

An Analysis of the Present State of Chemical Literature and the Need for the Establishment of an International Chemical Periodical*

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The production, dissemination and assimilation of new knowledge are the *conditiones sine qua non* for the existence of science. The fact, that modern science was born almost simultaneously with the invention of printing emphasizes the above statement. Thus the first great success of the union of craft and theoretical knowledge removed the old drawbacks of isolationism. That was the origin of all other similar fruitful unions.

In general, the chemical literature followed the same pattern as that of the other branches of modern science. Although its foundation lay in the wealthy and strong corporate trades and the highly individual black art of alchemy, chemistry as a science developed in close contact with philosophy, astronomy, physics and physiology.

SHORT REVIEW OF THE PERIODICAL CHEMICAL LITERATURE

In conformity with the time, the early chemical publications of Agricola (1530), Biringuccio (1540), Libavius (1597), and Boyle (1661) are individual works, principally in Latin, while the short notices in the general journals giving account of the »labours of the ingenios in many considerable parts of the world« may be taken as forerunners of the original short communications. It is a long way from the French *Journal des Scavans*, Britain's *Philosophical Transactions*, Italian *Saggi di Naturali Esperienze*, and German *Acta Eruditorum*, all from the second half of the 17th century, to the current journals *Annales de Chimie* (1789), *Journal der Physik* (1790), *Philosophical Magazine* (1798), and *American Journal of Science* (1818), which are the natural link between the older journals of general, philosophical, scientific and technical content and our present-day chemical periodicals. The national languages, the originality of communicated investigations, and the responsibility of the editing bodies, were characteristic of this most powerful agency of science. The printer's learned companion of the earlier period was succeeded by the regular editor and the publisher (an individual, an institution, or a society).

Nowadays there is an output of more than 16,000 periodicals with scientific contents. From this number about 4,000 are more or less of chemical interest, while about 400 may be taken as periodicals frequently used by chemists. The number of important journals, pure chemical and most closely related to chemistry, amounts to about 100. The distribution of the last group with regard to its contents is approximately as follows:

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50% special fields of chemistry, 35% all fields of chemistry, 10% all fields of science, and 5% various; with respect to the ownership: 50% national societies, 25% publishing companies, 20% national institutions, and 5% various; concerning the language: 30% English, 25% German, 10% French, 8% Russian, 7% Spanish and Portuguese, 4% Italian, 5% English-French-German, and 11% other languages. The number of copies, printed pages and words of publications in English well outweigh the total number of all the others. The possibility for direct exchange is approximately 50%. It is superfluous to add that these figures were given *cum grano salis*; an exact analysis is expected from a competent expert. The editorial methods of all these journals vary considerably from the type of an individual editor in close connection with a publishing house to the great editorial boards of open societies; similarly, the practice of accepting the material may depend on the direct discretion of the editor or on the selecting mechanism of the known or anonymous referees. Each of the mentioned practices shows several advantages and disadvantages; the clue to the question lies in the editor's hands depending thoroughly on his human qualities as well as on the intellectual and scientific interests of the governing bodies.

THE INTERNAL AND EXTERNAL DIFFICULTIES

It seems that this variety of forms, developed historically, was necessary in order to satisfy the specific needs up to now. But the simultaneous tendency towards the evergrowing specialization on one side, and the necessity to remove the boundary lines between the different departments of knowledge, on the other, have now reached the point where new solutions ought to be tried. We are confronted with a new and significant situation in the history of science. Chemistry, having started in a close companionship with alchemy and astrology is more or less automatically progressing through ultrachemistry towards cosmology. In chemistry as in other scientific fields the stage has been reached in which the most specialized investigations coalesce with the subject matter of all other branches of science. This situation imposes a lot of new, especially organizational problems; there is not only the question of team work in one laboratory, but also a number of questions concerning the global organizations for the collaboration of highly differentiated specialists in the whole realm of human knowledge to be answered. However, as these governing causes of the science are internal all the difficulties could be solved if left to the scientists themselves. The trouble is that in addition to these great internal difficulties there are many external ones outside the science itself. One of them, probably the greatest, we will discuss first.

