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CHEMICAL PUBLICATIONS.[1]

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In an address which has been given before the members of a number of the Local Sections of our Society I have emphasized the training of our young men in methods of research and the discovery of new facts and new principles, as the indispensable foundation upon which the development of chemistry must rest. But research work and discoveries are barren so long as they remain the exclusive possession of an individual. The very rapid development of our science during the last half century depends in no small degree upon the improved facilities for publication which have made new discoveries very quickly available for all who wish to use them.

Through the middle ages and at their close the alchemists and iatrochemists had no journals or organized methods of publication. Their researches, if we can dignify their random experiments by such a name, were published in books, usually in the Latin language. Many of the alchemists used mystical symbols and expressions and some of their writings were designed rather to conceal than to reveal their knowledge—an art which has not been altogether lost in the writing of German and sometimes of other patents.

It is very significant and interesting for us as a Society to recall that the beginning of a different and better form of publication had its origin in the organization of national societies, about the middle of the seventeenth

[1] President's Address delivered at Chicago, September 8, 1920.

century. Between 1650 and 1670 such societies were begun in London, Vienna, Florence and Paris. The Royal Society, which grew from the union of small scientific societies in Oxford and London has been, perhaps, the most effective of the group in its influence upon the growth of science. The meeting of small groups of kindred spirits in these societies gave an opportunity for the announcement of new results and for the exchange of ideas upon scientific topics which was most useful, not only in the dissemination of new knowledge, but perhaps still more in that growth of ideas which comes from the action of keen minds upon each other. We miss something of this very valuable side of society life in the large meetings of the present time. It is better represented, now, by the discussions among small groups in our laboratories.

The publication of the *Philosophical Transactions of the Royal Society*, begun in 1665, represents a new function of the Society which became of vastly greater importance than the scientific meetings. It would be difficult to overestimate the value of those *Transactions* in their effect on the growth of science. In their pages are to be found the first notice of the microscopic organisms which we now call bacteria. There, too, we find an account of the epoch-making discoveries of Davy and of Faraday and of others who did some of the fundamental work of the nineteenth century.

The publication of the *Comptes rendus* in France was begun in 1776, the year of our American Independence. Like the *Transactions of the Royal Society* it publishes articles in many different lines of science. In other respects the policies of the two Journals are very radically different. The Royal Society aims to publish papers which are the finished product, frequently of years of work, and publication has often been long delayed. Publication in the *Comptes rendus* is prompt but the papers are very brief and frequently lack details which are essential to make them useful. Both kinds of publication are desirable but for the permanent growth of our science and for the future, publication of the form used in the *Transactions* is much more valuable.

As far as I can learn, the first journal devoted to chemistry apart from other sciences was Crell's *Chemische Annalen*, which began as the *Chemisches Journal* in 1778. The oldest chemical journal which has had a continuous existence is the *Annales de chimie*, which was begun in 1789, the year of the French Revolution, by de Morveau, Lavoisier, Berthollet, de Fourcroy and four others, less well known. The subtitle of the journal was "ou Recuiel de Memoires concernant de Chimie et les Arts qui en Dependent." In the introduction the value of chemistry for the arts is emphasized, also the purpose of making new work in chemistry, wherever undertaken, available to all. Another object was, undoubtedly, to give untrammelled expression to the new ideas advocated by Lavoisier at a time when the *Journal de Physique* was still controlled by adherents

of the phlogiston theory. This journal must have been one of the factors which made Paris a chief center for the development of chemistry for fifty years following. Four volumes were published the first year, at 12 francs each. Volume 18 was published in July, 1793, and we find in it some signatures of blue paper, a reflection, doubtless, of the troublous times when it was printed, for that was the beginning of The Terror. After that there is a hiatus for four years and Volume 19 appeared in 1797 "Par les Citoyens Guyton, Monge, Berthollet, etc." We miss the name of Lavoisier, who was executed in 1794. In resuming publication the editors explain the interruption by saying that it was because of the necessity of busying themselves with the defense of the Republic, the events of the Revolution and the public occupations and functions of the authors. In 1816 the second series of the journal was commenced under the name *Annales de chimie et de physique*. The ninth series began in 1914, once more under the original name *Annales de chimie*. The other part of the ninth series is published as *Annales de physique*.

A second journal of very great importance was founded in 1832 under the name *Annalen der Pharmacie*. The editors were Brandes, Lorenz, Geiger and Liebig. Volume 25, published in 1838, bears the names of Dumas of Paris, Graham of London and Liebig, evidently an attempt to make the journal international. Apparently this did not prove successful, for with Volume 41, four years later, we find only the names of Wöhler and Liebig. In 1840 the name was changed from *Annalen der Pharmacie* to *Annalen der Chemie und Pharmacie* and this name continued till the death of Liebig in 1873. In 1874 we find the name which is still retained, Justus Liebig's *Annalen der Chemie*. Through the middle of the nineteenth century the *Annalen* was doubtless more valuable than any other journal for the development of chemistry. It remains one of our most valuable journals but its relative value has decreased for three reasons—the growth of the journals of national societies, the establishment of special journals for various fields and the fact that it has become exclusively a journal of organic chemistry.

