THE

INSTITUTE OF CHEMISTRY

OF

GREAT BRITAIN AND IRELAND.

FOUNDED, 1877. INCORPORATED BY ROYAL CHARTER, 1885.

PROCEEDINGS,

1906.

PART I.

REPORT OF THE COUNCIL FOR THE YEAR ENDING 1st MARCH, 1906.

FINANCIAL STATEMENT FOR 1905.

PROCEEDINGS OF THE COUNCIL.

REPORTS OF THE EXAMINERS:
INTERMEDIATE AND FINAL EXAMINATIONS: JANUARY, 1906.

ALTERATIONS IN AND ADDITIONS TO THE REGISTER.

NOTICES.

Issued under the supervision of the Proceedings Committee.

RICHARD B. PILCHER,
Registrar and Secretary.

30, BLOOMSBURY SQUARE, LONDON, W.C.,
February, 1906.

Proceedings Committee, 1905—6.

EDWARD DIVERS (*Chairman*),
EDWARD J. BEVAN,
CHARLES E. CASSAL,
OSCAR GUTTMANN,
E. GRANT HOOPER,
DAVID HOWARD (*President*),
HERBERT JACKSON,
A. GORDON SALAMON (*Treasurer*).

REPORT OF THE COUNCIL.

(1905-1906.

To be submitted to the Fellows and Associates at the Twenty-eighth Annual General Meeting of the Institute, on Thursday, the 1st day of March, 1906.

THE ROLL OF THE INSTITUTE.

During the year, 36 Fellows have been elected (of whom 32 were Associates); 42 Associates have been elected (of whom 25 were Students); and 38 new Students have been admitted. 1 Fellow has been re-elected.

The Council regret to record the deaths of 10 Fellows: William Ackroyd; John Lloyd Bullock; Alexander Nash Crosskey, B.Sc.; Samuel Dalziel; John Gardner; William Jesse Lovett; James Cochran Stevenson; Charles Robert Clarke Tichborne, L.R.C.S.I.; Charles Tookey; Charles William Vincent; and of 1 Student: Carey John Wilson.

The resignations of 5 Fellows, 1 Associate, and 2 Students have been accepted, and the names of 3 Fellows and 5 Students have been removed from the register under the provisions of Bye-Law 70.

The Register of the Institute, now (26th January, 1906) contains the names of 992 Fellows and 172 Associates: an increase of 28 Members during the year. The number of Students is now 177, an increase of 5.

THE WORK OF THE COUNCIL.

MEETINGS.—There have been 12 Council Meetings, and 39 meetings of Committees.

COMMITTEES.—The Chairmen of the Standing Committees have been as follows :—

Finance Committee	A. Gordon Salamon, Hon. Treasurer.
House Committee	R. J. Friswell.
Institutions Committee	The President.
Library Committee	A. Gordon Salamon.
Nominations and Examinations Committee	The President.
Proceedings Committee	Edward Divers.

Among the Special Committees, may be mentioned the Committee appointed to consider the recommendations attached to the Report of the Departmental Committee appointed by the Board of Agriculture to enquire into and report on the working in Great Britain of the Fertilisers and Feeding Stuffs Act, 1893 (Cd. 2372). The work of the Committee was mentioned in *Proceedings*, 1905, Part III. : their report was adopted by the Council and submitted to the Board of Agriculture, who thanked the Council for their views and stated that the opinions expressed would be carefully considered in the event of fresh legislation on the subject being undertaken.

A Special Committee was appointed in connection with the correspondence with the National Physical Laboratory. This correspondence has already been referred to in the *Proceedings*.

The Council appointed a Special Committee to consider the conditions affecting the appointments of Public Analysts, District Agricultural Analysts, and other professional chemists holding official positions. This Committee will consider what steps can be taken by the Institute, in the interests of the public and the Fellows, in questions arising in connection with such appointments.

PROFESSIONAL INTERESTS.

In *Proceedings*, 1905, Part III., the attention of the Fellows and Associates of the Institute was directed to the action taken by the Council with reference to the growing tendency on the part of State-aided Institutions to enter into competition with private practitioners. The Council regret to report that at the present time there are institutions, established for educational and other purposes, undertaking work in direct competition with professional chemists: Colleges undertaking agricultural analyses at nominal fees; Municipal and County Authorities undertaking, through their Public Analysts, and at the expense of the general rates, professional chemical work at far less than its cost; and Institutions issuing circulars offering their services in competition with scientific professions, which, it is well known, do not countenance self-advertisement.

The Council view this tendency with apprehension and are taking what steps they can to bring to an end such practices of public bodies, which handicap all free and individual effort to extend and improve the application of chemical science to the needs of the public.

EXAMINATIONS.

The Council have received the reports of the Examiners on Intermediate and Final Examinations held at the laboratories of the Institute in April, July, and October, 1905, and January, 1906, and on a Final Examination held in the laboratories of the Royal University of Ireland in April, 1905.

The number of Candidates examined and the number of those who passed are shown in the following table :—

Examinations.	Examined.	Passed.
Intermediate	39 ...	25
Final :—		
Branch A (Mineral Chemistry) ...	17 ...	8
Branch B (Metallurgical Chemistry) ...	4 ...	2
Branch C (Physical Chemistry) ...	— ...	—
Branch D (Organic Chemistry) ...	15 ...	10
Branch E (The Analysis of Food and Drugs and of Water, &c.)	28 ...	19
Branch F (Biological Chemistry) ...	3 ...	2
Examinations for the Fellowship: Final in Branch E	2 ...	2
	108	68

It will be seen that the number of Candidates examined during the year was 108, which is 2 less than the number examined in the year ending 1st March, 1905. The numbers for the previous year, however, included 4 Fellows who entered for the Examination in Biological Chemistry, while no Fellows entered for that Examination in the year under review. The

number of new Candidates for membership has not, therefore, diminished. There are now on the list 83 names of Candidates whose applications for admission to the Examinations have been accepted by the Council, and in view of the number of registered Students, there is every reason to believe that the number of Candidates taking the Examinations of the Institute will be maintained. In addition, it may be mentioned, that the Council will endeavour to arrange Examinations for eligible Candidates in the Colonies and in India.