In the past, there was a spontaneous, natural growth of learning by the collective effort of individual workers belonging to visible or invisible colleges of science all over the world. The interference of the state and of the commercial companies, as well as the material and organizational difficulties in accomplishing the scientific tasks and undertakings, were not beyond the strength of the scientific community. In this respect the contemporary scene is rapidly changing. It cannot be denied that utmost

efforts must be made for preservation of that very spirit of science to which our civilization is vitally bound. We are on a cross road and we have to follow up the ways of the best scientific endeavors and achievements of the past, or enter the frame of the official channels of the modern states. It must be pointed out, that our civilization is of a polyvalent type, and that the primary conditions of the exceptional material development of modern society originate in the continuity of faiths, thoughts and experiences, with no respect to time and space, of all the great religions, oriental and occidental, as well as of all great cultures: Greek, Roman, Arabic and Barbaric, which gave the great synthesis of the mediaeval ideas in the conceptions of universality and international community. Therefore, the imperative, that there ought to be one sphere of life free from the interference of the state where limitations set on behalf of the profane government do not exist, was certainly and necessarily a condition for the growth of science and the whole of our culture. If our desire is to avoid the dangers of the monovalent, isolated cultures, the rapid decay of which is incorporated in their character, the urgent need would be to take the bold course against the tendencies that science should be ruled by the laws which are not universal and generally human.

One of the greatest problems are the spreading of secrecy, and thus spreading of voluntary or involuntary censorship to scientific communications. The decline of science cannot be avoided if the reasons for publication of an investigation are governed by merits outside the scientific criteria. However, we must concede that there are reasons for censorship; the potentialities of science for direct use in war have grown to such an extent that it is difficult to draw the boundaries between pure science and its applications for good or bad. The phrase: »Science is power«, has a full and significant meaning. But one of the fundamental characteristics of science is progress, and while the progress of science presupposes an unrestricted communication of all results and their interpretation, the omnipotent state has also the need to secure, for the sake of its own strength, the greater or smaller spheres of activity where the freedom of science has to be fully preserved. Hence the possibility to find the way out of all individual, national and international troubles.

THE FREE AND RESTRICTED INFORMATIONS

The objective of all those concerned with scientific matter should be the proper balance between the free and the restricted elements in our individual, national, and international spheres of activity.

There are probably several solutions to this great problem, but Chart A attempts to show one satisfactory relationship between the principal elements.

Chart A may be taken as an attempt to present the standpoint expressed by many scientific organizers and administrators. In my opinion a similar scheme is worth while adopting as a realizable policy for the national and international scientific bodies.