Silliman's Journal, which later became the *American Journal of Science*, was organized in 1818. This has published some chemical articles throughout its history but when Professor Remsen and others began the intensive study of organic chemistry in the seventies they did not find that journal a very suitable medium of publication. This led to the establishment of the *American Chemical Journal* in 1879. For the following thirty years that journal contributed much toward the development of chemistry in America and to the recognition of the work of American chemists abroad. During that period it was more often quoted than any other American journal. In 1913 we had the good fortune to incorporate it in our own *Journal*.

Just as it was in England that the first scientific journal, the *Philosophical Transactions*, appeared, so it was in England, again, that the first representative of the group of journals which has become the most important of all, was published. The *Quarterly Journal of the Chemical Society of London* began in 1847.[1] It was followed by the *Bulletin de la societe chimique de Paris* in 1864, the *Berichte der deutschen chemischen Gesellschaft* in 1868, the *Gazzetta chimica italiana* in 1871, and our own *Journal of the American Chemical Society* in 1876. These journals fulfil, more nearly than any others the function of the older volumes of the *Annalen* in furnishing their readers with an account of researches from all fields of chemistry. I believe we are justified in thinking our own *Journal* performs this function more fully than any other journal published at the present time. In these days of intense specialization it is very important for us to retain some knowledge of fields remote from our own. President Remsen once told me that in his student days he read the older volumes of the *Annalen* till he was familiar, in a general way, with all of the important researches recorded in them. Even as late as the 80's we heard of chemists who read the *Berichte* from cover to cover and I am sure that some of those who did so gained a breadth of view that is too rare today. I should consider it a very great misfortune, especially for our younger men, if there were any important branch of chemistry which was not occasionally represented by papers in our *Journal*.

In spite of this, the special journals, which we now have in such profusion serve a very important function. In talking with young men and women who are trying to acquire a working knowledge of French and German I often point out that there should be two rather distinct elements in their study. There must be an intensive study of grammar and of a few articles or books till these are thoroughly mastered and then there must be a large amount of more superficial reading, best in elementary chemistries dealing with subjects with which they are familiar. In studying a foreign language we sometimes forget that we have not looked up in a dictionary one word in a thousand of those we understand in our mother tongue. We have acquired a knowledge of the meaning of these words by meeting them over and over again in a great variety of connections and each time we see the word we add something to our knowledge of its meaning. It is for this reason that the words of our mother tongue have for us a wealth of meaning that the words of a foreign language can never acquire until we have lived with them intimately for many years. But a knowledge of the meaning of words in a foreign language may be acquired by extensive reading and use, without a dictionary, exactly as we

[1] The Chemical Society had published previously, however, the "*Memoirs and Proceedings*," Vols. I to III, 1841–43, 1843–5, 1845–47, containing original papers and some abstracts.

acquire our own language. There may even be some question whether our teachers of language do not overdo the study of grammar. Young children do not study grammar.

A truly professional knowledge of chemistry must be acquired in somewhat the same manner as a language. We must have an intensive study of the fundamental principles and some knowledge of the more common facts. But Ostwald is right when he says that we have not done as well as the physicists in organizing our instruction. They have directed their teaching more toward general principles. We have allowed ourselves to be burdened with too great a mass of details. We should direct our elementary teaching more toward the great underlying principles of the science, using the details rather as the necessary setting by means of which the principles can be understood in their various relationships. But it is a great mistake to think that one of these principles can be acquired by learning a *definition* and understanding one or two illustrations of its application. We must live with it, just as we live day after day with the words of our mother tongue. It is here that the extensive, general reading that I have referred to is so useful. It is here, too, that teaching of general chemistry is such a valuable experience. The older professors in the German universities have been accustomed to give elementary courses both in general chemistry and in organic chemistry. I suspect that the compelling motive was the fees from courses attended by large numbers of students but, nevertheless, they gained in that way an intimate knowledge of those things which are most fundamental in our science. In this manner their attention was often directed to gaps in our knowledge and problems for research were suggested.

To some extent, therefore, the journals of our national societies may well furnish articles covering a wide range, and every chemist should read them, while the special journals may well publish articles suitable for intensive study in a narrow field. I will come back to this point again.

In some sense the special journals in chemistry bear the same relation to the national and other journals which publish articles from all fields, that the chemical journals, when they were first established, bore to the *Philosophical Transactions*, *Comptes rendus*, *Silliman's Journal*, and other journals covering many lines of science.

The first of these special journals was, I think, Fresenius's *Zeitschrift für analytischen Chemie*, started in 1862. Hoppe-Seyler's *Zeitschrift für physiologischen Chemie* was begun in 1877, Dr. Hart's *Journal of Analytical Chemistry* in 1887, Ostwald's *Zeitschrift für physikalischen Chemie* in the same year, the *Zeitschrift für anorganischen Chemie* in 1892, the *Journal of Physical Chemistry* in 1896, and the *Journal of Biological Chemistry* in 1905. As with other journals spoken of in this address, the list is not intended to be exhaustive, and any one else who prepared similar lists

would almost surely make, in part, a different selection. Each of these journals has been useful and some of them have played a very important part in the growth of our science.

