Victoria, Northumberland Avenue, London, W.C.2, at 11 a.m.—"Chemical Industry and the Outlook in Europe": Dr. Herbert Levinstein, President; "Leaching in Theory and Practice." Mr. M. B. Donald, at 2.15 p.m.
- MANCHESTER LITERARY AND PHILOSOPHICAL SOCIETY (Chemical Section): "Finance and Organisation in the Small Factory." Mr. F. C. Lawrence, at 36, George Street, Manchester, at 7 p.m.

**March**

- 1 INSTITUTE OF CHEMISTRY: Annual General Meeting, at 30, Russell Square, London, W.C.1, at 8 p.m.
- INSTITUTE OF THE PLASTICS INDUSTRY (Manchester Section): Prize Papers, at the College of Technology, Manchester.
- SOCIETY OF CHEMICAL INDUSTRY (London Section): "Natural and Artificial Radio-elements and their Practical Applications in Chemical and Biological Research." Prof. F. Paneth, at the Rooms of the Chemical Society, Burlington House, Piccadilly, London, W.1, at 8 p.m.
- 2 INSTITUTE OF FUEL, jointly with the INSTITUTION OF AUTOMOBILE ENGINEERS and other Societies: A Symposium on "Research in Relation to the Motor Vehicle." Dr. F. H. Garner will deal with "Fuels and Lubricants," and Dr. T. Swinden with "Materials with special reference to Steel," at the Royal Geographical Society's Rooms, Kensington, at 7 p.m.
- 3 INSTITUTE OF CHEMISTRY (London and South-Eastern Counties Section): Visit to Lyons' Laboratories.
- 3-4 FIRST INTERNATIONAL ELECTRODEPOSITION CONFERENCE, at British Industries House, Marble Arch, Oxford Street, W.1. Conference Secretary: H. Wynne-Williams, 12A, Raleigh House, Larkhall Estate, London, S.W.8.
- 4 THE CHEMICAL SOCIETY: "Some Problems of Tyrosine Metabolism." Prof. H. S. Raper, C.B.E., F.R.S., at Burlington House, Piccadilly, London, W.1, at 8 p.m.

**1937**  
**March**

- 4** INSTITUTE OF CHEMISTRY (Belfast and District Section): "Measurements of Hydrogen Ion Concentration." Mr. G. R. Perdue. Demonstrations of pH Apparatus, at the Physics Lecture Theatre, Royal Belfast Academical Institution, Belfast, at 7.30 p.m.
- INSTITUTE OF CHEMISTRY (East Midlands Section): "Oxidation and Reduction Potentials." Dr. Samuel Glasstone, at University College, Shakespeare Street, Nottingham, at 7.30 p.m.
- INSTITUTE OF CHEMISTRY (Newcastle upon Tyne and North-East Coast Section): "Recent Developments in Water Treatment." P. Hamer, at Sunderland Technical College.
- SOCIETY OF CHEMICAL INDUSTRY (Plastics Group): Joint Meeting with Bristol Section. "Synthetic Resinous Products in the Electrical Industry." R. Newbound, at the Chemical Dept., The University, Woodland Road, Bristol.
- 5** THE BEDSON CLUB: 37th Bedson Lecture: "The X-ray Interpretation of Protein Structure." Dr. W. T. Astbury, in the Chemistry Lecture Theatre, Armstrong College, Newcastle upon Tyne, at 6.30 p.m.
- INSTITUTE OF CHEMISTRY (Aberdeen and North of Scotland Section): "Some Aspects of Blood Chemistry." Mr. John Duckworth, in the Chemistry Department, Marischal College, Aberdeen, at 5.15 p.m.
- INSTITUTE OF CHEMISTRY (Cardiff Section): "Some Recent Advances in the Chemistry of the Rotenone Series and Related Compounds." Prof. A. Robertson, in the Chemistry and Physics Lecture Theatre, University College, Cardiff, at 7 p.m.
- INSTITUTE OF CHEMISTRY (South Yorkshire Section): "Search for the Rare Elements." Mr. F. M. Brewer, at the County Technical College, Worksop, at 7.30 p.m.
- INSTITUTION OF PETROLEUM TECHNOLOGISTS (Northern Branch), INSTITUTION OF THE RUBBER INDUSTRY, SOCIETY OF CHEMICAL INDUSTRY, and OIL AND COLOUR CHEMISTS' ASSOCIATION: "Industrial Solvents." Mr. F. N. Harrap, at the Constitutional Club, St. Ann's Street, Manchester, at 7 p.m.
- SOCIETY OF PUBLIC ANALYSTS: Annual General Meeting, at the Rooms of the Chemical Society, Burlington House, Piccadilly, London, W.1, at 5.45 p.m., to be followed at 6.15 p.m. by a lecture by Prof. G. Barger, F.R.S., on "The Alkaloids of Ergot."
- 8** THE CHEMICAL SOCIETY and the BIRMINGHAM UNIVERSITY CHEMICAL SOCIETY: "Recent Developments in Surface Action." Prof. E. K. Rideal, F.R.S., at the Chemical Department, Birmingham University, Edmund Street, Birmingham, at 5 p.m.
- SOCIETY OF CHEMICAL INDUSTRY (Yorkshire Section): Annual General Meeting. "Modern Developments in the Treatment of Water." Mr. C. W. Tod.
- 9** THE CHEMICAL SOCIETY OF ULSTER: "The Cancer-producing Hydrocarbons." The Rt. Hon. J. R. Hawthorne, in the Large Lecture Theatre, Chemical Dept., Queen's University, Belfast, at 4.30 p.m.