The Examiner in Therapeutics, Pharmacology, and Microscopy has reported on Examinations held in April and July, 1905, and in January, 1906. For these, 37 Candidates presented themselves, including 6 Fellows, 1 Associate and 30 Candidates in Branch E of the Final Examination. 28 Candidates obtained the Certificate of the Institute in these subjects, making in all 153 Fellows and Associates who hold the Certificate.

The Examiners in General and Theoretical Chemistry were Walter William Fisher, Esq., M.A., and Professor George Gerald Henderson, M.A., D.Sc.; in Biological Chemistry—Professor Adrian J. Brown, M.Sc.; and in Therapeutics, Pharmacology, and Microscopy—Frederick Gowland Hopkins, Esq., D.Sc., M.B., M.A., F.R.S.

The thanks of the Council have been accorded to the Senate of the Royal University of Ireland for the use of the Chemical Laboratory of the University in April, 1905, and to the Board of Education for the use of the Metallurgical Laboratory of the Royal College of Science, London, in January, 1906.

Several applications for the Fellowship have been received from the Colonies and India, and in one instance arrangements were made for the Examination of a Candidate in Durban, under the supervision of a Fellow of the Institute holding a high official position in Natal.

THE REGULATIONS.

The University of Sydney, New South Wales, and the Municipal School of Technology, now incorporated as the Faculty of Technology, in the Victoria University, Manchester, have been placed on the list of Institutions recognised for the training of Candidates for the Examinations of the Institute.

In order to afford a better indication of the knowledge of Therapeutics, Pharmacology, and Microscopy required of Candidates taking the Final Examination in the Analysis of Food and Drugs, etc., the Council have formulated a syllabus in these subjects, particulars of which are given in this issue of the *Proceedings*. (See p. 27.)

The Council have approved of the Examination of the Oxford and Cambridge Schools Examination Board for a School or Leaving Certificate, provided the Certificate include the subjects required by the regulations of the Institute. This Certificate is accepted under certain conditions by the University of Oxford in lieu of Responsions, and by the Army Council in lieu of the Qualifying Examination.

EXAMINATIONS IN TECHNICAL CHEMISTRY.

In August, 1905, the Council issued to the Fellows and Associates a scheme for Examinations in Technical Chemistry. The first Examination will be held during the present year.

The Advisory Committee, with the addition of Mr. C. C. Carpenter, Mr. R. Forbes Carpenter, and Dr. Ludwig Mond, F.R.S., have been appointed as an Examination Board. The Board will have power to examine and to appoint additional Examiners as they think fit. Any Fellow or Associate who desires to enter for the Examination should send in his name to the Registrar in order that further information may be sent him as soon as the necessary arrangements for the first Examination are made. (See p. 29.)

THE INSTITUTE'S HOUSE.

The Institute has again received from the London County Council a notice to the effect that the premises may possibly be required for proposed improvements in connection with the widening of Southampton Row. The house and laboratory are within the "limits of deviation" indicated in the plan of the proposed alteration, and, therefore, the Council of the Institute have expressed their formal dissent.

THE LIBRARY.

The volumes now in the Library number upwards of 1,700. The Library Committee have had the pleasure of receiving over 175 volumes, in addition to pamphlets and other gifts. The books received up to November last have been mentioned in *Proceedings*, 1905, Parts II. and III. The Library account for 1905 shows a deficit of £4 11*s*. 10*d*.

The Council look to the Fellows and Associates for a continuance of generous support of the Library, in the

interests of the Candidates for Examination and of themselves. Members who have written and published works of reference, or pamphlets on subjects connected with Analytical and Applied Chemistry of which they could present copies, are reminded that such contributions to the Library are highly acceptable for permanent preservation.

FINANCE

From the Financial Statement for the year 1905 (pp. 12-13), it will be seen that the receipts reckoned as income exceed, by about £60, the expenditure for the year. Deducting the balance at the bank, on the 31st of December, 1904, the receipts, exclusive of Life Compositions, amounted to £1,987 4*s*. 0*d*., while the expenditure, exclusive of the investment of Life Compositions, amounted to £1,925 12*s*. 1*d*. The income and expenditure for 1905 exceeded those of 1904 by £110 12*s*. 4*d*. and £71 4*s*. 3*d*. respectively. The figures for 1904 are also attached to the Statement, for comparison.

The principal increase in income occurs in the Examination Fees, which amount to £115 10*s*. 0*d*. more than those of 1904, and it is satisfactory to notice that the loss on the examination work of the Institute is being reduced by the gradual operation of the higher scale of fees, though it must be remembered, in this connection, that the items, set down under Examinations and Laboratory account, do not include rent, rates and taxes, gas, water, and general establishment charges.

The amount of the Life Compositions received during the year was £37 16*s*., which has been duly invested under the seal of the Institute.

PUBLICATIONS, 1905.

The *Proceedings* of the Institute for 1905 were published in three parts: Part I. was issued in February and contained the Report of the Council, the Financial Statement for 1904, and reports on the Examinations held in October, 1904, and January, 1905; Part II., issued in April, contained the Report of the Annual General Meeting and the address of the President; Part III., issued in November, contained an account of the work of the Council, reports on the April, July, and October Examinations, and particulars of the scheme for Examinations in Technical Chemistry. The Register of Fellows, Associates, and Students was published in April, and the Book of Regulations, in August.