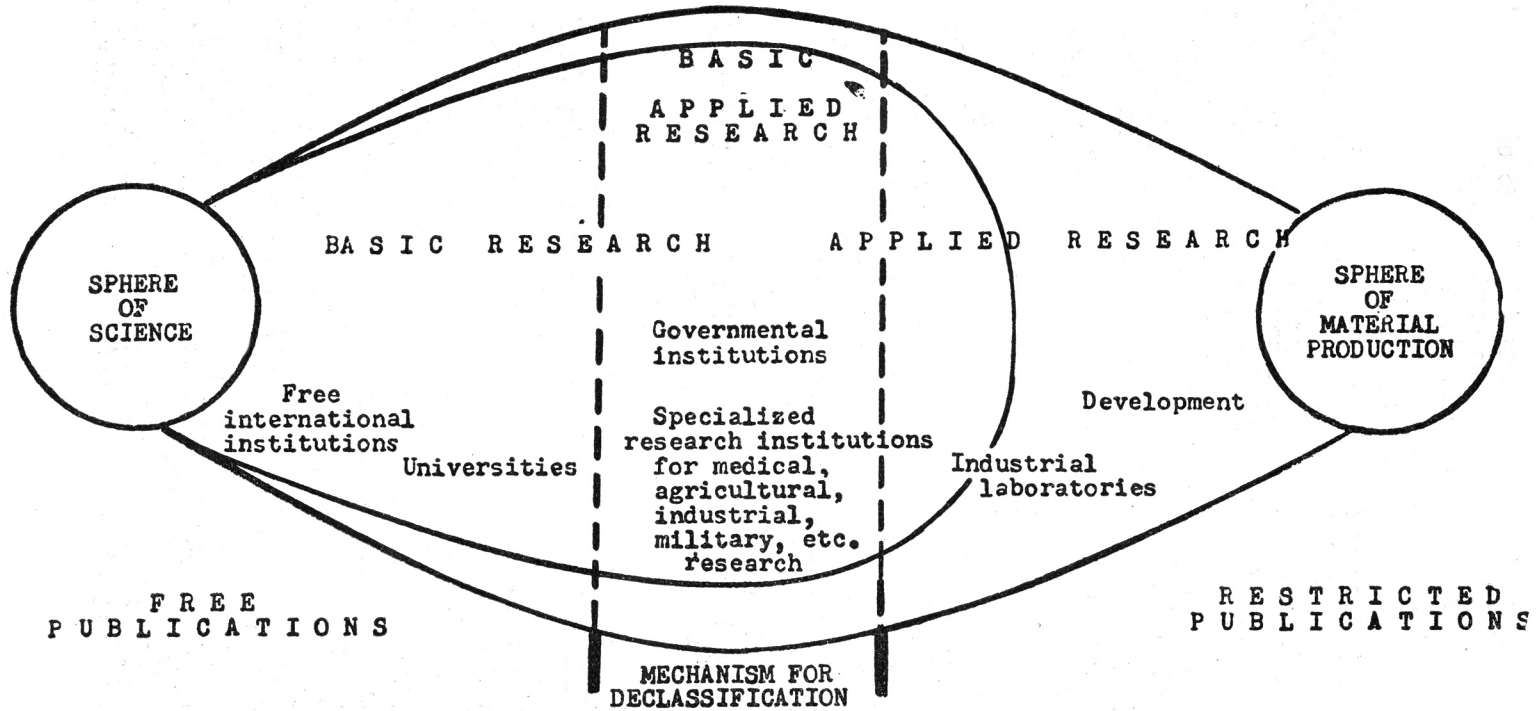
The starting point for the scheme is a clear differentiation between the areas of free and restricted activities. For basic research in the realm

CHART A.

FUNDAMENTAL

APPLIED
SCIENCE

BASIC
SCIENCE



THE PRESENT STATE OF CHEMICAL LITERATURE

Scheme representing the relationships between various activities concerning the publications

of fundamental science the free interchange of information through personal contact and publications must be secured unconditionally. This is the primary condition for regular functioning of the university, where academic freedom and the tendency for integration of knowledge with the faith in human values must provide the right atmosphere for the development of the most valuable type of the national and world citizen.

If and when a university scientist is engaged in restricted projects it seems logical that he take the responsibility connected with such a task individually; at the same time he must make sure that the scientific community is not unfavorably influenced by such circumstances. On the other hand, the walls of confidential laboratories, experimental stations or production units operate as semipermeable membrane and this function should be left to the wisdom of the security agency of the state or the company. The common aim ought to be that outside such walls freedom of inquiry with all its consequences shall not be violated.

For my further analysis of the present state of the chemical literature as well as for the discussion which follows concerning the internal organizational problems of the science of chemistry, let us suppose that a great deal of publication activities is in accordance with our schematic presentation on chart A. On ground of such a supposition we shall investigate the possibilities for improvement in the character and mutual relationship of various types of journals in the system of the chemical periodical literature.

Our division according to chart A enables us to proceed further with the construction of an international structure of science, what might otherwise be most seriously hampered. In conformity with our standpoint that the scientific journals are the strongest vehicle for international collaboration in the sphere of science arises the need of a clear policy in order to realize those tasks the fulfilment of which belongs to the internal requirements of the science.