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March

- 9 HULL CHEMICAL AND ENGINEERING SOCIETY: "Modern Steam Generation, with special reference to Industrial Factories." F. H. Preece, at the Lecture Room (Room 57), Municipal Technical College, Park Street, Hull, at 7.45 p.m.
- 10 INSTITUTE OF CHEMISTRY (Huddersfield Section): Annual General Meeting. Show of Industrial Films.
- SOCIETY OF CHEMICAL INDUSTRY (Road and Building Materials Group): "Some Plastering Problems in Building." Mr. B. Bakewell, at the Rooms of the Chemical Society, Burlington House, Piccadilly, London, W.1, at 8 p.m.
- 11 SOCIETY OF CHEMICAL INDUSTRY (Food Group): Members' Meeting, at the Institute of Chemistry, 30, Russell Square, London, W.C.1, at 8 p.m.
- THE CHEMICAL SOCIETY: Ordinary Scientific Meeting, at Burlington House, Piccadilly, London, W.1, at 8 p.m.
- THE CHEMICAL SOCIETY: Meeting for Reading of Original Papers, in the Chemistry Lecture Theatre, Manchester University, at 7 p.m.
- INSTITUTE OF CHEMISTRY (Liverpool and North-Western Section): "The Function of Technical Journalism." Mr. G. W. Lacey, at the Constitutional Club, India Buildings, Water Street, Liverpool, at 7.30 p.m.
- INSTITUTE OF THE PLASTICS INDUSTRY (London Section): "The Continuous Moulding of Thermo-setting Compounds." Mr. P. A. Delafield, at the British Industries House Club, Oxford Street, London, W.1.
- OIL AND COLOUR CHEMISTS' ASSOCIATION: "Modern Co-ordination Theory in Pigments." Mr. F. H. Burstall, at 30, Russell Square, London, W.C.1, at 7.30 p.m.
- 12 SOCIETY OF CHEMICAL INDUSTRY (Chemical Engineering Group): "Copper in Chemical Engineering." Dr. Stanley Baker.
- SOCIETY OF CHEMICAL INDUSTRY (South Wales Section): Jubilee Lecture: "Refractories." Dr. J. W. Mellor, F.R.S., at Swansea.
- 15 THE CHEMICAL CLUB: "Is it Worth While Patenting This?" Mr. G. S. W. Marlow, at the Chemical Club, 2, Whitehall Court, Whitehall, S.W.1, at 8.15 p.m.
- INSTITUTION OF THE RUBBER INDUSTRY (Manchester Section): "Problems in Practical Rubber Chemistry." Dr. J. G. Mackay at the Constitutional Club, St. Ann's Street, Manchester, at 7 p.m.
- 17 THE CHEMICAL SOCIETY: Seventh Hugo Müller Lecture: "Principles of Distribution of Chemical Elements in Minerals and Rocks." Prof. V. M. Goldschmidt, in the Lecture Theatre of the Royal Institution, Albemarle Street, W.1, at 5.30 p.m.
- INSTITUTE OF CHEMISTRY (London and South-Eastern Counties Section): "Chemistry in the Building Industry." Mr. F. L. Brady, at 30, Russell Square, London, W.C.1, at 7.30 p.m.