On the retirement of Mr. David Howard from the office of President, the Council desire to place on record their very high appreciation of his great services to the Institute. He was a member of the first Council, and served from 1877 to 1880, and 1881 to 1884. In 1885, he succeeded the late Dr. C. R. Alder Wright, F.R.S., as Honorary Treasurer, which position he held until his election as President in 1903.

The Council feel that Mr. Howard deserves the heartiest thanks of the Fellows and Associates for much valuable work done and time willingly given, during the long period of over 28 years.

30, Bloomsbury Square, London, W.C.

26th January, 1906.

THE INSTITUTE OF CHEMISTRY OF GREAT BRITAIN & IRELAND

Founded, 1877. Incorporated by Royal Charter, 1885.

Statement of Receipts and Expenditure for the Year ended the 30th December, 1905.

1904.	RECEIPTS.	£ s. d.	£ s. d.
	Balance at Bank on the 31st Dec., 1904—		
£101 9 4	General A/c	192 6 5	
45 10 10	Biological A/c	45 10 10	
	Library A/c	3 3 4	
			241 0 7
	Subscriptions—		
871 10 0	Fellows'	897 15 0	
184 16 0	Associates'	174 6 0	
35 5 0	Students'	47 5 0	
			1,119 6 0
202 13 0	Entrance Fees		166 19 0
60 9 1	Dividends		64 16 4
11 12 7	Sundry Receipts, including the Sale of Regulations		10 6 8
510 6 0	Examination Fees		625 16 0
			2,228 4 7
1 9 7	*Library Donations.*		
189 0 0	Life Compositions		37 16 0
£2,214 1 5			£2,266 0 7

1904.	EXPENDITURE.	£ s. d.	£ s. d.
£233 8 2	Printing	210 7 1	
45 11 3	Stationery, Office Books, &c.	55 11 8	
66 1 5	Postage	72 16 2	
			338 14 11
115 1 0	Rent	115 1 0	
138 15 4	Redemption Premiums	138 15 4	
90 10 5	Rates and Taxes	90 19 1	
6 10 0	Insurance	6 10 0	
50 6 11	Repairs and Furnishing	55 8 3	
			406 13 8
417 9 6	Salaries and Wages	474 0 4	
32 2 9	Advertisements	38 1 10	
52 11 8	Gas, Water, Electric Light and Power	50 18 5	
17 0 0	Telephone	17 0 0	
			580 0 7
	Examinations and Laboratory A/c—		
422 12 5	Examiners, Assistants, Attendants, &c.	415 14 8	
27 17 7	Apparatus	57 18 3	
61 11 8	Materials	40 2 0	
3 10 0	Sundry Expenses	7 4 6	
			520 19 5
18 10 7	Library Account (see below)		32 15 2
12 16 4	*Legal Expenses*		
42 0 10	Miscellaneous and Household		46 8 4
1,854 7 10			1,925 12 1
118 13 0	Purchase of £191 16*s.* 6*d.* National War Loan ...		189 0 0
	Balance at Bank on the 30th December, 1905—		
192 6 5	General A/c	105 17 8	
45 10 10	Biological A/c	45 10 10	
3 3 4	*Library A/c*		151 8 6
£2,214 1 5			£2,266 0 7

STATEMENT OF ASSETS AND LIABILITIES, 30th Dec., 1905.

ASSETS.	£ s. d.	£ s. d.
£241 0 7	Balance at Bank	151 8 6
1,555 0 0	Value of Lease of 30, Bloomsbury Square, and Redemption Policy (Scottish Provident Institution)	1,555 0 0
2,200 0 0	Value of Laboratories and Redemption Policy (Sun Assurance Company)	2,200 0 0
430 0 6	Approximate Value of Furniture ...	393 17 7
415 11 10	Approximate Value of Apparatus and Chemicals	409 15 3
486 9 7	Approximate Value of Library... ...	493 0 0
		1,296 12 10
1,775 0 0	£2,000 2½ per cent. Consols, 30th Dec., 1905 ...	1,787 10 0
354 6 9	£362 9*s.* 10*d.* Metropolitan 3 per cent. Stock, 30th Dec., 1905	348 0 0
(119 19 3)	£318 9*s.* 4*d.* National War Loan, 30th Dec., 1905 ...	313 13 9

LIABILITIES.	£ s. d.	£ s. d.
	Subscriptions received in advance—	
£17 17 0	Fellows'	24 3 0
2 2 0	Associates'	2 2 0
1 0 0	Students'	15 0
		27 0 0
2 2 0	*Cheque not "cleared"* (*Examinations A/c*)	
	Fees for the January (1906) Examination received in advance	242 11 0
157 10 0		
45 10 10	Balance on Biological A/c	45 10 10
3 3 4	*Balance on Library Fund A/c*	

LIBRARY FUND ACCOUNT for the Year ended 30th Dec., 1905.

RECEIPTS.	£ s. d.
Balance	3 3 4
£25 0 0 Grant from General A/c	25 0 0
1 9 7 *Donation for the Purchase of Books*	
Deficit	4 11 10
ASSETS, (1904).	
£26 9 7 *Balance £3 3 4*	£32 15 2

EXPENDITURE.	£ s. d.
£4 15 8 *Deficit on Library A/c, 30th Dec., 1904*	
18 10 7 Books, Journals, Binding, &c. 1904 A/c	4 13 6
3 3 4 *Balance in hand on Library A/c. 1905 A/c* ...	28 1 8
LIABILITY (1904).	
£26 9 7 *£4 13 6*	£32 15 2

Having examined the Books and Vouchers and verified the investments in Consols, in Metropolitan 3 per cent. Stock and in National War Loan, standing to the credit of the Institute in the Books of the Bank of England, we certify that the above Statement is correct.

15th January, 1906.

CECIL H. CRIBB,
W. T. BURGESS,
ROBERT E. ALISON,
} *Auditors for* 1905–06.

Proceedings of the Council,

NOVEMBER, 1905—JANUARY, 1906.