Of a somewhat related character, in that they may be considered partly special, are the industrial journals. Wagner's *Jahresberichte über chemische Technologie* was founded in 1855, *Die chemische Industrie*, published by the Verein zur Wahrung der Interessen der chemischen Industrie Deutschlands, in 1878. This journal is published by a society of Manufacturers and Manufacturing Companies. The Society for Chemical Industry was organized in 1881 and the first volume of its *Journal* was published in 1882. Dr. Hart's *Journal of Analytical Chemistry* became the *Journal of Analytical and Applied Chemistry* in 1890. In 1893, that *Journal* was combined with our *Journal* under the editorship of Dr. Hart, beginning a new era in the publications of our Society. Our *Journal of Industrial and Engineering Chemistry* began in 1909 under the editorship of W. D. Richardson. The new French journal, *Chimie et industrie*, published by La Société de la Chimie Industrielle, began in 1918 in the midst of the Great War, and is a reflection of the extraordinary part played by chemistry in the war. These journals and the meetings of the societies which they represent have done something toward transferring to chemical industry that habit of freely publishing new discoveries which has long been second nature to scientific men. The spirit of the older industry was to guard trade secrets most carefully and every competitor was looked upon as a rival whose advancement was considered as an injury to others who manufactured the same or similar articles. To that older time trade and industry were war, the battle was to the strong and the weak must be ruthlessly crushed. It was natural under such a regime that the manufacturer should consider almost exclusively his own interest and should care little for the interests of his workmen, to say nothing of the interests of the public. Where such an attitude was at its worst we can not wonder that workmen became indifferent to the interests of their employers.

I am optimist enough to believe that a better day is dawning when coöperation among manufacturers is replacing destructive competition, when there will be a fairer division of profits and losses between employees and employers and, fully as important as either, when the public interest will be considered and treated equitably by both. The command of nature's resources given us by the scientific advances of the last century is certainly such as to make possible a fair livelihood for every one who is willing to give a proper return in productive labor. As scientific men we must certainly put ourselves on the side of those forces which aim to reduce war and ruinous competition between individuals, or manufacturers, or nations. A useful direction for us to work as chemists is to promote the spread of useful information gained in our industrial life. These are

questions in which I am intensely interested, but over which we must not linger.

The growing volume of chemical literature led to the desire for some authoritative medium which should furnish a brief record of the advances each year and which should, at the same time, serve as an index for the literature of the year. For this purpose Liebig and Kopp published in 1849 the *Jahresberichte über die Fortschritte der reinen, pharmaceutischen und technischen Chemie*. During the last half of the nineteenth century this was the indispensable guide for any careful search of the literature. Gradually the task of compilation became so great and the publication was so delayed that the volumes have lost much of their usefulness.

To furnish more prompt reports of current work the London Chemical Society, the Deutsche chemische Gesellschaft and other societies began the publication of abstracts. The *Chemisches Centralblatt* was begun for the same purpose in 1856. In fact, it began as the *Pharmaceutisches Centralblatt* in 1830 and continued as such until 1850, when it became known as the *Chemisch-Pharmaceutisches Centralblatt*, then was changed to *Chemisches Centralblatt* in 1856. In 1897 it was taken over by the Deutsche chemische Gesellschaft and took the place of the abstracts which that Society had been publishing in the Berichte. The *Centralblatt*, however, was sent only to members who subscribed and paid for it in addition to their dues for the Society. This plan of publication cannot be considered a success, as nearly one-half of the members failed to subscribe, with the result that they were deprived of the use of the abstracts and the latter became unduly expensive. The membership of the Society fell off and the circulation of the *Zentralblatt*[1] has never exceeded about 2000 copies. Twenty years ago the question of publishing an abstract journal was often discussed in our Council. An abstract journal for American research which had been started by Professor A. A. Noyes was taken over and continued by our Society for a few years. At that time we felt that a general abstract journal was financially impossible. In 1905, however, an attempt was made to unite the London Chemical Society, with a membership of about 3000, the Society for Chemical Industry, then with a membership of about 4500, and our own Society, with a membership of nearly 3000, in the publication of a common journal. The three societies comprised about 8000 individuals and it was thought that this would give the necessary financial support at a very moderate rate for each. The English Societies were unwilling to enter into such a combination and a year later we decided to establish the journal alone, beginning in 1907. Profiting by the experience of the German Society we increased our dues by $3.00 and furnished *Chemical Abstracts* to all of our members. This policy, and the same policy applied to our *In-*

[1] The spelling was changed to "*Zentralblatt*" in 1907.

dustrial Journal, has been phenomenally successful. The attraction of our *Journals* together with the loyalty of our members in the local sections, and the very efficient work of our Secretary, have caused the membership of our Society to grow far beyond that of any other in the world.