**1937**  
**March**

- 17 LEICESTER LITERARY AND PHILOSOPHICAL SOCIETY (Chemistry Section): Annual General Meeting, at the Museum, Princes Road Entrance, Leicester, at 7.30 p.m.
- SOCIETY OF CHEMICAL INDUSTRY and SOCIETY OF DYERS AND COLOURISTS: "Some Aspects of Water Treatment." Mr. P. Hamer, at University College, Shakespeare Street, Nottingham, at 7.30 p.m.
- 18 THE CHEMICAL SOCIETY: 96th Annual General Meeting, at Burlington House, Piccadilly, London, W.1, at 4 p.m.; Anniversary Dinner, at Grosvenor House, Park Lane, W.1, at 7 for 7.30 p.m.
- INSTITUTE OF CHEMISTRY (Bristol and South-Western Counties Section) and SOCIETY OF CHEMICAL INDUSTRY (Bristol Section): "Evidence of Inks and Pencil Pigments." Dr. C. A. Mitchell, in the Chemical Department of Bristol University, Woodland Road, at 5.30 p.m.
- SOCIETY OF CHEMICAL INDUSTRY (Birmingham and Midland Section): "Modern Detergents." Prof. T. P. Hilditch, at the University Buildings, Edmund Street, Birmingham, at 7.30 p.m.
- 19 THE CHEMICAL SOCIETY, INSTITUTE OF CHEMISTRY, and SOCIETY OF CHEMICAL INDUSTRY (Edinburgh and East of Scotland Section): "Some Fundamental Laws of Chemical Change." Prof. C. N. Hinshelwood, F.R.S., at the North British Station Hotel, Edinburgh, at 7.30 p.m.
- THE CHEMICAL SOCIETY: "The Biochemistry of the Waxes." Prof. A. C. Chibnall, at University College, Shakespeare Street, Nottingham, at 7.30 p.m.
- INSTITUTE OF THE PLASTICS INDUSTRY (Birmingham Section): "The Continuous Moulding of Thermo-setting Compounds." Mr. P. A. Delafield, at the Grand Hotel, Birmingham.
- MANCHESTER LITERARY AND PHILOSOPHICAL SOCIETY (Chemical Section): Annual General Meeting. "Chemical Structure and Hormone Activity." Dr. W. F. Short, at 36, George Street, Manchester, at 7 p.m.
- SOCIETY OF DYERS AND COLOURISTS (Manchester Section): "A New Non-chlorine Unshrinkable Finish on Wool." Mr. A. J. Hall, at the Constitutional Club, St. Ann's Street, Manchester, at 7 p.m.
- 23 HULL CHEMICAL AND ENGINEERING SOCIETY: "Solvent Refining of Lubricating Oils." Mr. G. J. C. Vineall, in the Lecture Room (Room 57), Municipal Technical College, Hull, at 7.45 p.m.

**April.**

- 2 SOCIETY OF CHEMICAL INDUSTRY (Newcastle Section): Annual Meeting.
- SOCIETY OF CHEMICAL INDUSTRY (Manchester Section): Annual General Meeting, at the Constitutional Club, St. Ann's Street, Manchester, at 7 p.m.
- 7 SOCIETY OF PUBLIC ANALYSTS: Ordinary Meeting, at the Rooms of the Chemical Society, Burlington House, Piccadilly, London, W.1, at 8 p.m.