THE SCHEME FOR THE RELATIONSHIP BETWEEN CHEMICAL PERIODICALS

Within the scope of the science as a whole, chemistry is the most influential coordinator. The philosophical aspects and mathematical expressions of physics are on the ground of chemistry linked with the multitude and specificity of the biological and psychological world. Chemistry is the primary modulator of all the potentialities of the material culture ranging from the nuclear energy to the most powerful physiological agencies. Therefore, it is the duty of chemists, who outnumber nearly all the other scientists, to try to find new solutions which are adequate to the time in which we live.

The tendency that national societies become owners of an increasing number of chemical periodicals may be considered as a sound development. The scientists and professional men with common devotion to science, who are organized in societies and associations of open membership, certainly provide the best guaranty for the steady progress on the broad front of scientific achievements. Every national society can find its proper place in the sympathetic international community of similar members. In the past the bearers of international organizations were the promi-

CHART B.

INTERNATIONAL
CHEMICAL
JOURNAL

International Abstracting
Journal

INTERNATIONAL SECTIONAL JOURNALS

Inorganic	Organic	Physical	Biochemical	Analytical	Applied
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Chemical
journals
of the
publishing
companies

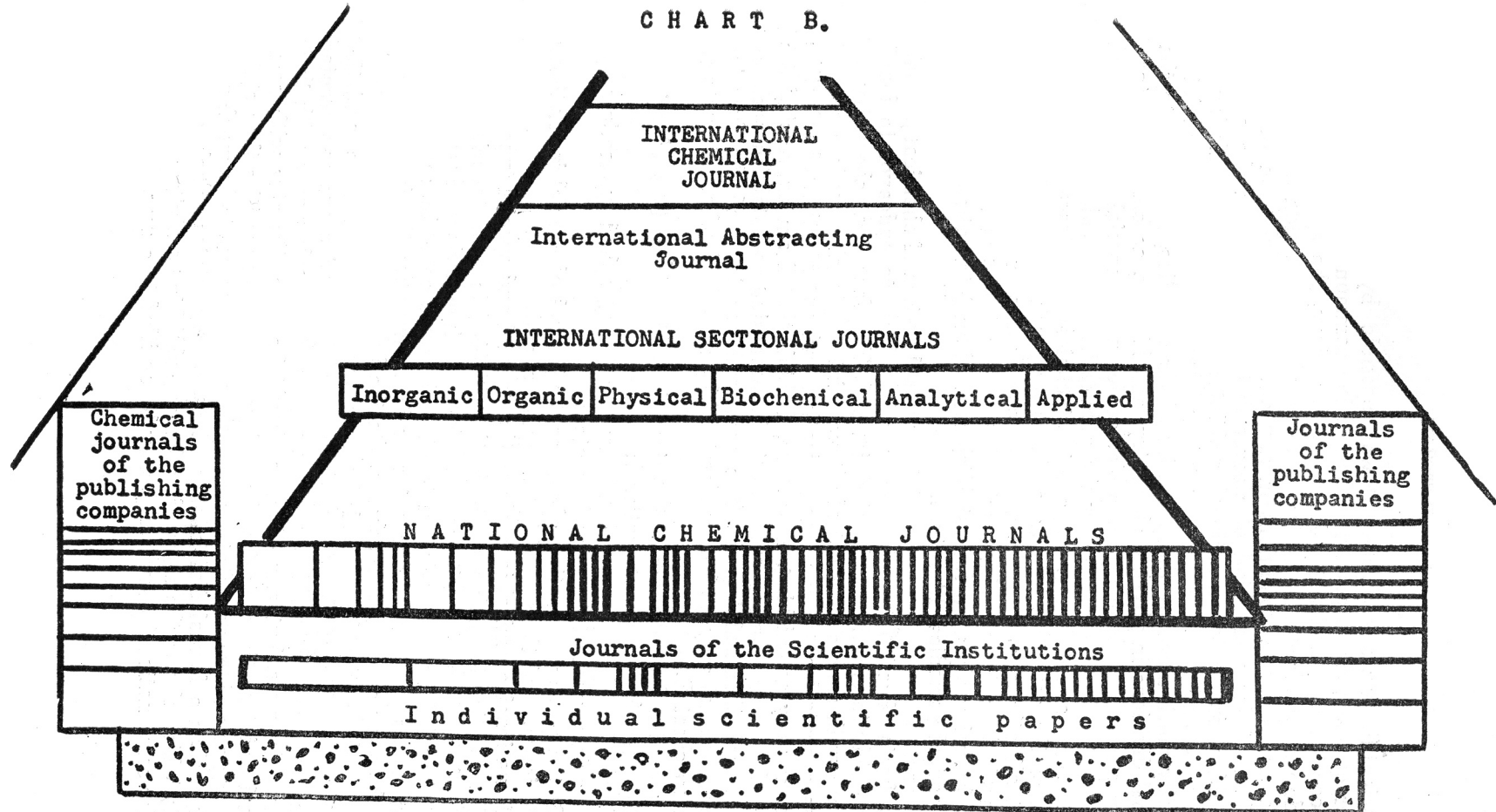
NATIONAL CHEMICAL JOURNALS

Journals
of the
publishing
companies

Journals of the Scientific Institutions

Individual scientific papers

Scheme representing the relationship
between various publications



ment scientific workers. Earlier, it was possible by a relatively small number of scientists to perform much of the common work through personal contact and exchange of letters. Nowadays, the specialization, on one side, and the large number of members of the profession who live and work under different conditions in any part of the globe, on the other side, demand for some kind of clearer distinction between the spheres of individual, institutional, national, and international activities. Today the congenial scientific climate is conditioned locally, nationally and internationally much more by the activities of the societies, according to the principal divisions in physics, chemistry, and biology, as chief mediators. The discussions, colloquia, symposia, conferences, special and general meetings, libraries, and especially the publications give evidence of such a situation. The scientific essence, and the technical steps towards the realizations of the scientific jobs as such, favor such organizational forms against all others, where the volume, complexity or officiality prevail. This mechanism for searching, selecting, accumulating and amalgamating should be primarily used for establishment of an international system of the chemical periodical literature.