THE Officers and Members of Council who retire at the Annual General Meeting on the 1st of March, 1906, under the provisions of Bye Law 30, are as follows:—The President: Mr. David Howard; Vice-Presidents: Professor Percy F. Frankland and Professor J. Millar Thomson; Members of Council: Mr. Bertram Blount, Mr. Alfred C. Chapman, Dr. J. J. Dobbie, Dr. Bernard Dyer, Mr. Henry J. Helm, I.S.O., Dr. W. W. J. Nicol, Professor W. J. Pope, Dr. Alexander Scott and Professor W. A. Shenstone.

The Officers and Members of Council nominated for election in their stead are:—President: Professor Percy F. Frankland; Vice-Presidents: Mr. David Howard and Sir William Ramsay, K.C.B.; Members of Council: Professor Adrian J. Brown, Mr. Cecil H. Cribb, Professor H. J. H. Fenton, Professor H. G. Greenish, Mr. A. R. Ling, Mr. Henry de Mosenthal, Mr. H. Droop Richmond, Mr. J. E. Stead and Mr. F. Napier Sutton.

National Physical Laboratory.—With reference to the remarks under this heading in *Proceedings*, 1905, Part III., the Fellows and Associates will be interested to learn that the Council have received a letter from Lord Rayleigh, Chairman

of the Executive Committee of the National Physical Laboratory, stating that the Committee believe that up to the present the Laboratory has not interfered with the ordinary work of professional analysts, and they have no intention of conducting it so as to cause such interference in the future. They have under consideration the wording of the Test Pamphlet, which contains particulars of the work undertaken at the Laboratory, and they propose to make certain changes which they believe will do away with any ambiguities which may at present exist. Lord Rayleigh also stated that the Committee are fully alive to the conditions attached to their work by the Report of the Treasury Committee of 1898.

Mr. David Howard, the retiring President of the Institute, has been appointed, in succession to Mr. R. Forbes Carpenter, as a representative of the Society of Chemical Industry on the General Board of the Laboratory, and as a member of the Executive Committee.

Agricultural Analysis.—In connection with the deputation from the Institute to the President of the Board of Agriculture, in April last, which has already been reported in the *Proceedings*, attention is directed to the following statement which is taken from the *Journal of the Board of Agriculture* for January, 1906:—

> **Testing of Farmers Milk.**—In connection with the arrangements which have been made by most of the agricultural colleges for determining the percentage of butter-fat in farmers' milk for a fee of sixpence per sample (Leaflet No. 146), the Board think it may be useful to point out that the services rendered for this small fee are by no means identical with the exact chemical analysis made by a public analyst. There is, indeed, an essential difference between the rapid mechanical tests carried out by the agricultural colleges for the purpose of enabling farmers to effect

an improvement in the economical management of their dairies and the important and accurate analyses required of public analysts, with the object very often of furnishing evidence on which to base a prosecution under the Sale of Food and Drugs Acts.

In the first case, the tests are made at the request of the farmer and for his private information only. The test applied is that known as the Gerber test, which merely calls for care and a certain amount of skill in working, but does not necessitate any scientific training. To be of value the tests should be taken regularly and continuously, so that each test becomes one of a series which, by indicating the variations in the quality of his milk as regards the content of butter-fat, will enable the farmer to trace the variations to such causes as the influence of weather, the interval between milking, the food supply, housing and treatment of cows, and to discover under what condition the best supply of milk is obtained, which cows are the most profitable, and, generally speaking, how his business may be conducted to the best advantage.

For this purpose it is not necessary that the tests should be of the nature of an exact analysis, and, so long as the result is sufficient to enable the farmer to determine his position as above indicated, nothing more is required.

On the other hand, analyses conducted by public analysts at the request of local authorities must necessarily be carried out in the most scientific and skilful manner, in order to ascertain with the utmost degree of exactness the character of the material analysed, and where so much depends upon the result of the analysis it would not be possible to adopt a rapid mechanical method such as the Gerber test.

With the view of securing uniformity in dealing with samples, the Board have prepared two forms of report for the use of farmers when sending samples to the various institutions—one for use when a sample of a single milking of a single cow is sent, and one for use when a sample of the mixed milk of a herd is sent. These forms are to be filled up with the necessary particulars as to the cow or cows from which the sample was taken and forwarded to the institute with the sample. The form will be returned to the sender with a report as to the percentage of fat contained in the sample as ascertained by the Gerber test.

Abstracts of the Reports of Examiners.

INTERMEDIATE AND FINAL EXAMINATIONS: JANUARY, 1906.

Examiners in Chemistry:
WALTER WILLIAM FISHER, M.A. (Oxon.), F.I.C.
GEORGE GERALD HENDERSON, M.A., D.Sc. (Glasgow), F.I.C.
Examiner in Therapeutics, Pharmacology, and Microscopy:
FREDERICK GOWLAND HOPKINS, D.Sc., M.B. (Lond.), M.A. (Cantab.), F.I.C., F.R.S.

The Examinations were divided into two periods of four days each, the first beginning on Tuesday, the 2nd of January, and the second on Tuesday, the 9th of January, 1906. The former period was devoted to Candidates for the Intermediate Examination, and for Branches B and D, of the Final Examination, and the latter to Candidates in Branches, A and E, of the Final Examination for the Associateship.

Thirty-nine Candidates presented themselves for Examination. The number of Candidates in each Branch, and the number of those who passed are shown in the following table:—

	No. of Candidates Examined.	No. of Candidates who Passed.
Intermediate Examination	14	10
Final Examination for A.I.C.:—		
A. Inorganic Chemistry ...	5	2
B. Metallurgical Chemistry ...	4	2
D. Organic Chemistry	4	3
E. Analysis of Food and Drugs, and of Water	12	9
	39	26

Several Candidates forwarded papers containing the results of original work.