**1937**  
**April**

- 8 INSTITUTE OF CHEMISTRY (East Midlands Section): Annual General Meeting. Address by the President, at St. James' Restaurant, Derby, at 7.45 p.m.
- INSTITUTE OF CHEMISTRY (Liverpool and North-Western Section): Annual General Meeting: "Let's Go Somewhere." Mr. G. Brearley, at the Constitutional Club, Water Street, Liverpool, at 7.30 p.m.
- INSTITUTE OF CHEMISTRY (Manchester and District Section): Annual General Meeting. "From Boyle to Priestley."—The Registrar of the Institute,—at the Constitutional Club, St. Ann's Street, Manchester, at 7 p.m.
- OIL AND COLOUR CHEMISTS' ASSOCIATION (London Section): "Paints Tests on Iron and Steel." Dr. J. C. Hudson, at 30, Russell Square, London, W.C.I.
- SOCIETY OF CHEMICAL INDUSTRY (Birmingham and Midlands Section): Jubilee Memorial Lecture: "The Service of Science to Industry." Dr. J. T. Dunn, at the University Buildings, Edmund Street, Birmingham, at 7.30 p.m.
- 9 INSTITUTE OF CHEMISTRY (South Wales Section): Annual General Meeting, at Swansea.
- INSTITUTE OF CHEMISTRY (South Yorkshire Section): "From Boyle to Priestley." The Registrar of the Institute,—at the Doncaster Technical College, at 7.30 p.m.
- INSTITUTION OF CHEMICAL ENGINEERS and SOCIETY OF CHEMICAL INDUSTRY (Chemical Engineering Group): "Costing Problems in the Chemical Industry." Mr. H. R. Odling, at the Rooms of the Chemical Society, Burlington House, Piccadilly, London, W.1, at 8 p.m.
- OIL AND COLOUR CHEMISTS' ASSOCIATION (Glasgow Section): Annual General Meeting and Smoking Concert, at St. Enoch Hotel, Glasgow.
- OIL AND COLOUR CHEMISTS' ASSOCIATION (Manchester Section): Annual General Meeting and Smoking Concert, at Reynolds Hall, Manchester College of Technology.
- 13 SOCIETY OF CHEMICAL INDUSTRY (Road and Building Materials Group): "The Use of Rubber in Road and Building Construction." Mr. B. D. Porritt, at the Rooms of the Chemical Society, Burlington House, Piccadilly, London, W.1, at 8 p.m.
- 14 INSTITUTE OF CHEMISTRY (Belfast and District Section): Visit to Belfast Ropework Co., Ltd.
- SOCIETY OF CHEMICAL INDUSTRY (Food Group): Papers and Discussion on Protein Chemistry, at the London School of Hygiene and Tropical Medicine, Keppel Street, London, W.C.I, at 8 p.m.
- 15 THE CHEMICAL SOCIETY and THE SOCIETY OF CHEMICAL INDUSTRY (London Section): Discussion at Burlington House, Piccadilly, London, W.1, at 8 p.m.
- 16 INSTITUTE OF CHEMISTRY (Cardiff Section): Annual General Meeting, at Queen's Hotel, Cardiff, at 7 p.m.
- SOCIETY OF DYERS AND COLOURISTS (Manchester Section): Annual Meeting. Short papers and discussion, in the Lecture Room of the Literary and Philosophical Society, 36, George Street, Manchester, at 7 p.m.