In order to create the proper international system of chemical journals on the basis of existing periodicals, we first have to endeavor to found a thoroughly international chemical journal. The fact, that chemistry, as a science with such a long list of ultimate international records, does not possess a central organ for communication and organization of scientific matter, is very astonishing. Therefore, I think that I am expressing the desire of a great number of chemists in proposing to establish such an international chemical journal. The proposed position and the function of such a journal may be best understood by means of schematic presentation on chart B.

There are four distinct categories of usual publications of original investigations (primary publications):

- (1) the individual papers (ordinary or mimeographed typescripts, reprints, photostats, microfilm etc.);
- (2) the papers, collection of papers, or journal of special institutions;
- (3) journals of the publishing companies, and
- (4) national chemical journals of the general and special type.

The existing journals may be further divided in subcategories according to their connection with some national or international function. The place of each journal in relation to other journals could be marked with respect to its position in our outer or inner triangle; the inner triangle gives the very core for our scheme. On the bottom of this inner triangle we place the national chemical journals owned by scientific societies covering all fields of chemistry; the powerful societies are represented with a greater number of known journals, and the weaker ones with their unknown journals, but any of them should be in conformity with some national or international duties. As nations are greater realities than states (in some parts of the world at least), national basis seems to be much more suitable, than a formal division according to the states. Each national society which shows the signs of enduring publishing activity representative for some national community, may be entitled to a row. Above these

national journals we find the first international level of a series of specialized journals covering all field according to the sections of International Union of Pure and Applied Chemistry: inorganic, organic, physical, biochemical, analytical, and applied. The appropriate periodicals for this function may be chosen from the long list of existing journals provided that they conform with the requirements generally accepted by the International Union for such kind of publications. The International Chemical Journal is placed on the top.