By the kind permission of the Board of Education, and the courtesy of Professor Gowland, the Candidates in Branch B were examined for two days in the Metallurgical Laboratory of the Royal College of Science, South Kensington.

The following Candidates passed the Intermediate Examination:

Davson, Archibald Prideaux	Royal Coll. of Science, London; and with R. Bodmer, F.I.C.
Foreman, Frederick William	University of Cambridge.
Garsed, William	School of the Pharmaceutical Society of Great Britain; and King's Coll., London.
Hodgson, Thomas Reginald	B.A. (Cantab.). Christ's Coll., Cambridge; and with Alfred C. Chapman, F.I.C.
Kirkland, Thomas James	King's Coll., London.
Lathwood, Arthur	B.Sc. (Lond.). Mason Coll. (The University), Birmingham.
Luff, Bernard Dunstan Wilkinson ...	Univ. Coll., Nottingham.
Reid, John Fountain	Heriot-Watt Coll., Edinburgh.
Stanley, Harry	B.Sc. (Lond.). Merchant Venturers' Tech. Coll., Bristol; and with E. J. Read, B.A., F.I.C.
Tattersfield, Frederick	University of Leeds; and with Thomas Fairley, F.I.C.

The following Candidates passed the Final Examination for the Associateship (A.I.C.):

In Branch A (Mineral Chemistry).

Bullock, Edmund Rayner...	Assoc. R. C. Sc. (Lond.). Royal College of Science, London.
Cowie, Thomas Field	University of Edinburgh.

In Branch B (Metallurgical Chemistry).

Rawlins, Henry James Bawtree	B.Sc. (Lond.); with H. Y. Loram, F.I.C.
Stenhouse, Thomas	B.Sc. (Lond.), Assoc.R.C.Sc. (Lond.), A.R.S.M., Royal Coll. of Science, London; and with C. K. Baker, A.R.S.M., F.I.C.

In Branch D (Organic Chemistry).

Hayworth, William Prince	Finsbury Tech. Coll., London.
Horsman, Frederick Henry Godfrey ...	B.Sc. (Lond.). Finsbury Tech. Coll., London; and with G. H. U. Harrow, Ph.D., F.I.C.
Spence, David	Ph.D. (Jena). Glasgow and West of Scotland Tech. Coll.

In Branch E (Analysis of Food and Drugs, and of Water, including Examination in Therapeutics, Pharmacology, and Microscopy).

Cart, John Trevor	B.Sc. (Lond.). School of the Pharmaceutical Society of Great Britain.
Gates, Charles Gordon	B.Sc. (Lond.). King's Coll., London; and with Edward Russell, B.Sc., F.I.C.

Holborow Alfred George	Merchant Venturers' Tech. Coll., Bristol ; Glasgow and West of Scotland Tech. Coll. : School of the Pharmaceutical Society of Great Britain.
Hooper, Elsie Seville	B.Sc. (Lond.). School of the Pharmaceutical Society of Great Britain ; and with E. F. Harrison, B.Sc. (Lond.), F.I.C.
Lewis, Samuel Judd	B.Sc. (Lond.). School of the Pharmaceutical Society of Great Britain ; University Coll., London ; and with A.G. Bloxam, F.I.C.
Lickorish, Adrian Joseph Clifford ...	King's Coll., London ; and with J. Kear Colwell, F.I.C.
Liversedge, Samuel Gordon	University of Leeds.
Macadam, Elison Ann	University of Edinburgh ; King's Coll., London : and with the late W. Ivison Macadam, F.I.C.
Thompson, Frank Ernest	Assoc.R.C.Sc. (Lond.). Royal Coll. of Science, London.

QUESTIONS AND EXERCISES SET AT THE JANUARY EXAMINATIONS, 1906.

Intermediate Examination.

January 2nd to 5th, 1906.

GENERAL AND THEORETICAL CHEMISTRY.

TUESDAY, JANUARY 2nd, 1906: 10 *a.m. to* 1 *p.m.*

(Not more than *four* of the following questions are to be answered.)

1. Describe the methods by which carbon monoxide can be prepared in the laboratory. How is it obtained, and for what purposes is it used, on the manufacturing scale? How is carbon monoxide estimated in a mixture of gases?

2. State and explain the Phase Rule, and give examples of its applications.

3. Explain the reactions on which the wet and the dry processes of extracting copper from its ores are based. What impurities are apt to occur in the metal, and how do they affect its physical properties? Describe the electrolytic method of refining copper.

4. By what methods can fluorine be isolated? Indicate the chief points of difference between fluorine and chlorine, and between fluorine compounds and the corresponding chlorine compounds.

5. Give an account of the principal compounds of uranium. With what other elements is it allied by reason of its chemical character?

6. Show how the study of the optical properties of organic compounds has proved of service in the determination of their constitution, and indicate the methods employed.

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

(Not more than *four* of the following questions are to be answered.)

7. What is the action of ethyl iodide on the nitrites and sulphites of potassium and silver respectively? Describe the properties of the organic compounds formed in those reactions, and show how the constitution of each has been established.

8. Name the reagents employed for the identification of carbonyl, hydroxyl, and imino groups respectively, and give examples to show how each reagent is used.

9. Give an account of the mode of preparation, properties, and uses of benzidine. What is the constitution of this compound?

10. How are sulphuric and chromic anhydrides and sulphuryl and chromyl chlorides prepared? Compare the properties of the corresponding compounds, and give examples of their use in organic synthesis.

11. Name and give the composition of the principal ores of manganese. Describe a method of obtaining the metal in a state of purity, and compare its properties with those of iron. Give the composition of the alloys of manganese which are of use in the arts.

12. By what means can (*a*) the reduction and (*b*) the oxidation of inorganic and organic substances be effected in alkaline solutions? Illustrate your answer by examples.

PRACTICAL CHEMISTRY.