**1937****April.**

- 19 INSTITUTION OF THE RUBBER INDUSTRY (Manchester Section): Annual General Meeting, at the Constitutional Club, St. Ann's Street, Manchester, at 7 p.m.
- OIL AND COLOUR CHEMISTS' ASSOCIATION (Scottish Section): Annual General Meeting and Smoking Concert, at St. Enoch Hotel, Glasgow.
- 19-24 INTERNATIONAL ASSOCIATION FOR TESTING MATERIALS: International Congress to be held in London. Particulars are obtainable from Mr. K. Headlam Morley, Iron and Steel Institute, 28, Victoria Street, Westminster, London, S.W.1. (Membership Fee: Before 31st March, 21s.; after that date 30s.)
- 20 MANCHESTER LITERARY AND PHILOSOPHICAL SOCIETY: Annual General Meeting, at 36, George Street, Manchester, at 5.30 p.m.
- SOCIETY OF CHEMICAL INDUSTRY (Plastics Group): "Alcohol as a Potential Source of Plastics." Mr. H. Langwell, at the Rooms of the Chemical Society, Burlington House, Piccadilly, London, W.1.
- 21 INSTITUTE OF CHEMISTRY (London and South-Eastern Counties Section): Visit to the Paper Works of Messrs. John Dickinson & Co., Ltd., Hemel Hempstead.
- INSTITUTION OF CHEMICAL ENGINEERS and SOCIETY OF CHEMICAL INDUSTRY (Chemical Engineering Group): "The Valuation and Insurance of Chemical Plant." Mr. H. A. S. Gothard, at the Rooms of the Chemical Society, Burlington House, Piccadilly, London, W.1, at 6 p.m.
- 22 INSTITUTION OF ELECTRICAL ENGINEERS: The 28th Kelvin Lecture. Prof. J. Chadwick, F.R.S., in the Lecture Theatre of the Institution, at 6 p.m.
- 23 INSTITUTE OF CHEMISTRY (Newcastle upon Tyne and North-East Coast Section) and SOCIETY OF CHEMICAL INDUSTRY (Newcastle Section): Annual Chemical Dinner, at Royal Station Hotel, Newcastle.
- 28 INSTITUTE OF CHEMISTRY (London and South-Eastern Counties Section): Visit to the Paper Works of Messrs. John Dickinson & Co., Ltd., Hemel Hempstead.
- 29 THE CHEMICAL SOCIETY: Haber Memorial Lecture. Prof. J. E. Coates, O.B.E., at Burlington House, Piccadilly, London, W.1.
- THE CHEMICAL SOCIETY: Meeting for the reading of Papers, in the Lecture Theatre of the New Chemistry Buildings, Leeds University, at 7 p.m.
- 30 SOCIETY OF CHEMICAL INDUSTRY (Chemical Engineering Group): Annual General Meeting and Dinner.

**May**

- 3 INSTITUTE OF CHEMISTRY (Belfast and District Section): Annual General Meeting, held in the Physics Lecture Theatre, Royal Belfast Academical Institution, at 7.30 p.m.

12 CORONATION OF H.M. KING GEORGE VI.

**July**

- 2-11 ACHEMA VIII: Chemical Engineering Exhibition, Frankfort-on-the-Main.
- 5-9 SOCIETY OF CHEMICAL INDUSTRY: Annual Meeting, in Harrogate.

## General Notices.

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**The Annual General Meeting of the Institute will be held at the Institute, on Monday, 1st March, 1937, at 8 p.m.**

Votes for the election of Council, Officers and Censors must be received at the office of the Institute not later than 8 p.m. on Saturday, the 27th February.

**Examinations.**—The list of entries for the April Examinations closed on 8th February.

Examinations for the Associateship will be held from 13th to 18th September.\* The list of entries will be closed on Monday, 5th July.

(Notebooks can be received up to 7th September.)

Examinations for the Fellowship will be held from 13th to 18th September.\* The list of entries will be closed on Monday, 5th July, except for candidates in Branch G, Industrial Chemistry, or for those desiring special examinations, whose applications should be received before 1st June.

Forms of Application and further particulars can be obtained from the Registrar.

\* When the number of Candidates renders it necessary, Examinations may also be held during the succeeding week.

**Notice to Associates.**—The Council desires to encourage all Associates to qualify for the Fellowship. Copies of the regulations and forms of application can be obtained from the Registrar.

**Appointments Register.**—A Register of Fellows and Associates who are available for appointments, or are desirous of extending their opportunities, is kept at the offices of the Institute. For full information, inquiries should be addressed to the Registrar.

Fellows and Associates are invited to notify the Institute of suitable vacancies for qualified chemists.

Students who have been registered as Students of the Institute for not less than six months and are in the last term of their training for the Associateship, may receive the Appointments Register of the Institute, provided that their applications for this privilege be endorsed by their professors.

Lists of vacancies are forwarded twice weekly to those whose names are on the Appointments Register. Fellows and Associates who are already in employment, but seeking to improve their positions, are required to pay 10s. for a period of six months. Members and Students who are without employment, are required to pay 6s. 6d. for the first period of six months, and, if not successful in obtaining an appointment, will thereafter be supplied with the lists gratis for a further period if necessary.