OTHER ACTIVITIES

In our national-international triangle there is ample space also for an international abstracting journal, as well as for special bibliographical and general information services; the use of UNESCO coupons, and other various possibilities for international collaboration could be incorporated into this scheme. As to reprints, it must be pointed out that they should remain means for direct contact among individual workers or research groups. Within the editing offices of these periodicals, it would not present a difficulty to establish most rational connections with special institutions, such as depositories for manuscripts, Gmelin Institute, Beilstein's editing body, various commissions, and all other working groups of the international structure of chemistry. The crystallization nuclei should in all the above cases be periodicals though not in an amorphous mass of concurring accidental efforts, but according to their typical functions, as it is required in science. The existing and new journals published by commercial companies of our outer triangle may serve as a corrective for the sound development of such a system.

THE INTERNATIONAL CHEMICAL JOURNAL

We cannot imagine such a process to start without the proposed international journal, and an adequate organization. Such a journal should primarily enable the publication of papers which represent a synthesis of current researches the records of which are distributed among a large number of communications already published in other journals. The stress should be laid on the synthetic, interpretative and correlative papers »placing the work in the background of existing knowledge and theory,« (J. A. C. S.) rather than on a mass of entirely new data.

As to the redaction, special care should be taken that the journal be an organ of free inquiries preserving the best mode of approach between the referees and the authors. On this line the journal should publish a list of the titles of all those papers which were received but not accepted for publications, and which are by author's request kept in a manuscript depository from which the photostats or microfilm copies could be obtained.

With respect to the language, full effort should be made for the use of one world language only. The progress of science has started with one language, Latin; for the early development the mass of researchers and the differentiation of various streams of investigations shaded nationally, as well as the use of national languages, may be found convenient for

various though sometimes very doubtful reasons. Nowadays the interests of specialists as well as synthetic scientists may be best satisfied by the preferential use of one language. If we examine the pros and cons for such use of various languages, I think that most arguments are for Basic English (with deliberate use of full English). Therefore, one of the English speaking countries should take the responsibility for finding publishing possibilities in close collaboration with the respective national chemical society, International Union of Pure and Applied Chemistry, and all other interested circles.

Beside publishing scientific matter such journal should — in form of supplements — publish all the matter relating to chemistry on an international scale, the works of International Chemical Congresses, and the commissions of the international Union of Chemistry, in case that the

Chart C

THE CHARACTERISTICS OF PROPOSED INTERNATIONAL CHEMICAL JOURNAL

GENERAL

- (1) *Ownership*: International Union of Pure and Applied Chemistry (acting through its special commission);
- (2) *Redaction*: Editor-in-chief, Assistant editor, and 6 to 12 sectional editors according to the sections of I. U. P. A. C.;
- (3) *Publications*: Monthly, with general and special, regular and irregular supplements;
- (4) *Language*: Full and Basic English;
- (5) *Finance*: Initial fund should be secured as a grant or a loan from some international or national foundation; for the future it is supposed that such a journal may be self-supporting to a greater extent.

SPECIAL

The contents of the International Chemical Journal should comprise:

- (a) Authoritative reviews of the most important recent results bearing the character of original communications;
- (b) List of titles of papers which are not accepted, but are on author's request kept in a manuscript depository;
- (c) Official short communications of the I. U. P. A. C. and its commissions;
- (d) Comments;
- (e) Review of books;
- (f) News and Notes; specially in connection with important events from the life of the international scientific organizations, and national chemical societies.

Supplements may be:

- (A) General, in connection with the conferences of I. U. P. A. C. and its working parties, and
- (B) Special reports.

The supplements may be regular in yearly, two-yearly, and four-yearly intervals (e. g. special review, sets of papers or abstracts of papers presented to International Chemical Congresses, etc.), and irregular according to the special needs (e. g. tables, monographs, etc.); subscription covering the supplements within one year.

REALIZATION

The creation of special commission of I. U. P. A. C. for international chemical journal with a power to act as an agency for all necessary arrangements.

Of course, all other improvements in the scientific and organizational respect could be channeled through the proposed system of periodicals. The periodicals are the great collective letters for the regular and simultaneous correspondence among the members of the international scientific community. In this respect, the nonpolitical and geographically boundless nature of science helps the progress of mankind towards the one world. The time has come in which the chemists, as scientists and as citizens, should send their letter of introduction to this new world.

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