WEDNESDAY, JANUARY 3*rd*, 1906: 10 *a.m. to* 4.30 *p.m.*

1. Determine the ratio of ammonia to carbon dioxide in the commercial ammonium carbonate supplied to you.

2. Identify, separate, and determine approximately the relative proportions of the two constituents present in the liquid A. (Ether and aldehyde; methyl alcohol and acetone; aniline and benzene. *One* mixture to each candidate.)

THURSDAY, JANUARY 4th, 1906: 10 *a.m. to* 4.30 *p.m.*

1. From the impure ferrous sulphate supplied to you, prepare a specimen of the purified salt and determine, by a volumetric method, the percentage of iron in your product.

2. The liquid B. is an aqueous solution of an organic acid and its sodium salt. Identify the acid and determine the quantity of each substance contained in 1 litre of the solution. (Formic acid and sodium formate.)

FRIDAY, JANUARY 5th, 1906: 10 *a.m. to* 4.30 *p.m.*

1. Make a complete qualitative analysis of the given alloy. (Aluminium bronze.)

2. Determine *a* the percentage of the chief ingredient of the alloy (by a gravimetric method), and (*b*) the specific heat of the alloy.

Final Examinations for the Associateship.

Branch A.—Mineral Chemistry.

TUESDAY, JANUARY 9th, 1906: 10 *a.m. to* 4.30 *p.m.*

Make a qualitative examination of the substance H, and ascertain what elements are present. (Manganese ferrocyanide.)

After consulting with the Examiners, candidates were required to determine quantitatively the amounts of the main constituents of the substance.

WEDNESDAY, JANUARY 10th, 1906: 10 *a.m. to* 4.30 *p.m.*

Identify the given compounds J (lead tungstate) and K (mercury borate), and estimate the percentage of metallic base in J, and of the acid in K.

THURSDAY, JANUARY 11th, 1906: 10 *a.m. to* 4.30 *p.m.*

Ascertain the solubility (at Laboratory temperature) of carbon di-oxide in distilled water and in dilute solutions of soda containing 0·4g. and 0·8g. of NaOH per litre.

FRIDAY, JANUARY 12th, 1906: 10 *a.m. to* 4.30 *p.m.*

1. Make a quantitative analysis of the specimen of Carnallite.

2. Examine the specimen by the Spectroscope and give an account of your results.

Branch B.—Metallurgical Chemistry

TUESDAY and WEDNESDAY, JANUARY 2nd and 3rd, 1906: 10 *a.m. to* 4.30 *p.m. each day.*

(*At the* ROYAL COLLEGE OF SCIENCE, LONDON.)

1. Determine the amounts of gold and of silver in the given complex gold ore, and return your results in ounces per ton.

2. Make an examination of the given alloy and determine its two chief constituents. (Ferro-nickel.)

(Two days are allowed for these analyses.)

THURSDAY and FRIDAY, JANUARY 4th and 5th, 1906: 10 *a.m. to* 4.30 *p.m. each day.*

(*At the* INSTITUTE.)

3. Determine the percentages of manganese and silicon in the sample of phosphoric pig iron.

4. Report, as far as you are able to do so from chemical analysis, on the suitability of the sample of brass for the manufacture of condenser tubes.

(Two days are allowed for these analyses.)

No Candidate was examined in Branch C (Physical Chemistry).

Branch D.—Organic Chemistry.

TUESDAY, JANUARY 2nd, 1906: 10 *a.m. to* 4.30 *p.m.*

1. Identify the elements present in the compound A, and determine the percentage of one of them. (Acetoxime.)

2. Make a qualitative examination of the mixture B. (Lysol.)

WEDNESDAY, JANUARY 3rd, 1906: 10 *a.m. to* 4.30 *p.m.*

1. Determine, as fully as time will permit, the physical constants of the given compound. (Asparagine.)

2. Ascertain what radicles are present in the compound, and leave on your bench specimens of any derivatives you can prepare from it.

THURSDAY, JANUARY 4th, 1906: 10 *a.m. to* 4.30 *p.m.*

1. Examine the mixture C, and determine approximately the proportions in which its ingredients are present. (Crude wood spirit.)

2. Investigate the substance D. (Trichloracetic acid.)

FRIDAY, JANUARY 5th, 1906: 10 *a.m. to* 4.30 *p.m.*

1. Determine the vapour density of the substance E. (Ethyl formate.)

2. What do you consider the nature of the substance F to be? (Bismarck brown.)

Branch E.—The Analysis of Food and Drugs, and of Water.

TUESDAY, JANUARY 9th, 1906: 10 *a.m. to* 4.30 *p.m.*

Examine the "Easton's Syrup"; determine (*a*) the total Alkaloids and identify each; determine also the amounts of (*b*) phosphoric acid and (*c*) iron.

Report whether the sample agrees in composition with the British Pharmacopœia preparation.

WEDNESDAY, JANUARY 10th, 1906: 10 *a.m. to* 4.30 *p.m.*

Investigate the vegetable oil and determine its chief physical and chemical constants as far as time allows. (Cotton-seed oil.)

THURSDAY, JANUARY 11th, 1906: 10 *a.m. to* 4.30 *p.m.*

1. The Barley is a portion of some suspected of having killed pheasants; examine it for poison and ascertain the proportion of any poison found. (Arsenic.)

2. Report on the sample of Cider.

FRIDAY, JANUARY 12th, 1906: 10 *a.m. to* 4.30 *p.m.*

The Saline Mixture is intended for making an artificial Seltzer Water.

Determine the relative quantities of as many constituents as possible in the time at your disposal.

Candidates in Branch E of the Final Examinations were required to pass an Examination in Therapeutics, Pharmacology, and Microscopy.

MONDAY, JANUARY 8th, 1906: 1.30 *p.m. to* 4.30 *p.m.*

1. Examine microscopically the sample of milk A, and report upon anything abnormal that it may contain. Leave prepared slides on your bench.