The mass of details which have been accumulated by chemical research has made necessary the publication of compendia of various kinds. The earliest of these were the chemical dictionaries, Watt's "Chemical Dictionary" in England and somewhat similar dictionaries in France and Germany. Dr. Andrew Ure, Professor of the Andersonian Institution, compiled a "Dictionary of Chemistry," "on the basis of Mr. Nicholson's," and the first American edition of this dictionary, edited by Dr. Robert Hare and Dr. Franklin Bache, was published in Philadelphia in 1821.[1]

Later, in 1881–83, we have Beilstein's "Handbuch der organischen Chemie." The second edition was published in 1886–90 and the third in 1893–99 and five volumes of supplements from 1901 to 1906. The preparation of the fourth edition was begun by the German Chemical Society in 1907 and the publication of this edition, which will cover the literature of organic chemistry only to 1910 was begun in 1919. It will be several years before the publication is completed. More than 150,000 compounds will be described briefly in this monumental work. Before printing began, 250,000 marks (over $60,000) had been spent under the direction of the Editors Bernhard and Prager Paul Jacobson. There are to be 15 volumes of about 1000 pages each. Dr. Jacobson writes me that a large amount of material has been accumulated for supplements, which are planned to cover the period 1910–1925.[2] In the spirit of nationalism which is often evil and full of danger, and not of patriotism, which is good, but which should always be compatible with hearty coöperation between nations—in a spirit of nationalism, I repeat, some Englishmen and Americans have wished to replace Beilstein's "Handbuch" by a book of the same scope in English. A sober second thought must, I think, lead us to question seriously the wisdom of this, for two reasons, first, is it wise for us to duplicate the colossal amount of work which has gone into the preparation of this book; I think it is a very moderate estimate to say that it would take a staff of twenty chemists five years to collect the materials for the book before printing could be commenced and that the cost of the complete work would be at least $250,000. It might easily be two or three times that. Second, we should consider carefully whether a quite different type of book would not meet our future needs better.

[1] There is a copy of this work in the library of the Department of Chemistry at the University of Illinois, and according to an inscription which was made on the fly leaf on March 19, 1833, it was the property, at that time, of the old Dominican Monastery at Kaskaskia, Illinois. (Kaskaskia was the oldest settlement in Illinois.)

[2] An interesting article by Dr. Jacobson on Beilstein's Handbuch is to be found in *Die Naturwissenschaften* for April 4, 1919, p. 222.

Do we not need, most, a book which shall give all the classes of organic compounds with their methods of preparation and properties, followed, in each case, by a table giving a carefully selected list of the more important compounds of the given class with their physical constants and references to the literature for each constant selected? When I was abroad in 1912 I expressed to some of my friends the wish that there might be found some way to annihilate those portions of our literature which are worthless. The thought met with a very hearty response. German scholars have been past-masters in accumulating all of the data to be found in the literature about a given topic. They have not always been as successful in selecting that which is important and rejecting things which are worthless or obsolete. A critical selection of compounds, given by classes in a series of tables, would be more useful for many purposes than the more complete account of all compounds given in Beilstein's "Handbuch." We must still have, of course, a complete catalog of all known compounds. For the future such a catalog is probably better given in a formula lexicon.

Gmelin-Kraut's "Handbuch der anorganischen Chemie" has very much the same function for inorganic chemistry as that of Beilstein for organic. Abegg's "Handbuch" is more of the nature of a critical compendium and for most purposes it is more useful. Meyer and Jacobson's "Lehrbuch der organischen Chemie" serves somewhat the same purpose.

The first of the formula lexicons was published by Richter in 1884. It registered 20,000 organic compounds. The second edition, published in 1900 gave 74,000 compounds, and the third, in 1910–12, 150,000. The formula indexes of the *Berichte* and *Annalen* have always seemed to me of very little value. We scarcely look for any given compound in a journal of that type unless we remember that there has been an article upon it in that particular journal. Even if we do know that, we often use the index of *Chemical Abstracts* rather than that of the special journal to locate the article we wish. I am sure that the formula index which is to be published for the first time this year in *Chemical Abstracts* will very soon prove itself so useful that we shall wonder how we ever got on without it. That index will not copy the Richter system exactly but will follow a more logical and consistent system devised by Mr. E. A. Hill of our Patent office.[1] Mr. Hill's system differs from that of Richter primarily in that it includes inorganic as well as organic compounds.[2]

[1] THIS JOURNAL, **22**, 478–94 (1900).

[2] Mr. Crane, editor of *Chemical Abstracts*, has prepared the following statement: "Since the Hill system is less familiar than the Richter system, it may be explained that according to the former the symbols in formulas are arranged in a purely alphabetical order except that in carbon compounds C always comes first, followed immediately by H, if hydrogen also is present. The number of atoms of any specific kind influence the order of compounds (*e. g.*, all compounds with C, come before those with C_2), but