The Institute also maintains a List of Laboratory Assistants who have passed approved Preliminary Examinations and, in some cases, Intermediate Science Examinations.

Fellows and Associates who have vacancies for Registered Students or Laboratory Assistants are invited to communicate with the Registrar.

**The Library.**—The Library of the Institute is open for the use of Fellows, Associates, and Registered Students between the hours of 10 a.m. and 6 p.m. on week-days (Saturdays, 10 a.m. and 1 p.m.), except when examinations are being held. The Library is primarily intended for the use of candidates during the Institute's practical examinations.

The comprehensive **Library of the Chemical Society** is available, by the courtesy of the Council of the Society, for the use of Fellows and Associates and Registered Students of the Institute wishing to consult or borrow books, from 10 a.m. to 9 p.m. on week-days (Saturdays from 10 a.m. to 5 p.m.), except during August and the early part of September, when the hours are from 10 a.m. to 5 p.m. Members and Students of the Institute using the Library of the Society are required to conform to the rules of the Society regarding the use of its books.

The Institute has entered into an arrangement with **The Science Library**, Science Museum, South Kensington, S.W.7, whereby books may be borrowed on production of requisitions signed by the Registrar or the Assistant Secretary of the Institute. In addition to its comprehensive sets of literature on cognate

subjects, which are not available in specialised libraries, this Library contains an exceptionally extensive collection of works on chemistry. Nine thousand scientific and technical periodicals are received regularly in the Library. All publications added to the Library are recorded in its Weekly Bibliography of Pure and Applied Science, which has a wide circulation among research workers and institutions.

**Boots' Booklovers Library.**—Under the arrangements made on behalf of Fellows and Associates of the Institute, current subscriptions will expire on **1st March**. All who wish to continue the use of the Library, or to subscribe *de novo*, should obtain application forms from the Registrar of the Institute. Members who do not immediately renew their subscriptions to the Library should return to the most convenient branch Library any volume of the Library which they may have in their possession and also their membership tokens.

**Lewis's Lending Library.**—Any Fellow or Associate who is not already acquainted with this Library of Scientific and Technical books may obtain a copy of the Prospectus from the Registrar of the Institute. A copy of the Catalogue of the Library (revised to December, 1927, with Supplements 1928-30 and 1931-33) is available in the Library of the Institute. A Bi-monthly list of Additions is also issued.

**Covers for Journal.**—Members who desire covers (1s. 2d. each) for binding the Journal in annual volumes, are requested to notify the Registrar of their requirements, indicating the years for which the covers are required.

Arrangements may be made with Messrs. A. W. Bain & Co., Ltd., 17-19, Bishop's Road, Cambridge Heath, London, E.2, to bind volumes of the JOURNAL AND PROCEEDINGS on the following terms: buckram cover, 1s. 2d.; binding, 2s. 9d.; postage and packing, 9d.; in all, 4s. 8d.

**Lantern Slides for Lecturers.**—A collection of slides is kept at the Institute for the use of members who are giving lectures. Enquiries should be addressed to the Registrar.

As the slides are frequently in demand, members are requested to notify their requirements at least 14 days before the date on which the slides are to be used.

**Changes of Address.**—In view of the expense involved through frequent alterations of addressograph plates, etc., Fellows, Associates, and Registered Students who wish to notify changes of address are requested to give, so far as possible, their permanent addresses for registration.

All requests for changes in the Register should be addressed to the Registrar, and not to the Honorary Secretaries of Local Sections.

"The Profession of Chemistry" (Third Edition, 1935), will be supplied gratis to any Fellow, Associate or Registered Student, on application to the Registrar.

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## Institute of Chemistry Benevolent Fund.

Founded in 1920 as a memorial to Fellows, Associates and Students who died in the service of their country, 1914-18.

**Contributions may be forwarded to**  
*The Hon. Treasurer,*

BENEVOLENT FUND, INSTITUTE OF CHEMISTRY,  
30, RUSSELL SQUARE, LONDON, W.C.1.