2. B, C, and D are the osazones of three common sugars. Prepare slides of a permanent nature from each; draw and, if possible, identify the crystals.

3. Identify the preparations E and F.

4. What is Ergot? Enumerate its official preparations and state the strength, when possible. Give an account of the symptoms produced in chronic poisoning by this drug.

5. State the medicinal doses of the following drugs and preparations, giving the amount in each case which has been described as producing toxic symptoms or death; Injectio Apomorphinæ Hypodermica, Oleum Sabinæ, Tinctura Aconiti, Acidum Arseniosum, Antimonium Tartaratum, Tinctura Opii.

Candidates in this Branch were examined practically and interrogated orally as to the recognition of Chemicals and Drugs.

Examination in Therapeutics, Pharmacology, and Microscopy,

January 8th, 1906.

Thirteen Candidates presented themselves for this Examination: one was an Associate admitted by special permission of the Council, and twelve were Candidates in Branch E, of the Final Examination (the Analysis of Food and Drugs, and of Water).

The Examination consisted of exercises in Microscopy and questions in Therapeutics and Pharmacology. The Candidates were also examined, *vivâ voce*, in the recognition of drugs and poisonous chemicals.

Harold Augustine Tempany, B. Sc. (Lond.), A.I.C., was recommended for the Special Certificate in these subjects.

The Candidates in Branch E, of the Final Examination are dealt with in the Report of the Examiners in Chemistry.

Alterations in and Additions to the Register.

Since the publication of *Proceedings*, Part III., 1905, the Council have elected 16 new Associates (of whom 9 were previously registered as Students). 4 Associates have been elected to the Fellowship, and 10 new Students have been admitted.

Associates Elected to the Fellowship.

Garle, John Longsdon, Sanctuary House, Tothill Street, Westminster, London, S.W.

Levy, Arthur Garfield, B.Sc. (Lond.), c/o Bertram Blount, Esq., F.I.C., 76-78, York Street, Westminster, London, S.W.

Parker, William Bayley, c/o Mrs. Quilley, 14, Murray Road, Rugby.
Spurge, Edward Charles, B.Sc. (Lond.), Witham, Essex.

Associates.

Blair, Robert Westrup, Assoc. R.C.Sc., I., 8, Crediton Road, West Hampstead, London, N.W.
Bullock, Edmund Rayner, Assoc. R.C.Sc. (Lond.), 21, Finborough Road, West Brompton, London, W.
Cart, John Trevor, B.Sc. (Lond.), 25, Mayflower Road, London, S.W.
Cowie, Thomas Field, Eden Lodge, Eden Lane, Edinburgh.
Gates, Charles Gordon, B.Sc. (Lond.), Oakdean, Rydes Hill, Guildford.
Holborow, Alfred George, 101, Chesterfield Road, Bristol.
Hooper, Elsie Seville, B.Sc. (Lond.), 52, Clapton Common, London, N.E.
Horsman, Frederick Henry Godfrey, B.Sc. (Lond.), 63, Hyde Vale, Greenwich, London, SE.
Lewis, Samuel Judd, B.Sc. (Lond.), 122, Newington Causeway, London, S.E.
Lickorish, Adrian Joseph Clifford, 5, Brunswick Mansions, Handel Street, London, W.C.
Liversedge, Samuel Gordon, Hazelton Terrace, Victoria Road, Barnsley.
Macadam, Elison Ann, Slioch, Lady Road, Edinburgh.
Rawlins, Henry James Bawtree, B.Sc. (Lond.), 11, The Grove, Wandsworth Common, London, S.W.
Spence, David, Ph.D. (Jena), The Bio-Chemical Department, The University, Liverpool.
Stenhouse, Thomas, B.Sc. (Lond.), Assoc. R.C.Sc. (Lond.), A.R.S.M., 100, St. George's Square, Portsea, Hants.
Thompson, Frank Ernest, Assoc. R.C.Sc. (Lond.), The Laboratory, Walsall.

Students.

Akers, Noel Charles, 26, King's Avenue, Muswell Hill, London, N.
Claremont, Claude Leopold Leszynski, Petersleigh, 57, Elm Grove, Southsea, Hants.
Elsdon, George Davidson, c/o F. H. Alcock, Esq., F.I.C., Temple Chambers, Broad Street Corner, Birmingham.
Gammon, Henry Leonard, 71, Westgrove Road, Mount Radford, Essex.
Hemens, George Frederick, 29, St. Andrew's Street, Battersea, London, S.W.
Laughton, Francis Eugene, 9, Pepy's Road, Wimbledon, Surrey.
McEwen, Basil Charles, 40, Handen Road, Lee, London, S.W.
Tattersfield, Frederick, The Hollins, Kilpin Hill, Dewsbury.
Trobridge, Frederick George, 21, Osborne Terrace, Gosforth, Northumberland.
Ward, Ernest Charles, 85, Barkston Gardens, Kensington, London, S.W.

General Notices.

Intermediate and Final Examinations, April, 1906.

The Intermediate Examination will commence on Tuesday, the 3rd day of April. Final Examinations in (A) Mineral Chemistry, (B) Metallurgical Chemistry, (C) Physical Chemistry, and (D) Organic Chemistry may commence on Tuesday, the 3rd, or on Monday, the 9th day of April.

The Final Examination in (E) Analysis of Food and Drugs, &c., will commence on Monday, the 2nd day of April. This Examination will also be open to Fellows and Associates who desire to obtain the Certificate of the Institute in Therapeutics, Pharmacology, and Microscopy, approved by the Local Government Boards under the Regulations as to the competency of Public Analysts.