Richter system.				Hill system. With a few inorganic compounds added.			
1.	CH_4	18.	$C_6H_4Br_2$		AgBr	15.	$C_3H_6Cl_2O_5$
2.	CO	19.	$C_6H_4I_2$		$AgNO_3$	13.	$C_3H_6HgO_3$
3.	CS_2	20.	$C_6H_5N_3$		Ag_2HO_4P	14.	$C_3H_6N_2O_4$
4.	CBe_2	21.	C_6H_5Cl		BrCl	18.	$C_6H_4Br_2$
5.	CMn_3	22.	C_6H_5Br	4.	CBe_2	19.	$C_6H_4I_2$
6.	CHN	23.	$C_7H_8O_4N_2S$	12.	CCl_2O	22.	C_6H_5Br
7.	$CHCl_3$	24.	$C_7H_8O_3NAs$	7.	$CHCl_3$	21.	C_6H_5Cl
8.	CH_2O	25.	$C_7H_8O_5N_2S$	6.	CHN	20.	$C_6H_5N_3$
9.	CH_2N_4	26.	$C_7H_8O_6NAs$	11.	CH_2Br_2	17.	C_6H_6
10.	CH_2Cl_2			10.	CH_2Cl_2	24.	$C_7H_8AsNO_5$
11.	CH_2Br_2			9.	CH_2N_4	26.	$C_7H_8AsNO_6$
12.	$COCl_2$			8.	CH_2O	23.	$C_7H_8N_2O_4S$
13.	$C_3H_6O_3Hg$			1.	CH_4	25.	$C_7H_8N_2O_5S$
14.	$C_3H_6O_4N_2$			5.	CMn_3		$ClKO_3$
15.	$C_3H_6O_5Cl_2$			2.	CO		ClO_2
16.	C_3H_6ClBr			3.	CS_2		Cl_2Cu
17.	C_6H_6			16.	C_3H_6BrCl		O_4SZn

I have a hope that when the time comes for another *Decennial Index* we may have a complete American formula index, including all known chemical compounds. It will be a very large task to prepare such an index but such indexes will, most likely, furnish chemists of the future the best means available of finding their way to the practical use of that vast, and ever increasing, mass of detailed information which the industrious chemists of the world have accumulated.

no attention is paid to the number of kinds of atoms in the molecule. Examples of both systems are given below. It has been my experience that the Hill system does not seem as good as the Richter system at first, particularly if one is accustomed to the latter system, but its appeal grows. The object is not to classify but to index. Former editor Patterson, who is always ready generously to help us with our problems, has written as follows regarding the two systems: 'The Richter system has usage in its favor; however, this may not be a sufficient reason for retaining a system of German origin if there is a better and simpler one, and if not, this is the best time to change. I submit the following arguments that occur to me: 1. *Richter:* (*a*) Usage: (*b*) Partial classification in each series, the hydrocarbons being brought together at the beginning, and compounds of many elements being relegated to the end. 2. *Hill:* (*a*) Simplicity; a purely alphabetical order of symbols is used except that by putting C and H first the organic compounds are thrown together. Neither must the number of kinds of elements be taken into account (we do not have to determine the number of kinds of different letters in a word in order to look it up in a dictionary). (*b*) Applicability without change to inorganic as well as organic compounds. (*c*) Usage: This system is already in use in a Government card index of several hundred thousand cards which has cost about $60,000 to date. At present this index is of limited use, due to neglect but I believe could and should be made very valuable to the chemists of the country. It might eventually form the basis of subscription cards like the Library of Congress cards. (*d*) I have found by experimenting that, in spite of my familiarity with the Richter system, cards can be more rapidly and certainly arranged and looked up by the Hill system. The question does not touch the arrangement of isomers; under either system these could be arranged by any scheme desired.' "

Another type of publication which has become very important is represented by the Landolt-Börnstein "Tables of Physical Constants." American chemists have undertaken to prepare a book of this character. Here, again, the superabundance of material and the fact that many constants to be found in the literature are now entirely worthless because they have been superseded by better, recent determinations, constitute the most difficult part of the task. When only one value can be true, it is important to select among many values the one for which we have the best evidence that it approaches closely to the truth. This demands an impartial, critical judgment and a breadth of knowledge that very few possess. Let us hope that the right man may be found to supervise this difficult task.

Detailed knowledge of scientific facts accumulates very rapidly. Our most fundamental theories have been subject, recently, to many changes and new points of view are frequently proposed. Such words and phrases as radioactivity, half-life of an element, atomic numbers, isotopes, vitamines, polypetides, metabolism of amino acids and many others that might be given suggest topics about which our knowledge had scarcely begun twenty years ago. The knowledge of many, older topics is also developing and changing in such a manner that only those intimately acquainted with them can keep abreast with the times. It is of very great service to other chemists when an expert in such a field is willing to digest and coördinate the knowledge that is available and present it in a reliable, interesting form. The form of publication most recently undertaken by our Society is to serve this purpose. In conjunction with the Chemical Catalog Company we are to issue two series of monographs, one scientific and one technical. In the Technical Series, Dr. H. S. Taylor is preparing a monograph on "Industrial Hydrogen" and Dr. H. C. Porter one on the "Carbonization of Coal." In the Scientific Series a monograph on "Enzymes" by Dr. K. G. Falk will appear shortly. One on the "Chemical Effects of Alpha Particles and Electrons" by S. C. Lind is nearly completed. Others in process of preparation are on "Conductance" by Dr. C. A. Kraus, "Organic Mercurials" by Dr. Whitmore, "The Animal as a Converter" by Professor H. P. Armsby, "Silicates" by Dr. R. B. Sosman. We also hope for a monograph on "Thyroxin" by Dr. E. C. Kendall and one on "Vitamines" by Professor H. C. Sherman. I wish to ask your hearty support for this new undertaking.

This has been called the Reconstruction Meeting of our Society. It is a period of rapid, far-reaching changes in a time when we should take stock of what has been accomplished and forecast carefully the directions for further development and change. Our three *Journals* form, undoubtedly, the most important activity of our Society and through these journals we contribute more to the advance of our science in America and, each year,

in a very rapidly increasing degree, throughout the world, than by means of all our other activities combined.