That part of the Examination in Branch E which is conducted by the Examiner in Therapeutics, Pharmacology, and Microscopy may include:—The recognition of the official drugs of the British Pharmacopœia, and of such non-official drugs as are of therapeutical importance; the uses of the commoner drugs, and their prominent action as such; the commoner impurities and falsifications in drugs; their recognition, and how far the impurities affect the medicinal value of the drugs; the chemical changes which familiar drugs may undergo in the body, and their paths of excretion, as illustrated by the following examples:—Arsenic, salts of lead, hydrocyanic acid, carbolic acid, chloral hydrate, salicin, aconitine; the reputed medicinal, deleterious, and average fatal doses of such drugs as are poisonous, and the reputed effects of age, idiosyncrasy, and habituation in modifying these.

The Examinations will be open only to Candidates who have complied with the regulations.

If less than 35 Candidates intend to present themselves in April, the Examinations will not extend over more than one week, and in that case, places will be allotted to only 25 Candidates, in the order in which their applications and fees are received. No application for admission to the April Examinations will be accepted after Thursday, the 22nd day of February, 1906.

Forms of application and further particulars may be obtained from the Registrar.

Intermediate and Final Examinations will also be held at the Laboratories of the Institute in July. The exact dates and other particulars will be forwarded to intending Candidates in due course.

Examination in Biological Chemistry.

An Examination in Biological Chemistry will be held at the Laboratories of the Institute in October, 1906. This Examination is open to any Candidate whose application for admission to the Final Examination has been accepted by the Council, and to any Candidate who has passed the Intermediate Examination of the Institute. The Examination extends over at least four days, and may be theoretical, practical, written and oral. The syllabus includes Biological Chemistry, with special reference to Fermentation, Enzyme-action, the Chemistry and Bacteriology of Food-Stuffs, Water Supply, and Sewage Disposal, and to the application of Biological Chemistry to Industries and Manufactures.

Candidates intending to enter for this Examination are recommended to study the following subjects:—1. Elementary Biology. 2. The Morphology, Physiology, and Life History of Bacteria, Yeasts, and Moulds, in their relation to Food, Water Supply, the Treatment of Sewage, Agriculture, and the Fermentation Industries. (A *special* study of pathogenic organisms is not demanded, but the Candidate should acquire a knowledge of such as are of importance in relation to Food and to Water Supply.) Practical work should include:—(*a*) General bacteriological methods and preparation of pure cultures; (*b*) Microscopy: the staining and mounting of preparations, and the recognition of species; (*c*) Fermentation changes caused by micro-organisms. 3. Enzymes and their actions. 4. The methods employed in the examination and estimation of the carbo-hydrates. 5. The proteids and their decomposition products.

Examinations in Technical Chemistry.

The Council have resolved to hold Examinations in the industrial applications of chemistry and to grant Certificates in respect thereof.

These Examinations will be open only to Fellows, and to those Associates who have been registered as such for at least one year.

Candidates will be required to produce evidence of practical technical training.

Each Candidate will be required to select one important industry, by which his knowledge of the subjects of the Examination may be tested.

All Candidates will be expected to give evidence of a general knowledge of chemical technology.

The Examiners will take into account original work and special knowledge, but not so as to excuse the Candidate from any part of the Examination.

The Examinations will comprise the following :—

(*a*) The application of well-known chemical and physical laws to industrial operations.

(*b*) The development, control, and transmission of power and heat.

(*c*) A working knowledge of operations and plant, of which general use is made in industrial works for the treatment and handling of materials, finished products, waste products and effluents, including a practical acquaintance with fittings and stores.

(*d*) The properties of materials affecting their application to the construction of plant and apparatus in chemical works.

(*e*) Some ability in interpreting drawings of chemical plant and in making dimensioned rough sketches.

(*f*) The calculation of working costs, and a general knowledge of the clerical work connected with manufacturing operations.

REGULATIONS.

1. The conduct of the examinations shall be under the control of the Technical Chemistry Examinations Board, appointed annually by the Council.

2. The Board have the power to examine and to appoint additional Examiners as they think fit.

3. The Examinations shall be conducted in accordance with the scheme adopted by the Council.

4. The Examination shall not extend over more than four days.

The written part of the Examination shall consist of at least two papers on the general principles of Technical Chemistry as indicated in the Scheme of the Examinations and shall include questions on the calculation of working costs.

In the oral part of the Examination the candidate shall be required to interpret drawings or models of plant and fittings, to show a general knowledge of the working of plant, and to have a competent knowledge of the general methods of technical analysis as practised in the industry he has selected.

Questions which might involve the disclosure of unpublished processes and details of plant in particular works shall not be put.

5. Any Fellow or Associate who desires to enter for the Examination in Technical Chemistry is required to send in his name to the Registrar of the Institute not less than two months prior* to the date fixed for the commencement of the Examination and to mention one important branch of industry by which his knowledge of the subjects of the Examination may be specially tested.

6. Candidates are invited to send in records of original technical chemical work, to which the Examination Board will give special consideration.

7. The Examination Fee, for the present, is three guineas for each entry.

8. Except by special permission of the Board, a candidate who has failed cannot enter again for the Examination until a year has elapsed.

Certificates will be granted to successful Candidates.

The first Examination in Technical Chemistry will be held in October, 1906. As considerable preparation will be necessary, Fellows and Associates who desire to present

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* For the *first* Examination see over.

themselves are required on this occasion to send in their applications not later than Thursday, the 31st day of May, 1906. Fees will be payable in September.

Further arrangements will be made when the applications of the candidates have been received.

Associates elected prior to February, 1903, who can produce evidence satisfactory to the Council that they have been continuously engaged in the study and practical application of chemistry for at least three years since their election to the Associateship, can obtain forms of application for election to the Fellowship.

The Sixth International Congress of Applied Chemistry will be held in Rome, commencing on the 25th of April, 1906. All communications should be addressed to the General Secretary, Professor Vittorio Villavecchia, Via Panisperna 89, Rome.