The *Journal of the American Chemical Society* contributes chiefly to the development of a better theoretical foundation for our knowledge and to the accumulation of an accurate knowledge of facts upon which the chemists of the future must build. An author who publishes an account of his researches in this *Journal* or in our *Industrial Journal* reaches a larger circle of readers than it is possible to reach by means of any other journal of the same type published in the world. Motives of economy have led the Editors of both of our *Journals* to insist on careful restrictions in the methods of presentation. As Professor Lamb has put the matter, "Authors should write their papers for an audience of experts familiar with the particular field under discussion, and should not attempt to prepare essays or monographs addressed to the general chemical public." There should be a clear, brief statement at the beginning of the paper giving the purpose for which the investigation was undertaken. References to previous work should be confined, as closely as possible to a *critically selected* set of references to the literature. Experimental results should be given in as concise a form as is compatible with a clear presentation and *only those results which are of permanent value* should be included. When one has worked for many months, or sometimes for years over a topic there is often a great temptation to present the results in a chronological order and to include material which may have been very useful in exploring the field and in finding the way toward the final conclusion, but which, nevertheless, is of no real value to others. Many chemists find the writing of papers irksome and many others fail to understand the amount of time and the painstaking care required before matters which seem clear to themselves can be made clear and useful to others.

While our Editors must insist on brief papers, where brevity is consistent with adequate presentation of valuable material, Professor Lamb writes, very justly, "I do not think we should insist invariably on brief papers, at least not in the absolute sense. If a man really has done a lot of work of permanent value, it should be published and rendered accessible."

Professor Lamb also writes, "The *Journal* should safeguard zealously the freedom of its pages; that is, nonconformity with current opinions should in no sense hinder the publication of a paper. On the other hand, this nonconformity should not relieve the author at all from compliance with the regular standards of the *Journal*, both as to form and as to matter." Articles should almost always close with a clear, concise summary of the results obtained in the investigation.

It is the aim of *Chemical Abstracts* to give an abstract of every chemical article published in the world, if the article contains *new* results. It

reaches this aim more nearly than any other abstract journal now published. With our present financial resources the length of the abstracts is necessarily restricted and the abstracts frequently contain less information than our Editor would be glad to include. Dr. Crane writes, "For example, if funds were available, we could rather frequently publish tables of new data which would be very useful, rather than merely refer to the tables as existing in the original papers. The indexes of *Chemical Abstracts* ought to be, along with the abstracts, complete records of new information of chemical interest published in the periods covered. Our present policy of indexing subjects from the body of abstracts thoroughly has taught us some things regarding the preparation of abstracts. If we felt free to do so, we could expand many abstracts in such a way as to improve their value from the indexing standpoint, and therefore, from the standpoint of their use as a record.

"*Indexes.*—The indexes to chemical publications destined to be used for reference work are very important parts of these publications. This is particularly true of an abstract journal. A great deal of our study and special effort here has been in connection with indexing, and in attempting to improve abstracts the subject index is kept prominently in mind. I believe that the indexes to many chemical publications are weak and that the fundamental faults have been the failure on the part of the one in authority to realize that a trained indexer only should undertake to prepare an important index and the failure on the part of the compiler to bear in mind that a so-called subject index should be an index of *subjects* and not one of *words*. There are many word indexes. Indexing is a science and profession. While I do not want to make any claim that perfection has been approached in our recent indexes to *C. A.* (they can be improved I am sure), I might point out that the weakest points with reference to the early volumes of *C. A.* were the tendency to word-index and the lack of uniformity in nature and quality of the indexes from year to year. The *Decennial Index* has perhaps served to remedy this fault somewhat. The formula indexes to be published annually and perhaps later in collective form will round out our indexes and strengthen them more than any other additional effort could. For the future it will be a wise policy for the indexes of *C. A.* to continue to receive special attention and in the interest of quality and uniformity in them the Society would, I believe, do well to recognize that, to use the words of Dr. J. C. Cain, Editor of the *Journal of the Chemical Society*, indexing is 'a very specialized and difficult job,' one requiring special training and experience to accomplish well, and help me to hold in this rather exacting work the experienced helpers who have been through the *Decennial Index* mill with me and who are dropping away into things which pay better. Better financial recognition of the professional chemical indexer, who must be chemist and indexer

both and who is in somewhat the position of the teacher nowadays, is the burden of my thought; the field is a narrow but a very important one."

"*Titles.*—I believe that it would be an improvement in our chemical literature if greater care were to be used by authors of papers in selecting their titles. Too often titles do not adequately tell what the papers are about. Occasionally titles are too long. A good index does not depend on titles for its subjects but good titles will usually suggest the main subjects of the work being described. In recent years there has been an unfortunate tendency in engineering and trade journals to use titles which resemble newspaper headlines. I can perhaps illustrate the form, at least, by quoting a recent headline in one of our local newspapers: 'Combustion Causes Costly Conflagration.' Conservative titles, which are not too long nor detailed, but which avoid leaving the reader with a vague notion only as to the contents of the paper are needed in some cases to replace unsatisfactory ones."

What has been said with regard to articles to be published in the *Journal of the American Chemical Society* applies equally to the original articles which are to appear in our *Journal of Industrial and Engineering Chemistry*. Professor Herty has asked me to emphasize, especially, what has been said with regard to the concise presentation of the results of an investigation. Both of our Editors frequently find it necessary to return papers to authors for abbreviation. In almost all cases such shortening of papers is an advantage both to the author and to readers of our *Journals* as well as a saving in expense to the Society.

About one-third of the pages of our *Industrial Journal* is used for other purposes than the publication of research. Of these other features Professor Herty writes:

"The Society should have one journal which can be a news publication. In adopting Dr. Whitaker's plan and principle it was decided that there should be a definite editorial policy. There should be personals, industrial notes, space for correspondence, such letters as we are now printing from Washington, London, and Paris, accounts of various scientific societies, book reviews, market reports (why not in a journal of this character?), and such addresses as it is believed will be of help to the average member of the Society.

"For instance, we printed Dr. Whitney's Chandler Memorial lecture. Dr. Whitney is an authority in this field. He spent a great deal of his valuable time and intelligent effort on the preparation of this survey of the field which he discussed. It was a splendid piece of work and one which the great majority of the members of the Society could read and be largely benefited thereby. It is true that the authorities of Columbia University could have published that lecture, but not one member in a

hundred of the A. C. S. would have seen it. By printing it we put it in the hands of every member.

"In other words, *This Journal* must be made attractive and readable by inclusion of various types of matter which will keep the average member of the Society in close touch with developments of all kinds. My position in this matter is that rather than curtail this many-sidedness of the *Journal*, we should further extend it, as for instance by the inclusion of important articles on chemical engineering by high authorities in that field. An especial appropriation was made for this purpose by the Directors when I first became Editor, but the tax of war service on the men best qualified to write such articles was so great that it was impossible to carry out the plan. Consequently I did not ask for a renewal of the appropriation on the scale on which it has been originally given. But it is my intention to urge the Directors, now that I think such articles can be secured, to renew that policy.

"But apart from all these considerations, it must be remembered that the Society looks upon *This Journal* as the agency to secure additional income through advertising. You may rest assured that if through a policy of retrenchment we restrict the *Journal* chiefly to publication of research in the industrial field, the goose that lays the golden eggs will surely be killed, and advertising will drop at a rate which will amaze you. The hard part of the work for me is to resist the constant pressure to modify the *Journal* from its present standard of being a scientific publication by adopting some of the practices of trade journals. This I will not agree to so long as I am Editor. I do not think it necessary to adopt such practices in order to get advertising business, but in order to do so and at the same time to maintain that standard, the *Journal* must certainly be made attractive and readable not only to scientific men but to men in the plants, business offices, etc., by the inclusion of a wide variety of matter."

During the present year we have greatly enlarged our News Service. Of this, Mr. John W. Harrington, its technical manager, writes:

"The purpose of the A. C. S. News Service is to give to the newspaper and magazine press accurate reports concerning chemical developments in the United States. The Service was founded in 1916, when it was noted that the press of the country was flooded with inaccurate and often exaggerated statements concerning chemistry. At the suggestion of a group of New York newspaper men, a publicity committee was established and bulletins were issued from time to time to a limited number of newspapers.

"It was found, however, that there were many technical reasons, such as the gauging of news values, which made it more practical to have this

work in charge of a man of newspaper training. The misunderstanding between science and the newspapers has been due largely to differences of nomenclature. The public and the scientist often speak different languages. The gulf has been bridged by the A. C. S. News Service, providing statements and bulletins concerning discoveries in chemistry, which are expressed in as nontechnical diction as is consistent with precision.

"The News Service seeks to interpret chemical activities in relation to the news of the hour and the thought of the day. It takes nothing for granted and endeavors to reach what the newspaper and magazine editors call 'the standard average reader,' the intelligent laymen. Its function is to translate chemistry into terms of everyday life.

"The News Service performs for chemistry what every other interest and industry in the United States has found it necessary to do, in order that its work and its motive should not only be understood—but not misunderstood. Undoubtedly, the remarkable services which chemistry performed in the war, would have been ignored or submerged had not the American Chemical Society seen to it through this channel that due credit was given to the Chemical Warfare Service, of which it was the sponsor before the nation. The attempt to destroy the identity of the Chemical Warfare Service, in fact, was frustrated largely because the Society was able to explain to the public through the newspapers what the result of such an action would have been.

"It is partly because the bulletins of the A. C. S. News Service are prepared in accordance with the usage of the 'newspaper shop' and partly because they contain nothing commercial and make no attempt to gain any notice for statements which are properly matter for the advertising columns, that the A. C. S. News Service is appreciated and recognized by newspaper editors. They have confidence in it because they know that it exploits the wares of no man and that it is guided by a desire to truthfully and accurately express the ideals and aims of the American chemist. Were this Service conducted with any commercial intent, which, of course, is foreign to the purposes of the American Chemical Society, it would cost far more than the modest and inadequate appropriation which at present is assigned to it.

"An association of industrial companies had, until recently, a budget of $125,000 a year, and still maintains a staff of experts and an extensive publicity service, in addition to what expenditures are made in this direction by individual companies. The A. C. S. News Service, far-reaching as are its results, has given little or no individual attention to newspapers and magazines and has, in fact, only been able to scratch the surface. Its technical manager is retained on a part time basis only and the bulk

of the appropriation is spent for secretarial and office expenses and for postage and supplies.

"As far as its relations with the American press are concerned, the A. C. S. News Service is conducted on a policy of give and take. It endeavors, with its limited facilities, to provide material, free of charge, as acceptable as paid contributions would be and devoid of propaganda. It therefore, has the good-will of the American press to such an extent that when crises have arisen in which the interests of the chemical profession were affected, it has, as the editorial and news columns of every leading American newspaper testify, a friend at court in the Fourth Estate."

Members often ask the question whether it might not be possible to furnish our members a choice among our Journals at a reduced rate for dues. As our Council has decided that it is necessary to increase our dues, this question is likely to be raised again. The question has been partially answered in the reference to the experience of the German Chemical Society in connection with the *Chemisches Centralblatt*. The fact that we have furnished our members with an abstract journal larger than the *Centralblatt* and also with the *Journal of the American Chemical Society* and *Journal of Industrial and Engineering Chemistry* for $10 dues to American members and $12.50, including postage, to foreign members, while the *Berichte* and *Centralblatt* cost foreign members about $19.00 before the war, and the *Journal of the Chemical Society* (London) and the *Journal of the Society of Chemical Industry* cost, together, $16.25, is a further demonstration of the economy to our members of the policy which we have followed. Those who wish to receive and pay for only one or two of our three journals forget that the cost of collecting the material for the *Journals*, editing and type-setting is the same whether a small or large number of copies are printed. After this initial work is done it costs only about $2.00 a year to print and send an additional copy of the *Journal of the American Chemical Society* to a member or subscriber and about $3.50 each to send copies of *Chemical Abstracts* or of our *Industrial Journal*. It is evident that these are the maximum rebates which we could possibly offer to members who do not care for one of the journals we publish. And the question is not as simple as even these statements of cost would indicate. Any decrease in the circulation of our *Industrial Journal* would be immediately reflected in our income from advertising. We must certainly continue that splendid spirit of coöperation in supporting all of the varied interests of our Society and our profession which has made our present commanding position possible. The following table shows clearly the phenomenal success of the policies adopted by the Society. At a time when all other costs have increased so much we feel sure that the chemists of the country will stand united behind the Society in the work it is doing.

Year.	Income.	Expense.	Surplus.	Deficit.	Excess of assets aver. liabilities.	Members.
1880.....	.....	.....	.....	.....	.....	288
1890.....	1,915.21	1,915.21	.....	.....	.....	256
1900.....	10,190.87	9,943.95	246.92	None	5,155.81	1715
1905.....	16,532.37	15,353.76	1,178.61	None	7,027.51	2888
1906.....	23,106.67	20,494.44	2,612.23	None	13,875.74	3047
1907.....	33,275.25	27,248.89	6,026.36	None	17,490.06	3361
1908[a].....	29,785.94	41,302.86	.....	11,516.92	5,171.53	3978
1909.....	55.985.65	51,175.20	4,810.45	None	14,316.09	4460
1910.....	61,760.91	52,483.64	9,277.27	None	19,659.17	5011
1915.....	109,377.71	101,286.41	8,091.30	None	34,820.06	7332
1916.....	136,557.65	123,375.77	13,181.88	None	51,038.25	8265
1917.....	196,210.57	173,195.10	23,015.47	None	87,407.37	10504
1918.....	203,483.32	165,158.92	38,324.40	None	126,601.27	12099
1919.....	232,935.53	227,731.94	5,203.59	None	150,068.24	13568
1920[b].....	272,160.66	290,498.96	.....	18,338.30	131,729.94	15577

[a] Part of 1906 dues were credited to 1907 and there was no decrease in receipts in 1908.

[b] Estimate September 1, 1920.

[CONTRIBUTION FROM THE CHEMICAL LABORATORIES OF COLUMBIA UNIVERSITY, No. 343.]

THE DETERMINATION OF THE HYDROGEN-ION CONCENTRATION IN PURE WATER BY A METHOD FOR MEASURING THE ELECTROMOTIVE FORCE OF CONCENTRATION CELLS OF HIGH INTERNAL RESISTANCE.

BY H. T. BEANS AND E. T. OAKES.

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The present investigation was undertaken for the purpose of developing a method of measuring the hydrogen-ion concentration of pure water as directly as possible. It was desired to carry out this work in such manner as to avoid, as much as possible, the use of data obtained from the investigation of various solutions of salts, acids or bases. The object was to make the primary measurements on pure water in such a way as to be translated into hydrogen-ion concentration through the use of only such data as are substantiated by such proof, both experimental and theoretical, as to make it readily acceptable to everyone.

The only investigation of this question so far carried out in which measurements were made on pure water was that of Kohlrausch and Heydweiller who measured the conductivity of pure water, but in order to calculate hydrogen-ion concentration use was made of the ionic mobilities as determined in solutions of acids, bases and salts. These mobilities may or may not hold true for pure water. A more complete discussion of the possible objections to be raised against this method as well as the additional objections to the various other methods will be given later.